Appendix A

Site Plans

For Appendix A Site Plans, please see the separately bound volume entitled *Drawing Package for Clear River Energy Center and Burrillville Interconnection Project* included with the filing of this application.

Appendix B

ROW Vegetation Management Plan

Five Year Vegetation Management Plan 2014-2018

nationalgrid

10/18/2013

National Grid and the environment

We, at National Grid, will be the foremost international electricity and gas company, delivering unparalleled safety, reliability and efficiency, vital to the wellbeing of our customers and communities.

We are committed to being an innovative leader in energy management and to safeguarding our global environment for future generations.

Investing in, and operating a safe, and reliable gas and electricity supply network uses energy and raw materials, and produces waste. Our effect on the environment and the communities we serve depends on how we and our supply chain work.

We will face these challenges by deploying best practice throughout our operations, by engaging on national and international energy issues and by supporting renewable energy targets. We will show leadership by working with others to deliver a more sustainable future.

We are committed to:

- reducing the effect our activities have on the environment by considering whole life environmental costs and benefits in our business decisions
- using resources efficiently through good design, using sustainable materials, responsibly refurbishing existing assets, and reducing and recycling waste
- reducing the effect our business has on climate change by decreasing our emissions of greenhouse gases by 45% by 2020 and by 80% by 2050
- respecting the environmental status and biodiversity of the places we work, aiming to enhance areas for the benefit of local communities or the natural environment
- managing the risks associated with sites where we have responsibility for dealing with contamination associated with past operations
- helping consumers reduce their dependency on fossil fuels by giving them access to more sustainable energy and through innovative energy efficiency programmes
- working with governments and regulators to help them develop and deliver more effective environmental polices and targets
- continually improving our management systems to prevent pollution, reduce the risk of environmental incidents, and comply with environmental laws, policies, charters and other commitments to which we subscribe
- making sure that our employees have the training, skills, knowledge and resources they need to meet our environmental commitments
- openly sharing our performance with employees, members of the public and others, and giving them the opportunity to comment on our performance
- requiring those working on our behalf to demonstrate at least the same level of commitment to the environment and creating a culture where best practice can be shared.

Steve Holliday
Chief Executive

nationalgrid
The power of action.

April 2009

TABLE OF CONTENTS

LIST OF TABLES

APPENDICES

1. INTRODUCTION

The purpose of this Vegetation Management Plan (VMP) is to outline the National Grid USA Electric Companies (hereafter referred to as National Grid)[1] five year plan for managing vegetation in compliance with 333 CMR 11.00 (Appendix 1).[2] Removing incompatible vegetation is necessary on transmission and distribution rights-of-way, and around associated structures and facilities to ensure safe, reliable delivery of electric service. Tall growing tree species must be prevented from growing into or falling onto the lines. Dense woody vegetation, vines, noxious[3] (invasive plant species, nuisance and poisonous vegetation), and all vegetation that interferes with access must be removed from around structures, access roads and anywhere in which they prevent access to the rights-of-way for inspections, maintenance, repairs and in emergencies.

National Grid manages approximately 20,000 acres and 1,500 miles of rights-of-way within the Commonwealth of Massachusetts through the municipalities listed in Appendix 2. These rights-of-way extend from the western border of the Commonwealth through Worcester County, the Merrimack Valley, the North Shore, and the Southeast down through to the Attleboro area and Somerset. They traverse all types of terrain from steep mountainous topography to rolling hills and level lowlands, and from remote, relatively inaccessible locations right through high density population centers.

Taking this variety of landscape conditions into consideration, National Grid applies an Integrated Vegetation Management (IVM) approach to controlling vegetation on its rights-of-way. IVM is the utility variation of Integrated Pest Management (IPM) in which the pest is incompatible vegetation. IPM/IVM is the conscientious use of

[1]National Grid companies with rights-of-way in Massachusetts include Massachusetts Electric Company, New England Power Company and New England Hydro Transmission Electric Company.

[2]National Grid's VMP takes into account not only 333 CMR 11.00 and Chapter 132B, but all applicable state and federal regulations that mandate the management of utility rights-of-way including but not limited to: all pertinent clauses in Chapter 85 of the Acts of 2000; MESA; MGL c. 131 A and 321 CMR 10.00; 310 CMR 10.00 and 310 CMR 22.00; 310 CMR 40.0000; applicable Federal Energy Regulatory Commission standards including NERC Standard FAC-003-1, Commissioner Order 693, FAC-003-2 (effective July 1, 2014), and all applicable Federal Occupational Safety and Health Act, Department of Transportation and Department of Environmental Protection regulations.

[3]"NOXIOUS WEED.—The term ''noxious weed'' means any plant or plant product that can directly or indirectly injure or cause damage to crops (including nursery stock or plant products), livestock, poultry, or other interests of agriculture, irrigation, navigation, the natural resources of the United States, the public health, or the environment." (PUBLIC LAW 106–224—JUNE 20, 2000, TITLE IV—PLANT PROTECTION ACT).

appropriate management techniques to control pests in a program designed to minimize the risk of unreasonable adverse effects on human health and the environment. National Grid's IVM program brings together a combination of treatment methods and an understanding of the variety of New England ecosystems and the built environment.

2. THE PRIMARY GOAL AND OBJECTIVES OF THE VMP

The primary goal of this VMP is to outline the standard operating procedures for vegetation management operations on National Grid's rights-of-way. Its purpose is to document National Grid's IVM Program standards, practices and procedures.

The VMP is intended to provide a basic source of information for state and municipal officials and any interested parties regarding National Grid's vegetation management program. It also provides guidance for the technicians contracted by National Grid to carry out the vegetation management treatment program.

The following items are, therefore, individual objectives that must be taken into consideration as part of the primary goal of National Grid's vegetation management program:

- To ensure the reliable delivery of electric service to our customers;
- To maintain an optimum three to five year maintenance cycle for all rights-of-way[4];
- To ensure that vegetation management operations are conducted in a safe, effective manner and in conformity with federal and state laws, regulations, and if applicable, permit conditions;
- To treat sensitive areas listed in 333 CMR 11.04 according to regulatory and National Grid policy as areas that require special consideration during vegetation management operations;
- To allow for unplanned tasks for which all precautions are taken to utilize the correct treatment methods and to protect sensitive areas (construction, restorations, hazard tree removal, etc.);
- Following the procedures in 333 CMR 11.05(4)(d), to maintain the flexibility necessary to accommodate unique situations and the need for more appropriate techniques as they arise (in accordance with regulations, scientific advances, operational experience and/or comments from municipalities, state agencies & contractors);
- To have a National Grid representative respond quickly to any questions or complaints from the public and/or governmental agencies that relate to rights-of-way vegetation management.

[4]Maintenance cycles are the years between treatments.

3. RIGHTS-OF-WAY VEGETATION AND IDENTIFICATION OF INCOMPATIBLE TARGET VEGETATION

More compatible non-target vegetation live on electric rights-of-way than incompatible target vegetation. In fact, National Grid's rights-of-way are one of the primary remaining early successional ecological communities[5] in New England. These low growing plant communities help discourage the establishment of incompatible vegetation, do not hinder access and do not generally interfere with the lines. Plant species that are generally encouraged on the rights-of-way include herbaceous growth and shrubs that mature less than 12 feet in height, unless due to their location or attributes they interfere with the function of the rights-of-way. As a result, many plant and animal species use our rights-of-way as their homes, feeding grounds or nurseries. This early successional landscape, however, is not, by nature, stable; it is instead the sustained result of the IVM program established on National Grid's rights-of-way in the late 1960's.

Vegetation that obscures the right-of-way corridors and/or grows tall enough to interfere with the lines is considered incompatible vegetation and must be removed as targets. Incompatible vegetation includes trees and limbs, tall growing shrubs, vegetation growing around substations, structures, access roads, gates, and anywhere vegetation impedes access to the rights-of-way and equipment.

The primary incompatible plant species are trees, generally defined as woody plant species that mature at heights exceeding 15 feet. Trees must be removed or controlled within the cleared width and along the edges of National Grid's rights-of-way because they are capable of growing tall enough to grow into or fall onto the lines causing electric service outages. Examples of incompatible vegetation include, but are not limited to, maples, oaks, ash, cherries, birches, beeches, spruce, hemlocks and pines.

In rare isolated instances trees may be left where the electric lines are high enough off the ground so that mature trees will not interfere with the operation of the line. Also, those species that are under the purview of the Natural Heritage and Endangered Species Program of the Massachusetts Division of Fisheries and Wildlife

[5] A simplified definition of early successional ecological communities is low growing vegetation including grasses, herbaceous and shrub species and the wildlife species that inhabit them.

(NHESP) will be treated on a case by case basis.

Certain categories of non-tree species are also considered incompatible vegetation, some due to their location and others because of their nature. All woody vegetation on/or encroaching upon existing roads or pathways or immediately adjacent to line structures or equipment will be controlled to provide adequate access to structures, equipment and along the rights-of-way. These include shrubs and vines, including, but are not limited to, Viburnum, Mountain Laurel, Bush Honeysuckle, Grape Vines, Virginia Creeper, etc.

If no permanent access route exists along a right-of-way, a pathway may be created during the treatment cycle and maintained in a suitable location by managing all woody vegetation within the selected route. Woody vegetation must be removed in these areas to ensure access to and along the right-of-way and line structures for safe, efficient inspection, maintenance and emergency operations.

Plant species that pose an environmental or safety problem will be removed whenever practical. The categories of these plant species types that cause safety problems are noxious vegetation plant species including nuisance and poisonous plant species that have heavy thorn growth or dermal toxicity and may create hazards for people working on or traversing the right-of-way. These also include invasive plant species that poses environmental problems, some of which also fit one of the first two categories of noxious vegetation.

Poisonous vegetation poses a health hazard to National Grid personnel, contractors and the public-at-large, which can lead to increased incidences of first aid and OSHA recordable incidents. Mechanical methods do not reduce the spread of these populations, particularly Poison Ivy and Poison Sumac, therefore National Grid plans to use herbicides to spot treat poisonous plants at sites under its rights-of-way identified as having a high risk of posing a health hazard.

Other types of noxious and nuisance vegetation poses a risk to the safety and health of all individuals working on or traversing a right-of-way and can further impede a rapid response in an emergency. These plants have heavy thorns, dense foliage and/or impenetrable stems; examples include, but are not limited to, federal and Massachusetts classified noxious vegetation such as Multi-floral Rose, Common &

Glossy Buckthorn, and Blackberries, as well as nuisance vegetation such as Hawthorne, Greenbrier and dense populations of grapevines.

Invasive plant species create hazards for the environment. Invasive plant species have become an increasing concern throughout Massachusetts in areas that include rights-of-way corridors where they can spread rapidly and then move into the adjacent landscape. According to the Massachusetts Invasive Plant Advisory Group, "Invasive plants" are non-native species that have spread into native or minimally managed plant systems in Massachusetts. These plants cause economic or environmental harm by developing self-sustaining populations and becoming dominant and/or disruptive to those systems…."[6] Some examples of invasive plant species commonly found on rights-of-way include, but are not limited to, Japanese Knotweed, Multi-flora Rose, Oriental Bittersweet and Glossy Buckthorn (some of these also fit the noxious vegetation category).

To ensure the accurate identification of incompatible and compatible vegetation, all vegetation management contractors are required to supply personnel familiar with the vegetation typically found growing on utility sites.

[6] http://www.massnrc.org/mipag/invasive.htm.

4. INTEGRATED VEGETATION MANAGEMENT AND RATIONALE FOR USE

National Grid has one of the oldest IVM programs in the Commonwealth of Massachusetts, adopting this multi-faceted approach to rights-of-way vegetation management in the late 1960's. Following the "Purpose" of 333 CMR 11.00, National Grid has, and continues to utilize, an IVM program that "…minimize our impact on human health and the environment while allowing for the benefits to public safety provided by the selective use of herbicides."

National Grid's approach relies on reducing the amount of herbicides used; using selective herbicides/application techniques; timing applications for maximum effect; avoiding fixed application schedules; using mechanical control techniques where appropriate, and encouraging low growing plant communities. These techniques are applied to individual rights-of-way on a three to five year treatment cycle when incompatible vegetation averages heights of six to ten feet and low to medium average densities.

National Grid's IVM program actually begins with understanding the concept of ecological succession. Plant life is by its nature unstable, it is, however, governed by relatively predictable processes of change in composition or structure known as succession. In New England, succession strives towards the climax forest, but is interrupted by natural or man-made disturbances both intentional and accidental, which can lead back to earlier stages. National Grid's goal is to encourage early successional landscapes including wetlands, vernal pools, heaths, barrens, scrub land, fields and meadows, all of which, if left alone, are not stable; all of which dominate the landscape of utility rights-of-way under an IVM program and all of which are ideally suited to the requirements of the right-of-way. An additional benefit to this management strategy is that these early successional communities are generally populated by diverse, well-dispersed species that include many of New England's plant, animal and insect species, including many of those that are threatened or endangered.

IVM, as applied to electric utility rights-of-way, therefore is an environmentally responsible means of combining chemical and mechanical treatment methods (mowing, side pruning, hand-cutting and herbicide applications) with an understanding of the stages of ecological succession and interspecies competition. The resulting right-of-

way corridor is dominated by vegetation below economically damaging heights that could otherwise interfere with the delivery of electric service. IVM has many variations, but here in New England, where the practice first began, IVM is scheduling treatment crews to target incompatible vegetation as selectively as possible and then letting early successional ecological communities help maintain compatible vegetation between treatment programs. In this interim period competition (for light, moisture, and nutrients), wildlife depredation (browsing/feeding) and other ecosystem processes inhibit the germination and growth of incompatible woody vegetation, primarily trees.[7]

These biological processes or natural controls[8] lower the dependence on chemical and mechanical controls. Inhibiting the process of plant succession, however, requires the use of all three components of IVM. All three depend upon the others in a continuous cycle that employs the unique advantages of each. Without combining all three, incompatible plant species develop increased stem densities that require more intense control measures, and natural succession runs its course, forcing vegetation management activities to start at ground zero every treatment cycle. Thus narrow, one-dimensional management techniques, while frequently less expensive initially, decrease biodiversity and increase the impact of long-term vegetation management activities on the environment.

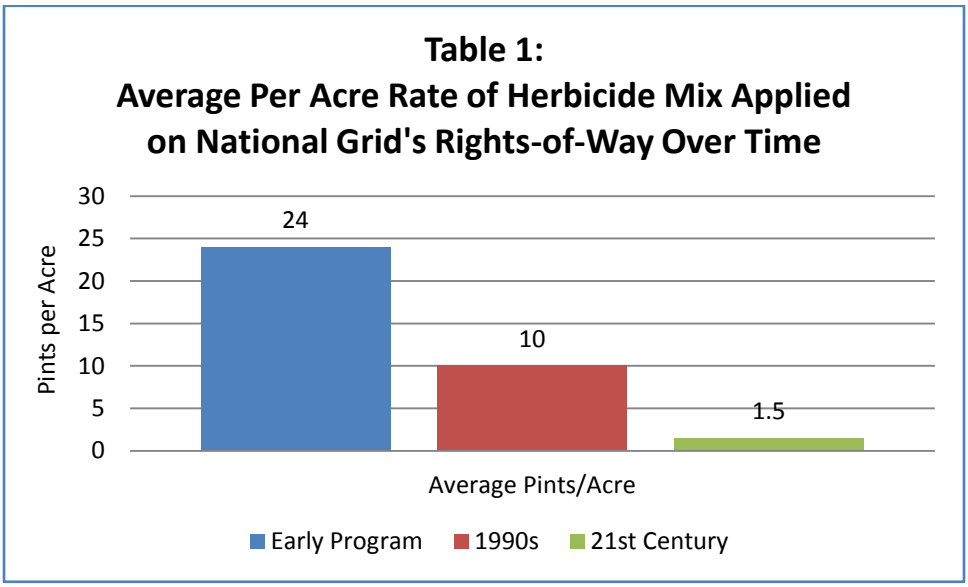
For example, a mechanical only program cannot control the roots of incompatible vegetation resulting in increased stem densities of resprouting vegetation that grows at a rapid rate. Likewise, there are areas of a utility right-of-way that cannot be treated

---

[7]Yahner. "Wildlife Response to More than 50 years of Vegetation Maintenance on a Pennsylvania U.S., Right-of-Way": 123; Christopher A. Nowak & Benjamin D Ballard. "A Framework for Applying Integrated Vegetation Management on Rights-of-Way." Journal of Arboriculture 31(1) (January 2005): 28-37; Richard H. Yahner "State Game Lands 33 Research and Demonstration Project—57 years of Continuous Study on the Shawville to Lewiston 230-kV line of First Energy (Penelec). 2009: 9; Yahner. "2009 Annual Report to Cooperators. Green Lane Research and Demonstration Project: 23 Years of Continuous Study." (2009): 8; Yahner. "Wildlife Response to More than 50 years of Vegetation Maintenance on a Pennsylvania U.S., Right-of-Way." Journal of Arboriculture 30(2) (March 2004): 123 United States Environmental Protection Agency. "Fact Sheet: Integrated Vegetation Management." EPA 731-F-08-010 (Oct. 2008).

[8]National Grid recognizes that in addition to using the stages of ecological succession and interspecies competition to limit the germination and growth of incompatible vegetation, there are direct biological applications techniques. For example, the release of two leaf feeding beetles (Galerucella calmariensis and G. pusilla) can help control Purple Loosestrife (Lythrum salicaria). While National Grid does not rule out the potential use of these application techniques in limited areas, with approximately 20,000 acres of treatment area and the composition of our primary target species, they are not currently a significant part of our IVM program.

with herbicides. Combining the direct use of appropriate chemical and mechanical treatments with an understanding of ecological succession, therefore lengthens the time between management cycles, reduces the amount of herbicide applied per acre and limits the need for intense mechanical controls.



Following this approach has, over time, significantly reduced the per-acre application rate of herbicide formulations at National Grid (see Table 1).[9] In the early stages, when herbicide applications first replaced a pure mechanical program, our rights-of-way were dominated by high stem densities of incompatible tree species. As a result, the average rate per acre of applied herbicide formulations was approximately three gallons (24 pints). Around, fifteen years ago, as years of selective herbicide applications sustained a diverse desirable vegetation cover, the average rate per acre was approximately 1-1½ (8-10 pints) gallons per acre. Currently, the average rate is approximately 1 pint to 2 quarts per acre. Studies in New York have documented similar reductions in herbicide use through stable plant community management.[10]

National Grid's IVM program also recognizes and manages instances in which landscape changes prescribe the IVM techniques. Control methods are adapted or

[9] National Grid Transmission Forestry Herbicide Use Summary Records.
[10] C.A. Nowak, C.A. and L.P. Abrahamson, "Vegetation Management on Electric Transmission Line Rights-of-Way in New York State: The Stability Approach to Reducing Herbicide Use", Proceedings of the International Conference on Forest Vegetation Management, Auburn University, April 1993.

limited to suit the management situation. These are areas of a right-of-way in which geologic, geographic, climactic, environmental and legal factors along with economic, agricultural, social and recreational uses of the landscape affect the application of IVM management techniques. Treatment methods are determined by soil type, moisture levels, elevation, density and growth rates; land use patterns such as golf courses, inhabited areas, Christmas tree farms, active pasture and crop lands, or where individual alternate control agreements are in place with landowners. These landscapes limit or alter the applied treatment methods. For example, trees might not grow in well-kept lawns but incompatible vegetation may still grow into structures, and street trees need to be trimmed.

By the selective applications and judicious use of herbicides in combination with mechanical controls and an understanding of ecological succession, National Grid's rights-of-way are meeting environmental and management goals. Taking a multi-faceted approach minimizes the disadvantages and maximizes the benefits of each IVM component, thereby reducing the environmental impact and the financial cost of vegetation management while simultaneously increasing the overall effectiveness of the program.

5. VEGETATION MANAGEMENT AND OPERATIONAL GUIDELINES

National Grid retains independent contractors for all vegetation management treatment activities and requires that these contractors comply with all applicable state and federal laws and regulations, and National Grid vegetation management specifications. Furthermore, contractor performance and compliance with this VMP is monitored and evaluated by National Grid Foresters.

Vegetation Management Guidelines

National Grid's IVM program is applied to the full width of each right-of-way to remove or control all incompatible vegetation. Vegetation management activities must result in l00% control or removal of all incompatible target plant species greater than or equal to six feet in height and a minimum of 90% control or removal of all incompatible vegetation less than six feet in height.

With a few exceptions, all incompatible tree species will be removed or controlled during a treatment operation. This includes all woody vegetation and vines growing on or encroaching upon access roads, gates, or on or within ten feet of guys, poles and towers within the cleared width of the right-of-way. Treatments will also extend around the perimeter of substations following all sensitive area restrictions.

The only exceptions are trees in or edging yards, visual screens and trees or shrub species specified by NHESP in the Priority Habitat of state-listed species. All exceptions, however, must be maintained at an acceptable height or condition that will not exceed minimum vegetation clearance distances from the lines before the next maintenance cycle.

National Grid uses two types of visual screens, shrub and tree/shrub, which screen the general public from views of structures and substations. They are maintained at sites where, in the opinion of National Grid, people may find the view of structures or substations objectionable. These sites include, but are not limited to, locations where rights-of-way cross roads,

recreational areas and inhabited areas.

Sensitive areas will be treated per 333 CMR 11.04. Vegetation management operations on such sites are designed to prevent any unreasonable adverse environmental effects. These no-spray and limited spray areas will be maintained using the appropriate control methods (see Table 1 & Appendix 7).

Conifers are generally not treated with herbicides since most species do not re-sprout. One exception to this general guideline is pine species that do resprout, particularly Pitch Pine, which may be treated on a limited basis with herbicides. Another exception is where White Pine regeneration has seeded in large thick carpets and mowing might be more destructive than an herbicide application.

In cases where large areas of high density incompatible species have exceeded maximum herbicide treatment heights, it may be more practical to do a mechanical treatment followed in one or two growing seasons by an herbicide treatment to obtain effective control.

Right-of-way access will be through the use of established roadways whenever possible. The contractor will obtain permission to enter a right-of-way by any other means in advance.

Unreasonable site damage or destruction during any phase of the vegetation management operation by the contractor, his agents or employees, must be repaired immediately to the satisfaction of National Grid; National Grid will determine what constitutes unreasonable site damage.

General Operational Guidelines

The National Grid Forester will inform the contractor(s) which rights-of-way will be treated, the range of treatment dates and the possible methods, materials and mixing rates. National Grid will supply treatment restrictions data, maps and written instructions outlining any special treatment considerations or instructions for each right-of-way. No work will be done until the contractor has the appropriate data, permits, restriction lists, mixing rate instructions and licensed staff unless authorized by National Grid.

The contractor must provide:

- Appropriately licensed or certified supervisors who understand all aspects of the contracted treatment and who are responsive to the guidance of National Grid;
- Supervisors who effectively manage treatment crews to ensure the satisfactory completion of the contract;
- Supervisors who effectively communicate with the public ;
- Experienced and/or trained workers, who are appropriately licensed or certified;
- Workers who conduct themselves professionally at all times;
- The appropriate equipment maintain the highest practical level of efficiency and effectiveness;
- Appropriately calibrated herbicide application equipment;
- Equipment in good visual and working condition;
- Completed paperwork.

The contractor must:

- Comply with all applicable federal and state laws and regulations;
- Have a copy of this VMP;
- Have all treatment crews carry a copy of the current Yearly Operational Plan (YOP);
- Have all treatment crews carry National Grid right-of-way maps.

In conclusion, vegetation management operations must be conducted according to this VMP and the written instructions of National Grid. Failure to do so is grounds for removal of the crew from the treatment site and termination of the vegetation management contract.

6. VEGETATION MANAGEMENT CONTROL METHODS

Mechanical and chemical controls work together to support the viability of early successional communities, therefore, National Grid utilizes a combination of hand cutting, mowing, selective pruning, selective foliar treatments, low volume basal treatments and cut stump treatments. Based on a three to five year cycle,[11] the treatment methods used on any given right-of-way are selected based on timing, site sensitivity, species composition and density, site access, topography and treatment methods.

National Grid inspects rights-of-way for incompatible vegetation density, height and composition. A right-of-way is then scheduled for treatment when incompatible vegetation height averages six to ten feet or densities reach low to moderate levels. These inspections are important because although treatment cycles should remain relatively consistent with the use of our IVM program, short term changes in growth conditions, site disturbances or the effectiveness of past treatments may affect the schedule on individual rights-of-way.

The advantage of a flexible IVM program is the ability to apply the appropriate treatment methods to meet the conditions of individual rights-of-way. As the sole means to control vegetation, mechanical controls are a short-term solution. With the exception of most conifer species, cut vegetation re-sprouts, resulting in significantly thicker stem densities. Selective herbicide application treatment methods effectively remove vegetation that would otherwise compete with and dominate the desired early successional ecological communities. In some areas, however, mechanical controls are the preferred method, sometimes in combination with the appropriate herbicide treatment method: on vegetation over 12 feet tall; on non-sprouting conifers (with exceptions); in no-spray sensitive areas; in visual screens; around structures; on access roads; in areas of thick, impenetrable vegetation, and where large areas of high density incompatible species exceed maximum herbicide treatment heights.

[11]Extending treatment cycles results in average tree heights that exceed ten feet and high densities. This requires the use of more herbicide to get proper coverage of the resulting larger tree crown area. Since the coverage is more difficult on taller trees, it increases the chance of improper coverage, off-target drift and unsatisfactory results. Deferring treatment even one year beyond their optimum treatment cycle can result in an increased herbicide use of over sixty percent (National Grid Transmission Forestry Herbicide Use Summary Records).

Mechanical Control Methods

Hand Cutting

Hand cutting is the mechanical cutting of incompatible vegetation using chain saws or brush saws, lopers or hand pruners:

- Hand cutting may be conducted at any time of the year;
- Incompatible vegetation is cut as close to the ground as practical;
- Slash from the operation is cut and scattered so as to lay as close to the ground as practical, but not exceeding two feet in height.

Hand cutting is used to protect sensitive areas*;* around structures, gates and access roads; to control incompatible vegetation greater than 12 feet in height; where herbicide use is prohibited by regulation or easement restriction; on non-sprouting conifer species greater than two feet in height, and on sites where terrain, site size or sensitivity renders mowing impossible or impractical.

Mowing

Mowing is the mechanical cutting of vegetation using large brush mowers mounted on rubber tired tractors or tracked vehicles:

- Mowing may be used at any time of the year except when deep snow precludes operations;
- Selection of specific equipment is based on terrain, vegetation size and equipment availability;
- Mowing is restricted by steep slopes, rocky terrain, obstructions, wet sites with deep, soft soils, and debris on the right-of-way.

Mowing is used on sites where herbicide use is prohibited by regulatory or easement restriction, where a large number of the stems of incompatible species have exceeded maximum control heights, where access is impeded by high woody vegetation density and access is required in the short term, and where terrain, site size and sensitivity permit the efficient use of the equipment.

Selective Pruning

Selective pruning is the mechanical removal of the tops or encroaching limbs of

tall-growing tree species to prevent them from growing into, or falling onto, the lines:

- Selective pruning may be done at any time of the year;
- Pruning will be accomplished using aerial lifts mounted on trucks, skidders or tracked vehicles or, if terrain or obstructions prevent equipment access, by climbing crews.
- Slash will be disposed of by dicing, chipping or piling, at the discretion of National Grid:
    - Slash will not be left in waterways, trails or roads, or in such a manner that would permit it to wash into these areas;
    - The placement of cut woody vegetation must comply with applicable State Fire Marshall's regulations;
    - Slash from yards or recreational sites will be chipped or removed to an adjacent area or removed;
    - Slash will be piled in isolated areas or windrowed in parallel lines along the right-of-way in piles that should not exceed two feet in height and that do not obstruct access along or to the right-of-way;
    - Dicing will be accomplished by cutting the slash in pieces so that it lies as close to the ground as practical;
    - All slash and debris of cherry species will be removed immediately after treatment in active pastures to prevent any harm to livestock.
- Chipping is used when dicing and/or piling are prohibited or impractical:
    - Wood chips will be removed from highly sensitive areas;
    - When left on site, wood chips will be scattered uniformly over the site at depths not exceeding four inches or piled in isolated areas;
    - No chips will be left in wetlands.

This method is used in maintaining visual screens in the limited areas where tree screens are desired and selective removals are not practical; on individual state or town regulated road crossings where it is required or practical; along the edge of rights-of-way where pruning will reduce or eliminate the threat of outages, and to provide landowners with a viable alternative to the otherwise mandatory removal of trees for electric line maintenance and integrity that are aesthetically desirable to the property owner.

Chemical Controls

Herbicide applications include foliar, basal and cut stump surface treatments. Herbicides are applied as mixtures consisting of herbicide formulation(s), adjuvants, carriers and additives. The timing of herbicide applications, materials, and mixture rates

will be listed in National Grid's YOP, twenty-one day notice letter and/or forty-eight hour newspaper notice as required under 333 CMR 11.06 and 11.07 and Chapter 85 of the Acts of 2000, Section 10 (see Appendices 1 & 4). National Grid's first choice is to use herbicides on the *Sensitive Area Materials List* administered by the Massachusetts Department of Agricultural Resources (DAR).[12] If the situation is appropriate, National Grid, however, reserves the right to use other EPA and Massachusetts approved herbicides, following all restrictions in 333 CMR 11.04. The National Grid Forester(s) will further specify to the treatment crews the particular materials and mixture rates for individual rights-of-way according to conditions and timing of the treatment(s). Treatment crews will not deviate from National Grid's specifications without the approval of the Forester(s).

Individual herbicides have different levels of effectiveness on incompatible vegetation and under different conditions. No herbicide is equally effective on all plant species and certain herbicides are more effective on certain plant species than others. National Grid selects the herbicide or combination of herbicides in conjunction with the appropriate treatment method to obtain the most effective control on each right-of-way.

Individual herbicides and treatment methods also have distinctive physical effects and environmental behaviors. For example, certain herbicides or treatment methods cause foliar brownout while others do not, and certain herbicides have been formulated for use in wet environments while others have not. The selection of specific herbicides or herbicide mixtures coupled with the appropriate treatment methods is made with equal consideration given to the visual and environmental sensitivity of a right-of-way or site within a right-of-way. As a result, herbicides will not be used in certain areas if site sensitivity, regulations, restrictions, plant species composition or height recommend otherwise.

Selective Foliar Treatments

Selective foliar treatments are the application of materials to fully developed leaves, stems, needles or blades of incompatible vegetation. Selective foliar treatments

[12] A current list of the *Sensitive Area Materials List* and individual *Fact Sheets* on these herbicides are available at: http://www.mass.gov/eea/agencies/agr/pesticides/rights-of-way-vegetation-management.html.

are limited to the season when leaves are fully developed in the spring until fall and the beginning of leaf abscission—i.e., when leaves begin dropping off the trees.

The equipment for selective foliar treatments includes: hand-pump backpack sprayers, motorized backpack sprayer and off-road vehicle mounted hydraulic sprayers. In each case, mixtures are applied as a uniform spray over the plant's entire foliage to only dampen or lightly wet the targeted vegetation, instead of being applied to the point of run-off. This minimizes the amount of herbicide drip onto desirable ground cover.

- Selective foliar treatments are used on hardwood trees and incompatible shrub species below 12 feet in height.
- In general, selective foliar treatments are not applied to conifer species; exceptions to this general guideline will be identified in National Grid's YOPs.
- Foliar treatments are also not used where landowner agreements preclude their use, within visual screens on plant species greater than six feet in height and within mechanical only sensitive areas per 333 CMR 11.04.
- Foliar treatments are allowed in wetland areas where no standing water is present, per the Department of Food and Agriculture Decision, dated October, 1995, concerning the wetland impact study conducted pursuant to 333 CMR 11.04 (4)(C)(2) (Appendices 1, 5 & 6).

Low Volume Basal Treatment

Low volume basal treatments are the selective application of an herbicide, diluted in specially formulated oil, to wet the entire lower 12 to 18 inches of the main stem of incompatible vegetation. Using a hand pump backpack unit, the oil enables the herbicide solution to penetrate the bark tissue and translocate within the plant. Low volume basal treatments are extremely selective, and when used at appropriate locations are applied at very low per acre rates:

- Optimum vegetation density is low with average heights greater than four feet, within visual screens and in areas where extreme selectivity is necessary;
- This treatment method can be used any time of year except in conditions that prevent adequate access to stems;
- The optimum treatment time frame is in the dormant season when applications are easier due to the lack of foliage and the obstruction caused by grasses and herbaceous growth;
- Restrictions include when snow is too deep or in extremely wet weather;
- Basal treatments are not ideal in high stem densities because of high labor costs and increased herbicide rates per acre.

Low volume basal treatments are used with the same rationale as selective foliar treatments. Basal treatments have the advantage of extending the treatment season into the dormant season thus facilitating the retention of experienced applicators and spreading out the work load. They also have the advantage of being low profile with no noisy motorized equipment and incompatible vegetation is generally controlled without creating brownout when the treatments are completed during the dormant season.

Cut Stump Treatment

Cut stump treatments are the mechanical cutting of incompatible vegetation followed by an herbicide treatment to the phloem and cambium tissue of the stumps. The cut stump mixture is diluted in water or a non-freezing agent and is ideally applied to freshly cut stumps. Application equipment includes: low-volume backpack; hand-pump sprayers; hand held squirt bottles; paintbrushes, and sponge applicators.

This method is used where maximum control is desirable and/or to reduce the visual impact of vegetation management treatments. It is commonly used:

- To prevent re-sprouts when hand cutting vegetation in preparation for a foliage application;
- To chemically treat incompatible vegetation in sensitive sites where other methods are not possible,
- On all woody vegetation (except non-sprouting conifers) removed from visual screen except within an environmentally sensitive area where restrictions take precedence.

Like basal treatments, cut stump treatments may be used at any time of the year provided snow depth will not prevent cutting the stumps below three inches in height. It is best to avoid during the season of high sap flow, in moderate to heavy rains, and is not practical in moderate to heavy stem densities.

Herbicide Application Restrictions and Guidelines

Herbicide application will be restricted during certain adverse weather conditions, such as rain, wind or deep snow.

Rain

Herbicide applications will not be made during periods of moderate or heavy rain fall:

- Foliar applications are effective in light mist;

- Foliar applications will cease during measurable rainfall that creates leaf runoff;
- Foliar applications interrupted by unexpected rainfall, will not resume until the rain ends and active leaf runoff has ceased;
- Basal and cut stump treatment applications are ineffective during measurable rainfall;
- Basal applications that are interrupted by rainfall will not be resumed until at least fifty percent of the application area of the targeted plants is dry.

Wind

Wind affects the individual herbicide treatment methods on different levels.

- Basal or cut stump treatments are not affected by all but the most extreme wind conditions because they are applied in such close proximity to the ground.
- During foliar applications, excessive winds can cause damage to compatible vegetation on or off the right-of-way, therefore, to prevent any significant herbicide drift, treatment crews will comply with the following restrictions:
    - During winds strong enough to bend the tops of trees' main stems on the right-of-way, the treatment crew supervisor will periodically observe the foliar application to ensure no significant movement of the herbicide mixture. If the supervisor can see the mixture moving off the targeted plants, applications will immediately stop until the wind has subsided enough to continue.
    - Following the label, all foliar application mixtures will contain anti-drift agents to reduce the potential of herbicide drift beyond the targeted plants:
        - In moderate wind conditions, as per label recommendations, more anti-drift agents may be added, at the discretion of the contractor supervisor.

Deep Snow

Herbicides will not be applied in deep snow conditions. Deep snow renders it impractical to basally apply herbicides to the lower six inches of the stems or to cut stumps below acceptable maximum height limit.

General Operational Guideline Restrictions

***Disposal*:** The contractor is responsible for the proper disposal of all excess materials and mixtures in accordance with all applicable federal and state laws, regulations and guidelines.

Mixing: Mixing will take place according to all restrictions in 333 CMR 11.00 and according to the chemical labels.

7. JUSTIFICATION OF SELECTIVE HERBICIDE APPLICATIONS

Both regulatory and economic factors dictate the safe, reliable delivery of electric service through our transmission and distribution lines. This requirement necessitates a vegetation management program to control incompatible vegetation. Other regulations require National Grid to minimize the impact our activities have on the environment. National Grid's IVM program allows us to stay in compliance with these various regulations, including 333 CRM 11.00, by maximizing the control of incompatible vegetation while minimizing the use of herbicides through their judicious use. Having analyzed various vegetation management methods, National Grid's chemical direct control methods of choice are the selective herbicide treatments described in Section 6 which in combination with mechanical treatment methods and an understanding of ecological succession, are the most sound and cost effective methods currently available.

Research has determined that when used appropriately herbicides are a safe method of vegetation control and can benefit public safety through selective use.[13] The small amount of herbicide applied selectively at low rates per acre and the herbicide formulations listed in our YOP's are low in acute toxicity, are not known to bio-accumulate and, as applied, and have a short life span in the environment.[14]
The *Sensitive Area Material List* is an additional environmental protection tool at our disposal. This list of herbicides helps us further reduce the potential of any negative impact by limiting the herbicide formulations used in the limited spray sensitive areas defined by 333 CMR 11.04. In addition to extensive testing by the Federal EPA before

[13]U.S.D.A., Forest Service, "Pesticide Background Statements, Volume 1," *Herbicides,* Agriculture Handbook Number 633, 1984; U.S.E.P.A. Environmental Stewardship Strategy for Electric Utility Rights-of-Way*,* Pesticide Environmental Stewardship Program, Edison Electric Institute Vegetation Management Task Force, August 1996; 333 CMR 11.01, *Rights of Way Regulations*.
[14](USDA Forest Service, 1984; K.H. Deubert. Studies on the Fate of Garlon 3A and Tordon 101 Used in Selective Foliar Application in the Maintenance of Utility Rights-of-Way in Eastern Massachusetts*,* Final Report prepared for New England Electric et al., 1985; Harrison Biotech, Inc. A Generic Environmental Impact Report on the Control of Vegetation on Utility and Railroad Rights-of-Way in the Commonwealth of Massachusetts, Final Report prepared for the Department of Food and Agriculture, Commonwealth of Massachusetts, 1985; N.H. Nickerson, G.E. Moore and A.D. Cutter,Study of the Environmental Fates of Herbicides in Wetland Soils on Electric Utility Rights-of-Way in Massachusetts over the Short Term*,* Final Report prepared for New England Electric et.al., December 1994; Massachusetts Department of Agricultural Resources. Surface Water Monitoring of Glyphosate used in Rights-of-Way Railroad Vegetation Management (2005–2006)*,* Report, November, 2006.

being included on the *Sensitive Area Materials List*, the impact of these herbicides on the environment are put through careful review by DAR and the Massachusetts Department of Environmental Protection.

333 CMR 11.04(4) also limits the use of herbicides around various surface waters. However, it makes an exception to the general rule for public utilities by allowing herbicide treatments within wetlands as long as sensitive are*a* approved herbicides are not sprayed on or within ten feet of standing or flowing water. This exception is based on a study cited in the *DFA Decision Concerning The Wetland Impact Study Conducted Pursuant to 333 CMR 11.04(4)(c)(2).* This research shows that selective herbicide applications do not adversely affect wetland plant composition or function (Appendix 5). In fact, according to the study by Environmental Consultants, Inc. quoted in the *Decision*, mechanical vegetation control techniques result in a significantly greater impact on wetland composition and function.[15]

The high degree of selectivity and control inherent in selective herbicide applications adds further protections. A potential route for public exposure to herbicides is through drift during foliar treatments. National Grid's vegetation management program does not allow significant drift from foliar treatments by requiring the use of low drift agents, prohibiting treatments in high wind situations and following maximum height limits of incompatible vegetation. Herbicides, particularly when applied selectively by low-volume methods, also dry quickly on the plant surface thereby significantly restricting the potential for dermal exposure. Selective herbicide applications further reduce the visual impact of treatments by eliminating extensive foliar brownouts or the drastic landscape changes cause by less selective herbicide or mechanical treatments.

The success of our selective herbicide application program in minimizing unreasonable adverse effects is evidenced by the thriving early successional ecological communities currently present on National Grid's rights-of-way, which includes the

[15]Nickerson et al., 1993; Environmental Consultants, Inc., Study of the Impact of Vegetation Management Techniques on Wetlands for Utility Rights-of-Way in the Commonwealth of Massachusetts, Final report prepared for New England Electric et.al., 1989.

diversity and numbers of observed wildlife species taking advantages of our rights-of-way.[16]

Selective herbicide applications offer varied degrees of selectivity and favor, or release, certain types of plants; for example, broadleaf vegetation can be controlled with little or no impact to grasses. This diversity can only be achieved by periodically and selectively removing vigorously competitive tree species, including their root systems, which is only practical through selective herbicide application.

Selective herbicide applications minimize the amount of manpower, equipment and the impact of both on the environment compared to less selective mowing operations. For example, when used judiciously, they can be much less destructive than mowing to nesting sites and the vegetation necessary for food and cover. The resulting low growing vegetation provides a more open right-of-way with more attractive flowering plants and berries that support an increase in the diversity of wildlife species.

A selective herbicide program is also more cost effective than a purely mechanical program. The comparatively increased density and height of incompatible vegetation promoted by mechanical cutting requires the expenditure of more time and resources to control. Estimates, based on actual costs for the limited cutting currently done at National Grid, indicate that average expenditures for a mechanical cutting program are two to over five times the cost of the current IVM program. The indirect costs not factored into the estimate include lost income from reduced electric service reliability, increased time and costs for line inspections, maintenance and repair, increased insurance costs caused by higher accident rates, and the increased labor costs required to attract workers to perform this type of work.

Mechanical controls are also relatively hazardous to workers, the public and the environment. In a mowing operation, objects including rocks and pieces of wood are thrown by the mower, often long distances. Chain saws can kick back and cause injuries despite safety features and protective leg guards. Small diameter cut stumps left by cutting operations may cause trips, falls or punctured tires. Mechanical only treatment programs also facilitate the spread of injurious thorny or poisonous plants

[16] Several research projects demonstrate the positive impacts of selective right-of-way vegetation management to non-target organisms (See Appendix 9).

which results in unsafe conditions for the public, vegetation management and electric line crews. Again, due to their growth habits, rapidly, in thick, impenetrable masses, and their effect on human health, these plants are most practically controlled by herbicide applications.

The use of mechanical equipment always includes the risk of hydraulic fluid, oil and gas spills or leaks, and all mechanical equipment releases petroleum products into the environment in the form of bar and chain oil. These mechanical operations are a necessary and integral part of National Grid's IVM program, but these hazards are an important limitation that needs to be considered as part of the overall decisions made regarding treatment options, especially when compared to the environmental and safety history of the selected herbicides. [17]

The net benefits of including selective herbicide applications in National Grid's IVM program are tied to their role in establishing early successional ecological communities. Not only does reducing the density and inhibiting the growth of incompatible tree species reduce the actual amount of herbicides needed for vegetation control, but low-growing plant cover helps prevent the soil exposure and erosion that can result from rutting caused by mowing. Treatment cycles are lengthened and there are fewer incompatible plant species that require control which reduces both the long and short term ecological impact of vegetation management activities.

[17] National Grid's Incident Management System (IMS) is a Safety, Health and Environmental Services' online management tool; Calvert, Geoffrey, Plate, D.K., Das, R., Rosales, R., Shafey, O., Tomsen, C., Male, D., Beckman, J., Arvizu, E. & Lackovic, M. "Acute Occupational Pesticide-Related Illness in the US, 1998-1999: Surveillance Findings From the SENSOR-Pesticide Program", American Journal of Industrial Medicine 45:14-23, 2004; Osha Logging Standard, Scope of this Advisor and the OSHA Standard*:* **"**Logging is one of the most dangerous occupations…and the felling of trees with a chainsaw is the most dangerous…."

8. DEFINITION, IDENTIFICATION AND TREATMENT OF SENSITIVE AREAS

The general definition of sensitive areas regulated by 333 CMR 11.04 is as follows:

> …any areas within Rights-of-Way, including No-Spray and Limited-Spray Areas, in which public health, environmental or agricultural concerns warrant special protection to further minimize risks of unreasonable adverse effects.

Protecting these environmentally sensitive sites is accomplished by defining specific sensitive areas and establishing limited spray and no-spray areas and treatment restrictions within these borders based on the sensitivity of each site and the requirement to minimize any unreasonable adverse impacts within that area.

Sensitive Areas regulated by 333 CMR 11.00 include the following:

Water Supplies:

- Zone I's
- Zone II's
- IWPA's (Interim Wellhead Protection Areas)
- Class A Surface Water Sources
- Tributaries to a Class A Surface Water Source
- Class B Drinking Water Intakes
- Private Wells

Surface Waters:

- Wetlands
- Water Over Wetlands
- The Mean Annual High Water Line of a River
- The Outer Boundary of a Riverfront Area
- Certified Vernal Pools

Cultural Sites:

- Agricultural Areas
- Inhabited Areas

Wildlife Areas:

- Certified Vernal Pool Habitat
- Priority Habitat.

These sensitive areas consist of no-spray areas in which herbicide use is prohibited, larger limited spray areas where herbicide use is permitted under certain

conditions, general limited spray areas, and areas that require special treatment recommendations (See Table 1 and Appendix 7).

TABLE 2: CONTROL STRATEGIES FOR SENSITIVE AREAS[#]

Sensitive Area	Limited Spray and No-Spray Areas (feet)	Control Method	Restriction Code
Public Ground Water Supplies	400'	Mechanical Only	None
Primary Recharge Area	Designated no-spray area or 1/2 mile radius	Mechanical, Recommended Herbicides*	24 months
Public Surface Water Supplies (Class A & Class B)	100'	Mechanical Only	None
	100'-400'	Recommended Herbicides	24 months
Tributary to Class A Water Source, within 400' upstream of water source	100'	Mechanical Only	None
	100'-400'	Recommended Herbicides	24 months
Tributary to Class A Water Source, greater than 400' upstream of water source	10'	Mechanical Only	None
	10'-200'	Recommended Herbicides	24 months
Class B Drinking Water Intake, within 400' upstream of intake	100'	Mechanical Only	None
	100'-200'	Recommended Herbicides	24 months
Private Drinking Water Supplies	50'	Mechanical Only	None
	50'-100'	Recommended Herbicides	24 months
Surface Waters	10'	Mechanical Only	None
	10'-100'	Recommended Herbicides	12 months
Rivers	10' from mean annual high water line	Mechanical Only	None
	10'-200'	Recommended Herbicides	12 months
Wetlands	100' (treatment in wetlands permitted up to 10' of standing water)[+]	Hand Operated Equipment with 5 gal. mix capacity[+] Recommended Herbicides	24 months
Inhabited Areas	100' (for high-pressure foliar only)	Recommended Herbicides	12 months
Agricultural Area (Crops, Fruits, Pastures)	100' (for high-pressure foliar only)	Recommended Herbicides	12 months
Certified Vernal Pools	10'	Mechanical Only when water is present	None
Certified Vernal Pool Habitat	10'-outer boundary of habitat	No treatment without written approval per 321 CMR 10.14(12)	
Priority Habitat	No treatment without written approval per 321 CMR 10.14(12)		

Restrictions: "24 Months": A minimum of 24 months shall elapse between applications.
"12 Months": A minimum of 12 months shall elapse between applications.

*Commonwealth of Massachusetts recommended herbicides from the *Sensitive Area Materials List*, rates and methods per 333 CMR 11.04.

[+]Per "Decision Concerning the Wetlands Impact Study" (see Appendix 5).

[#]Table Compiled by Jeffrey M. Taylor, Vegetation Control Service, Inc.

Treatment in the limited spray area requires the use of herbicides from the *Sensitive Area Materials List* and the application restrictions in 333 CMR 11.04 or in the case of Priority Habitat, approval of the YOP by NHESP.

The general characteristics of the herbicides included on the *Sensitive Area Materials List* are: low toxicity to humans and other animal species; short term soil persistence; biodegradation of active ingredients, and low soil mobility. It is National Grid's policy to primarily use the herbicides on the *Sensitive Area Materials List*, which means as a rule, in most years and/or areas, limited spray areas do not need to be identified in the field by treatment crews. Instead, they may concentrate on marking the more sensitive no-spray areas.

A current list of the *Sensitive Area Materials List* and individual *Fact Sheets* are available at: http://www.mass.gov/eea/agencies/agr/pesticides/rights-of-way-vegetation-management.html. The specific herbicide formulations and mixtures to be used in any given year will be listed in the YOP and the manufacturers' labels and *Fact Sheets* will be included in the appendices of the YOP.

Identification Methods

Two simple descriptions guide the complex identification of the sensitive areas defined in 333 CMR 11.04: *Readily identifiable in the field* and *Not readily identifiable in the field.* Readily identifiable in the field areas will be treated, identified and when appropriate, marked according to all applicable restrictions listed in 333 CMR 11.00. Not readily identifiable in the field areas will likewise be treated and marked when appropriate, but they are identified by the use of data marked on maps and collected in the YOP and notification processes before the time of treatment.

The individuals assigned the task of identifying and treating sensitive areas in the field will use the appropriate sources and methods from the following list (some of which are already included in National Grid's records):

- National Grid right-of-way maps, records and institutional knowledge;
- Massachusetts Department of Environmental Protection water supply maps available through MassGIS;
- DAR and Municipal Board of Health maps and lists of identified private wells along the right-of-way;

- Correspondence, meetings and input from municipalities within the forty-five day YOP and twenty-one day municipal right-of-way notification letter review and comment periods and the 48 hour newspaper notification (under 333 CMR 11.06 & 11.07 and Chapter 85 of the Acts of 2000);
- Correspondence and meetings resulting from National Grid's abutter notification procedure;
- A point person who verifies identified sensitive areas and any additional areas that may require special precautions;
- United State Geological Survey (USGS) topographical maps;
- Information from contractor's knowledge and records;
- Information from MassGIS;
- Confidential information from NHESP;
- A copy of the YOP and VMP.

The YOPs will contain maps with the most current data available at the time of printing. The maps are a resource and a tool for both the public and the vegetation management crews, therefore, they contain the data needed to identify, mark and treat sensitive areas appropriately. The maps are printed on USGS topographic maps. The most current data available through MassGIS, such as public water supplies and certified vernal pools, and any data that National Grid has collected on items such as private wells are then added on top of the USGS data. At the time of treatment, additional sensitive area information that is collected will be added to the information utilized by National Grid's vegetation management contractors.

As appropriate, sensitive areas will be identified and marked in the field by either National Grid personnel, trained and experienced vegetation management contractor personnel, and/or by individuals trained in the identification of sensitive areas.

Public and Private Drinking Water Supplies

Public and private drinking water supplies come under the *Not readily identifiable in the field* definition and deserve further discussion due to their sensitivity in relationship to the public.

The appropriate sources and references listed above will be consulted to determine the location of drinking water supplies, and in accordance with 333 CMR 11.04, known drinking water supplies are marked on the YOP maps and identified in the

field. In the various notification processes under 11.06 and 11.07, or at any point, we request municipalities to assist in the identification new water supplies. Identified private drinking supplies within one hundred feet of a right-of-way are included in our permanent records and maps, and when made cognizant of new wells, these will also be identified and added to our records and maps. Landowners are also encouraged to post signs on the edge of the rights-of-way to help identify private water supplies.

The several different limited spray and no-spray areas mandated by 333 CMR 11.04(2)(a-b) for each type of water supply are included in the diagrams and table in Appendix 7. In all cases, contractors will take all measures necessary to mark and/or identify the appropriate no-spray areas for private and public drinking water supplies.

Priority Habitat of State-Listed Species

National Grid recognizes the importance of the Massachusetts Endangered Species Act, M.G.L.C. 131A, and its significance to right-of-way vegetation management and will comply with all applicable portions of this act and the regulations promulgated thereunder.

321 CMR 10.14, Massachusetts Endangered Species Act Regulations, Part II Exemptions and 333 CMR 11.04(3)(a-c) exempts utility rights-of-way vegetation management from the permit process under the following condition:

> The management of vegetation within existing utility rights-of-way provided that the management is carried out in accordance with a vegetation management plan approved in writing by the Division prior to the commencement of work for which a review fee shall be charged, the amount of which shall be determined by the commissioner of administration under the provisions of M.G.L. c.7, § 3B…

To comply with this exemption, National Grid will submit this VMP and our YOPs for approval by the NHESP.

The NHESP has delineated areas as Priority Habitat based on the "Best Scientific Evidence Available" to protect state-listed species from a "take." Under the approval process, details about the Priority Habitat of state-listed species that our activities might affect and management recommendations are shared with National Grid under strict confidentiality agreements. Using this data and best management

practices, National Grid and contract personnel will follow the appropriate vegetation management treatment methods within these sensitive areas taking all practical means and measures to modify right-of-way vegetation management procedures to avoid damage to state-listed species and their habitat.

To identify Priority Habitats, National Grid personnel and vegetation management crews must use proper identification procedures. Contractors are, therefore, required to train their personnel to recognize Priority Habitats using one of the following tools: training meetings, paper maps, GPS coordinates and/or GIS systems.

Provisions of 321 CMR 10.00, Part III, also allow the NHESP to designate Significant Habitat on land in the Commonwealth as a legal easement. Vegetation management activities within Significant Habitats require an Alteration Permit per 321 CMR 11.68. No such designations have been made to date, but in the eventuality that any Significant Habitats are designated on a National Grid right-of-way, we would be notified as an owner of interest. National Grid will, when it becomes necessary, seek a permit under the terms of the coordinated permit review process.

Treatment of Wetlands

Pursuant to 333 CMR 11.04 based upon the results of two right-of-way wetland impact studies, the Massachusetts Department of Food and Agriculture (now DAR) in consultation with the Department of Environmental Protection and the Right-of-Way Advisory Panel, made a determination that herbicides, when used under the guidance of an IVM program and other conditions as set forth in the determination, have less impact on wetlands than the sole use of mechanical techniques (see Appendices 5 & 6).

Based on the *DFA Decision Concerning The Wetland Impact Study Conducted Pursuant to 333 CMR 11.04(4)(c)(2),* incompatible vegetation will, therefore, be selectively treated following the recommendations in the *Decision* including the use of sensitive area approved herbicides and a no-spray area on or within ten feet of standing or flowing water.

9. ALTERNATE LAND USE

Most National Grid right-of-way acreage, estimated at over eighty percent, is owned by easement rights. This, in general, permits National Grid to construct, operate and maintain the electric lines, control vegetation and access the lines. The easement usually prohibits the landowner from erecting structures, inhibiting access by National Grid and its contractors, growing trees or otherwise interfering with the operation of the electric line. The property owner retains all other ownership rights and may use or restrict the use of the property on the right-of-way in any manner that conforms to the easement.

Alternative land uses that are compatible with the operation of electric utility lines are acceptable on National Grid's rights-of-way. Currently, land uses on rights-of-way include, but are not limited to, parking lots, golf courses, parks, driveways, roadways, crops, pastures, gardens, lawns and Christmas tree farms.

Sometimes landowners request that their property not be treated with herbicides. Through the easement, National Grid purchased the right to maintain vegetation on the right-of-way. National Grid utilizes the safest, most effective management program available. Generally, when the program is described to the property owner and/or the property owner observes the treatment application, their previous concerns are reduced or eliminated. If the property owner still requests that National Grid refrain from using herbicides on that property, National Grid may enter a formal agreement with that property owner. Before executing an agreement, the property owner must agree to maintain the vegetation on the right-of-way, at their expense, within National Grid's specifications. Specifications vary with each individual property, but basically require that woody vegetation be kept below a certain height and clear of access roads, gates, guys, poles and towers. National Grid's policy sets the maximum height criteria as the smaller of 12 feet or at a height such that five years of growth will not put the tree into the line.

10. Qualifications of Individuals Developing and Submitting the VMP and Supervising the IVM program

The professionals responsible for developing and submitting this plan are:

Dawn Travalini
Lead Vegetation Strategy Specialist
National Grid
40 Sylvan Road, Waltham, MA
Tel. 781-907-2448

Ms. Travalini received a B.S. degree in Biology and has completed graduate studies in Forestry. She has been at National Grid since 1993, initially working in the environmental department and then joining the forestry department in 2008. In both positions, she has been involved in the process of completing numerous regulatory compliance documents included National Grid's last VMP and multiple YOPs. She previously worked at Goldman Environmental Consultants and WCH Industries, environmental consulting firms.

She currently serves as a utility company representative on the Department of Agricultural Resources Rights-of-Way Advisory Panel, and is a member of the International Society of Arboriculture, Utility Arborist Association, and Society for Women Environmental Professionals.

Wendy L. Priestley, Ph.D.
Vegetation Control Service, Inc.
2342 Main Street, Athol, MA

Her qualifications extend from her education, work experience, and practical experience in the field of herbicide application, crew management and VMP consulting:

She currently holds a Ph.D. from The George Washington University, Washington, DC. In this capacity her research, analytical and organizational skill have aided her efforts in writing Vegetation Management Plans.

She has worked since 1985 for Vegetation Control Service, Inc., a consulting and service company that provides vegetation management programs for utilities, municipalities, private business and landowners throughout New England. In this capacity, she is a certified pesticide applicator and her experience includes both field and administrative experience in IVM programs. Since 1985, she has written or co-

authored a number of Vegetation Management Plans for utilities both in Massachusetts and throughout New England.

The professionals responsible for supervising this plan are:

National Grid retains qualified professionals to conceive, design, implement and supervise all phases of vegetation management operations. Vegetation management, especially herbicide application operations, requires an elevated level of technical expertise and experience to design the best integrated management approach and to adequately prescribe the proper treatments to control incompatible vegetation.

Overall supervision of the VMP and YOP's will be performed by:

Anne-Marie Moran
National Grid
939 Southbridge Street
Worcester, MA 01610
508-860-6925

Coordination of the VMP and YOP's will be performed by National Grid and contract foresters. The contract foresters are responsible for guaranteeing that their field crews comply with the VMP and YOP while the National Grid foresters will supervise the field implementation of the VMP and YOP:

Jason Magoon
National Grid
939 Southbridge Street
Worcester, MA 01610
508-860-6212

Mariclaire Rigby
National Grid
939 Southbridge Street
Worcester, MA 01610
508-860-6282

11. REMEDIAL SPILL AND EMERGENCY PLAN

This section is offered as a general procedural guide for responding to chemical spills or related accidents (related accidents include but are not limited to fire, poisoning and vehicle accidents). National Grid contracts with independent, professional, certified herbicide applicators that are responsible for the containment, clean up and reporting of chemical spills or accidents. The following is, therefore, only a guide to the items that shall be available to the treatment crew in the event of a chemical spill or emergency:

Types of Chemical Spills that Require Action

Chemicals include, but are not limited to the following:

- Herbicides
- Bar and Chain Oil
- Motor and Hydraulic Oil/Fluids
- Diesel Fuel
- Gasoline
- Title 3 Hazmat Materials

Required Spill Response Equipment

As a minimum, the treatment crew should have available on the job site:

- YOP with Emergency Contact List
- Safety Data Sheets (SDS)
- Product Label
- Product Fact Sheets (when applicable)
- Appropriate Absorbent Material
- Shovel
- Broom
- Flagging
- Leak Proof Container
- Heavy-duty Plastic Bags

Personal Contact

In the event of **Personal Contact** with hazardous chemicals:

- Wash affected area with plenty of soap and water;
- Change clothing which has absorbed hazardous chemicals;
- If necessary, contact a physician;
- If necessary, contact the proper emergency services;
- If necessary, follow the procedures for Major or Minor Spills as outlined in Appendix 8;
- Avoid breathing the fumes of hazardous chemicals.

Clean-up Procedures

Education and attention will constantly be directed at accident and spill prevention, however, in the event of an unfortunate incident, a spill response check list is included in Appendix 8 as a guide that will be included in the YOP's.

Reference Tables (information subject to change as necessary)

Table 3: Herbicide Manufacturers

MANUFACTURER	TELEPHONE NUMBER	SPECIAL INSTRUCTIONS
Albaugh Inc.	800-247-8013	
BASF Corporation	800-832-4357	
Dow Agro Sciences	800-992-5994	
E.I. du Pont de Nemours and Company	800-441-3637	Medical Emergencies
Monsanto	314-694-4000	
Nufarm	877-325-1840	Medical Emergencies
Rainbow Treecare	877-272-6747	

Table 4: State Agencies

STATE AGENCY	TELEPHONE NUMBER	SPECIAL INSTRUCTIONS
Massachusetts Pesticide Program	617-626-1700	A.S.A.P. (within 48 hours)
Massachusetts Department of Environmental Protection, Emergency Response Section	Main Office: (888) 304-1133	For emergencies involving reportable quantities of hazardous materials; required info: City/town, street address, site name (if applicable), material
	Southeast Region: (508) 946-2700	
	Northeast Region: (978) 694-3200	
	Central Region: (508) 792-7650	
	Western Region: (413) 784-1100	
Massachusetts Dept. of Public Health, Bureau of Environmental Toxicology Program	(617) 624-5757	
Massachusetts Poison Information Centers	(800) 682-9211	For medical emergencies involving suspected or known pesticide poisoning symptoms

Table 5: Emergency Services

EMERGENCY SERVICE	TELEPHONE NUMBER	SPECIAL INSTRUCTIONS
Massachusetts State Police, Central Office	617-566-4500 or 911	
Local Fire / Police Dept.	911	
ChemTrec	800-424-9300	
Clean Harbors	800-OIL-TANK	
Pesticide Hotline	800-858-7378	PST: 6:30 am – 4:30 pm, Web: www.NPIC.orst.edu

Table 6: National Grid's contacts in the case of a spill or accident

Anne-Marie Moran National Grid 939 Southbridge Street Worcester, MA 01610 508-860-6925	Jason Magoon National Grid 939 Southbridge Street Worcester, MA 01610 508-860-66212	Mariclaire Rigby National Grid 939 Southbridge Street Worcester, MA 01610 508-860-6282

Table 7: Local Boards of Health/Town Hall (to be filled as appropriate in the YOPs)

TOWN	BOARD OF HEALTH/ TOWN HALL

Appendix 1

333 CMR 11.00, Rights-of-Way Regulations

333 CMR 11.00: RIGHTS OF WAY MANAGEMENT

Section

11.01: Purpose

The purpose of 333 CMR 11.00 is to establish a statewide and uniform regulatory process which will minimize the uses of, and potential impacts from herbicides in rights-of-way on human health and the environment while allowing for the benefits to public safety provided by the selective use of herbicides. Specific goals of 333 CMR 11.00 are to:

1. Ensure that an Integrated Pest Management (IPM) approach to vegetation management is utilized on all rights-of-way covered by 333 CMR 11.00.

2. Establish standards, requirements and procedures necessary to prevent unreasonable risks to humans or the environment, taking into account the economic, social and environmental costs and benefits of the use of any pesticide.

3. Ensure ample opportunity for public and municipal agency input on potential impacts of herbicide application to rights-of-way in environmentally sensitive areas.

4. Establish a mechanism for public and municipal review of rights-of-way maintenance plans.

11.02: Definitions

For the purposes of 333 CMR 11.00, unless the context clearly requires otherwise, the following definitions shall apply:

Agricultural Area includes, but is not limited to, actively cultivated gardens, greenhouses, orchards, fields, pastures, and other areas under cultivation or agricultural management.

Applicant, any person representing any federal, state or local government or agency, utility, railroad or pipeline, that intends to maintain a right-of-way in the Commonwealth by application of herbicides.

Associated Surface Water Body, as identified on the most current available maps prepared by the Department of Environmental Protection, any body of water that is hydrologically connected to a Class A surface water source.

Ballast, the coarse gravel or crushed rock on which the ties, tracks and switching, signaling and communication devices of a railroad are laid.

Broadcast, any non-selective herbicide application technique which results in application to all vegetation within a target area.

Certified Vernal Pool, a confined basin depression, certified and mapped by NHESP pursuant to the provisions of 310 CMR 10.57(2)(a)5,6, which, at least in most years, holds water for a minimum of two continuous months during the spring and/or summer, and which is free of adult fish populations.

Certified Vernal Pool Habitat, that vernal pool habitat which has been certified and mapped by NHESP pursuant to the provisions of 310 CMR 10.57(2)(a)5,6 or, in the event that such habitat has not been mapped, the area extending 100 feet horizontally outward from the boundary of any Certified Vernal Pool.

Class A Waters, waters which are designated as a source of public water supply, as defined in 314 CMR 4.05(3)(a).

Class B Drinking Water Intakes, intakes to Class B waters suitable as sources of public water supply with appropriate treatment, as defined at 314 CMR 4.05(3)(b) and as identified on the most current available maps prepared by the Department of Environmental Protection.

Department, the Department of Agricultural Resources.

FIFRA, the Federal Insecticide, Fungicide and Rodenticide Act, Public Law 92-516.

Foliar Treatment, any technique which applies herbicide to leaves of target vegetation.
Inhabited Area, any area where people generally live, work or gather, including, but not limited to, any residence, school, hospital, park or recreational facility.

Interim Wellhead Protection Area (IWPA), for public water systems using wells or well fields that lack a Department of Environmental Protection-approved Zone II, an interim wellhead protection area, as that term is defined in the Massachusetts drinking water regulations, 310 CMR 22.02, and as identified on the most current available maps prepared by the Department of Environmental Protection, shall apply. Generally, this is a ½- mile radius for sources whose approved pumping rate is 100,000 gallons per day or greater. For smaller sources, the radius in feet is determined by multiplying the approved pumping rate in gallons per minute by 32 and adding 400.

Limited Application Waiver, a waiver from the requirements of 333 CMR 11.05 and 11.06, granted at the Department's sole discretion pursuant to 333 CMR 11.03(14), when the reason for the application is emergency public health or safety or when the application is for one time only.

Limited Spray Area, any area that is both within a Right-of-Way and within:

(a) any Zone II or IWPA
(b) a distance of between 100 feet and 400 feet of any Class A Surface Water Source
(c) a distance of between 10 and 200 feet of any tributary or associated surface water body where the tributary or associated surface water body runs outside the Zone A for the Class A surface water source
(d) a lateral distance of between 100 and 200 feet for 400 feet upstream, on both sides of the river, of a Class B Drinking Water Intake
(e) a distance of between 50 and 100 feet of any identified Private Well
(f) a distance of between 10 and 100 feet of any Wetlands or Water Over Wetlands
(g) a distance of between 10 feet from the mean annual high water line of any river and the outer boundary of the Riverfront Area
(h) a distance of between ten feet from any Certified Vernal Pool and the outer boundary of any Certified Vernal Pool Habitat
(i) a distance of 1oo feet of any Agricultural or Inhabited Area.
Low Pressure, pressure under 60 pounds per square inch (psi).

Maps, United States Geological Survey maps of scale 1:25,000 or other maps, as determined by the Department, which are of such accuracy and scale to provide sufficient detail so that sensitive areas can be delineated.

NHESP, the Natural Heritage and Endangered Species Program within the Massachusetts Division of Fisheries and Wildlife.

No-Spray Area, any area that is both within a Right-of-Way and within:

(a) any Zone I
(b) 100 feet of any Class A Surface Water Source
(c) 100 feet of any tributary or associated surface water body where the tributary or associated surface water body runs within 400 feet of a Class A surface water source
(d) 10 feet of any tributary or associated surface water body where the tributary or associated surface water body is at a distance greater than 400 feet from a Class A surface water source
(e) a lateral distance of 100 feet for 400 feet upstream, on both sides of the river, of a Class B Drinking Water Intake
(f) 50 feet of any identified Private Well
(g) 10 feet of any Wetlands or Water Over Wetlands
(h) 10 feet of the mean annual high-water line of any river
(i) 10 feet of any Certified Vernal Pool.
Person, an individual, association, partnership, corporation, company, business organization, trust, estate, the Commonwealth or its political subdivisions, administrative agencies, public or quasi-public corporation or body, or any other

legal entity or its legal representatives, agent or assignee, or a group of persons.

Person Aggrieved, any person who, because of an act or failure to act by the Department may suffer an injury in fact which is different either in kind or magnitude from that suffered by the general public and which is within the scope of the interests identified in 333 CMR 11.00. Such person must specify in writing sufficient facts to allow the Department to determine whether or not the person is in fact aggrieved.

Private Well, any private drinking water supply identified by the local Board of Health, the well owner or the Department of Agricultural Resources.

Private Well Registry, a registry of private wells located within 100 feet of a right-of-way which is maintained by the Department of Agricultural Resources. Homeowners must notify the Department by completing a registration form which is available directly from the Department or online at the Department website.

Public Ground Water Source, a source of water for a Public Water Supply System, as that term is defined in the Massachusetts drinking water regulations at 310 CMR 22.02.

Public Water Supplier, as defined at 310 CMR 22.02(1), any person who owns or operates a public water supply system.

Right(s)-of-Way (ROW), any roadway, or thoroughfare on which public passage is made and any corridor of land over which facilities such as railroads, powerlines, pipelines, conduits, channels or communication lines or bicycle paths are located.

Rights-of-Way Advisory Panel, a panel established to advise the Department on issues relating to 333 CMR 11.00 and to fulfill specific functions as detailed within 333 CMR 11.05 and 11.11.

River, a river as defined at 310 CMR 10.04 and as identified on the most current available maps prepared by the Department of Environmental Protection.

Riverfront Area, a riverfront area as defined at 310 CMR 10.58(2) and as identified on the most current available maps prepared by the Department of Environmental Protection. In general, this term shall mean the area between the mean annual high-water line of a perennially flowing river and a parallel line 200 feet away.

Selective Application, any application of herbicides, in such a manner that the delivery to the target vegetation is optimized and delivery to non-target vegetation and the environment is minimized.

Sensitive Areas, as defined in 333 CMR 11.04, any areas within Rights-of-Way, including No-Spray and Limited-Spray Areas, in which public health, environmental or agricultural concerns warrant special protection to further minimize risks of unreasonable adverse effects.

State-listed Species, any species on the Massachusetts list of Endangered, Threatened, and Special Concern Species as described in the Massachusetts Endangered Species Act (M.G.L. c. 131A; 321 CMR 10.02).

State-listed Species Habitat, the Estimated Habitats of Rare Wildlife (310 CMR 10.59 and 10.37) and the Priority Habitats for State-listed Species (321 CMR 10.02) as shown on the most recent edition of the Massachusetts Natural Heritage Atlas prepared by NHESP.

Stem Treatment, any technique including, but not limited to, stump, basal, stem, injection, banding, frill, or girdle and any other technique which delivers herbicide at low pressure to the stump, base or stem of the target vegetation.

Surface Water Source, any lake, pond, reservoir, river, stream or impoundment designated as a public water supply in the Massachusetts Surface Water Quality Standards, 314 CMR 4.00, as identified on the most current available maps prepared by the Department of Environmental Protection.

Target Vegetation, any plant species which has the potential to interfere with the operation and safety of the right-of-way.

Touch-up Application, any limited application of herbicides following an initial treatment, which is necessary to achieve the desired vegetation control.

Tributary, as identified on the most current available maps prepared by the Department of Environmental Protection, any body of running, or intermittently running, water which moves in a definite channel, naturally or artificially created, in the ground due to a hydraulic gradient, and which ultimately flows into a Class A surface water source, as defined in 314 CMR 4.05(3)(a).

Vegetation Management Plan (VMP), a long term management plan for the applicant's right-of-way system which describes the intended program for vegetation control over a five year period.

Vernal Pool, see Certified Vernal Pool.

Water Over Wetlands, the ocean or any estuary, lake or pond as defined at 310 CMR 10.04.

Wetland(s), any of the following areas as defined in 310 CMR 10.02(1)(a), (b), (c) and (f):

(a) Any bank, the ocean
any freshwater wetland, any estuary
any coastal wetland, any creek
any beach, bordering any river
any dune, on any stream
any flat, any pond
any marsh, or any lake
or any swamp

(b) Land under any of the water bodies listed above
(c) Land subject to tidal action
(f) Riverfront area.

Wetlands Determination, a written determination of the boundaries of Wetlands and boundaries of areas within 100 feet of Wetlands in accordance with the regulations of the Department of Environmental Protection (DEP) at 310 CMR 10.05(3)(a)1. and 2.. 310 CMR 10.03(6)(b) require applicants not eligible for a public utility exemption to submit these determinations with their VMPs if they will apply herbicides within 100 feet of wetlands and will not submit a Notice of Intent under M.G.L.c. 131, §40, the Wetlands Protection Act. In order to obtain a Wetlands Determination, the applicant should submit a request to the conservation commission on maps of a scale that will enable the conservation commission or Department of Environmental Protection to find and delineate the boundaries of Wetlands and buffer zones within the vicinity of the right-of-way herbicide management area. To be considered "valid", the Wetlands Determination should be made no sooner than six months immediately prior to the submission of the Vegetation Management Plan. The Wetlands Determination shall cover the period of the Vegetation Management Plan only and shall expire at the end of the five year period of that Vegetation Management Plan.

Yearly Operational Plan (YOP), the yearly operational plan which describes the detailed vegetation management operation for the calendar year consistent with the terms of the long term Vegetation Management Plan.

Zone A, as identified on the most current available maps prepared by the Department of Environmental Protection, the protective land area for a Surface Water Source, Class A water source, Tributary, or Associated Surface Water Body defined in 310 CMR 22.02 as:

(a) the land area between the Class A surface water source and the upper boundary of the bank;
(b) the land area within a 400 foot lateral distance from the upper boundary of the bank of a Class A surface water source, as defined in 314 CMR
4.05(3)(a); and
(c) the land area within a 200 foot lateral distance from the upper boundary of the bank of a Tributary or Associated Surface Water Body.
Zone I, as identified on the most current available maps prepared by the Department of Environmental Protection and as defined at 310 CMR 22.02, the protective radius required around a public water supply well or wellfield. For public water system wells with approved yields of 100,000 gallons per day (gpd)or greater, the protective radius is 400 feet. Tubular wellfields require a 250 foot protective radius. Protective radii for all other public water system wells are determined by the following equation: Zone I radius in feet = (150 x log of pumping rate in gpd) –350.
Zone II, as identified on the most current available maps prepared by the Department of Environmental Protection and as defined at 310 CMR 22.02, the aquifer recharge area for a public water supply well or wellfield.

11.03: General Provisions

(1) No person shall use an herbicide for the purpose of clearing or maintaining a right-of-way unless appropriately certified by the Department, or licensed by the Department and working under the on-site supervision of an appropriately certified applicator.

(2) No person shall use an herbicide for the purpose of clearing or maintaining a right-of-way except in accordance with a Vegetation Management Plan (VMP) and a Yearly Operational Plan (YOP) as approved by the Department. The YOP shall be available at the work site at all times during herbicide applications and be made available to the Department and municipal officials including the Conservation Commission and Board of Health upon reasonable request.

(3) No person shall handle, mix or load an herbicide concentrate on a right-of-way within 100 feet of a sensitive area.

(4) The perimeter of any sensitive areas which are not readily identifiable on the ROW shall be identified with a clearly visible marker system, consistent with the VMP, prior to any herbicide application.

(5) No foliar application of herbicides shall be used to control vegetation greater than 12 feet in height except for side trimming.

(6) No herbicide shall be applied when the wind velocity is such that there is a high propensity to drift off target and/or during measurable precipitation, and no person shall apply herbicides in such a manner that results in drift into any No-spray Area.

(7) No person shall apply herbicides by aircraft for the purpose of clearing or maintaining a right-of-way.

(8) No touch-up applications shall be carried out except under the following conditions:
(a) Touch-up applications must occur within 12 months of the initial application.
(b) All applicable public notification procedures of M.G.L. c. 132B, § 6B, as outlined in 333 CMR 11.07(1) and (3), are followed.
(c) No more than 10% of the initially identified target vegetation on the applicant's right-of-way in any municipality may be treated and the total amount of herbicide applied in any one year shall not exceed the limits specified by the label or Yearly Operational Plan.
(d) The Department may impose such additional restrictions or conditions on the use of herbicides as it deems necessary to protect public health and the environment.

(9) The Department will maintain mailing lists of individuals and groups desiring to obtain notices on various aspects of the Program.

(10) No person shall apply any herbicide identified as a Potential Ground Water Contaminant pursuant to 333 CMR 12.00 to a right-of-way.

(11) No person shall use an herbicide for the purpose of clearing or maintaining a right-of-way unless that person has obtained the most current available map of public ground water sources from the Department of Environmental Protection.

(12) No person shall use an herbicide for the purpose of clearing or maintaining a right-of-way unless that person has done one or more of the following:

(a) obtained a current list of identified Private Wells within 100 feet of the right-of-way from the Board of Health, or
(b) obtained a current list of all private wells, within 100 feet of the right of way from the Department of Agricultural Resources private well registry; or (c) followed an alternative Private Well identification method outlined in an approved YOP.

(13) The applicator shall provide any employee of any state agency, or authority as defined in M.G.L. c. 3, § 39, when such employee is, within a right-of-way, using pesticides, supervising the use of pesticides, or present during the use of pesticides, with personal protective equipment and clothing. Applicators should note that other federal or state laws or regulations pertaining to pesticide applications may require this personal protective equipment to include protections according to Material Safety Data Sheets (MSDS's), the product label, and any other supporting technical data supplied by the manufacturer.

(14) Notwithstanding the provisions of 333 CMR 11.03(2) or other provisions of 333 CMR 11.00, the Department may, at its sole discretion, issue Limited Application Waivers to applicants wishing to apply herbicides to clear or maintain rights-of-way without VMPs or YOPs, but only under the following conditions:

(a) The applicant must demonstrate either:
1. that the application will not occur more than once in a five year period unless a VMP and a YOP are prepared and all other requirements of 333 CMR 11.00 are met; or
2. that the application is necessary to protect public health or safety.

(b) The applicant must still adhere to all public notification requirements established at 333 CMR 11.07(1) and (3).
(c) The applicant must provide the Department with a letter establishing the concurrence of the chief elected official or board of selectmen of the municipality where the application is to be made.
(d) The applicant may only use herbicides on the Department's "Herbicides Recommended for Use in Sensitive Areas List."
(e) If the application could impact Wetlands, the Department recommends that the applicant send a copy of its application for a Limited Application Waiver to the Department of Environmental Protection's Division of Wetlands and Waterways no less than 21 days before the proposed application.
(f) It should be noted that, with certain exceptions for public utilities, wetlands regulations at 310 CMR 10.03(6)(b) currently require

Wetlands Determinations prior to any application within 100 feet of a Wetland.

Limited Application Waivers shall be issued solely at the Department's discretion, and the Department may impose such additional restrictions or conditions on the use of herbicides as it deems necessary to protect public health and the environment.

11.04: Sensitive Area Restrictions

(1) General

In any sensitive area:

(a) No more than the minimum labeled rate of herbicide for the appropriate site, pest, and application method shall be applied.

(b) Herbicides shall only be applied selectively by low pressure, using foliar techniques or basal or cut-stump applications, or other method approved for use by the Department.

(c) No person shall apply herbicides for the purpose of clearing or maintaining a right-of-way in such a manner that results in drift to any area within 10 feet of standing or flowing water in a wetland; or area within 400 feet of a public drinking water supply well; or area within 100 feet of any Class A surface water used as a public water supply; or area within 50 feet of a Private Well.

(d) Only herbicides specified by the Department as acceptable for use in sensitive areas pursuant to the Cooperative Agreement executed between the Department of Agricultural Resources and the Department of Environmental Protection on July 1-2, 1987, or future amendments thereto, shall be used in sensitive areas. Applicants proposing to use an herbicide which has been registered for use on rights-of-way but has not yet been evaluated pursuant to the provisions of the Cooperative Agreement may request that such herbicides be evaluated pursuant to said provisions. For an herbicide that has been evaluated pursuant to the provisions of the Cooperative Agreement, applicants proposing to use such herbicide in a manner inconsistent with the terms and conditions of use imposed in the guidelines may request a modification or waiver of such terms or conditions. A request for such modification or waiver shall provide a detailed rationale for use, with all relevant data including but not limited to environmental fate, efficacy and human health effects of the proposed herbicide. Such herbicides and/or uses shall be subject to the evaluation standards adopted by the Departments of Agricultural Resources and Environmental Protection in the Cooperative Agreement.

Commentary
Applicants not eligible for the public utilities exemption from the Wetlands Protection Act outlined at 310 CMR 10.03(6)(a), who wish to apply pesticides registered for use in Massachusetts to rights-of-way, may choose to apply herbicides determined to be suitable for use in sensitive areas in accordance with the provisions of the Cooperative Agreement mentioned above or, alternatively, such applicants may

proceed pursuant to the provisions of 310 CMR 10.00 as authorized by M.G.L. c. 131, § 40.

(e) The Department may impose such additional restrictions or conditions on the use of herbicides within or adjacent to sensitive areas as it determines necessary to protect human health or the environment. Such changes may be proposed by a municipal agency or individual during the public comment period.

(f) In the event of a question or dispute as to which setback applies to a sensitive area, the most restrictive setback shall apply.

(2) Water Supplies

(a) Public Ground Water Sources

1. No herbicides shall be applied within a Zone I.
2. No herbicides shall be applied within a Zone II or IWPA unless:
    a. A minimum of 24 months has elapsed since the last application to the site; and
    b. Herbicides are applied selectively by low pressure, using foliar techniques or basal or cut-stump applications.

(b) Class A Public Surface Water Sources, Associated Surface Water Bodies, Tributaries and Class B Drinking Water Intakes

1. No herbicides shall be applied within 100 feet of any Class A public surface water source.
2. No herbicides shall be applied within 100 feet of any tributary or associated surface water body located within the Zone A of a Class A public surface water source, or within 10 feet of any tributary or associated surface water body located outside of the Zone A of the Class A public surface water source.
3. No herbicides shall be applied within a lateral distance of 100 feet for 400 feet upstream of any Class B Drinking Water Intake.
4. No herbicides shall be applied within a distance of between 100 feet from any Class A surface water source and the outer boundary of any Zone A, or within a distance of between 10 feet and the outer boundary of the Zone A for any tributary or associated surface water body located outside of the Zone A of a Class A surface water source, or within a lateral distance of between 100 and 200 feet for 400 feet upstream of a Class B Drinking Water Intake**,** unless:
    a. A minimum of 24 months has elapsed since the last application to the site; and
    b. Herbicides are applied selectively by low pressure, using foliar techniques or basal or cut-stump applications.

(c) Private Wells

1. No herbicides shall be applied within 50 feet of an identified Private Well.

2. No herbicides shall be applied within a distance of between 50 feet and 100 feet of an identified Private Well, unless:

a. A minimum of 24 months has elapsed since the last application to the site; and

b. Herbicides are applied selectively by low pressure, using foliar techniques or basal or cut-stump applications.

(3) State-listed Species Habitat

(a) Any person proposing to apply an herbicide within any State-listed Species Habitat who does not have a current Yearly Operational Plan approved in writing by the Division of Fisheries and Wildlife pursuant to 321 CMR 10.14(12), shall submit all necessary materials required for review pursuant to 321 CMR 10.18.

(b)The management of vegetation within existing utility rights-of-way shall be exempt from the requirements of 321 CMR 10.18 through 10.23, provided that the management is carried out in accordance with a Yearly Operational Plan approved in writing by the Division of Fisheries and Wildlife, pursuant to 321 CMR 10.14(12).

(c) No person shall apply an herbicide within State-listed Species Habitat unless the application is approved by the Division of Fisheries and Wildlife pursuant to 333 CMR 11.04 (3a and 3b), and such approval is submitted to the Department.

(4) Wetlands, Waters Over Wetlands, Riverfront Areas, and Certified Vernal Pools

(a) No herbicide shall be applied on or within 10 feet of a Wetland or Water Over a Wetland, within 10 feet of the mean annual high-water line of any River, or within 10 feet of any Certified Vernal Pool.

(b) No herbicide shall be applied on or within a distance of between 10 feet and 100 feet of any Wetland or Water Over a Wetland, within a distance of 10 feet from the mean annual high-water line of any River and the outer boundary of any Riverfront Area, or within a distance of 10 feet from any Certified Vernal Pool and the outer boundary of any Certified Vernal Pool Habitat unless:

1. A minimum of 12 months has elapsed since the last application to the site; and

2. Herbicides are applied selectively by low pressure, using foliar techniques or basal or cut-stump applications.

(c) Notwithstanding 333 CMR 11.04(4) (a) –(b), public utilities providing electric, gas, water, telephone, telegraph and other telecommunication services (and other applicants, if consistent with all relevant provisions of the Massachusetts Wetlands Protection Act and its regulations in effect at the time of application) may apply herbicides on or within 10 feet of a Wetland in accordance with the following conditions:

1. Submission of a study, the design of which is subject to prior approval by the Departments of Agricultural Resources and Environmental Protection, evaluating impacts of the proposed vegetation management

program utilizing herbicides on or within 10 feet of Wetlands, and comparing those impacts to those which would result if only non-chemical control methods were used in these areas. The study must detail vegetation management practices and use patterns specific to those used by the type of entity submitting the study; and

2. A finding by the Department, after consultation with the Rights-of-Way Advisory Panel, that the proposed vegetation management program utilizing herbicides on or within 10 feet of Wetlands will result in less impacts to the Wetlands than mechanical control.
3. Notwithstanding the above, no herbicides shall be applied on or within ten feet of any standing or flowing water in a Wetland.

(5) Inhabited and Agricultural Areas

No foliar herbicide shall be applied within 100 feet of any Inhabited Area or any Agricultural Area unless:

1. A minimum of 12 months has elapsed since the last application to the site; and
2. Herbicides are applied selectively by low pressure, using foliar techniques or basal or cut-stump applications.

11.05: Vegetation Management Plan (VMP)

(1) General.

(a) Unless otherwise specified by the Department, all VMPs should be submitted by the applicant no later than September 1st prior to the calendar year of the proposed first year of maintenance. All approved VMPs shall be effective for a five year period unless otherwise modified, or revoked by the Department.
(b) The VMP shall be presented on forms and/or format approved by the Department.

(2) Requirements. The VMP shall include, but not be limited to, the following:

(a) General statement of goals and objectives of the VMP.
(b) Identification of target vegetation.
(c) Intended methods of vegetation management and rationale for use, including vegetation control techniques, equipment proposed for use, timing of applications and alternative control procedures.
(d) Discussion of justification for proposed herbicide applications, including a description of the alternative control methods considered and the reasons that they were rejected.
(e) Methods, references and sources for identifying sensitive areas and control strategies proposed for sensitive areas. Applicants should note that Department of Environmental Protection regulations at 310 CMR 10.03(6)(b) currently require Wetlands Determinations for applicants that are not eligible for a public utility exemption.
(f) Operational guidelines for applicators relative to herbicide use.

(g) Identification and qualifications of individuals developing and submitting a plan.
(h) A detailed description of the IPM Program, showing how it will minimize the amount and frequency of herbicide application.
(i) Description of alternative land use provisions or agreements that may be established with individuals, state, federal or municipal agencies that would minimize the need for herbicides, including the rationale for accepting or denying any reasonable request made by any individual.
(j) Description of a remedial plan to address spills and related accidents.
(k) For state agencies and authorities as defined in M.G.L. c. 3, § 39, a description of the applicant's policy to eliminate or, if necessary, reduce the use of pesticides for any vegetation management purpose along roadways, and a demonstration that, for the proposed application, the costs of non-chemical vegetation control significantly outweigh the benefits.

(3) Public Notice, Review and Comment.

(a) Upon receipt of the proposed VMP, the Department shall schedule and hold appropriate regional public hearings affording all interested parties the opportunity to comment, both at the hearings and in writing to the Department, on the proposed plan.
(b) At least 21 days prior to the public hearings, the Department shall publish notice of the hearings in the Environmental Monitor and regionally located newspapers, and send notice to municipalities covered by the plan and to the appropriate mailing list. The notice will include locations where copies of the VMP can be reviewed.
(c) The public shall have no less than 45 days, starting from publication of the Environmental Monitor notice, to comment upon proposed VMPs, unless the Department extends the comment period for good cause.
(d) Wherever a chief elected official, Board of Health or Conservation Commission in a municipality covered by the proposed VMP requests a copy of the proposed plan, the applicant shall, at least 21 days prior to the end of the public comment period, respond to this request. The response must either include a copy of the proposed VMP, or an
Internet address where the VMP may be viewed and a note that a hard copy will be provided promptly upon further request.

(4) Disposition of VMP.

(a) 25 copies of the proposed VMP shall be submitted to the Department. The Department shall distribute copies of the proposed VMP to each member of the Rights-of-Way Advisory Panel. The Department may, at its sole discretion, allow electronic presentation of the VMP in lieu of some or all of the 25 copies that would otherwise be submitted pursuant to this subsection.
(b) Within 30 days of the end of the public comment period unless extended for good cause, the Rights-of-Way Advisory Panel shall review the VMPs and recommend in writing to the Department

approval, denial or modification of each VMP; if necessary, the Advisory Panel may request additional information from the applicant.
(c) Within 21 days of the end of the Rights-of-Way Advisory Panel review period, unless extended by the Department for good cause, the Department will notify the applicant and the Advisory Panel in writing one of the following:

1. request for additional information or modification; or
2. denial of VMP; or
3. approval of VMP.

(d) The VMP may be modified, withdrawn or amended by the applicant through a written request sent by certified mail to the Department.
(e) Resubmission of a denied VMP, updating of a VMP, or a significant amendment to an approved VMP shall be processed according to 333 CMR 11.05.
(f) The applicant must send a copy of the approved VMP, or an Internet address where the VMP may be viewed and a note that a hard copy will be provided promptly upon further request, to the chief elected official, Board of Health, and Conservation Commission in each municipality covered by the plan.

(5) Time for Action. Non-action by the Department on a VMP within the time specified herein does not constitute approval of the submitted plan. In the event that the Department fails to notify the applicant of a decision within the time specified above and upon written request from the applicant, the Commissioner must issue a finding within ten days of receipt stating the reason for the delay and providing an estimated completion date.

11.06: Yearly Operational Plan (YOP)

(1) General.
(a) The applicant is responsible for the accuracy and completeness of all information submitted with the YOP. The YOP shall be consistent with the objectives of the VMP and shall describe the intended operational program for that calendar year.
(b) The YOP shall be presented on forms and in a format approved by the Department.

(2) Requirements. The YOP shall include but not be limited to the following:
(a) Maps locating the rights-of-way and sensitive areas not readily identifiable in the field;
(b) Herbicides proposed including EPA Registration numbers, application rates, carriers and adjuvants;
(c) Herbicide application techniques and alternative control procedures proposed.
(d) The name, address and phone number of the company which will perform any herbicide treatment;
(e) Identification of target vegetation;
(f) The name, address and phone number of the individual representing the YOP applicant;

(g) Description of methods used to flag or otherwise designate sensitive areas on the right-of-way;
(h) Herbicide Fact Sheets as approved by the Department; and
(i) Procedures and locations for handling, mixing and loading of herbicide concentrates.

(3) Public Notice, Review and Comment.

(a) Upon submittal of the YOP for approval, the Department will publish a notice in the Environmental Monitor. Said notice shall be provided by the applicant and shall include the information on the municipalities through which the rights-of-way pass, a brief description of the intended program, and the procedure for public review and comment.
The Department shall send notification of the publication to the applicant and the appropriate mailing list.
(b) Upon submittal of the YOP to the Department, the applicant shall provide by certified mail under separate cover to the Board of Health, Conservation Commission, chief elected municipal official, and where applicable, the Massachusetts Water Resources Authority and Massachusetts Department of Conservation and Recreation, a copy of the proposed YOP (or an Internet address where the proposed YOP may be viewed and a note that a hard copy will be provided promptly upon request) and the Environmental Monitor notice for the municipality or municipalities in which the herbicide treatment is proposed. Community water suppliers shall receive electronic information or a one page notification by mail which provides details about where to receive more information. The applicant shall maintain copies of the packet sent to municipalities and certified mail receipts. The applicant shall make copies of the packet, certified mail receipts, and any further correspondence regarding hard copies of YOPs in lieu of Internet viewing, available to the Department upon request.
(c) The Department shall allow a 45-day comment period on proposed YOPs, unless extended for good cause, commencing with the publication of the notice in the Environmental Monitor and receipt of the proposed YOP and Environmental Monitor notice by each municipality.
(d) The Department may approve, deny or modify YOPs after the 45-day comment period has expired.

(4) Disposition of YOP.

(a) The applicant shall submit the YOP to the Department at least 90 days prior to the proposed commencement of application to allow completion of the comment and review period.
(b) The Department shall review the YOP to ensure that the YOP is consistent with the approved VMP. Any inconsistencies or deficiencies will be noted by the Department and returned with the YOP to the applicant.

(c) Where practical, the Department shall approve or deny the YOP within 90 days of receipt. The Department will provide notice of the decision to the applicant, municipal agencies and commentators in writing.
(d) The approved YOP in conjunction with the VMP shall govern the application of herbicide for a period not to exceed 12 months in accordance with other laws and regulations of the State and Federal governments and impose such conditions as necessary to minimize the risk of adverse effects on human health and the environment.

(5) Time for Action. Non-action by the Department on a YOP within the time specified herein does not constitute approval of the submitted plan. In the event that the Department fails to notify the applicant of a decision within the time specified above and upon a written request from the applicant, the Commissioner must issue a finding within ten days of receipt stating the reason for the delay and providing an estimated completion date.

11.07: Public Notification

(1) At least 21 days in advance of application of herbicide to a right-of-way in any city or town, the applicant shall notify the Department, the board of health and the local public water supplier and, by registered mail, the mayor, city manager or chairman of the board of selectman, and the conservation commission in the municipality where the right-of-way lies. The notice shall include the following information: the approximate dates on which such herbicide application shall commence and conclude, provided however, that said application shall not commence more than ten days before nor conclude more than ten days after said approximate dates; the method and locations of application; a Department-approved Herbicide Fact Sheet on the active ingredient(s) of the herbicide(s) used; the EPA registration number(s) for the herbicide(s) used; the name, title, business address and phone number of the certified commercial applicator or licensed applicator, or the contractor, employer or employees responsible for carrying out the application. Where specific information required for this notice is already contained in the current YOP that is on file with the local official, the applicant may incorporate the appropriate pages of the YOP by reference in its notice to that official, indicating that these pages are also directly available from the applicant upon request.

(2) This public notice may run concurrently with the public notice and comment period in 333 CMR 11.06(3), provided that the notice is distributed at least 21 days prior to the herbicide application, and that, prior to the herbicide application, the public notice and comment period has closed and the Department has granted YOP approval without modifications. When the Department's final approval requires modifications or application dates are selected after YOP approval, separate notice under 333 CMR 11.07(a) is required.

(3) At least 48 hours prior to the application referred to in 11.07(a), the applicant must publish a conspicuous notice in at least one newspaper of general circulation in the city or town where the right-of-way lies. The notice must appear in the local section of the newspaper and measure at least four by five

inches in size. The notice shall contain the following information: the method and locations of pesticide application; the approximate dates on which the pesticide application shall commence and conclude, provided that the applications shall not commence more than ten days before nor conclude ten days after said approximate dates; a list of potential pesticides to be used; a description of the purpose of the application; and the name, title, business address and phone number of a designated contact person representing the applicant from whom any citizen may request further information. The notice should apply only to the calendar year in which the notice is published. Upon request the notice must be made available to the Department.

11.08: Notice of Modification and Revocation

(1) The Department may suspend approval of any VMP or YOP, by written notice to the applicant and applicator, halting the application of herbicide to that right-of-way of the above mentioned YOP. After 21 days if the applicant does not request a hearing, the Department may revoke or modify the VMP and YOP, if it finds:

> (a) that the terms, conditions of restrictions thereof, are being violated or are inadequate to avoid unreasonable adverse effects on the environment or on human health; or
> (b) that the applicant has made a false or misleading statement or has not provided information requested by the Department or Rights-of-Way Advisory Panel; or
> (c) that the applicant has violated any provision of the Massachusetts Pesticide Control Act or FIFRA, or any regulations, standards, orders or license issued under either.

(2) Upon notice of revocation or modification, the applicant may modify the YOP by written request to the Department. Applications to modify the YOP shall be submitted in the manner set forth in 333 CMR 11.06 and disposed of in the manner set forth in 333 CMR 11.06. The Department may waive all or part of the requirement if it determines that the proposed changes do not significantly change the terms of the approved YOP.

11.09: Rights of Appeal

Any person aggrieved by the decision of the Department to approve, deny, modify or revoke a VMP or YOP may request an adjudicatory hearing. The request for a hearing must be received by the Department within 21 calendar days after receipt of the decision. The request should state clearly and concisely the facts of the proceeding, the reasons the decision is alleged to be inconsistent with 333 CMR 11.00 and the relief sought by the adjudicatory hearing. The adjudicatory hearing before the Pesticide Board shall be conducted in accordance with the informal rules of adjudicatory proceeding as set forth in the regulations promulgated pursuant to M.G.L. c. 30A.

11.10: Penalties

Any person who violates any provision of 333 CMR 11.00 shall be subject to the criminal and civil penalties set forth in M.G.L. c. 132 B, § 14.

11.11: Rights-of-Way Advisory Panel

(1) A Rights-of-Way Advisory Panel shall be established to advise the Department on issues relating to 333 CMR 11.00 and to fulfill specific functions as detailed within 333 CMR 11.00.

(2) The Department shall request that the following members participate on the Rights-of-Way Advisory Panel: the Commissioners/Secretaries or his/her designee of the Department of Environmental Protection, the Department of Public Health, and the Executive Office of Transportation and Construction; and a representative of each of the following, all to be appointed by the Department Commissioner: the Massachusetts Association of Conservation Commissions, the Massachusetts Association of Health Boards, the Massachusetts Department of Conservation and Recreation, and an Environmental Advocacy Organization Representative, a member of the University of Massachusetts Extension who is well versed in weed science and Integrated Pest Management of weeds, a representative of the Massachusetts Railroad Association, a representative of a utility company, and a commercial pesticide applicator.

(3) Non-agency representatives shall remain on the panel for a term of five years. Any member absent from two or more consecutive meetings may be removed from the Advisory Panel at the discretion of the Commissioner of the Department, and a replacement requested from the representative agency, industry group, or association.

(4) The Advisory Panel shall meet at least once each year, and shall hold further meetings upon the request of the Department of Agricultural Resources or at the request of any two members of the Advisory Panel.

(5) All Advisory Panel members shall serve without compensation.

Appendix 2

List of Municipalities through which National Grid Manages Rights-of-Way

Abington
Adams
Amesbury
Andover
Ashburnham
Athol
Attleboro
Auburn
Avon
Ayer
Barre
Belchertown
Bellingham
Berlin
Bernardston
Beverly
Billerica
Blackstone
Boxford
Boylston
Bridgewater
Brimfield
Brockton
Brookfield
Buckland
Charlemont
Charlton
Chelmsford
Cheshire
Clarksburg
Clinton
Cohasset
Colrain
Conway
Danvers
Deerfield
Dighton
Douglas
Dracut
Dudley
Dunstable
East Bridgewater
East Brookfield
Easthampton
East Longmeadow
Easton
Egremont
Erving
Everett
Fall River
Fitchburg
Florida
Foxborough
Franklin
Gardner
Georgetown
Gill
Gloucester
Grafton
Granby
Great Barrington
Greenfield
Groton
Groveland
Halifax
Hampden
Hancock
Hanson
Hanover
Hardwick
Harvard
Haverhill
Heath
Hingham
Holbrook
Holden
Hopedale
Hubbardston
Hull
Lancaster
Lanesborough
Lawrence
Lee
Leicester
Lenox
Leominster
Leverett
Leyden
Littleton
Lowell
Ludlow
Lunenburg
Lynn
Lynnfield
Malden
Mansfield
Marlborough
Medford
Medway
Melrose
Mendon
Merrimac
Methuen
Middleton
Milford
Millbury
Millville
Monroe
Monson
Montague
Newbury
Newburyport
New Salem
North Adams
Northampton
North Andover
North Attleborough
Northborough
Northbridge
North Brookfield
North Reading
Norton
Norwell
Oakham
Orange
Oxford
Palmer
Paxton
Peabody
Pelham
Pembroke
Pepperell
Petersham
Phillipston
Plainville
Princeton
Randolph
Reading
Rehoboth
Revere
Richmond
Rockland
Rockport
Rowe
Rowley
Royalston
Rutland
Salem
Salisbury
Saugus
Scituate
Seekonk
Sheffield
Shelburne
Shirley
Shrewsbury
Shutesbury
Somerset
Southborough
Southbridge
Spencer
Sterling
Stockbridge
Stoughton
Sturbridge
Sunderland
Sutton
Swampscott
Swansea
Templeton
Tewksbury
Topsfield
Tyngsborough
Upton
Uxbridge
Wakefield
Ware
Warren
Warwick
Webster
Wendell
Wenham
Westborough
West Boylston
West Bridgewater
West Brookfield
Westford
Westminster
West Newbury
Westport
West Stockbridge
Weymouth
Wilbraham
Williamstown
Wilmington
Winchendon
Winthrop
Whitman
Worcester
Wrentham

Appendix 3

Chapter 132B

Statutes - Pesticides
MGL 132B Massachusetts Pesticide Control Act

Chapter 132B: Section 1. Title; purpose.

Section 1. This chapter shall be known and may be cited as the Massachusetts Pesticide Control Act.
The purpose of this chapter is to conform the laws of the commonwealth to the Federal Insecticide, Fungicide, and Rodenticide Act, Public Law 92-516, as amended, and the regulations promulgated thereunder and to establish a regulatory process in the commonwealth. The exclusive authority in regulating the labeling, distribution, sale, storage, transportation, use and application, and disposal of pesticides in the commonwealth shall be determined by this chapter.

Chapter 132B: Section 2. Definitions.
Section 2. Unless the context clearly requires otherwise, when used in this chapter, the following words and phrases shall have the following meanings:[a]

"Active ingredient", in the case of a pesticide other than a plant regulator, defoliant, or desiccant, an ingredient which prevents, destroys, repels, or mitigates any pest; in the case of a plant regulator, an ingredient which through physiological action accelerates or retards the rate of growth or rate of maturation or otherwise alters the behavior of ornamental or crop plants or the products thereof; in the case of a defoliant, an ingredient which causes the leaves or foliage to drop from a plant; and, in the case of a desiccant, an ingredient which artificially accelerates the drying of plant tissue.

"Administrator", the Administrator of the United States Environmental Protection Agency.

"Adulterated", when used with reference to a pesticide, any pesticide the strength or purity of which falls below the professed standard of purity as expressed on its labeling under which it is sold; a pesticide for which any substance has been substituted wholly or in part; or a pesticide from which any valuable constituent has been wholly or in part abstracted.

"Advisory council", a council established by regulations adopted by the department for the purposes set forth in section five.

"Agricultural commodity", a plant, or part thereof, or animal or animal product produced by a person primarily for sale, consumption, propagation, or other use by man or animals.

"Animal", all vertebrate and invertebrate species, including but not limited to man and other mammals, birds, fish and shellfish.

"Certified applicator", an individual who is certified under the provisions of section ten as authorized to use or supervise the use of any pesticide which is classified by the department as being for restricted use.

"Private applicator", a certified applicator who uses or supervises the use of any pesticide which is classified by the department as being for restricted use for purposes of producing any agricultural commodity on property owned or rented by him or his employer or if applied without compensation other than trading of personal services between producers of agricultural commodities on the land of another person.

"Commercial applicator", a certified applicator, whether or not he is a private applicator with respect to some users, who uses or supervises the use of any pesticide which is classified by the department as being for restricted use for any purpose or on any land other than as provided in the preceding paragraph.

"Licensed applicator", an individual who is licensed under the provisions of section ten as authorized to be

present while pesticides classified by the department as being for restricted use are being applied under the direct supervision of a certified applicator, or to use or to be present to supervise the use or land of another for hire any pesticide classified by the department as being for general use.

"Beneficial insects", insects which, during their life cycle, are effective pollinators of plants, are parasites or predators of pests, or are otherwise beneficial.

"Board", the pesticide board, established by section three.

"Commissioner", the commissioner of food and agriculture.

"Defoliant", a substance or mixture of substances intended to cause the leaves or foliage to drop from a plant, with or without causing abscission.

"Department", the department of food and agriculture.

"Desiccant", a substance or mixture of substances intended to artificially accelerate the drying of plant tissue.

"Device", an instrument or contrivance, other than a firearm, intended to hold or dispense a pesticide and used in conjunction with a pesticide, the purpose of which is to trap, destroy, repel, or mitigate any pest or any other form of plant or animal life, other than man and other than bacteria, virus, or other micro-organism on or in living man or other living animals, but not including equipment used for the application of pesticides when sold separately therefrom.

"Director", the pesticides program director established by section four.

"Distribution" or "Distribute", to offer for sale, hold for sale, sell, barter, ship, deliver for shipment, or receive.

"Environment", includes water, air, land, and all plants and man and other living animals therein, and the interrelationships which exist among these.

"Federally registered pesticide", a pesticide which is registered pursuant to FIFRA.

"FIFRA", the Federal Insecticide, Fungicide, and Rodenticide Act, Public Law 92-516, as amended.

"Fungi" or "Fungus", non-chlorophyll-bearing thallophytes of a lower order than mosses and liver-worts, as, for example, rusts, smuts, mildews, molds, yeasts, and bacteria, except those on or in living man or other living animals, and except those in or on processed food, beverages, or pharmaceuticals.

"Imminent hazard", a situation in which the continued use of a pesticide would result in unreasonable adverse effects on the environment.

"Inert ingredient", an ingredient which is not active.

"Insect", a small invertebrate animal generally having the body more or less obviously segmented, for the most part belonging to the class insecta, comprising six-legged, usually winged forms, as for example, moths, beetles, bugs, bees, flies, and their immature stages, and to other allied classes of anthropods whose members are wingless and usually have more than six legs, as for example, spiders, mites, ticks, millipedes, and wood lice.

"Label", the written, printed, or graphic matter, on or attached to, the pesticide or device or any of its containers or wrappers.

"Labeling", all labels and all other written, printed or graphic matter accompanying the pesticide or device

at any time, or to which reference is made on the label or in literature accompanying the pesticide or device, but shall not include publications of the United States Environmental Protection Agency, the United States Department of Agriculture, or Interior, or Health, Education and Welfare, state experiment stations, state agricultural colleges, and other similar federal or state institutions or agencies authorized by law to conduct research or disseminate information in the field of pesticides, except as otherwise provided by regulation of the department.

"Land", land and water areas, including airspace, and structures, buildings, contrivances, and machinery appurtenant thereto or situated thereon, fixed or mobile.

"Licensed pesticide dealer", a person who distributes pesticides classified by the department as being for restricted use or pesticides whose uses or distribution are further restricted by regulations adopted by the department, with the approval of the board.

"Misbranded", (a) in the case of a pesticide or device, if the labeling bears any statement, design, or graphic representation relative thereto or to its ingredients which is false or misleading in any particular;

(b) in the case of a pesticide or device, if it is an imitation of, or is offered for sale under the name of, another pesticide or device;

(c) in the case of a pesticide or device, if any word, statement, or other information required by or under authority of FIFRA or this chapter to appear on the label or labeling is not prominently placed thereon with such conspicuousness, as compared with other words, statements, designs, or graphic matter in the labeling, and in such terms as to render it likely to be read and understood by the ordinary individual under customary conditions of purchase and use;

(d) in the case of a pesticide, if it is contained in a package or other container or wrapping which does not conform to standards established pursuant to FIFRA or this chapter;

e) in the case of a pesticide, if it does not contain a label bearing the registration number assigned under FIFRA to each establishment in which it was produced;

(f) in the case of a pesticide, if the labeling accompanying it does not contain directions for use which are necessary for effecting the purpose for which the product is intended and if complied with, together with any requirements imposed under FIFRA or this chapter, is adequate to protect health and the environment;

(g) in the case of a pesticide, if its label does not contain a warning or caution statement which may be necessary and if complied with, together with any requirements imposed under FIFRA or this chapter, is adequate to protect health and the environment;

(h) in the case of a pesticide, if its label does not bear an ingredient statement on that part of the immediate container, and on the outside container or wrapper of the retail package, if there be one, through which the ingredient statement on the immediate container cannot be clearly read, which is presented or displayed under customary conditions or purchase, except that a pesticide is not misbranded if the administrator has permitted the ingredient statement to be placed on another part of the container pursuant to FIFRA;

(i) in the case of a pesticide, if its labeling does not contain a statement of the use classification under which it is registered;

(j) in the case of a pesticide, if there is not affixed to its container, and to the outside container or wrapper of the retail package, if there be one, through which the required information on the immediate container cannot be clearly read, a label bearing the name and address of the producer, registrant, or person for

whom the pesticide is produced; the name, brand, or trademark under which the pesticide is distributed; the net weight or measure of the content, as required by the administrator; and the registration number assigned to the pesticide by said administrator pursuant to FIFRA;

(k) in the case of a pesticide containing any substance or substances in quantities highly toxic to man, unless the label shall bear, in addition to any other matter required by FIFRA or this chapter the skull and crossbones; the word "POISON" prominently in red on a background of distinctly contrasting color; and a statement of practical treatment, first aid or otherwise, in case or poisoning by the pesticide; and (%93) in the case of a pesticide, if its container does not bear a label, as required by the department pursuant to this chapter.

"Nematode", invertebrate animals of the phylum nemathelminthes and class nematoda, that is, unsegmented round worms with elongated, fusiform, or sac-like bodies covered with cuticle, and inhabiting soil, water, plants or plant parts. Nematodes may also be referred to as nemas or eel-worms.

"Person", an individual, association, partnership, corporation, company, business organization, trust, estate, the commonwealth or its political subdivisions, administrative agencies, public or quasi-public corporation or body, or any other legal entity or its legal representative, agent or assign, or a group of persons.

"Pest", an insect, rodent, nematode, fungus, weed, or any other form of terrestrial or aquatic plant or animal life or virus, bacterium, or other micro-organism, except viruses, bacteria or other micro-organisms on or in living man or other living animal, which is declared to be a pest by the administrator or by the department with the approval of the board.

"Pesticide", a substance or mixture of substances intended for preventing, destroying, repelling, or mitigating any pest, and any substance or mixture of substances intended for use as a plant regulator, defoliant, or desiccant; provided that the term "Pesticide" shall not include any article that is a "new animal drug" within the meaning of section 201 (w) of the Federal Food, Drug and Cosmetic Act (21 U.S.C. s 321 (w), or that has been determined by the Secretary of the United States Department of Health, Education and Welfare not to be a new animal drug by a regulation establishing conditions of use for the article, or that is an animal feed within the meaning of section 201 (x) of such act (21 U.S.C. s 321 (x)).

"Plant regulator", a substance or mixture of substances intended, through physiological action, to accelerate or retard the rate of growth or rate of maturation, or to otherwise alter the behavior of plants or the produce thereof, but shall not include substances to the extent that they are intended as plant nutrients, trace elements, nutritional chemicals, plant inoculants, and soil amendments. Also, the term "plant regulator" shall not include any nutrient mixtures or soil amendments commonly known as vitamin-hormone horticultural products, intended for improvement, maintenance, survival, health, and propagation of plants, and as are not for pest destruction and are nontoxic, nonpoisonous in the undiluted package concentration.

"Produce", to manufacture, prepare, compound, propagate, process or repackage any pesticide or device.

"Producer", a person who manufactures, prepares, compounds, propagates, processes or repackages any pesticide or device.

"Protect health and the environment" or "protection of health and environment", protection against any unreasonable adverse effects on the environment.

"Registrant", a person who has registered any pesticide pursuant to the provisions of this chapter.

"Under the direct supervision of a certified applicator", unless otherwise prescribed by its labeling, a pesticide shall be considered to be applied under the direct supervision of a certified applicator if it is

applied by a competent person acting under the instructions and control of a certified applicator who is available if and when needed, and who is responsible for the pesticide applications made by that person, even though such certified applicator is not physically present at the time and place the pesticide is applied.

"Unreasonable adverse effects on the environment", an unreasonable risk to man or the environment, taking into account the economic, social and environmental cost and benefits of the use of any pesticide.

"Weed", a plant which grows where not wanted.

"Wildlife", vertebrate animals, excluding man, that are wild by nature, including fish, birds, mammals, reptiles and amphibians.

Chapter 132B: Section 3. Pesticide board.
Section 3. There shall be within the department of food and agriculture a pesticide board which shall consist of the commissioner of environmental protection or his designee, the commissioner of food and agriculture or his designee, the director of the division of food and drugs or his designee, the commissioner of fisheries, wildlife and recreational vehicles or his designee, the commissioner of environmental management or his designee, the commissioner of public health or his designee, and seven persons appointed by the governor one of whom shall have been engaged in the commercial production of a plant-related agricultural commodity for at least the preceding five years on land owned or rented by him, one of whom shall have been an active commercial applicator of pesticides for at least the preceding five years, one of whom shall have expertise in the health effects of pesticide use, one of whom shall be a physician, one of whom shall be experienced in the conservation and protection of the environment, and two of whom shall represent the public at large. The commissioner of food and agriculture or his designee shall be chairman of the board.

The appointive members of the board shall receive fifty dollars for each day or portion thereof spent in the discharge of their official duties and shall be reimbursed for their necessary expenses incurred in the discharge of their official duties. Each appointive member shall be appointed for a term of four years, except for persons appointed to fill vacancies who shall serve for the unexpired term. Any member shall be eligible for reappointment.

The board shall hold an annual meeting in March, and regularly at three other times annually, and from time to time at the call of the chairman or upon the request of any two members.

Seven members of the board shall constitute a quorum. The board may, by vote of a majority of its members then in office, adopt rules and regulations for the conduct of its business. Rules and regulations adopted may be amended or repealed by a two-thirds vote of its members.

The board in addition to other powers conferred in this chapter shall advise the commissioner of food and agriculture with respect to the implementation and administration of this chapter.

The pesticides program director established by section four shall attend meetings of the board, shall serve as secretary thereto, but shall have no vote in its deliberation.

Chapter 132B: Section 3A. Pesticide board subcommittee.
Section 3A. A subcommittee of the pesticide board shall be established and shall be charged with the responsibility of registering all pesticides for use in the commonwealth pursuant to section seven. Said subcommittee shall also be responsible for issuing all experimental use permits pursuant to section eight. Said subcommittee shall consist of five members, the director of the division of food and drugs, who shall act as chairman, the commissioner of the department of food and agriculture or his designee, the commissioner of the department of environmental management or his designee, the commissioner of public health or his designee, and one person appointed by the governor, who shall have been actively engaged in commercial application of pesticides for at least the preceding five years who shall be a

member of the pesticide board. Any person aggrieved by the decision of said subcommittee may appeal any such decision according to the provisions of section thirteen.

Chapter 132B: Section 4. Programs director.
Section 4. The pesticide regulatory functions conferred upon the department under the provisions of this chapter shall be under the administrative supervision of a pesticide programs director who shall be qualified by training and experience to perform such duties. Said director shall be appointed by the commissioner with the approval of the board for a term of five years. Said person shall be eligible for reappointment, but may be removed by the commissioner for cause. The position of director shall not be subject to the provisions of chapter thirty-one or the provisions of section nine A of chapter thirty. If an employee serving in a position which is classified under chapter thirty-one or in which he has tenure by reason of section nine A of chapter thirty shall be appointed director, he shall upon termination of his service as director be restored to the position which he held immediately prior to such appointment or to a position equivalent thereto in salary grade in the same state department; provided, however, that his service in such unclassified position shall be determined by the civil service commission in administering chapter thirty-one. Such restoration shall be made without impairment of his civil service status or tenure under section nine A of chapter thirty and without loss of seniority, retirement, or other rights to which uninterrupted service in such prior position would have entitled him. During the period of such appointment, the person so appointed from a position in the classified service shall be eligible to take any competitive promotional
examination for which he would otherwise have been eligible.

Chapter 132B: Section 5. Powers and duties of department.
Section 5. The department with the approval of the board may cooperate and enter into cooperative agreements and contracts with appropriate federal agencies, the agencies of other states, interstate agencies, other agencies of the commonwealth or its political subdivisions, or private or nonprofit organizations in matters related to the purposes of this chapter or FIFRA, and may receive from and dispense to such agencies such funds as may be available for the purposes of this chapter and FIFRA.

The department with the approval of the board shall take all action necessary or appropriate to secure for the commonwealth the benefits of FIFRA and other pertinent federal legislation.

The department with the approval of the board and subject to the provisions of chapter thirty A may from time to time adopt, amend or repeal such forms, regulations and standards as it deems necessary for the implementation and administration of this chapter.

The department with the approval of the board shall by regulation establish and formulate procedures whereby the advice or relevant advisory councils shall be sought incident to the development of policy or the adoption, amendment or repeal of regulations related to the administration of this chapter.

The department may with the approval of the board declare such pests and devices as it deems necessary to be subject to the provisions of this chapter.

Chapter 132B: Section 6. Prohibited distributions, etc.
Section 6. No person shall distribute a pesticide not registered pursuant to the provisions of section seven. This prohibition shall not apply to the transfer of a pesticide from one plant or warehouse to another plant or warehouse and used solely at such plant or warehouse as a constituent part to make a pesticide which is or will be registered pursuant to the provisions of this act; or the distribution of a pesticide pursuant to the provisions of an experimental use permit issued under section eight.

No person shall distribute a pesticide classified by the department as being for restricted use to a person not appropriately certified to use that pesticide. This prohibition shall not apply to the distribution of a pesticide to a competent individual acting under the direct supervision of an individual appropriately certified to use that pesticide.

No person shall distribute a pesticide that is adulterated or misbranded or a device that is misbranded.

No person shall distribute any pesticide unless it is in the registrant's or the producer's unbroken, unopened, and sealed container. This prohibition shall not apply to the repackaging of pesticides because of damage in transit.

No person shall distribute any pesticide that does not conform to any requirement of its registration or permit.

No person shall distribute any pesticide in containers that are unsafe due to damage or design.

No person shall detach, alter, deface, or destroy, wholly or in part, any label or labeling provided for in this chapter or in regulations adopted thereunder, or to add any substance to, or take any substance from, a pesticide in a manner that may defeat the purposes of this chapter or regulations adopted thereunder.

No person shall distribute, handle, dispose of, discard, or store any pesticide or pesticide container in such a manner as to cause injury to humans, vegetation, crops, livestock, wildlife, beneficial insects, to cause damage to the environment, or to pollute or contaminate any water supply, waterway, groundwater or waterbody.

No person shall act in the capacity of, or advertise as, or assume to act as a licensed pesticide dealer unless that person is in possession of a currently valid license issued by the department pursuant to the provisions of section nine. No person possessing a pesticide dealer license shall violate or allow to be violated any term, condition, restriction or provision of said license.

No person shall purchase or use a pesticide that is not registered by the department under the provisions of section seven; provided, however, that this prohibition shall not apply to the use of a pesticide consistent with the terms of an experimental use permit issued by the department under the provisions of section eight.

Chapter 132B: Section 6A. Prohibited activities.
Section 6A. No person shall use a registered pesticide in a manner that is inconsistent with its labeling or other restrictions imposed by the department. No person shall use a pesticide which is the subject of an experimental use permit inconsistently with the terms and conditions of said permit.

No individual certified or licensed as a pesticide applicator shall violate any provision, condition, term or restriction of his certification or license.

No person shall use a pesticide that has been classified by the department as being for restricted use unless he is an appropriately certified private applicator, an appropriately certified commercial applicator, or a competent individual acting under the direct supervision of an appropriately certified applicator.

Chapter 132B: Section 6B. Herbicides; application by utilities; notice.
Section 6B. No gas, electric, telephone or other utility company licensed to do business in the commonwealth shall spray, release, deposit, or apply any herbicide to any land which it owns or as to which it holds an easement or similar right and over which it maintains power, high tension or other lines without first notifying, by registered mail, the mayor, city manager or chairman of the board of selectmen and the conservation commission in the city or town where such land lies twenty-one days prior to such spraying.

The notice shall contain the following information: the approximate dates on which such spraying shall commence and conclude; provided, however, that said spraying shall not commence more than ten days prior nor conclude more than ten days after said approximate dates; the type of herbicide to be used and a copy of all information supplied by the manufacturers thereof to the utility relative thereto; the name and address of the contractor who will make the application for the utility or the name, title and business

address of the employee who will be responsible for carrying out the application if it is to be made by utility company employees.

Chapter 132B: Section 7. Registration.
Section 7. Pesticides, including pesticides that are federally registered may be registered by the subcommittee of the pesticide board for use in the commonwealth.

Each applicant for the registration of a pesticide shall annually file with the subcommittee an application providing thereon such information as said subcommittee shall require. Said subcommittee may require of applicants for pesticide registrations any information that it deems necessary to determine whether, or how, the pesticide should be registered.

An applicant desiring to register or reregister a pesticide shall pay such registration fee, not to exceed twenty-five dollars, as said subcommittee may by regulation require. All pesticide registrations shall be for a period not to exceed one year.

In the event that any person files with said subcommittee an application to reregister a pesticide which is registered on the date of application for reregistration and pays the appropriate fee therewith, such registration shall be deemed to be in effect until the earlier of the following two events shall occur, ninety days have elapsed after the registration was scheduled to expire, or the subcommittee notifies the applicant for reregistration that the registration has been renewed, modified or denied.

If said subcommittee determines that a pesticide, when used in accordance with its directions for use, warnings and cautions and for the uses for which it is registered, or for one or more such uses, or in accordance with a widespread and commonly recognized practice, will not generally cause unreasonable adverse effects on the environment, it may classify the pesticide, or the particular use or uses of the pesticide to which the determination applies, as being for general use.

If said subcommittee determines that a pesticide, when used in accordance with its directions for use, warnings and cautions and for the use for which it is registered, or for one or more of such uses, or in accordance with a widespread and commonly recognized practice, may cause, without additional restrictions, unreasonable adverse effects on the environment, including injury to the applicator, it may classify the pesticide or the particular use or uses to which the determination applies, for restricted use.

Said subcommittee shall register a pesticide if it determines that its composition is such as to warrant the proposed claims for it; its labeling and other material required to be submitted comply with the requirements of this chapter; it will perform its intended function without unreasonable adverse effects on the environment; and when used in accordance with widespread and commonly recognized practice it will not generally cause unreasonable adverse effects on the environment.

As part of the registration of a pesticide, said subcommittee may require that the pesticide be colored or discolored if such requirement is necessary for the protection of health or the environment, may classify for restricted use any pesticide or pesticide use classified for general use under FIFRA, and may include in the registration such conditions of use as it deems necessary.

If at any time it appears that a pesticide registration does not comply with the provisions of FIFRA, this chapter, or rules and regulations promulgated thereunder, or when used as registered, or a pesticide may cause unreasonable adverse effects on the environment, or a registered pesticide is an imminent hazard, the subcommittee as established in section three A, may, forthwith by an order suspend the registration of such pesticide. Notification of such order shall be sent to the applicant and shall be a public record.

Chapter 132B: Section 8. Experimental use permits.
Section 8. Any person may apply to the subcommittee for an experimental use permit for a pesticide. Each applicant for an experimental use permit shall file with the department an application providing thereon such information as the department may require. Each applicant for an

experimental use permit shall pay such registration fee, not to exceed twenty-five dollars, as the department may by regulation require.

The subcommittee may grant an experimental use permit to an applicant therefor if it determines that the applicant needs such a permit to accumulate information necessary to register a pesticide.

The subcommittee shall refuse to grant an experimental use permit if it believes that the pesticide applications to be made under the proposed terms and conditions may cause unreasonable adverse effects on the environment, or if it believes that the applicant or person to conduct the experimentation is not competent to conduct such experimentation without causing unreasonable adverse effects on the environment.

The subcommittee shall revoke any experimental use permit, at any time, if it believes that its terms or conditions are being violated, or that its terms and conditions are inadequate to avoid unreasonable effects on the environment.

Chapter 132B: Section 9. Dealers' licenses.
Section 9. A person may apply to the department to be a licensed pesticide dealer. Said applicants shall submit to the department a statement supplying such information thereon as the department may require. An applicant for such a license shall pay such registration fee, not to exceed twenty-five dollars, as the department may by regulation require, for each principal distribution center, branch outlet, or direct sales representative of an out-of-state distributor.

In the event that any person files with the department an application to renew a pesticide dealer's license which is in effect on the date of application for renewal and pays the appropriate fee therewith, such license shall be deemed to be in effect until the earlier of the following two events shall occur: ninety days have elapsed after the license was scheduled to expire; or the department notifies the applicant for renewal that the license has been renewed, modified or denied.

The department shall grant a pesticide dealer's license for a term not to exceed one year. The department shall grant such licenses subject to such terms, conditions and restrictions as it deems necessary or appropriate.

The department shall refuse to grant a pesticide dealer's license if it finds that the proposed distributor or his agent has acted in a manner inconsistent with the purposes for requirements of this chapter or FIFRA.

The department shall revoke any pesticide dealer's license, at any time, if it finds that its terms, conditions or restrictions are being violated or are inadequate to avoid unreasonable adverse effects on the environment.

As part of its determination to refuse to grant, or to revoke, a pesticide dealer's license the department may specify a period, not to exceed two years, within which the applicant may not reapply for a pesticide dealer's license. In the event that the department has specified a period for nonapplication, the department may later, at its discretion, shorten or waive such period.

Chapter 132B: Section 10. Certificates and licenses; issuance, suspension and revocation.
Section 10. Certifications and licenses to use pesticides may be issued to individuals by the department in accordance with the provisions, standards and procedures contained in and established pursuant to this chapter. Each certification and license issued pursuant to this section shall be valid only for the individual to whom it is issued, may not be transferred, and shall not continue in force and effect after the death of the individual to whom it is issued. All certifications and licenses shall be for a period not to exceed one year, unless sooner revoked or suspended.

The department may authorize individuals to use pesticides in classifications as a certified commercial applicator, a certified private applicator, and a licensed applicator provided, however, that the department shall require that all persons who are applicators of pesticides in public and private places used for

human occupation and habitation, except residential properties with three or less dwelling units, shall be so licensed or certified with such special designation.

The department may establish such categories and subcategories as it deems necessary to restrict or condition the scope of pesticide use permitted within each classification. The department may establish such standards and criteria, take such action and impose such requirements as it deems necessary to determine or redetermine levels of competence and experience to qualify for each classification and each category and subcategory thereof.

Each applicant for a certification or license shall annually file with the department an application providing thereon such information as the department may require.

Each applicant desiring to be certified or licensed shall annually pay such application fee, not to exceed twenty dollars, as the department may by regulation require.

In the event that any individual files with the department an application to renew a certification or license which is in effect on the date of the application for renewal and pays the appropriate fee therewith, such certification or license shall be deemed to be in effect until the earlier of the following two events shall occur: ninety days have elapsed after the certification or license was scheduled to expire; or the department notifies the applicant that the certification or license has been renewed, modified or denied.

The department may issue a certification or license to an applicant therefor if it determines that the applicant satisfies the criteria established for that certification or license and the category or subcategory for which the certification or license is sought. The department may thus issue a certification or license subject to such terms, conditions, restrictions and requirements as it deems necessary. The department may require that an applicant for a certification or license has obtained and maintains in effect a contract of liability insurance conforming to regulations established by the department.

The department shall prior to issuing a certificate or license evaluate each applicant to determine his competence with respect to the use and handling of pesticides, or to the use and handling of the pesticides or class of pesticides covered or to be covered by said individual's certification or license. Said evaluation shall include such examinations as the department may require. Examinations may be taken only upon payment of a fee, not to exceed ten dollars for each examination given, as the department may require by regulation approved by the board.

The department may revoke, suspend, cancel or deny any certification or license, or any class thereof, at any time, if it believes: that the terms or conditions thereof are being violated or are inadequate to avoid unreasonable adverse effects on the environment, or that the holder of or applicant for the certification or license has violated any provision of this chapter or FIFRA or any regulation, standard, order, license, certification or permit issued thereunder or that the holder or applicant for said certification or license is not competent with respect to the use and handling of pesticides, or to the use and handling of the pesticides or class of pesticides covered by said individual's certification or license. Any person whose certification or license is suspended or revoked hereunder shall also be subject to such other punishment, penalties, sanctions or liabilities as may be provided by law. As part of its determination to refuse to grant, to revoke, or to suspend a certification or license the department may specify a period, not to exceed two years, within which the applicant may not reapply for a certification or license. In the event that the department has refused to issue or has revoked or suspended such a certification or license, and has specified a period for non-application, the department may later, at its discretion, shorten or waive such period.

The department may, at its discretion, appropriately license or certify any person possessing a valid certification or license, or equivalent rating, issued by the pesticide control agency of any other state or the federal government whose standards for the issuance of such rating are not less stringent than those of the department, provided that the pesticide control agency of that state extends similar privileges to persons so licensed or certified by the commonwealth. Any person so licensed or certified shall be subject to the annual fee requirements of this section.

Chapter 132B: Section 11. Protection of health and environment; regulations.
Section 11. The department shall by regulation establish such restrictions and prohibitions upon the disposal and storage of pesticides, packages and containers of pesticides, and materials used in the testing or application of pesticides as it deems necessary to protect health and the environment.

Chapter 132B: Section 12. Departmental orders; hazards; adverse environmental effects; violations.
Section 12. Whenever it appears to the department that there is an imminent hazard, or a potential threat of unreasonable adverse effect on the environment, or a violation or a potential violation of any provision of this chapter or of any license, certification, permit, order, registration or regulation issued or adopted thereunder, the department may issue to such persons as it deems necessary an order requiring the production of samples and records, or an order imposing restraints on or requiring such action, as it deems necessary. Issuance of an order under this section shall not preclude and shall not be deemed an election to forego any action to recover for damages to interests of the commonwealth or, under section fourteen of this act, for civil penalties or for criminal fines and penalties.

Chapter 132B: Section 13. Adjudicatory hearings.
Section 13. Any person aggrieved by a determination by the department to register or not to register a pesticide, to suspend a pesticide registration, to issue, not issue or revoke an experimental use permit, to issue, deny, revoke or suspend any certification or license, or to issue an order, made under the provisions of this chapter, may request an adjudicatory hearing before the board under the provisions of chapter thirty A. Said determination shall contain a notice of a right to request a hearing and may specify a time limit, not to exceed twenty-one days, within which said persons may request a hearing before the board under the provisions of said chapter thirty A. If no such request is timely made, the determination shall be deemed assented to. If a timely request is received, the board shall within a reasonable time hold a hearing and comply with the provisions of said chapter thirty A. In hearings so held the board shall designate a hearing officer to preside over the hearing, to assemble an official record thereof, and to render a tentative decision as provided in paragraph (7) of section eleven of said chapter thirty A. The board shall make the final decision on the basis of the official record and tentative decision so rendered.

If, in making a determination which under the provisions of the preceding paragraph may be the subject of an adjudicatory hearing, the department finds that an imminent hazard or an unreasonable adverse effect on the environment could result pending the conclusion of the adjudicatory hearing requested thereon, the department may order that the determination shall become provisionally effective and enforceable immediately upon issuance, and shall remain so notwithstanding and until the conclusion of any adjudicatory hearing procedures timely requested. In the event that the department has thus made a determination provisionally effective, it may later, at its discretion, shorten the duration of or waive such order.

As part of a final decision in an adjudicatory proceeding held under the provisions of this section, the board may specify a reasonable time period within which the matter may be barred from further proceedings before the department or the board. In the event that the board has so specified a time period, the board may later, at its discretion, shorten or waive such period.

A person aggrieved by a final adjudicatory determination of the board may obtain judicial review thereof pursuant to the provisions of chapter thirty A.

Chapter 132B: Section 14. Violations; penalties; injunctions.
Section 14. Any person who knowingly violates any provision of section six shall be punished by a fine of not more than twenty-five thousand dollars, or by imprisonment for not more than one year, or both such fine and imprisonment, for each such violation, or shall be subject to a civil penalty not to exceed twenty-five thousand dollars for each such violation, which may be assessed in an action brought on behalf of the commonwealth in any court of competent jurisdiction. Each day of violation shall constitute a separate offense.

Any person who violates any provision of section six A or six B or who violates any regulation adopted under the provisions of this chapter, (a) shall be punished by a fine of not more than one thousand dollars, or imprisonment for not more than six months, or both such fine and imprisonment, for the second and each subsequent offense knowingly committed, or (b), shall be subject to a civil penalty not to exceed ten thousand dollars for any offense, which may be assessed in an action brought on behalf of the commonwealth in any court of competent jurisdiction. Each day of violation shall constitute a separate offense.

Any person who violates any order issued under the provisions of this chapter, (a) shall be punished by a fine of not more than twenty-five thousand dollars or imprisonment for not more than two years, or both such fine and imprisonment, for each violation knowingly committed, or (b) shall be subject to a civil penalty not to exceed twenty-five thousand dollars for each violation, which may be assessed in an action brought on behalf of the commonwealth in any court of competent jurisdiction. Each day of violation shall constitute a separate offense.

The superior court shall have jurisdiction to enjoin violations of, or grant such relief as it deems necessary or appropriate to secure compliance with, any provision of this chapter or the terms of an order, license, certification, registration, permit or regulation issued or adopted thereunder.

Chapter 132B: Section 15. Departmental personnel, agents and inspectors; powers; evidence; confidential information.

Section 15. For the purpose of administering the provisions of this chapter, personnel or agents of the department and its inspectors shall have access and entry at reasonable times to any premises pursuant to a search warrant duly issued by a court of competent jurisdiction, provided that no sample of a pesticide obtained in the course of such inspection and no result of any analysis or test of any such sample shall be received in evidence in any criminal proceeding under this chapter unless the sample shall have been taken and the analysis or test conducted by a chemist in the agricultural extension service of the University of Massachusetts authorized by the department. Personnel or agents of the department may take such samples as are reasonably necessary to accomplish the purpose of their investigation and inspection. Any information relating to secret processes, methods of manufacture, production or use obtained in the course of such inspection shall be kept confidential upon request, when not required to be disclosed incident to the enforcement of this chapter. This section shall not be construed to abrogate any of the powers and duties, as defined by general or special law or common law, of any agency or political subdivision of the commonwealth.

Appendix 4

Chapter 85, Section 10

CHAPTER 85 OF THE ACTS OF 2000

SECTION 10.

Said chapter 132B is hereby further amended by striking out section 6B, as appearing in the 1998 Official Edition, and inserting in place thereof the following section:

Section 6B.

a. No gas, electric, telephone or other utility company licensed to do business in the commonwealth, nor any agency of the commonwealth or any of its political subdivisions, nor any authority, as defined in section 39 of chapter 3, nor any private entity or their agent, shall spray, release, deposit or apply any pesticide to any land which it owns, or as to which it holds an easement or similar right and over which it maintains power, high tension or other lines, or to any roadway, railway, or other transportation layout, without first notifying the department and, by registered mail, the mayor, city manager or chair of the board of selectmen and the conservation commission in the city or town where such application is to occur 21 days before such spraying, release, deposit or application, and without first publishing conspicuous notice in at least one newspaper of general circulation in each city or town where such land lies at least 48 hours prior to such spraying, release, deposit or application. Such notice shall appear in the local section of the newspaper and measure at least four by five inches in size. The published notice shall include: the method and locations of pesticide spraying, release, deposit or application; the approximate dates on which spraying, release, deposit or application shall commence and conclude, but such spraying, release, deposit or application shall not commence more than ten days before nor conclude more than ten days after such approximate dates; a list of potential pesticides to be used; a description of the purpose of the spraying, release, deposit or application; and the name, title, business address and phone number of a designated contact person from whom any citizen may request further information.

b. The notice to the city or town where the affected land lies shall contain the following information: the method and locations of pesticide spraying, release, deposit or application; the approximate dates on which such spraying, release, deposit or application shall commence and conclude, but such spraying, release, deposit or application shall not commence more than ten days before nor conclude more than ten days after such approximate dates; the type of pesticide to be used and a copy of all information supplied by the manufacturers thereof relative to the pesticide; a department-approved fact sheet and United States Environmental Protection Agency registration number for each pesticide; the name, title, business address and phone number of the certified commercial applicator, certified private applicator or licensed applicator, or the contractor, employers or employees responsible for carrying out the pesticide spraying, release, deposit or application.

c. Notwithstanding any other provision of law, all agencies of the commonwealth and all authorities, as defined in section 39 of chapter 3, shall develop policies to eliminate or, if necessary, reduce the use of pesticides for any vegetation management purpose along any roadway.

d. Any employee of any state agency, or authority, as defined in section 39 of chapter 3, when spraying, releasing, depositing or applying pesticides, supervising the use of pesticides, or when present during the spraying, release, deposit or application of pesticides, shall be provided with personal protection equipment and clothing in conformance with all federal and state laws and regulations pertaining to pesticide applications. This shall include, but not necessarily be limited to, protections according to Material Safety Data Sheets (MSDS), the product label, and any other supportive technical data provided by the manufacturer.

Appendix 5

Department of Food and Agriculture Wetland Decision

COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF ENVIRONMENTAL AFFAIRS
DEPARTMENT OF FOOD AND AGRICULTURE
100 CAMBRIDGE ST., BOSTON, MA 02202 617-727-3000 FAX 727-7235

WILLIAM F. WELD
Governor

ARGEO PAUL CELLUCCI
Lt. Governor

TRUDY COXE
Secretary

JONATHAN L. HEALY
Commissioner

Decision Concerning
The Wetland Impact Study Conducted
Pursuant to 333 CMR 11.04(4)(c)(2)

PUBLIC UTILITY VEGETATION MANAGEMENT PROGRAM FINDING

Background

The Rights of Way Management (ROW) Regulations (333 CMR 11:00) promulgated in 1987 prohibit the use of herbicides to control vegetation along utility right of ways on or within ten (10) feet of a wetland unless the following conditions are met:

1. Submission of a study, the design of which is subject to prior review and approval of the Departments of Food and Agriculture and Environmental Protection, evaluating impacts of proposed vegetation management programs on wetlands; and
2. A finding by the Department, after consultation with the Advisory Committee, that the proposed vegetation management program will result in less impacts to the wetland than mechanical control.
3. Notwithstanding the above, no herbicides shall be applied on or within ten feet of any standing or flowing water in a wetland.

On April 28, 1988, The Departments of Food and Agriculture and Environmental Protection approved the scope of the study. In the fall of 1989, Environmental Consultants, Inc. submitted to the Department of Food and Agriculture the study entitled, "Study of the Impacts of Vegetation Management Techniques on Wetlands for Utility Rights-of Way in the Commonwealth of Massachusetts", dated June 1989. The Department consulted with the Vegetation Management Plan (VMP) Advisory panel at their November 15, 1989, December 7, 1989 and August 1, 1991 meetings.

The study provided some broad information of vegetation control along utility right of ways. The Department based its finding solely upon the narrow scope of whether the "proposed vegetation management program will result in less impacts to the wetland than mechanical control."

The following are the major evaluation points the Department considered in reaching its decision.

What are the Long-term and Short-term Impacts From Herbicide use and Mechanical Control?

Since wetlands are not a static, unchanging resource, there is some difficulty in determining the actual long-term impacts from the various vegetation control practices. The extent of wetland alterations must be the most important factor in determining impacts. With limited or selective removal of unwanted plant species in specific locations, it appears that long-term impacts are negligible. While mowing or foliar application can damage non-target species, neither control practice appears to result in adverse long-term impacts if they are carefully executed. Clear cutting, however, has a greater impact on wetlands since both wanted and nuisance species are removed.

Although there were some reservations about the sites that were chosen to determine the level of chemical residues, the study did show that there was not a buildup of background residues of herbicides applied from previous practices. However, there were some trace amounts of petroleum products - bar oil or hydraulic fluid found. The source of these petroleum products is unclear and may have been the result of public activities not related to vegetation management. Retrospective analyses for herbicide residues in previously treated wetland areas is not generally applicable since the herbicides used today are less persistent than those which were used previously. However, these analyses did indicate that the herbicides used in the past do not persist in the environment.

The study clearly demonstrated that adjacent non-controlled wetland areas did not differ significantly in composition and abundance of plant species from the controlled areas. The control practices did not appear to impact the entire wetland ecosystem, since a long-term comparison of wetland plant species composition between controlled and non-controlled sites did not differ significantly. Therefore, the long-term effects on the entire wetland ecosystem were considered negligible.

The determination of the short-term impacts to the wetland from the control practices was the most noted short-coming of the study. However, this was not part of the original scope. The VMP Advisory Panel felt, and the Department agreed, that a short-term environmental fate study would be needed.

The first study indicated that certain mechanical control practices can impact wetlands and disrupt the ecosystem to a greater extent than the judicious use of herbicides. While cutting may result in re sprouting of some unwanted vegetation in a manner unlikely to be encountered in unaltered wetland areas, unregulated mechanical vegetation control could result in the destruction of other non-target plant species.

What is the Impact to Non-target Wetland Plant Communities?

Basal and cut stump treatment with low mobility, short persistence herbicides that are judiciously applied usually do not impact adjacent plant species. Likewise careful selective mechanical cutting (versus mowing or clear cutting) also usually does not impact non-target wetland plants. The greatest potential risk to non-target wetland plants comes from mowing, clear-cutting, and high volume foliar applications. Low volume foliar applications in wetlands may also cause non-target impacts if application guidelines are not followed (e.g. no applications during high winds, or without using anti-drift agents, etc.).

Is There Enough Information on Which to Base a Finding?

As in most environmental assessments, a complete database is not available to answer all of the questions posed by the Department and the Vegetation Management Advisory Panel. Some of the questions posed were entirely valid, but were beyond the scope of the approved study.

The study did provide some clear evidence that selective mechanical and herbicide use does minimally alter wetlands by removing specific plant species. Mechanical mowing operations, however, can result in far greater short-term and potentially long-term impacts to wetlands since both wanted and un-wanted plant species are indiscriminately removed. Additionally, foliar herbicide applications may cause short-term impacts to non-target species.

The Department did not find any significant difference in wetland impacts between careful mechanical removal (selective hand cutting) of unwanted species

and, cut stump or basal treatment with herbicides.

There is no assurance that prohibiting the use of herbicides in wetlands will result in careful mechanical control. If herbicide use is prohibited in wetland areas, mechanical control in wetlands will be the only practice available to utilities. Financial pressures and other considerations may force Utilities to increase mowing and / or the use of more destructive non-chemical control practices due to a lack of alternative control techniques.

On August 29, 1991, the Department made a finding that the submitted study met the approved scope. However, although the study contained useful information, it was also determined that additional data needed to be gathered and analyzed because the study was inconclusive in a number of instances.

The Department issued a finding that a proposed vegetation program containing the specific elements listed does not pose an unreasonable adverse impact to wetlands. In addition, the Department required a study be conducted to provide important environmental fate data necessary for the long-term implementation of the rights of way program.

AUGUST 1991 FINDING

The Department of Food and Agriculture finds that a proposed vegetation program containing the following elements will not pose an unreasonable adverse impact to wetlands:

1. *The Integrated pest Management (IPM) system, as described in the Vegetation Management Plan and Yearly Operation Plan, is utilized in wetland areas. The IPM system must, at a minimum, place emphasis on encouraging low growth plant species to discourage unwanted vegetation and, minimizing the frequency and amount of herbicide use by only controlling specific non-conifer tree species which will impact transmission line operation and access to the right of way.*

2. *Herbicides may be applied by basal, cut stump or low volume foliar methods. Foliar applications must include the use of drift reduction agents. Foliar applications may only be conducted in situations where basal and cut stump treatments are not appropriate based on the size of the vegetation and potential for off-target drift. Foliar applications must not result*

in the off-target drift to non-target species.

3. *Herbicides are not applied to conifer species (pine, spruce, fir, cedar and hemlock).*

4. *Carriers for herbicides do not contain any of the following petroleum based products: jet fuel, kerosene or fuel oil. Carriers will be subjected to review by the Department of Food and Agriculture and DEP through 333 CMR 11.04(1)(d).*

5. *Herbicides must be recommended by the Department of Food and Agriculture and DEP through 333 CMR 11.04(1)(d).*

6. *Herbicides may only be applied by hand operated equipment containing no more than 5 gallons of diluent.*

7. *All other restrictions within sensitive areas remain in effect. In accordance with 333 CMR 11.04(1)(c), no person shall apply herbicides for the purposes of clearing or maintaining a right-of-way in such a manner that results in drift to any areas within 10 feet of standing or flowing water in a wetland or area within 400 feet of a public drinking water supply well; or area within 100 feet of any surface water used as a public water supply; or area within 50 feet of a private drinking water supply identified under 333 CMR 11.04(2)(c)(3).*

8. *Approved Vegetation Management Plans and Yearly Operation Plans must be amended as needed to reflect the conditions of this FINDING.*

9. *The Department further requires that environmental fate data be provided by the utilities that are applying herbicides to rights-of-way, which characterizes the movement of herbicides applied to wetland areas under these conditions. The Department further requires that all study protocols be reviewed by the Vegetation Advisory Panel and be approved by the Department of Food and Agriculture and the Department of Environmental Protection. Failure to submit the required information by the dates outlined in the schedule below will render this finding void.*

An approvable scope of the study developed and

submitted by January 1, 1992.

Field data submitted to DFA by October 1, 1992. Data must be consistent with the requirements of the approved scope.

Draft study report submitted to DFA by October 1, 1993.

Final Report submitted to DFA by March 1, 1994.

10. *The Department reserves the right to amend or withdraw its FINDING at anytime if it determines that the use of herbicides in wetland areas poses a greater impact than mechanical control or may pose an unreasonable adverse effect to humans or the environment.*

11. *This finding expires December 31, 1994.*

Therefore, herbicide use may be allowed to control certain vegetation along utility right of ways if the proposed vegetation program as described in the approved Vegetation Management Plan and Yearly Operational Plans contains the above elements.

On, April 27, 1992, the Departments of Food and Agriculture and Environmental Protection approved the scope of the *"Study of Fates of Herbicides in Wetlands on Electric Utility Rights of Way in the Massachusetts Over the Short Term"*. The final report was submitted to the Department of Food and Agriculture December 31, 1993. The Department began reviewing the report in consultation with the VMP Advisory panel.

At the end of 1994, the Department had not completed its review. Therefore, on December 22, 1994 the Department extended the current finding for one year (to December 31, 1995) or until such time it is able to make a final determination, whichever occurs first.

Fates of Herbicides Over the Short Term Study

The objective of this study was to determine the short term environmental fate and assess the impacts of selected herbicides applied by four common Right-of-Way management techniques. Additionally, the study evaluated which of the four Right-of-Way management techniques provides the most effective control of target vegetation and which techniques produced the least impact on the non-target plant community, and consequently the least alteration of wooded wetland community.

The study investigated the environmental fate of two herbicides, which are typically used to control vegetation on ROWs, and are included in the list recommended for use in sensitive areas. These herbicides were chosen, among other reasons, for their use patterns, size of area treated, and application rates. Accord, which contains the active ingredient glyphosate, is the primary herbicide used for cut stump treatment and is also used for foliar application. Garlon 4, which contains the active ingredient triclopyr, is the primary herbicide used for basal applications. Collectively these products represent the typical herbicides used to control vegetation on ROWs.

Results

A summary of the most important findings and conclusions of the study include:

* Based upon the samples collected immediately after application, at 1 week, 1 month, 3 months and 1 year:

  - The two herbicides, glyphosate and triclopyr degrade rapidly. Residues reach low quantities quickly, often less than detection limits, within a year.; and
  - There is essentially no movement either laterally or vertically from the treated sites by glyphosate. Triclopyr does not move laterally, but was noted to move vertically in small amounts.

* Drift cards indicate that the herbicides are neither splashed nor carried any distance by the wind. Glyphosate drift is not a significant problem resulting in slight effects on neighboring vegetation and are not detectable in the next year's growth. Sphagnum moss next to trunks treated basally with triclopyr were killed within three months in a 15 cm diameter circle immediately around the target tree, but the dead circle did not continue to enlarge.

* Filter paper recovered immediately after application of herbicide showed that all methods of application deposit herbicide on the ground. Treated bare soil samples showed as consistent a drop in herbicide concentrations and as little vertical movement as did samples beneath target trees.

* The use of the herbicides glyphosate and triclopyr at the strengths and application rates used does not pose a risk of accumulation in organically rich soils.

* Herbicide concentrations in soil continue to decline as time advances.

* Rainfall occurring more than a week after application does not appear to spread the herbicide nor does groundwater carry any substantial fraction of what has been applied to a particular site down into the soil or horizontally.

* Based upon the results of the study, an assessment of the environmental fate, and observations of both treatment effectiveness and non-target impacts, an effective and environmentally sensitive ranking from most effective and posing least potential environmental risks to least effective and posing the most environmental risk is suggested:

1. Most effective control and exclusive effect on target:
   low-volume foliar (with glyphosate).

2. Most consistent control with lethal effects on bordering vegetation:
   high-volume foliar (with glyphosate)

3. Total control with rings of dead vegetation around treated trunks:
   low-volume basal (with triclopyr)

4. Incomplete target control and leaving largest soil residues:
   cut-stump (with glyphosate)

It is important to note that the results of the second short term study suggest that the most efficacious application techniques and which pose the lowest environmental risk were not those recommended in the interim finding.

DEPARTMENT DETERMINATION

Based upon the results of the two ROW impact studies, the general information in the literature, and after consultations with the Vegetation Management Panel, the Department finds that the following proposed vegetation management program will result in less impacts to wetlands than exclusive use of mechanical control methods. Therefore, the Department finds that any vegetation management program that incorporates the conditions under which the study was conducted as well as taking into account the results of previous studies, will result in the least impacts to wetlands.

These conditions include:

1. An Integrated Pest Management (IPM) system, also known as Integrated Vegetation Management (IVM), as described in the Vegetation Management Plan and Yearly Operation Plan is utilized in wetland areas. The IPM system must, at a minimum, place emphasis on encouraging low growth plant species to discourage unwanted vegetation and, minimizing the frequency and amount of herbicide use by only controlling specific non-conifer tree species which will impact transmission line operation and access to the right of way.

2. Herbicides may be applied by low volume foliar, basal, or cut stump methods. Foliar applications must include the use of appropriate drift reduction agents, and must not result in the off-target drift to non-target species. Basal and cut-stump treatments may be conducted in those situations where the size of the vegetation, potential for off-target drift, or other considerations precludes the use of low-volume foliar applications. Cut stump and basal applications shall be restricted, when practicable, to periods when static ground water levels are low or otherwise when conditions are less susceptible to potential contamination.

3. Herbicides are not applied to conifer species (pine, spruce, fir, cedar and hemlock).

4. Carriers for herbicides do not contain any of the following petroleum based products: jet fuel, kerosene or fuel oil. Carriers will be subjected to review by the Department of Food and Agriculture and DEP through 333 CMR 11.04(1)(d).

5. Only herbicides recommended by the Departments of Food and Agriculture and Environmental Protection through 333 CMR 11.04(1)(d) may be used in sensitive areas.

6. Herbicides may only be applied by hand operated equipment containing no more than 5 gallons of diluent.

7. All other restrictions within sensitive areas remain in effect. In accordance with 333 CMR 11.04(1)(c), no person shall apply herbicides for the purposes of clearing or maintaining a right-of-way in such a manner that results in drift to any areas within 10 feet of standing or flowing water in a wetland or area within 400 feet of a public drinking water supply well; or area within 100 feet of any surface water used as a public water supply; or area within 50 feet of a private drinking water supply identified under 333 CMR 11.04(2)(c)(3).

8. A minimum of twelve months must elapse between herbicide treatments. Only touch-up applications may be performed between twelve and twenty four months.

9. Approved Vegetation Management Plans and Yearly Operation Plans must be amended as needed to reflect the conditions of this determination.

.....

Therefore, herbicide use may be allowed to control certain vegetation along utility right of ways if the proposed vegetation program as described in the approved Vegetation Management Plan and Yearly Operational Plans contains the above elements.

Jonathan Healy, Commissioner

10/12/95
Date

Appendix 6

Preface to 310 CMR 10.00

310 CMR: DEPARTMENT OF ENVIRONMENTAL PROTECTION
PREFACE TO WETLANDS REGULATIONS RELATIVE TO RIGHTS OF WAY MANAGEMENT 1987 REGULATORY REVISION

In 1983, the Massachusetts Pesticide Control Act, M.G.L. c. 132B, was amended to require notification of conservation commissions prior to application of herbicides on rights of way. Many commissions became aware for the first time that application of herbicides on rights of way may result in alteration of wetlands and, with the exception of exempt utilities, may require action under the
M.G.L. c. 131, § 40. On July 18, 1986, the Department issued a final decision after adjudicatory hearing in DEP Hearing Docket Nos. 83-28 and 83-35 (Clinton and Leverett) finding that the application of specific herbicides by the railroads to track and ballastwithin100 feet of wetland areas would alter those wetlands and was therefore subject to jurisdiction under M.G.L. c. 131, § 40, requiring the filing of Notices of Intent with the local conservation commissions.

The Department of Food and Agriculture (DFA) initiated a Generic Environmental Impact Report (GEIR) evaluating alternatives for rights of way management. A technical advisory task force of environmentalists, agencies and rights of way managers assisted in the GEIR preparation and, based on results of the study, recommended to the Secretary of Environmental Affairs a framework for a coherent state-wide rights of way regulatory program. DFA published draft regulations to implement thisprogramin1986 and received extensive public commentary. Final regulations, 333 CMR11.00, became effective on July 10, 1987.

The DFA regulations require persons proposing to apply herbicides to rights of way to first receive approval of a five year Vegetation Management Plan (VMP) and Yearly Operating Plan (YOP). These regulations identify certain "sensitive areas", including wetlands and public and private surface and groundwater supplies, where the application of herbicides is, in most instances, prohibited, and areas adjacent to the sensitive areas where use of herbicides is curtailed.

DEP worked closely with DFA to include provisions which give maximum protection for water supplies and provide protection for wetlands at least equal to that provided under the M.G.L. c. 131, § 40 and 310 CMR 10.00. To eliminate duplicate review under M.G.L. c. 131, § 40, DEP has adopted changes to the wetlands regulations which allow herbicide applications on rights of way in accordance with the DFA regulations without filing a Notice of Intent under the M.G.L. c. 131, § 40. However, non-exempt applicants will still be required to file a Request for Determination of Applicability to the appropriate conservation commission to establish boundaries of wetlands on or near the right of way. Specifically, these regulations presume that work performed in accordance with a VMP and YOP, as may be required under DFA regulations, will not alter an area subject to protection under M.G.L. c. 131, § 40.

During the public comment period on its proposed regulations, the Department identified several issues of major concern. After consideration of all comments, the Department has determined that, except for minor points of clarification and the addition of an automatic expiration date, no further changes in the regulations are warranted at this time. A discussion of these issues follows.

A. Presumption vs. Limited Project. Several commentators suggested that conservation commissions should retain the authority to review each herbicide application on rights of way through the usual Notice of Intent process. These regulations create a presumption that herbicide application carried out in accordance with an approved VMP and YOP under the DFA regulations will not alter wetlands and that the filing of a Notice of Intent is therefore not required. This procedure was established pursuant to the recommendation of the GEIR task force which states:

The regulations which provide for approval of Vegetation Management Plans by the Department of Food and Agriculture should be conditioned on review and approval by the Department of Environmental Protection (DEP) of those portions of the Plans that deal with wetlands. The DEP should be required to certify to the DFA that these portions of the Plans will result in compliance with the substantive and procedural provisions which protect the interests of the M.G.L. c. 131, § 40. If the regulations are so drawn, activities under a Plan approved by DEP would not constitute an alteration of wetlands as defined under 310 CMR 10.00.

Since the DFA regulations provide that DEP is a member of the VMP advisory panel which reviews and makes recommendations on the approval of VMPs, the GEIR task force recommendations have been fully implemented. Therefore, the Department has determined that it would be duplicative to require the filing of individual Notices of Intent in each municipality for each application of herbicides to rights of way.

B. Adequacy of Setback from Wetlands. The DFA rights of way regulations prohibit application of herbicides on or within ten feet of wetlands and strictly limit herbicide application from ten feet to 100 feet of wetlands. Many commentators questioned the adequacy of these setback requirements and suggested that a 50 or 100 foot no spray zone would be more appropriate. Several commentators suggested that the proposed setback requirements were inconsistent with the Department's adjudicatory hearing decision in the Clinton and Leverett cases.

The no spray zone surrounding wetlands is necessary for three reasons: to compensate for mapping errors, to compensate for applicator errors and to assure that herbicides will not migrate into wetlands after application on the adjacent uplands. During the public comment period, the Department received no evidence demonstrating that the ten-foot setback established in the DFA regulations will not be adequate. The DFA regulations establish a procedure for selecting a limited number of herbicides that may be applied in the limited spray zone (from 10 to 100 feet from wetlands) which is adjacent to the no spray zone. Herbicides that will be selected for use in these limited spray zones under the DFA regulations are those which available data demonstrate will not migrate further than ten feet.

The applicators have argued that they can maintain a level of accuracy in mapping of wetlands and in application of herbicides to assure that herbicides will not be inadvertently applied within ten feet of wetland areas. The Department is not convinced that these claims are unreasonable; however, in order to confirm their accuracy, the Department has included in the final regulations an automatic expiration date two years from the effective date, which is coterminous with the expiration date of the DFA regulations. During the two-year effective period of these regulations, the Department expects applicators to conduct studies monitoring

herbicide application operations and to submit a report concerning impacts of herbicide application on wetlands under these new regulations detailing the accuracy of wetlands mapping, the accuracy of herbicide application, and the extent of herbicide migration. The results of this study will provide a basis for recommendations by the Department for amendments to the DFA regulations and a decision on reauthorization of these amendments to the Department's wetland regulations.

Finally, the Department does not find the setbacks requirements established in the DFA regulations to be inconsistent with its decision in the Clinton and Leverett cases. In that decision, the Department assumed a worst-case analysis in terms of an herbicide known to be highly mobile which was applied to the track and ballast areas adjacent to wetlands. The Department found, based on the particular facts of these cases and the particular herbicide proposed for application that there would be a migration of that herbicide into the wetlands from application within the 100-foot buffer zone that would be sufficiently concentrated to cause alterations of the wetlands plants. However, the DFA rights of way management regulations set up a procedure for identification of herbicides which are relatively immobile and which are preapproved for application on the buffer zone in order to avoid alteration of wetlands plants. Furthermore, guidelines for application of the selected herbicides will also be established. Finally, no herbicides may be applied within ten feet of wetland areas. In light of the strict controls placed on application of herbicides within the 100-foot buffer zone under the DFA regulations, the Department finds that adoptions of the proposed regulatory scheme is fully consistent with its previous adjudicatory hearing decision in the Clinton and Leverett cases.

C. Impacts of Herbicides Application on Wildlife Habitat. The Department is currently developing regulations under M.G.L. c. 131, § 40 to protect wildlife habitat, The effective date of these regulations is November 1, 1987. One commentator expressed concern regarding the impact of herbicide application on wildlife habitat in wetlands, and particularly on the habitat of rare, "state-listed" wildlife species. As discussed above, the Department has determined that the DFA regulations provide for protection of wetlands from alterations due to herbicide application. However, the DFA regulations do not include flood plains in their definition of wetlands, although those regulations do prohibit herbicide application within 10 feet of any standing or flowing surface water. Beyond that, there is no specific protection of wildlife habitat, including rare species, in floodplain areas.

The Department is concerned that the DFA regulations do not specifically address protection of wildlife habitat in floodplains, in particular those rare, "state-listed" wildlife species. Therefore, as a member of the VMP advisory panel, the Department will review VMPs for potential effect on wildlife habitat and specifically will recommend disapproval of any VMP that will have an adverse effect in areas mapped by the Natural Heritage and Endangered Species Program as habitat of any rare, "state-listed" wildlife species. Furthermore, the Department expects applicators to incorporate into the previously discussed two-year monitoring study a section detailing the effects of herbicide application on wildlife habitat in floodplains and on the habitat of rare, "state-listed" wildlife species. The Department will use the results of this study as the basis for recommending any amendments to the DFA regulations and a decision on reauthorization of these amendments to the Department's wetlands regulations.

Appendix 7

Sensitive Areas:
Illustrations of No-Spray and Limited Spray Areas

Vegetation Control Strategies in Sensitive Areas

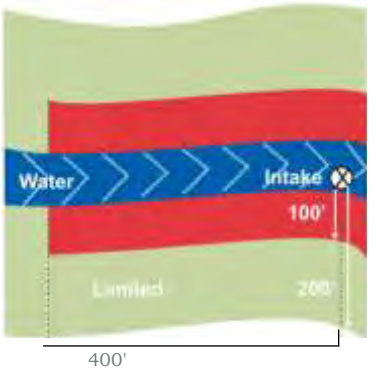
Required by 333 CMR 11.00 and/or approved Vegetation Management Program and Yearly Operational Plan.

Sensitive areas not readily identified in the field:

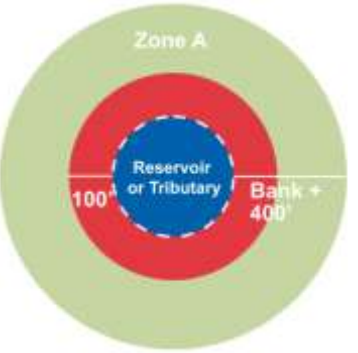
- Mapped on electronic USGS Topographic Maps.
- Contractor will be provided electronic and hard copy of maps with which to flag the boundaries of no-herbicide zones within the right-of-way (ROW) prior to herbicide application.

Public Ground Water Supply Well Zone I

Drinking Water Intake Class B



Public Surface Water Source Class A



Identified Private Drinking Water Well

Sensitive areas readily identifiable in the field:

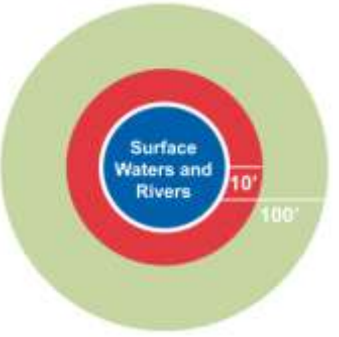
- Consult USGS Topographic Maps
- Contractor will be provided electronic and hard copy of maps with which to flag the boundaries of no-herbicide zones within the right-of-way (ROW) prior to herbicide application.
- Contractor will mark additional areas not found on maps

Wetlands

Defined by Chapter 131, Section 40

Surface Waters and Rivers

All surface water and water over wetlands. Mean high water for rivers.



Agricultural Areas

Active - Growing Season

Inactive Agricultural

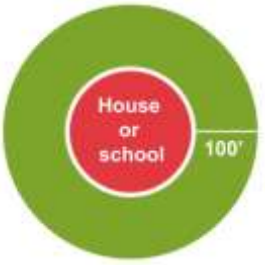
No Restrictions

Sensitive areas readily identifiable in the field: *continued*

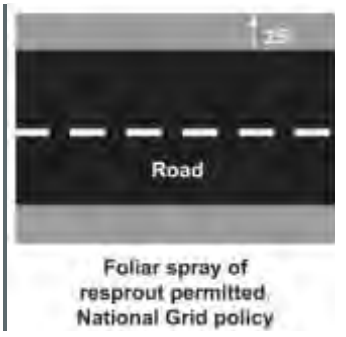
- Consult USGS Topographic Maps
- Contractor will be provided electronic and hard copy of maps with which to flag the boundaries of no-herbicide zones within the right-of-way (ROW) prior to herbicide application.
- Contractor will mark additional areas not found on maps

Inhabited Areas

Where people live, work, or gather



Road Crossings



KEY

= No Herbicide Use

= Water

= Public Ground Water Supply Well or Private Well

= Limited Herbicide Use

1.) Herbicide recommended for use in sensitive area: per (333 CMR 11.04(1)(d)).

2.) Cut stump, basal and low pressure foliar.

3.) 24 months elapsed since previous treatment.
12 months elapsed since previous treatment.

4.) No herbicides applied to conifer species and carriers reviewed by DAR and DEP.

5.) Cut stump only.

6.) Cut stump and basal treatments. (Foliar application to resprouts is permitted.) No other conditions.

nationalgrid

Appendix 8

Remedial Plan to Address Spills Form

REPORTABLE SPILLS

(Spills of reportable quantity of material per 310 CMR 40.0000)**:**

FOLLOW STEPS 1-11

NON-REPORTABLE SPILLS:

FOLLOW STEPS 1-4, 7-11 as appropriate & contact the TransCanada representative.

Order	ACTION		Done (√)
1	Use any and all PPE as directed by product label or SDS.		
2	Cordon-off spill area to unauthorized people and traffic to reduce the spread and exposure of the spill		
3	Identify source of spill and apply corrective action, if possible stop or limit any additional amounts of spilled product.		
4	Contain spill and confine the spread by damming or diking with soil, clay or other absorbent materials.		
5	Report spills of "reportable quantity" to the Mass. DEP and MDAR:		
	MDAR, Pesticide Bureau	(617) 626-1700	
	Massachusetts Department of Environmental Protection, Emergency Response Section (call within 2 hours)	Main Office: (888) 304-1133 Fill in appropriate district office	
6	If the spill cannot be contained or cleaned-up properly, or if there is a threat of contamination to any bodies of water, immediately contact any of the following applicable emergency response personnel:		
	local fire, police, rescue	911	
	National Grid's Rep: (Listed in YOP)		
	Product manufacturer(s) 1 2 3	 1 2 3	
	Chemtrec	(800) 424-9300	
	additional emergency personnel		
	If there is a doubt as to who should be notified, contact local State Police Barracks: FILL IN		
7	Remain at the scene to provide information and assistance to responding emergency clean-up crews		
8	Refer to the various sources of information relative to handling and clean-up of spilled product		
9	If possible, complete the process of "soaking up" with absorbent materials		
10	Sweep or shovel contaminated products and soil into leak proof containers for proper disposal at approved location		
11	Spread activated charcoal over spill area to inactivate any residual herbicide		

Appendix 9

Bibliography

Bibliography

SENSITIVE MATERIALS LIST:

A current list of the *Sensitive Area Materials List* and individual *Fact Sheets* on these herbicides are available at:

http://www.mass.gov/eea/agencies/agr/pesticides/rights-of-way-vegetation-management.html

SAFETY:

Calvert, Geoffrey, Plate, D.K., Das, R., Rosales, R., Shafey, O., Tomsen, C., Male, D., Beckman, J., Arvizu, E. & Lackovic, M. "Acute Occupational Pesticide-Related Illness in the US, 1998-1999: Surveillance Findings From the SENSOR-Pesticide Program." American Journal of Industrial Medicine 45:14-23, 2004.

"Hazards Associated with All-Terrain Vehicles (ATVs) in the Workplace." Safety and Health Information Bulletin, SHIB 08-03-2006.

National Grid's Incident Management System (IMS) a Safety, Health and Environmental Services' online management tool.

"Safety Hazard Information Bulletin: Employees' Exposure to Possible Pinch Point Hazard on Skid Steer Loaders Equipped with Backhoe Attachments," Hazard Information Bulletin, November 12, 1986.

IVM and the Environment:

Askins, Robert A. Restoring North America's Birds; Lessons from Landscape Ecology, Yale University Press, New Haven, CT, 2000.

_____. "Sustaining Biological Diversity in Early Successional Communities: The Challenge of Managing Unpopular Habitats," Wildlife Society Bulletin 29(2) (Summer, 2001).

Belisle, Francis. "Wildlife Use of Riparian Vegetation Buffer Zones in High Voltage Powerline Rights-of-Way in the Quebec Boreal Forest." 7th International Symposium on Environmental Concerns in Rights-of-Way Management, 1999.

Bramble, W.C. and Burns, W.R. "A Long-term Ecological Study of Game Food and Cover on a Sprayed Utility Right-of-Way." Bulletin No. 918, Purdue University, 1974:16.

Bramble, W.C; W.R. Burns; R.J. Hutnik, and S.A. Liscinsky. "Interference Factors Responsible for Resistance of Forb-Grass Cover Types to Tree Invasion on an Electric Utility Right-of-Way." Journal of Arboriculture 22(2), March 1996: 99-105.

Bramble, W.C., W.R. Byrnes, and R.J. Hutnik. "Resistance of Plant Cover Types to Tree Seedling Invasion on an Electric Utility Transmission Right-of-Way." Journal of Arboriculture, 16(5), May 1990.

"Central Vermont Public Service Corporations 2006 Strategy; T&D Forestry." Rutland, VT, 2006.

Confer, John L. "Management, Vegetative Structure and Shrubland Birds of Rights-of-Way." 7th International Symposium on Environmental Concerns in Rights-of-Way Management, 1999.

Deubert. K.H. Studies on the Fate of Garlon 3A and Tordon 101 Used in Selective Foliar Application in the Maintenance of Utility Rights-of-Way in Eastern Massachusetts. Final Report prepared for New England Electric et. al.,1985.

Environmental Consultants, Inc. Study of the Impact of Vegetation Management Techniques on Wetlands for Utility Rights of Way in the Commonwealth of Massachusetts. Final report prepared for New England Electric et.al, 1989.

_____. Determination of the Effectiveness of Herbicide Buffer Zones in Protecting Water Quality on New York State Powerline Rights-of-Way. Final report for the Empire State Electric Energy Research Corporation, 1991.

Foster, David R. "Conservation Issues and Approaches for Dynamic Cultural Landscapes," Journal of Biogeography, Volume 29, Numbers 10/11, October/November 2002: 1533.

Goodrich-Mahoney, John W.; Abrahamson, Lawrence, P.; Ballard, Jennifer I.; Tikalsky, Susan M. 8th International Symposium Environmental Concerns in Rights-of-Way Management, 2004.

Harrison Biotech, Inc. A Generic Environmental Impact Report on the Control of Vegetation on Utility and Railroad Rights-of-Way in the Commonwealth of Massachusetts. Final Report prepared for the Department of Food and Agriculture, Commonwealth of Massachusetts, 1985.

Hickler, Matt, MANHESP approved Review Biologist, Reports for National Grid, NSTAR, Northeast Utilities, TransCanada under *321 CMR 10.00 Massachusetts Endangered Species Act Regulations.* (Also Reports in NH and VT), 2006-2013.

Marshall, James S. "Effects of Powerline Right-of-Way Vegetation Management on Avian Communities." 7th International Symposium on Environmental Concerns in Rights-of-Way Management, 1999.

Marshall, James S. and Vandruff, L.W. "Impact of Selective Herbicide Right-of-Way Vegetation Treatment on Birds," Environmental Management Vol. 30, No. 6, December 2002.

Nickerson, N.H, G.E. Moore and A.D. Cutter. Study of the Environmental Fates of Herbicides in Wetland Soils on Electric Utility Rights-of-Way in Massachusetts over the Short Term. Final Report prepared for New England Electric et.al, December 1994.

Neiring, W.A. and R.H. Goodwin. "Creation of Relatively Stable Shrublands With Herbicides: Arresting Succession on Rights-of-Way and Pastureland." Ecology 55(4), 1974.

Niering, W.A. "Roadside Use of Native Plants: Working with Succession, An Ecological Approach in Preserving Biodiversity." Roadside Use of Native Plants: http://www.environment.fhwa.dot.gov/ecosystems/vegmgmt_rdsduse.asp.

Nowak, Christopher.A. and L.P. Abrahamson. "Vegetation Management on Electric Transmission Line Rights-of-Way in New York State: The Stability Approach to Reducing Herbicide Use." Proceedings of the International Conference on Forest Vegetation Management, Auburn University, April 1993.

Nowak, Christopher A. & Ballard, Benjamin D. "A Framework for Applying Integrated Vegetation Management on Rights-of-Way." Journal of Arboriculture 31(1) (January 2005).

Oehler, James D., ed; Darrel F. Covell, ed; Steve Capel, ed, and Bob Long, ed. Managing Grasslands, Shrublands and Young Forests for Wildlife; A Guide for the Northeast. The Northeast Upland Habitat Technical Committee. 2006.

Schaefer, Valentin. "Rights-of-Way in Support of Biological Conservation" 7th International Symposium on Environmental Conserns in Rights-of-Way Management, 1999.

United States Environmental Protection Agency. "Fact Sheet: Integrated Vegetation Management." EPA 731-F-08-010 (Oct. 2008).

Yahner, Richard H. "Wildlife Response to More than 50 years of Vegetation Maintenance on a Pennsylvania U.S., Right-of-Way." Journal of Arboriculture 30(2), March 2004.

_____. "State Game Lands 33 Research and Demonstration Project—57 years of Continuous Study on the Shawville to Lewiston 230-kV line of First Energy (Penelec). 2009.

_____. "2009 Annual Report to Cooperators. Green Lane Research and Demonstration Project: 23 Years of Continuous Study." (2009).

Appendix C

Wetland Delineation Forms

Wetland Edge Delineation Data Form (WETLAND)

Applicant: INVENERGY, LLC

Wetland No. 1

Project: INVENERGY COMBINED CYCLE

Flag No. Sequence: Between Flags 1-9 & 1-10

City/Town: BURRILLVILLE

Date: 6/19/15

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree	Indicator Status	Herbs	Indicator Status
1. A. rubrum	FAC	1. T. noveboracensis	FAC
2. Q. rubra	FACU	2. C. cornata	OBL
3.		3. M. canadense	FACU

Saplings/Shrubs		Woody Vines
1. C. alnifolia	FAC	1.
2. H. virginiana	FACU	2.
3. V. corymbosum	FACW	3.

List other vegetative species noted which may have affected determination of the wetland edge: _____.

Soil: SCS Soil Survey Mapping Unit: _____
On Hydric Soils List? (Y/N) _____

Soil Profile (Note wetland flag no. nearest soil test pit): _____

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water	
	0-2"	ORGANIC	N/A	Surface	N/A	
	2-6"	7.5 YR 3/3	"		"	MEDIUM SAND
	6-8"	7.5 YR 5/2	"		"	FINE SANDY CLAYEY LOAM
	8-22"+	7.5 YR 2.5/1	"		"	FINE SANDY LOAM

Other hydrological indicators (e.g. water marks, drainage patterns, root rhizospheres, etc.; see Appendix 4(A)(4) of the Rules): WATER-STAINED LEAVES, STRESSED TREES, DRAINAGE PATHWAYS

Landscape position: Hillslope

Altered/atypical situation? (describe) N/A

Comments: Adjacent to stream channel

Wetland Edge Delineation Data Form (UPLAND)

Applicant: INVENERGY, LLC

Wetland No. 1

Project: INVENERGY COMBINED CYCLE

Flag No. Sequence: Between Flags 1-9 & 1-10

City/Town: BURRILLVILLE

Date: 6/19/15

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree	Indicator Status
1. A. rubrum	FAC
2. Q. rubra	FACU
3. Q. alba	FACU

Herbs	Indicator Status
1. C. almifolia	FAC
2. V. angustifolium	FACU
3. M. canadense	FACU

Saplings/Shrubs	
1. C. almifolia	FAC
2. H. virginiana	FACU
3. P. strobus	FACU

Woody Vines
1.
2.
3.

List other vegetative species noted which may have affected determination of the wetland edge: Tree - P. strobus (FACU).

Soil: SCS Soil Survey Mapping Unit: _____
On Hydric Soils List? (Y/N) _____

Soil Profile (Note wetland flag no. nearest soil test pit): _____

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water	
	0-1"	ORGANIC	N/A	N/A	N/A	
	1-2"	10 YR 3/6	"	"	"	CLAYEY LOAM
	2-18"	10 YR 5/6	"	"	"	CLAYEY LOAM
	18-29"+	10 YR 5/6	"	"	"	FINE SANDY CLAYEY LOAM

Other indicators exhibiting an absence of wetland hydrology (e.g. absence of water marks, lack of redoximorphic features, lack of oxidized rhizospheres, etc.): Lack of redox features, lack of water-stained leaves / drainage pathways.

Landscape position: Hillslope

Altered/atypical situation? (describe) N/A

Comments: _____

Wetland Edge Delineation Data Form (WETLAND)

Applicant: INVENERGY, LLC

Wetland No. 1

Project: INVENERGY COMBINED CYCLE

Flag No. Sequence: Between Flags 1-33A & 1-33B

City/Town: BURRILLVILLE

Date: 6/19/15

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree	Indicator Status	Herbs	Indicator Status
1. A. rubrum	FAC	1. O. cinnamomea	FACW
2. Q. rubra	FACU	2. Sphagnum	N/A
3. P. strobus	FACU	3. C. trifolia	FACW
Saplings/Shrubs		**Woody Vines**	
1. V. corymbosum	FACW	1. S. rotundifolia	FAC
2. K. latifolia	FACU	2.	
3. C. alnifolia	FAC	3.	

List other vegetative species noted which may have affected determination of the wetland edge: _____.

Soil: SCS Soil Survey Mapping Unit: _____
On Hydric Soils List? (Y/N) _____

Soil Profile (Note wetland flag no. nearest soil test pit): _____

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water	
	0-3"	ORGANIC	N/A	Surface	N/A	
	3-6"	2.5/N	"		4"	FINE SANDY LOAM
	6-12"	10YR 7/1	"			SILTY FINE-MEDIUM SAND
	12"+	10YR 6/4	"			SILTY MEDIUM-COARSE SAND

Other hydrological indicators (e.g. water marks, drainage patterns, root rhizospheres, etc.; see Appendix 4(A)(4) of the Rules): Surface saturation, high water table, water-stressed trees, water-stained leaves, microtopography

Landscape position: Hillslope

Altered/atypical situation? (describe) N/A

Comments: A11: Depleted below dark surface.

Wetland Edge Delineation Data Form (UPLAND)

Applicant: INVENERGY, LLC

Wetland No. 1

Project: INVENERGY COMBINED CYCLE

Flag No. Sequence: Between flags 1-33A & 1-33B

City/Town: BURRILLVILLE

Date: 6/19/15

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree	Indicator Status
1. Q. rubra	FACU
2. Q. alba	FACU
3. A. rubrum	FAC

Saplings/Shrubs	
1. K. latifolia	FACU
2. C. alnifolia	FAC
3. V. corymbosum	FACW

Herbs	Indicator Status
1. O. cinnamomea	FACW
2. C. alnifolia	FAC
3.	

Woody Vines	
1. S. rotundifolia	FAC
2.	
3.	

List other vegetative species noted which may have affected determination of the wetland edge: _____.

Soil: SCS Soil Survey Mapping Unit: _____
On Hydric Soils List? (Y/N) _____

Soil Profile (Note wetland flag no. nearest soil test pit): _____

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water	
	0-3"	ORGANIC	N/A	N/A	N/A	
	3-9"	10YR 4/1	"	"	"	FINE SANDY LOAM
	9-16"	10YR 5/2	"	"	"	FINE SANDY LOAM
	16-30"+	10YR 6/4	10YR 6/8	"	"	SILTY FINE SAND

Other indicators exhibiting an absence of wetland hydrology (e.g. absence of water marks, lack of redoximorphic features, lack of oxidized rhizospheres, etc.):
Lack of hydrologic indicators.
Landscape position: Hillslope.
Altered/atypical situation? (describe) N/A

Comments:

Wetland Edge Delineation Data Form (WETLAND)

Applicant: INVENERY, LLC

Wetland No. 2

Project: INVENERGY COMBINED CYCLE

Flag No. Sequence:

City/Town: BURRILLVILLE

Date: 10/17/14

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree	Indicator Status	Herbs	Indicator Status
1. A. rubrum	FAC	1. O. cinnamomeum	FACW
2. P. strobus	FACU	2. T. noveboracensis	FAC
3. Q. rubra	FACU	3. C. trifolia	FACW
Saplings/Shrubs		**Woody Vines**	
1. C. alnifolia	FAC	1.	
2. V. corymbosum	FACW	2.	
3. H. virginiana	FACU	3.	

List other vegetative species noted which may have affected determination of the wetland edge: _____.

Soil: SCS Soil Survey Mapping Unit: Ridgebury, Whitman, and Leicester extremely stony fine sandy loams.

On Hydric Soils List? (Y/N) Y

Soil Profile (Note wetland flag no. nearest soil test pit): _____

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
	4-0"	ORGANIC WOODY DEBRIS	N/A		N/A
	0-6"	2.5/N	N/A		"
	6-15"	10YR 4/2	N/A		"
	15"+	10YR 6/1	10YR 7/6		"

Other hydrological indicators (e.g. water marks, drainage patterns, root rhizospheres, etc.; see Appendix 4(A)(4) of the Rules): Water-stressed plants

Landscape position: Depression

Altered/atypical situation? (describe) N/A

Comments: S7- Dark surface

Wetland Edge Delineation Data Form (UPLAND)

Applicant: INVENERGY, LLC

Wetland No. 2

Project: INVENERGY COMBINED CYCLE

Flag No. Sequence:

City/Town: BURRILLVILLE

Date: 10/17/14

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree	Indicator Status	Herbs	Indicator Status
1. P. strobus	FACU	1. C. alnifolia	FAC
2. Q. rubra	FACU	2. T. borealis	FAC
3. Q. velutina		3. P. biflorum	FACU
Saplings/Shrubs		**Woody Vines**	
1. C. alnifolia	FAC	1.	
2. H. virginiana	FACU	2.	
3. K. latifolia	FACU	3.	

List other vegetative species noted which may have affected determination of the wetland edge: _____.

Soil: SCS Soil Survey Mapping Unit: Canton fine sandy loam, 15-30% slopes, rocky

On Hydric Soils List? (Y/N) N

Soil Profile (Note wetland flag no. nearest soil test pit): _____

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
	1-0"	WOODY ORGANIC	N/A	N/A	N/A
	0-1"	10 YR 3/1	"	"	"
	1-5"	7.5 YR 3/3	"	"	"
	5-8"	10 YR 5/6	"	"	"
	8"+	10 YR 6/8	"	"	"

Other indicators exhibiting an absence of wetland hydrology (e.g. absence of water marks, lack of redoximorphic features, lack of oxidized rhizospheres, etc.): Lack of redox features and hydrology.

Landscape position: Hillside

Altered/atypical situation? (describe) N/A

Comments: _____

Wetland Edge Delineation Data Form (WETLAND)

Applicant: INVENERGY, LLC

Wetland No. 2

Project: INVENERGY COMBINED CYCLE

Flag No. Sequence: Between flags 2-19 & 2-20

City/Town: BURRILLVILLE

Date: 6/19/15

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree	Indicator Status
1. A. rubrum	FAC
2. B. alleghanensis	FAC
3. Q. rubra	FACU

Herbs	Indicator Status
1. C. alnifolia	FAC
2. Sphagnum	N/A
3.	

Saplings/Shrubs	
1. C. alnifolia	FAC
2. V. corymbosum	FACW
3. K. latifolia	FACU

Woody Vines	
1.	
2.	
3.	

List other vegetative species noted which may have affected determination of the wetland edge: _____.

Soil: SCS Soil Survey Mapping Unit: _____
On Hydric Soils List? (Y/N) _____

Soil Profile (Note wetland flag no. nearest soil test pit): _____

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water	
	0-2"	ORGANIC	N/A	N/A	N/A	
	2-7"	2.5/N	"	"	"	FINE SANDY LOAM
	7-18"+	5/10Y	"	8"	10"	MEDIUM-COARSE SAND

Other hydrological indicators (e.g. water marks, drainage patterns, root rhizospheres, etc.; see Appendix 4(A)(4) of the Rules): Stressed trees, water-stained leaves

Landscape position: Hillside depression

Altered/atypical situation? (describe) N/A

Comments:

Wetland Edge Delineation Data Form (UPLAND)

Applicant: INVENERGY, LLC

Wetland No. 2

Project: INVENERGY COMBINED CYCLE

Flag No. Sequence: Between flags 2-19 & 2-20

City/Town: BURRILLVILLE

Date: 6/19/15

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree	Indicator Status	Herbs	Indicator Status
1. P. strobus	FACU	1. C. alnifolia	FAC
2. A. rubrum	FAC	2.	
3. B. alleghanensis	FAC	3.	
Saplings/Shrubs		**Woody Vines**	
1. H. virginiana	FACU	1.	
2. K. latifolia	FACU	2.	
3. V. corymbosum	FACW	3.	

List other vegetative species noted which may have affected determination of the wetland edge: _____.

Soil: SCS Soil Survey Mapping Unit: _____
On Hydric Soils List? (Y/N) _____

Soil Profile (Note wetland flag no. nearest soil test pit): _____

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water	
	0-2"	ORGANIC	N/A	N/A	N/A	
	2-4"	10 YR 4/6	"	"	"	SICTY LOAM
	4-11"	10 YR 5/6	"	"	"	FINE LOAM TRACE GRAVEL
	11-18"+	10 YR 7/3	"	"	"	FINE TO MEDIUM SANDY LOAM

Other indicators exhibiting an absence of wetland hydrology (e.g. absence of water marks, lack of redoximorphic features, lack of oxidized rhizospheres, etc.):
Lack of redox features and hydrology

Landscape position: Hillslope

Altered/atypical situation? (describe) N/A

Comments:

Wetland Edge Delineation Data Form (WETLAND)

Applicant: INVENERGY, LLC

Wetland No. 2

Project: INVENERGY COMBINED CYCLE

Flag No. Sequence: Between flags 2-70 & 2-71

City/Town:

Date: 6/19/15

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree	Indicator Status	Herbs	Indicator Status
1. A. rubrum	FAC	1. C. alnifolia	FAC
2. P. strobus	FACU	2. C. trifolia	FACW
3. B. alleghaensis	FAC	3. O. cinnamomea	FACW
Saplings/Shrubs		**Woody Vines**	
1. V. corymbosum	FACW	1.	
2. B. alleghaensis	FAC	2.	
3. C. alnifolia	FAC	3.	

List other vegetative species noted which may have affected determination of the wetland edge: Sphagnum.

Soil: SCS Soil Survey Mapping Unit: _____
On Hydric Soils List? (Y/N) _____

Soil Profile (Note wetland flag no. nearest soil test pit): _____

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water	
	0-2"	ORGANIC	N/A	N/A	N/A	
	2-8"	2.5/N	"	"	"	FINE SANDY LOAM
	8-15"	10 YR 7/2	10 YR 7/8 10%	12"	"	SILTY FINE TO MEDIUM SAND
	15-22"+	10 YR 7/2	10 YR 7/8 20%		"	SILTY FINE TO MEDIUM SAND

Other hydrological indicators (e.g. water marks, drainage patterns, root rhizospheres, etc.; see Appendix 4(A)(4) of the Rules): Stressed trees, drainage pathways

Landscape position: Hillside depression

Altered/atypical situation? (describe) N/A

Comments: S4: Sandy gleyed matrix

Wetland Edge Delineation Data Form (UPLAND)

Applicant: INVENERGY, LLC

Wetland No. 2

Project: INVENERGY COMBINED CYCLE

Flag No. Sequence: Between flags 2-70 & 2-71

City/Town: BURRILLVILLE

Date: 6/19/15

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree	Indicator Status
1. A. rubrum	FAC
2. Q. velutina	
3. B. nigra	FACW

Herbs	Indicator Status
1. C. alnifolia	FAC
2. M. repens	FACU
3. M. canadense	FACU

Saplings/Shrubs	
1. H. virginiana	FACU
2. C. alnifolia	FAC
3. B. alleghaensis	FAC

Woody Vines
1.
2.
3.

List other vegetative species noted which may have affected determination of the wetland edge: _____.

Soil: SCS Soil Survey Mapping Unit: _____
On Hydric Soils List? (Y/N) _____

Soil Profile (Note wetland flag no. nearest soil test pit): _____

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water	
	0-1"	ORGANIC	N/A	N/A	N/A	
	1-4"	10 YR 3/1	"	"	"	FINE SANDY LOAM
	4-11"	10 YR 4/6	"	"	"	SILTY LOAM
	11-23"+	10 YR 6/6	10 YR 4/6 10%	"	"	FINE SANDY SILTY LOAM

Other indicators exhibiting an absence of wetland hydrology (e.g. absence of water marks, lack of redoximorphic features, lack of oxidized rhizospheres, etc.):
Lack of hydrology

Landscape position: Hillslope

Altered/atypical situation? (describe) N/A

Comments: _____

Wetland Edge Delineation Data Form (WETLAND)

Applicant: INVENERGY, LLC Wetland No. 3

Project: INVENERGY COMBINED CYCLE Flag No. Sequence: At flag 3-4

City/Town: BURRILLVILLE Date: 4/23/15

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree	Indicator Status	Herbs	Indicator Status
1. A. rubrum	FAC	1. C. alnifolia	FAC
2. B. populifolia	FAC	2. Sphagnum	N/A
3. Q. rubra	FACU	3. S. album	FACU
Saplings/Shrubs		**Woody Vines**	
1. V. corymbosum	FACW	1.	
2. C. alnifolia	FAC	2.	
3. H. virginiana	FACU	3.	

List other vegetative species noted which may have affected determination of the wetland edge: _____.

Soil: SCS Soil Survey Mapping Unit: _____
On Hydric Soils List? (Y/N) _____

Soil Profile (Note wetland flag no. nearest soil test pit): _____

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
	0-5"	N 2/0		Surface	
B	5-10"	10 YR 5/1			
	10-22"+	5 Y 5/1			

Other hydrological indicators (e.g. water marks, drainage patterns, root rhizospheres, etc.; see Appendix 4(A)(4) of the Rules): Water-stained leaves, surface saturation.

Landscape position: Hillside depression

Altered/atypical situation? (describe) N/A

Comments:

Wetland Edge Delineation Data Form (UPLAND)

Applicant: INVENERGY, LLC

Wetland No. 3

Project: INVENERGY COMBINED CYCLE

Flag No. Sequence: At flag 3-4

City/Town: BURRILLVILLE

Date: 4/23/15

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree	Indicator Status
1. Q. velutina	
2. A. rubrum	
3. B. populifolia	

Herbs	Indicator Status
1. V. angustifolium	FACU
2. C. alnifolia	FAC
3. M. repens	FACU

Saplings/Shrubs
1. H. virginiana
2. A. rubrum
3. B. populifolia

Woody Vines
1.
2.
3.

List other vegetative species noted which may have affected determination of the wetland edge: Saplings/Shrubs: P. strobus (FACU).

Soil: SCS Soil Survey Mapping Unit: _____
On Hydric Soils List? (Y/N) _____

Soil Profile (Note wetland flag no. nearest soil test pit): _____

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
A	0-4"	10YR 2/1			
E	4-7"	10 YR 4/1			
B	7-15"	10 YR 5/6			
B	15"+	2.5 Y 6/4			

Other indicators exhibiting an absence of wetland hydrology (e.g. absence of water marks, lack of redoximorphic features, lack of oxidized rhizospheres, etc.): _____

Landscape position: _____

Altered/atypical situation? (describe) N/A

Comments: _____

Wetland Edge Delineation Data Form (Wetland)

Applicant: National Grid

Wetland No.: 163

Project: NEEWS

Flag No. Sequence: 113-124

City/Town: Berrillville

Date: Delin 11/7/07
Data 3/13/08

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1.		1. Solidago sp.	—
2.		2.	
3.		3.	

Saplings/Shrubs		Woody Vines
1. Clethra alnifolia	FACt	1.
2. Lyonia ligustrina	FAC	2.
3. Betula populifolia	FAC	3.

List other vegetative species noted which may have affected determination of the wetland edge:
Abundant Sphagnum sp. moss.
Typha sp. to SW

Soil: SCS Soil Survey Mapping Unit: Ridgebury Whitman + Leicester (RF)
On Hydric Soils List? (Y/N) Yes.

Soil Profile (Note wetland flag no. nearest soil test pit): Sp. SE (115° Mag.) fr. WF-120

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
Epipedon		10YR2/1-3/2	mucky		∑ = 1"

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Very stony.

Landscape position:

Altered/atypical situation? (Describe):

Comments:

Wetland Edge Delineation Data Form (Upland)

Applicant: National Grid

Wetland No. 163

Project: NEEWS

Flag No. Sequence: 113-124

City/Town: Burrillville

Date: Delin 11/7/07 } P.L.
Data 3/13/08 }

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1.		1. Dennstaedtia punctilobula	N.L.
2.		2.	
3.		3.	

Saplings/Shrubs		Woody Vines	
1. Hamamelis virginiana	FAC-	1. Smilax rotundifolia	FAC
2. Clethra alnifolia	FAC+	2.	
3. Rubus allegheniensis	FACU	3.	

List other vegetative species noted which may have affected determination of the wetland edge:
Sassafras albidum, Lyonia ligustrina

Soil: SCS Soil Survey Mapping Unit: Canton + Charlton (CeC)
On Hydric Soils List? (Y/N) No.

Soil Profile (Note wetland flag no. nearest soil test pit): Sp. NW (305° Mag.) fr. WF-120

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
A	0-3"	10YR2/1			
AB	3-8"	10YR3/4			
	ref.		extremely stony		

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Landscape position:

Altered/atypical situation? (Describe):

Comments:

Wetland Edge Delineation Data Form (Wetland)

Applicant: National Grid

Wetland No.: 163

Project: NEEWS

Flag No. Sequence: 101-110

City/Town: Burrillville

Date: Delin 11/7/07 } P.L.
Data 3/13/08 }

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1. Acer rubrum	FAC	1.	
2. Betula populifolia	FAC	2.	
3.		3.	

Saplings/Shrubs		Woody Vines	
1. Hamamelis virginiana	FAC-	1. Smilax rotundifolia	FAC
2. Betula alleghaniensis	FAC	2.	
3. Clethra alnifolia	FAC+	3.	

List other vegetative species noted which may have affected determination of the wetland edge:
Nyssa sylvatica, Occasional Sphagnum moss

Soil: SCS Soil Survey Mapping Unit: Ridgebury Whitman + Leicester (Rf)
On Hydric Soils List? (Y/N) Yes.

Soil Profile (Note wetland flag no. nearest soil test pit): 5p. W (280° Mag.) fr. WF-103

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
	0-8(10)"	10YR2/1 - 7.5YR2/0			▽ = 3"
Bg	10"+	10YR5/2			

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Very stony.

Landscape position:

Altered/atypical situation? (Describe):

Comments:

Wetland Edge Delineation Data Form (Upland)

Applicant: National Grid

Wetland No. 163

Project: NEEWS

Flag No. Sequence: 101-110

City/Town: Burrillville

Date: Delin: 11/7/07 Data: 3/13/08 } P.L.

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1. Acer rubrum.	FAC	1.	
2. Betula alleghenensis	FAC	2.	
3. Betula lenta	FACU	3.	
Saplings/Shrubs		**Woody Vines**	
1. Vaccinium corymbosum	FACW-	1.	
2. Clethra alnifolia	FAC+	2.	
3.		3.	

List other vegetative species noted which may have affected determination of the wetland edge: Betula populifolia, Pinus strobus, Sassafras, Quercus, Pteridium aquilinium

Soil: SCS Soil Survey Mapping Unit: Woodbridge (WoB)

On Hydric Soils List? (Y/N) No (MWD)

Soil Profile (Note wetland flag no. nearest soil test pit): Sp. E (102° Mag.) fr. WF-104

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
A	0-4"	10YR3/2			
Bw	4-18"	10YR5/4	no redox	~14"	

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.): very stony

Landscape position:

Altered/atypical situation? (Describe):

Comments:

Wetland Edge Delineation Data Form (Wetland)

Applicant: National Grid

Wetland No.: 163

Project: NEEWS

Flag No. Sequence: PFO portion of 200 series

City/Town: Burrillville

Date: data plot: 4-24-08 J.K.
delineation: 11-8-07 P.L.

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1. Acer rubrum	FAC	1.	
2. Quercus rubra	FACU-	2.	
3. Betula lenta	FACU	3.	

Saplings/Shrubs	Woody Vines
1. Vaccinium corymbosum FACW-	1.
2.	2.
3.	3.

List other vegetative species noted which may have affected determination of the wetland edge:
Alnus rugosa-FACW+

Soil: SCS Soil Survey Mapping Unit: Ridgebury, Whitman, ~~Sutton~~ & Leicester (Rf)
On Hydric Soils List? (Y/N) Yes

Soil Profile (Note wetland flag no. nearest soil test pit): 20-30ft north of 204

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
—	3-0	—	leaf litter	—	—
Oa	0-2	10YR 2/1	—	—	—
B	2-8	10YR 2/2	—	—	6'

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Landscape position: pit and mound

Altered/atypical situation? (Describe):

Comments: Rock restricted at 6'

Wetland Edge Delineation Data Form (Upland)

Applicant: National Grid

Wetland No. 163

Project: NEEWS

Flag No. Sequence: PFO portion of 200 series

City/Town: Burrillville

Date: data plot: 4-24-08 JK
delineation: 11-8-07 PL

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1. Acer Rubrum -	FAC	1.	
2. Betula lenta - 1	FACU	2.	
3. Betula populifolia	FAC	3.	
Saplings/Shrubs		**Woody Vines**	
1. Betula populifolia	FAC	1.	
2. Pinus strobus	FACU	2.	
3.		3.	

List other vegetative species noted which may have affected determination of the wetland edge:

Soil: SCS Soil Survey Mapping Unit: Canton and Charlton fine sandy loam (CeC)
On Hydric Soils List? (Y/N) NO

Soil Profile (Note wetland flag no. nearest soil test pit): ≅ 15ft. e. southeast flag 204

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
	3-0"		leaf litter		
Oa	0-2"	10YR 2/1			
A	2-6"	10YR 4/6	7.5YR 4/6		
B	6-16"+	10YR 6/3	7.5 YR 4/6		

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Landscape position:

Altered/atypical situation? (Describe):

Comments: Very Rocky

Wetland Edge Delineation Data Form ~~(Upland)~~ Wetland

Applicant: National Grid

Wetland No. Ile 3

Project: NEEWS

Flag No. Sequence: 219-222

City/Town: Burrillville

Date: 4/24/08 - Data. -AM
11/8/07 - Delin. PL

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1.		1. Onoclea sensibilis	FACW
2.		2.	
3.		3.	

Saplings/Shrubs	Woody Vines
1. Clethra alnifolia FAC+	1.
2. Vaccinium corymbosum FACW-	2.
3.	3.

List other vegetative species noted which may have affected determination of the wetland edge:

Soil: SCS Soil Survey Mapping Unit: Ridgebury, Whitman + Leicester extremely stony fsl (CRf)
On Hydric Soils List? (Y/N) Yes

Soil Profile (Note wetland flag no. nearest soil test pit): 220

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water	
Oe	0-3"	10YR 2/1				
A	3-8"	10YR 2/1				fsl
B	8"+	10YR 6/2	Many masses	surface	8"	sl

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Landscape position:

Altered/atypical situation? (Describe):

Comments: Many boulders.

Wetland Edge Delineation Data Form (Upland)

Applicant: National Grid

Wetland No. 163

Project: NEEWS

Flag No. Sequence: 200 series

City/Town: Burrillville

Date: 4/24/08 - Data - AM
11/8/07 - Delin. PL

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1.		1. Rosa rugosa	FACU-
2.		2.	
3.		3.	

Saplings/Shrubs		Woody Vines
1. Spiraea latifolia	FACW	1.
2.		2.
3.		3.

List other vegetative species noted which may have affected determination of the wetland edge: A lot of dead, Prostrate Spirea latifolia on ground. Not too much live vegetation.

Soil: SCS Soil Survey Mapping Unit: Sutton very stony fsl (SuB)
On Hydric Soils List? (Y/N) NO

Soil Profile (Note wetland flag no. nearest soil test pit): 220

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
Oi	0-3"	10YR 3/3			
A	3"-8"	10YR 2/1			
Bw	8"+	10YR 5/4			

fSL
SI w/ coarse fragments

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Landscape position:

Altered/atypical situation? (Describe):

Comments: data plot taken next to southern-most pole of structure 22.

Wetland Edge Delineation Data Form (Wetland)

Applicant: National Grid

Wetland No.: 162

Project: NEEWS

Flag No. Sequence: 301-308

City/Town: Burrillville

Date: Delin 11/7/07 P.L.
Data 3/13/08

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1.		1. Carex stricta	OBL
2.		2. Scirpus cyperinis	FACW+
3.		3. Calamagrostis canadensis	FACW+

Saplings/Shrubs		Woody Vines
1. Clethra alnifolia	FAC+	1.
2. Spiraea tomentosa	FACW	2.
3. Lyonia ligustrina	FAC	3.

List other vegetative species noted which may have affected determination of the wetland edge:
Polytrichum sp. moss.

Soil: SCS Soil Survey Mapping Unit: Ridgebury Whitman + Leicester (RF)
On Hydric Soils List? (Y/N) Yes.

Soil Profile (Note wetland flag no. nearest soil test pit): 10p. SW (230° Mag.) fr. WF-306

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
C	0-3"	2.5Y 5/3			
2Ab	3-6"	10YR 2/1			
2Bg	6-14"	10YR 3/2-4/2	fine oxi rhizo		

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Landscape position:

Altered/atypical situation? (Describe): Area heavily sedimented from nearby gravel road.

Comments: Multiple diffuse channels - flow path is changeable due to sheeting of sediments.

Wetland Edge Delineation Data Form (Upland)

Applicant: National Grid

Wetland No. 162

Project: NEEWS

Flag No. Sequence: 315-321

City/Town: Burrillville

Date: Delin 11/7/07
Data 3/13/08

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1.		1. Dichanthelcum sp.	--
2.		2. Rubus flagellaris	FACU
3.		3. Spiraea tomentosa	FACW

Saplings/Shrubs		Woody Vines	
1. Clethra alnifolia	FAC+	1. Smilax rotundifolia	FAC
2. Lyonia ligustrina	FAC	2.	
3. Leucothoe racemosa	FACW	3.	

List other vegetative species noted which may have affected determination of the wetland edge:
Calamagrostis canadensis, Solidago spp., Hamamelis virginiana
Kalmia angustifolia

Soil: SCS Soil Survey Mapping Unit: Woodbridge (WoB)
On Hydric Soils List? (Y/N) No (MWD)

Soil Profile (Note wetland flag no. nearest soil test pit): 4p. NW (305° Mag.) fr. WF-319

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
loam BC	0-4"	10YR3/4			
lfs C1	4-12"	10YR3/3-4/3			
cos C2	12-15"	5YR 4/6			
vfsl 2Ab	15-18"	7.5YR2/0			∇ = 18"
vfsl 2Bw	18-24"	10YR3/3	oxirhizo		

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Landscape position:

Altered/atypical situation? (Describe):

Comments:

Wetland Edge Delineation Data Form (Wetland)

Applicant: National Grid

Wetland No.: 162

Project: NEEWS

Flag No. Sequence: 308-314

City/Town: Bernardsville

Date: Delin 11/7/07 } P.L.
Data 3/13/08 }

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1. Acer rubrum	FAC	1.	
2. Betula populifolia	FAC	2.	
3. Betula lenta	FACU	3.	
Saplings/Shrubs		**Woody Vines**	
1. Hamamelis virginiana	FAC-	1.	
2. Vaccinium corymbosum	FACW-	2.	
3.		3.	

List other vegetative species noted which may have affected determination of the wetland edge:
Occas. patches of Sphagnum moss.

Soil: SCS Soil Survey Mapping Unit: Ridgebury Whitman + Leicester (Rf)
On Hydric Soils List? (Y/N) Yes.

Soil Profile (Note wetland flag no. nearest soil test pit): 4p. N (10 May.) fr WF-309.

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Extremely stony drainage draw

Landscape position:

Altered/atypical situation? (Describe):

Comments: Adjacent upland w/ oak, Sassafras, hickory - and lacking Sphagnum.

Wetland Edge Delineation Data Form (Upland)

Applicant: National Grid

Wetland No. 162

Project: NEEWS

Flag No. Sequence: – See Below

City/Town: Burrillville

Date: Delin 11/7/07 } P.L.
Data 3/13/08 }

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1. Acer rubrum		1.	
2.		2.	
3.		3.	

Saplings/Shrubs	Woody Vines
1. Hamamelis virginiana	1.
2. Clethra alnifolia	2.
3. Ilex verticillata	3.

List other vegetative species noted which may have affected determination of the wetland edge:
Quercus, Sassafras, Prunus serotina

Soil: SCS Soil Survey Mapping Unit: Ridgebury Whitman + Leicester (Rf)
On Hydric Soils List? (Y/N) Yes.

Soil Profile (Note wetland flag no. nearest soil test pit): westerly from WF-315 – See Comments

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
A		7.5YR2/0			
Bw	to 20"	10YR 3/3-3/4			

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.): – fine-textured soilum (vfsl) results in seasonal episaturation.

Landscape position: – clumps of witch hazel to ~30 ft.

Altered/atypical situation? (Describe):

Comments: – Location: Approx 25 ft. NNE (20° Mag.) from the confluence of stream channels 84+85

Wetland Edge Delineation Data Form (Wetland)

Applicant: National Grid

Wetland No.: 161

Project: NEEWS

Flag No. Sequence: 301-304

City/Town: Burrillville

Date: Delin 11/5/07
Data 3/13/08

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1. Acer rubrum	FAC	1. Osmunda cinnamomea	FACW-
2. Betula lenta	FACU	2. Thelypteris noveboracensis	FAC
3.		3.	

Saplings/Shrubs		Woody Vines
1. Hamamelis virginiana	FAC-	1.
2. Acer rubrum	FAC	2.
3. Betula alleghaniensis	FAC	3.

List other vegetative species noted which may have affected determination of the wetland edge:

Soil: SCS Soil Survey Mapping Unit: Canton + Charlton (CeC)
On Hydric Soils List? (Y/N) No.

Soil Profile (Note wetland flag no. nearest soil test pit): 6p. SW (215° Mag.) fr. WF-302

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
	0-10"	10YR2/0	mucky		
	10-11"+	10YR3/2			
	12"		refusal (Bx)		

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.): leafy wrack deposits, flow patterns, exposed roots, buttressing.

Landscape position:

Altered/atypical situation? (Describe):

Comments: Notes from Nov. 2007: "High OM, very dark A horiz. over depleted, fine-textured subsoil (sil-colluvium)"

Wetland Edge Delineation Data Form (Upland)

Applicant: National Grid

Wetland No. 161

Project: NEEWS

Flag No. Sequence: 301-304

City/Town: Burrillville

Date: Delin 11/5/07 } P.L.
Data 3/13/08 }

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1.		1. Calamagrostis canadensis	FACW+
2.		2. Gaultheria procumbens	FACU
3.		3. Pteridium aquilinum	FACU

Saplings/Shrubs		Woody Vines
1. Comptonia peregrina	N.L.	1.
2. Kalmia angustifolia	FAC	2.
3.		3.

List other vegetative species noted which may have affected determination of the wetland edge: Lyonia ligustrina, Hamamelis virginiana, Pinus strobus (seedl.) Carex pensylvanica.

Soil: SCS Soil Survey Mapping Unit: Canton + Charlton (CeC)
On Hydric Soils List? (Y/N) No.

Soil Profile (Note wetland flag no. nearest soil test pit): 7p. NNW (340° Mag.) fr. WF-304.

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
A	0-3"	10YR 3/2			
Bw	3-19"	10YR5/6-5/4			▽ @ 14"

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.): Chroma decreasing gradually w/ depth...

Landscape position:

Altered/atypical situation? (Describe):

Comments: Likely connects to ▽ 162 through woods via stony SPD/MWD drainage way.

Wetland Edge Delineation Data Form (Wetland)

Applicant: National Grid Wetland No.: 160

Project: NEEWS Flag No. Sequence: 401-416

City/Town: Bumlville Date: 11/5/07 - P.L.

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1.		1. Juncus canadensis	OBL
2.		2. Agrostis	--
3.		3. Scirpus cyperinus	FACW+

Saplings/Shrubs		Woody Vines
1. Acer rubrum	FAC	1.
2. Spiraea tomentosa	FACW	2.
3. Betula populifolia	FAC	3.

List other vegetative species noted which may have affected determination of the wetland edge:
Sphagnum sp. moss

Soil: SCS Soil Survey Mapping Unit: Canton + Charlton (CeC)
On Hydric Soils List? (Y/N) No

Soil Profile (Note wetland flag no. nearest soil test pit):

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.): Basin topography (water marks, reduced if litter) - flooded to ~10" (max.) on 3/13/08

Landscape position:

Altered/atypical situation? (Describe): collapsed culvert xcross road at WF-402.

Comments:

Wetland Edge Delineation Data Form (Upland)

Applicant: National Grid

Wetland No. 160/161

Project: NEEWS

Flag No. Sequence: N/A

City/Town: Burrillville

Date: Delin 11/5/07 } P.L.
Data - 3/13/08 }

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1.		1. Calamagrostis canadensis	FACW+
2.		2. Solidago sp.	
3.		3.	

Saplings/Shrubs		Woody Vines
1. Comptonia peregrina	N.L.	1.
2. Betula populifolia	FAC	2.
3.		3.

List other vegetative species noted which may have affected determination of the wetland edge:
Carex sp., Schizachyrium, Gaultheria, [Danthonia?]
Verbascum thapsus, Pteridium
- Occas. Spiraea tomentosa + Lycopus to west

Soil: SCS Soil Survey Mapping Unit: Canton + Charlton (CeC)
On Hydric Soils List? (Y/N) No.

Soil Profile (Note wetland flag no. nearest soil test pit): 36 p. due S. (180° Mag.) fr. WF 160-403

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
Bw	to 16"	10YR 4/4			

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Landscape position:

Altered/atypical situation? (Describe):

Comments: Channel (seasonal storm flow) between WL 160 + WL 161 is intermittent and variable; does not extend further beyond data point. Sheet flow over exposed ledge, then with no channelized flow through rocky, level meadow...

Wetland Edge Delineation Data Form (Wetland)

Applicant: National Grid Wetland No.: 159

Project: NEEWS Flag No. Sequence: 301-314

City/Town: Burrillville Date: Delin 11/2/07 } P.L.
Data 3/12/08 }

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1. Quercus rubra	FACU	1. Osmunda cinnamomea	FACW-
2. Acer rubrum	FAC	2.	
3.		3.	

Saplings/Shrubs		Woody Vines
1. Clethra alnifolia	FAC+	1.
2. Rhodo viscosum	OBL	2.
3. Vaccinium corymbosum	FACW-	3.

List other vegetative species noted which may have affected determination of the wetland edge:
Sphagnum, Ilex verticillata

Soil: SCS Soil Survey Mapping Unit: Ridgebury Whitman + Leicester (Rf)
On Hydric Soils List? (Y/N) Yes.

Soil Profile (Note wetland flag no. nearest soil test pit): 4p. NE (45° Mag.) fr. WF-304

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
Bw		10YR5/1-6/1			

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Landscape position:

Altered/atypical situation? (Describe):

Comments:

Wetland Edge Delineation Data Form (Upland)

Applicant: National Grid

Wetland No. 159

Project: NEEWS

Flag No. Sequence: 301-314

City/Town: Burrillville

Date: Delin 11/2/07 } P.L.
Data 3/12/08 }

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1. Quercus rubra	FACU	1. Gaultheria procumbens	FACU
2. Acer rubrum	FAC	2.	
3. Pinus strobus	FACU	3.	

Saplings/Shrubs		Woody Vines
1. Hamamelis virginiana	FAC-	1.
2. Viburnum cassinoides	FACW	2.
3. Clethra alnifolia	FAC+	3.

List other vegetative species noted which may have affected determination of the wetland edge:
Castanea dentata, Gaylussacia baccata, Nyssa sylvatica, Quercus alba, Kalmia latifolia

Soil: SCS Soil Survey Mapping Unit: Woodbridge (WoB)
On Hydric Soils List? (Y/N) NO (MWD)

Soil Profile (Note wetland flag no. nearest soil test pit): 5p. WSW (250° Mag.) fr. WF-304

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
Bw	16"	10YR 4/2 → 10YR 5/3-5/2			

See below

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Landscape position: Topo sloping gently to SW

Altered/atypical situation? (Describe):

Comments: 9p. SW (210° Mag.) fr. WF-304 : Bw = 10YR 4/3
14p. SSW (200° Mag) fr. WF-304 : Bw = 10YR 4/3-4/4

Wetland Edge Delineation Data Form (Wetland)

Applicant: National Grid

Wetland No.: 158

Project: NEEWS

Flag No. Sequence: 400-439

City/Town: Bumllville

Date: Delin 11/2/07 } P.L.
Data 3/12/08 }

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1.		1. Solidago rugosa	FAC
2.		2.	
3.		3.	

Saplings/Shrubs		Woody Vines	
1. Clethra alnifolia	FAC+	1. Vitis labrusca	FACU
2. Lyonia ligustrina	FAC	2. Rubus hispidus	FACW
3. Betula populifolia	FAC	3.	

List other vegetative species noted which may have affected determination of the wetland edge:
Sphagnum sp. moss (abundant) Spiraea tomentosa, Leucothoe racemosa, Vaccinium corymbosum, Panicum rigidulum,

Soil: SCS Soil Survey Mapping Unit: Ridgebury Whitman Leicester (Rf)
On Hydric Soils List? (Y/N) YES.

Soil Profile (Note wetland flag no. nearest soil test pit): 4p. SSE (155° Mag.) fr. WF-410.

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):
High OM Ap horizon w/ depleted subsoil.

Landscape position:
▽ @ 2"

Altered/atypical situation? (Describe):

Comments:
▽158 (Typ.) = PSS Clethra + Grey birch over haircap moss + Sphagnum.
Other typical non-dominants = Lyonia ligustrina, Leucothoe racemosa, A. rubrum, + Calamagrostis.

Wetland Edge Delineation Data Form (Upland)

Applicant: National Grid

Wetland No. 158

Project: NEEWS

Flag No. Sequence: 400-439

City/Town: Bernardsville

Date: Delin 11/2/07 } P.L.
Data 3/12/08 }

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1.		1. Solidago rugosa	FAC
2.		2.	
3.		3.	

Saplings/Shrubs		Woody Vines	
1. Comptonia peregrina	N.L.	1. Rubus hispidus	FACW
2. Betula populifolia	FAC	2.	
3. Clethra alnifolia	FAC+	3.	

List other vegetative species noted which may have affected determination of the wetland edge:
Kalmia angustifolia, Sassafras albidum, Quercus sp.

Soil: SCS Soil Survey Mapping Unit: Woodbridge (WoB)
On Hydric Soils List? (Y/N) NO (MWD)

Soil Profile (Note wetland flag no. nearest soil test pit): 6p. NW (295° Mag.) fr. WF-410

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
C	0-16/20"	10YR4/3	high chroma, diffuse	s.m.	
Ab/E	16/20"				

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Landscape position: - graded mineral soil

Altered/atypical situation? (Describe): - very stony w/ irregular topography
- large stones w/ voids

Comments: vicinity of Structure 27 - disturbed historically

Wetland Edge Delineation Data Form (Wetland)

Applicant: National Grid

Wetland No.: 158

Project: NEEWS

Flag No. Sequence: 394-399, 440-443

City/Town: Berrillville

Date: Delin. 11/2/07 } P.L.
Data 3/12/08 }

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1. Quercus coccinea	NL	1.	
2. Acer rubrum	FAC	2.	
3.		3.	

Saplings/Shrubs		Woody Vines
1. Hamamelis virginiana	FAC-	1.
2. Vaccinium corymbosum	FACW	2.
3. Acer rubrum	FAC	3.

List other vegetative species noted which may have affected determination of the wetland edge:
Sphagnum sp. moss, Nyssa sylvatica, Tsuga canadensis, Kalmia latifolia, Betula lenta.

Soil: SCS Soil Survey Mapping Unit: _____
On Hydric Soils List? (Y/N) _____

Soil Profile (Note wetland flag no. nearest soil test pit): Sp. NNE (20° Mag.) fr. WF-441

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
A	0-4"	10YR 2/1			
Bg	4-12"	10YR 4/1-5/1			
	12"	refusal			

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):
- Diffuse overland flow toward ROW.
- Some small wrack deposits

Landscape position:

Altered/atypical situation? (Describe):

Comments: Extremely stony.

Wetland Edge Delineation Data Form (Upland)

Applicant: National Grid

Wetland No. 158

Project: NEEWS

Flag No. Sequence: 394-399, 440-443

City/Town: Burrillville

Date: Delin 11/2/07 } P.L.
Data 3/12/08 }

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1. Quercus coccinea	NL	1.	
2. Quercus alba	FACU	2.	
3. Pinus strobus	FACU	3.	

Saplings/Shrubs		Woody Vines
1. Hamamelis virginiana	FAC-	1.
2. Gaylussacia baccata	FACU	2.
3. Gaultheria procumbens	FACU	3.

List other vegetative species noted which may have affected determination of the wetland edge:
Betula lenta, Acer rubrum.

Soil: SCS Soil Survey Mapping Unit: Woodbridge (WoB)
On Hydric Soils List? (Y/N) NO (MWD)

Soil Profile (Note wetland flag no. nearest soil test pit): 7p. N (357° Mag.) fr WF-397

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Landscape position:

Altered/atypical situation? (Describe):

Comments:

Wetland Edge Delineation Data Form (Wetland)

Applicant: National Grid

Wetland No.: 157

Project: NEEWS

Flag No. Sequence: 301-314

City/Town: Bernardville

Date: 11/1/07 - P.L.

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1.		1. Solidago rugosa	FAC
2.		2. Osmunda cinnamomea	FACW-
3.		3. Calamagrostis canadensis	FACW+

Saplings/Shrubs		Woody Vines	
1. Spiraea latifolia	FAC+	1. Rubus hispidus	FACW
2. Kalmia angustifolia	FAC	2.	
3.		3.	

List other vegetative species noted which may have affected determination of the wetland edge: Viburnum recognitum, Onoclea sensibilis, Spiraea tomentosa, Clethra alnifolia

Soil: SCS Soil Survey Mapping Unit: Woodbridge (WoB)

On Hydric Soils List? (Y/N) No.

Soil Profile (Note wetland flag no. nearest soil test pit): Sp. SE (130° Mag.) fr WF-312

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
Ap	0-7"	10YR2/1			
AB	7-11"	10YR4/1			
Bg	11-14"	2.5Y6/2	loamy sand		

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Landscape position:

Altered/atypical situation? (Describe):

Comments:

Wetland Edge Delineation Data Form (Upland)

Applicant: National Grid

Wetland No. 157

Project: NEEWS

Flag No. Sequence: 301-314

City/Town: Burrillville

Date: Delin 11/1/07
Data 3/13/08

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1.		1. Solidago rugosa	FAC
2.		2. Calamagrostis canadensis	FACW+
3.		3.	

Saplings/Shrubs		Woody Vines	
1. Clethra alnifolia	FAC+	1.	
2. Hamamelis virginiana	FAC-	2.	
3. Betula populifolia	FAC	3.	

List other vegetative species noted which may have affected determination of the wetland edge:
Smilax glauca, Kalmia latifolia, Rubus allegheniensis, Pinus strobus

Soil: SCS Soil Survey Mapping Unit: Woodbridge (WoB)
On Hydric Soils List? (Y/N) No (MWD)

Soil Profile (Note wetland flag no. nearest soil test pit): 5p. NW (298° Mag.) fr. WF-312

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
A	0-4"	10YR 2/1			
Bw1	4-16"	10YR 4/4			
Bw2	16-20"	10YR 5/4	10YR 5/8 many, co. s.m.		

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Landscape position:

Altered/atypical situation? (Describe):

Comments: PSS/PEM (Clethra/Viburnum recognitum)

Wetland Edge Delineation Data Form (Wetland)

Applicant: National Grid Wetland No.: 156

Project: NEEWS Flag No. Sequence: 301-323

City/Town: Burrillville Date: 11/1/07 P.L.

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1. Acer rubrum	FAC	1.	
2. Betula populifolia	FAC	2.	
3.		3.	

Saplings/Shrubs		Woody Vines	
1. Clethra alnifolia	FAC+	1. Smilax rotundifolia	FAC
2. Ilex verticillata	FACW+	2.	
3. Vaccinium corymbosum	FACW-	3.	

List other vegetative species noted which may have affected determination of the wetland edge: Sphagnum (occas.), Rubus hispidus, Nyssa sylvatica, Quercus rubra

Soil: SCS Soil Survey Mapping Unit: Woodbridge (WoB)
On Hydric Soils List? (Y/N) No.

Soil Profile (Note wetland flag no. nearest soil test pit): typ. soils

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
A	0-3"		high OM		
Bg	3+				

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Landscape position:

Altered/atypical situation? (Describe):

Comments:

Wetland Edge Delineation Data Form (Upland)

Applicant: National Grid Wetland No. 156

Project: NEEWS Flag No. Sequence: 301-323

City/Town: Bernardsville Date: Delin 11/1/07 Data 3/13/08 P.L.

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1. Acer rubrum	FAC	1. Lycopodium obscurum	FACU
2. Pinus strobus	FACU	2. Osmunda cinnamomea	FACW-
3. Prunus serotina	FACU	3.	

Saplings/Shrubs		Woody Vines
1. Acer rubrum	FAC	1.
2. Vaccinium corymbosum	FACW	2.
3. Clethra alnifolia	FAC+	3.

List other vegetative species noted which may have affected determination of the wetland edge: Fraxinus [americana] Carya glabra, Quercus spp.

Soil: SCS Soil Survey Mapping Unit: Woodbridge (WoB)
On Hydric Soils List? (Y/N) No. (MWD)

Soil Profile (Note wetland flag no. nearest soil test pit): 7 p. ESE (109° Mag.) fr. WF-303

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
A	0-8"	10YR3/2			
E	8-12"	10YR5/2			
B_{w1}	12-16"	10YR3/4-4/4			
B_{w2}	16"	10YR4/4	10YR5/8 concs		

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Landscape position: Topo break (+/-) to wetland.

Altered/atypical situation? (Describe):

Comments:

Wetland Edge Delineation Data Form (Wetland)

Applicant: National Grid

Wetland No.: 155

Project: NEENS

Flag No. Sequence: 309-317

City/Town: Bernardville

Date: Delin 11/1/07 Data 3/13/08

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1.		1. Solidago rugosa	FAC
2.		2. Mikania scandens	FACW+
3.		3.	

Saplings/Shrubs		Woody Vines
1. Clethra alnifolia	FAC+	1.
2. Rubus occidentalis	NL	2.
3. Acer rubrum	FAC	3.

List other vegetative species noted which may have affected determination of the wetland edge: Spiraea spp., Lycium ligustrina, Crataegus sp., Sphagnum sp. moss

Soil: SCS Soil Survey Mapping Unit: Woodbridge (WoB)

On Hydric Soils List? (Y/N) No. (MWD)

Soil Profile (Note wetland flag no. nearest soil test pit): 6 p. NE (38° Mag.) fr. WF-315

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Landscape position:

Altered/atypical situation? (Describe): Extremely stony (old rock dump?)

Comments:

Wetland Edge Delineation Data Form (Wetland)

Applicant: National Grid

Wetland No.: 155

Project: NEEWS

Flag No. Sequence: 301-309, 320-324

City/Town: Burrillville

Date: Delin 11/1/07 } P.L.
Data 3/13/08 }

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1. Acer rubrum	FAC	1. Osmunda cinnamomea	FACW-
2. Betula populifolia	FAC	2.	
3.		3.	

Saplings/Shrubs		Woody Vines
1. Clethra alnifolia	FAC+	1.
2. Vaccinium corymbosum	FACW-	2.
3.		3.

List other vegetative species noted which may have affected determination of the wetland edge: Sphagnum sp. moss (occas. to common), Ilex verticillata, Smilax rotundifolia, Nyssa sylvatica

Soil: SCS Soil Survey Mapping Unit: Woodbridge (WoB)
On Hydric Soils List? (Y/N) No (MWD)

Soil Profile (Note wetland flag no. nearest soil test pit): 7p. SW (225° Mag.) fr WF-303

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Landscape position:

Altered/atypical situation? (Describe): Extremely stony.

Comments: wetland boundary on west side (flags 320-324) +/- defined by topography.

Wetland Edge Delineation Data Form (Upland)

Applicant: National Grid

Wetland No. 155

Project: NEEWS

Flag No. Sequence: 301-309

City/Town: Burrillville

Date: Delin 11/1/07 } P.L.
Data 3/13/08 }

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1. Acer rubrum	FAC	1.	
2. Betula populifolia	FAC	2.	
3.		3.	

Saplings/Shrubs		Woody Vines
1. Clethra alnifolia	FAC+	1.
2. Hamamelis virginiana	FAC-	2.
3. Betula populifolia	FAC	3.

List other vegetative species noted which may have affected determination of the wetland edge: Sassafras, Populus grandidentata, Betula lenta, Kalmia latifolia Quercus spp.

Soil: SCS Soil Survey Mapping Unit: _____
On Hydric Soils List? (Y/N) _____

Soil Profile (Note wetland flag no. nearest soil test pit): 6p NE (60° Mag.) fr. WF-305

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
A	0-5"				
B_{w1}	5-14"	10YR4/6		14"	
B_{w2}	14-20"	10YR4/4			

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

very stony

Landscape position:

Altered/atypical situation? (Describe):

Comments: Trees/Sapl: Even-aged 4"-8" dbh (typ.)
multi-stemmed stump sprout clumps
35-40 ft est. height (typ.)

Wetland Edge Delineation Data Form (Wetland)

Applicant: National Grid Wetland No.: 154

Project: NEEWS Flag No. Sequence: 401-415

City/Town: Burrillville Date: Delin 10/31/07, Data 3/13/08 } P.L.

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1.		1. Onoclea sensibilis	FACW
2.		2. Solidago rugosa	FAC
3.		3. Agrostis sp.	—

Saplings/Shrubs		Woody Vines
1. Spiraea latifolia	FAC+	1.
2. Spiraea tomentosa	FACW	2.
3. Clethra alnifolia	FAC+	3.

List other vegetative species noted which may have affected determination of the wetland edge: Kalmia angustifolia, Betula populifolia, Acer rubrum, Calamagrostis canadensis, Lyonia ligustrina — occasional Sphagnum moss

Soil: SCS Soil Survey Mapping Unit: Woodbridge (WoB)

On Hydric Soils List? (Y/N) YES.

19 paces E (108° Mag.) fr. WF-414

Soil Profile (Note wetland flag no. nearest soil test pit): 4p. upslope from center pole of structure # 31

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
AC		10YR3/2			
Bw		10YR5/2-4/3	10YR6/2 depl.		∇=9"

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.): — occas. high chroma mottles along root channels and ped faces.

Landscape position:

Altered/atypical situation? (Describe): — Soils are disturbed (close proximity to structure 31)

Comments:

- Some Mtn Laurel + Sweet fern in ROW

Wetland Edge Delineation Data Form (Upland)

Applicant: National Grid

Wetland No. 154

Project: NEEWS

Flag No. Sequence: 401-415

City/Town: Burrillville

Date: Delin 10/31/07 } P.L.
Data 3/13/08 }

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1.		1. Solidago rugosa	FAC
2.		2. Carex [pennsylvanica]	NL
3.		3.	

Saplings/Shrubs		Woody Vines	
1. Clethra alnifolia	FAC+	1. Rubus flagellaris	UPL
2. Kalmia latifolia	FACU	2.	
3. Hamamelis virginiana	FAC-	3.	

List other vegetative species noted which may have affected determination of the wetland edge:
Comptonia peregrina, Schizachyrium scoparium, Lycopodium obscurum, Rubus allegheniensis, Betula populifolia

Soil: SCS Soil Survey Mapping Unit: Woodbridge (WoB)
On Hydric Soils List? (Y/N) No (MWD)

Soil Profile (Note wetland flag no. nearest soil test pit): 6 p. SW (240° Mag.) fr WF-414

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
A	0-3"	10YR3/2			
Bw1	3-16"	10YR5/4			
Bw2	16-20+"	10YR5/4	10YR 4/6 s.m.		

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Landscape position:

Altered/atypical situation? (Describe):

Comments: Some sheep laurel, bluejoint grass, and hardhack in Dpl.

Wetland Edge Delineation Data Form (Wetland)

Applicant: National Grid   Wetland No.: 153

Project: NEEWS   Flag No. Sequence: 401-407

City/Town: Burrillville   Date: Delin 10/31/07 } P.L.
Data 3/13/08 }

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1.		1.	
2.		2.	
3.		3.	

Saplings/Shrubs		Woody Vines
1. Lyonia ligustrina	FAC	1.
2. Vaccinium corymbosum	FACW-	2.
3. Spiraea latifolia	FAC+	3.

List other vegetative species noted which may have affected determination of the wetland edge:

- Spiraea tomentosa, Kalmia angustifolia
- Some Mtn Laurel, Wh. pine
- Sphagnum in ↓

Soil: SCS Soil Survey Mapping Unit: Woodbridge (WoB)
On Hydric Soils List? (Y/N) No (MWD)

Soil Profile (Note wetland flag no. nearest soil test pit): 9p WNW (289° Mag.) fr. WF402

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
A	0-10"	10YR2/0			
Bg	10+"	10YR5/2	w/ depl.		

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Landscape position:

Altered/atypical situation? (Describe):

Comments: Adjacent Upland in woods = Rutted MWD soils with maple, birches, oaks, witch hazel, mountain laurel etc., but lacking Sphagnum

Wetland Edge Delineation Data Form (Wetland)

Applicant: National Grid

Wetland No.: 152

Project: NEEWS

Flag No. Sequence: 401-410

City/Town: Bernardsville

Date: Delin 10/31/07 } P.L.
Data - 3/12/08 }

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1.		1. Onoclea sensibilis	FACW
2.		2. Solidago rugosa	FAC
3.		3. Eupatoriadelphus	FACW

Saplings/Shrubs		Woody Vines
1. Spiraea tomentosa	FACW	1.
2. Hamamelis virginiana	FAC-	2.
3. Lyonia ligustrina	FAC	3.

List other vegetative species noted which may have affected determination of the wetland edge: Sphagnum (occas.), Rubus allegheniensis

Soil: SCS Soil Survey Mapping Unit: Woodbridge (WoB)
On Hydric Soils List? (Y/N) NO (MWD)

Soil Profile (Note wetland flag no. nearest soil test pit): 6 p. SW (235° Mag.) fr. WF-410

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
A	0-3"	10YR3/1			
Bw1	3-7"	10YR4/3			
Bw2	7-17"	10YR6/3-	10YR4/6-5/8		
		2.5YR6/2	oxirhizos + ped faces.		

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Landscape position: very stony.

Altered/atypical situation? (Describe):

Comments: Some Sphagnum - S. side nr. woods.

Wetland Edge Delineation Data Form (Upland)

Applicant: National Grid Wetland No. 152

Project: NEENS Flag No. Sequence: 401-410

City/Town: Burrillville Date: Delin - 10/31/07 } P.L.
Data - 3/12/08 }

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1.		1. Solidago rugosa	FAC
2.		2.	
3.		3.	

Saplings/Shrubs		Woody Vines	
1. Spiraea latifolia	FACW	1. Smilax rotundifolia	FAC
2. Hamamelis virginiana	FAC-	2.	
3. Rubus allegheniensis	FACU	3.	

List other vegetative species noted which may have affected determination of the wetland edge:
Onoclea sensibilis, Comptonia peregrina

Soil: SCS Soil Survey Mapping Unit: Woodbridge (WoB)
On Hydric Soils List? (Y/N) NO (MWDI)

Soil Profile (Note wetland flag no. nearest soil test pit): Sp. @ 70° Mag. fr. WF-410

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
A	0-5"	10YR2/1			
B_{w1}	5-17"	10YR4/4-4/6			
B_{w2}	17-20"+	10YR4/3-5/3			

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Landscape position:

Altered/atypical situation? (Describe):

Comments: Entire area is heavily disturbed by ATV/ORV use...

Wetland Edge Delineation Data Form (Wetland)

Applicant: National Grid Wetland No.: 151

Project: NEEWS Flag No. Sequence: 306-311

City/Town: Burrillville Date: Delin 10/31/07 } P.L.
Data 3/12/08 }

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1.		1. Solidago rugosa	FAC
2.		2. Osmundastrum cinnamomeum	FACW-
3.		3.	

Saplings/Shrubs		Woody Vines	
1. Clethra alnifolia	FAC+	1. Rubus hispidus	FACW
2. Lyonia ligustrina	FAC	2. Vitis labrusca	FACU
3.		3.	

List other vegetative species noted which may have affected determination of the wetland edge:
Sphagnum (abundant), Spiraea tomentosa

Soil: SCS Soil Survey Mapping Unit: Ridgebury Whitman + Leicester (Rf)
On Hydric Soils List? (Y/N) YES.

Soil Profile (Note wetland flag no. nearest soil test pit): 5p. NE (60° Mag.) fr WF-310.

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
Bw		10YR5/2-5/1		Surface	∇ = 4"

lcos

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):
- ponding in tire ruts
- subsoil is depleted

Landscape position:

Altered/atypical situation? (Describe):

Comments:

Wetland Edge Delineation Data Form (Upland)

Applicant: National Grid

Wetland No. 151

Project: NEEWS

Flag No. Sequence: 301-306

City/Town: Burrillville

Date: Delin 10/31/07
Data 3/12/08

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1.		1. Onoclea sensibilis	FACW
2.		2.	
3.		3.	

Saplings/Shrubs	Woody Vines
1.	1.
2.	2.
3.	3.

List other vegetative species noted which may have affected determination of the wetland edge: Solidago rugosa, Mikania scandens, Galium sp., Comptonia peregrina, Spiraea latifolia, Verbascum Thapsus,

Soil: SCS Soil Survey Mapping Unit: Ridgebury Whitman Leicester (Rf)
On Hydric Soils List? (Y/N) YES.

Soil Profile (Note wetland flag no. nearest soil test pit): 9p N (2° Mag.) fr. WF-303
19p WSW (249° Mag) fr. B33-south

fsl-sl

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
	0-5"	10YR2/0		Surface	∇ = 3"
	5+"	10YR5/4	10YR 5/3 – many, coarse		
			+ oxi rhizo		

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.): Episaturation

Landscape position:

Altered/atypical situation? (Describe):

Comments: Sensitive fern = dominant at this location –

Wetland Edge Delineation Data Form (Upland)

Applicant: National Grid

Wetland No. 151

Project: NEEWS

Flag No. Sequence: 306-311

City/Town: Burrillville

Date: Delin 10/31/07 } P.L.
Data 3/12/08 }

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1.		1. Gaultheria procumbens	FACU
2.		2. Lycopodium obscurum	FACU
3.		3. Calamagrostis canadensis	FACW+

Saplings/Shrubs		Woody Vines	
1. Clethra alnifolia	FAC+	1. Rubus hispidus	FACW
2. Hamamelis virginiana	FAC-	2.	
3. Comptonia peregrina	NL	3.	

List other vegetative species noted which may have affected determination of the wetland edge:
Carex pensylvanica

Soil: SCS Soil Survey Mapping Unit: Ridgebury Whitman + Leicester (Rf)
On Hydric Soils List? (Y/N) YES.

Soil Profile (Note wetland flag no. nearest soil test pit): Sp. W (265° Mag.) fr. WF-310

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
Bw	to 14"	10YR5/4	10YR5/6 d.s.m.		
			10YR5/3 rhizods		

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Landscape position:

Altered/atypical situation? (Describe):

Comments:

Wetland Edge Delineation Data Form (Wetland)

Applicant: National Grid

Wetland No.: 150

Project: NEEWS

Flag No. Sequence: 301-320

City/Town: Burrillville

Date: Delin 10/31/07 } P.L.
Data 3/12/08 }

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1.		1. Scirpus cyperinus	FACW+
2.		2. Solidago rugosa	FAC
3.		3.	

Saplings/Shrubs		Woody Vines	
1. Ilex verticillata	FACW+	1. Rubus hispidus	FACW
2. Clethra alnifolia	FAC+	2.	
3.		3.	

List other vegetative species noted which may have affected determination of the wetland edge:
Rhamnus frangula, Spiraea spp.
Sphagnum sp. moss (abundant)

Soil: SCS Soil Survey Mapping Unit: Ridgebury Whitman + Leicester (Rf)
On Hydric Soils List? (Y/N) YES.

Soil Profile (Note wetland flag no. nearest soil test pit): 9 p. NNW (343° Mag.) fr. WF-310

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
	0-3"	10YR3/2		Surface	▽ = 0"
	3-5"	10YR4/1			
	5-12"	10YR5/1-6/1			

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Landscape position:

Altered/atypical situation? (Describe):

Comments:

Wetland Edge Delineation Data Form (Upland)

Applicant: National Grid

Wetland No. 150

Project: NELEWS

Flag No. Sequence: 301-320

City/Town: Bumillville

Date: Delin 10/31/07 } P.L.
Data 3/12/08 }

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1. Betula populifolia		1.	
2. Prunus serotina		2.	
3. Quercus rubra		3.	

Saplings/Shrubs	Woody Vines
1. Hamamelis virginiana	1.
2. Carpinus caroliniana	2.
3.	3.

List other vegetative species noted which may have affected determination of the wetland edge:
Quercus alba, Crataegus sp.

Soil: SCS Soil Survey Mapping Unit: Woodbridge (WoB)
On Hydric Soils List? (Y/N) No.

Soil Profile (Note wetland flag no. nearest soil test pit): 5p. W (290° Mag.) fr. WF-317

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):
- Subsoil w/ 10YR 4/3-4/4 matrix
- occas zones of eluviation (E horiz.) and redox features immed below A horiz.

Landscape position:

Altered/atypical situation? (Describe):

Comments:
- Adjacent downslope wetland with Sphagnum, Alnus, Betula alleghaniensis Osmunda cinnamomea, Ilex verticillata

Wetland Edge Delineation Data Form (Wetland)

Applicant: National Grid

Wetland No.: 149

Project: NEEWS

Flag No. Sequence: 106-114

City/Town: Berrilville

Date: Delin 10/30/07 J P.L.
Data 3/11/08 J

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1.		1. Osmunda cinnamomea	FACW-
2.		2. Carex spp.	
3.		3.	

Saplings/Shrubs		Woody Vines	
1. Clethra alnifolia	FAC+	1. Rubus hispidus	FACW
2. Acer rubrum	FAC	2.	
3. Spiraea latifolia	FAC+	3.	

List other vegetative species noted which may have affected determination of the wetland edge: Sphagnum (abundant), Spiraea tomentosa, Kalmia angustifolia

Soil: SCS Soil Survey Mapping Unit: Ridgebury Whitman + Leicester (Rf)
On Hydric Soils List? (Y/N) _____

Soil Profile (Note wetland flag no. nearest soil test pit): 4 p. WNW (294° Mag.) fr. WF-112

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):
histic epipedon + depleted subsoil

Landscape position:

Altered/atypical situation? (Describe):

Comments:

Wetland Edge Delineation Data Form (Wetland)

Applicant: National Grid

Wetland No.: 149

Project: NEEWS

Flag No. Sequence: 201-206

City/Town: Burrillville

Date: Delin - 10/31/07 } PL
Data - 3/12/08 }

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1.		1. Solidago rugosa	FAC
2.		2.	
3.		3.	

Saplings/Shrubs		Woody Vines
1. Viburnum recognitum	FACW-	1.
2. Rhamnus frangula	FAC	2.
3. Spiraea tomentosa	FACW	3.

List other vegetative species noted which may have affected determination of the wetland edge: Sphagnum sp. moss, Onoclea sensibilis

Soil: SCS Soil Survey Mapping Unit: Ridgebury Whitman + Leicester (Rf)
On Hydric Soils List? (Y/N) Yes.

Soil Profile (Note wetland flag no. nearest soil test pit): Sp. NE (50° Mag.) fr. WF-205

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.): - Ponding, ↓ microtopography.

Landscape position: - ∇ at surface

Altered/atypical situation? (Describe): - Soils are disturbed/inconclusive

Comments: -w/ poly value colors:

10YR 3/2 - 4/3 - 5/2

Wetland Edge Delineation Data Form (Wetland)

Applicant: National Grid

Wetland No.: 149

Project: NEEWS

Flag No. Sequence: 206-212

City/Town: Burrillville

Date: Delin: 10/31/07 } P.L.
Data: 3/12/08 }

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1.		1. Cinna arundinacea	FACW+
2.		2. Carex debilis var rudgei	FAC
3.		3.	

Saplings/Shrubs		Woody Vines
1. Betula populifolia	FAC	1.
2. Acer rubrum	FAC	2.
3. Tsuga canadensis	FACU	3.

List other vegetative species noted which may have affected determination of the wetland edge:
Betula alleghaniensis

Soil: SCS Soil Survey Mapping Unit: Ridgebury Whitman + Leicester (Rf)
On Hydric Soils List? (Y/N) Yes.

Soil Profile (Note wetland flag no. nearest soil test pit): 5p. NE (25° Mag.) fr. WF-209

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
	0-4"	10YR 2/1			∇ = 0"
	4-12"+	10YR 3/2-4/2			

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.): - localized ponding 3/12/08
- Wind throw

Landscape position:

Altered/atypical situation? (Describe): - selective (patch) clear cuts

Comments: - wetland at this location is a mixture of hemlock and birches (yellow and gray) and maple due to management for deer hunting by landowner.

Wetland Edge Delineation Data Form (Upland)

Applicant: National Grid

Wetland No. 149

Project: NEEWS

Flag No. Sequence: 114-117

City/Town: Bernardville

Date: Delin. 10/30/07 } P.L.
Data 3/11/08 }

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1. Tsuga canadensis	FACU	1. Gaultheria procumbens	FACU
2. Acer rubrum	FAC	2. Mitchella repens	FACU
3. Quercus rubra	FACU	3.	

Saplings/Shrubs		Woody Vines
1. Kalmia latifolia	FACU	1.
2.		2.
3.		3.

List other vegetative species noted which may have affected determination of the wetland edge:

Soil: SCS Soil Survey Mapping Unit: Ridgebury Leicester + Whitman (RF)
On Hydric Soils List? (Y/N) Yes.

Soil Profile (Note wetland flag no. nearest soil test pit): 7p. NNE (20° Mag.) fr. WF-116

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

SOILS = formative spodic under hemlock (O/A/E/Bhs)

Landscape position:

Altered/atypical situation? (Describe):

Comments: Edge is distinct due to topography (terracing)

Wetland Edge Delineation Data Form (Upland)

Applicant: National Grid

Wetland No. 149

Project: NEEWS

Flag No. Sequence: 106-114

City/Town: Burrillville

Date: Delin. 10/30/07
Data 3/11/08

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1.		1. Pteridium aquilinum	FACU
2.		2.	
3.		3.	

Saplings/Shrubs		Woody Vines
1. Clethra alnifolia	FACt	1.
2. Rubus allegheniensis	FACU	2.
3.		3.

List other vegetative species noted which may have affected determination of the wetland edge:
Solidago sp., Gaultheria procumbens, Carex [pennsylvanica]
Quercus sp. stump sprouts.

Soil: SCS Soil Survey Mapping Unit: Ridgebury, Whitman + Leicester (RL)
On Hydric Soils List? (Y/N) Yes.

Soil Profile (Note wetland flag no. nearest soil test pit): 6p. E (90° Mag.) fr. WF-113

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
A	0-4"	10YR 3/2			
Bw	4+	10YR 4/4-4/3	no redox		

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.): Bw - >15% coarse fragments (cobbles and rounded stones)

Landscape position: landform adjacent to the Clear River.

Altered/atypical situation? (Describe):

Comments:

Wetland Edge Delineation Data Form (Upland)

Applicant: National Grid

Wetland No. 149

Project: NEEWS

Flag No. Sequence: 201-206

City/Town: Burrillville

Date: Deln. 10/31/07 } P.L.
Data. 3/12/08 }

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1.		1. Solidago rugosa	FAC
2.		2.	
3.		3.	

Saplings/Shrubs		Woody Vines
1. Hamamelis virginiana	FAC-	1.
2. Rhamnus frangula	FAC	2.
3.		3.

List other vegetative species noted which may have affected determination of the wetland edge:
Verbascum Thapsus, Spiraea tomentosa, Corylus sp.
Rubus allegheniensis

Soil: SCS Soil Survey Mapping Unit: Ridgebury Whitman Leicester (Rf)
On Hydric Soils List? (Y/N) Yes.

Soil Profile (Note wetland flag no. nearest soil test pit): 5 p. W (274° Mag.) fr. WF-205

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
Bw	to 16"+	7.5YR4/4			

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Landscape position: terraced landform at wetland boundary.

Altered/atypical situation? (Describe): Soils are disturbed

Comments:

Wetland Edge Delineation Data Form (Upland)

Applicant: National Grid

Wetland No. 149

Project: NEEWS

Flag No. Sequence: 206-212

City/Town: Brookville

Date: Delin 10/31/07 } P.L.
Data 3/12/08 }

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1. Acer rubrum	FAC	1.	
2. Betula populifolia	FAC	2.	
3. Tsuga canadensis	FACU	3.	

Saplings/Shrubs		Woody Vines	
1. Hamamelis virginiana	FAC-	1.	
2. Acer rubrum	FAC	2.	
3. Populus grandidentata	FACU-	3.	

List other vegetative species noted which may have affected determination of the wetland edge:
Prunus serotina, Quercus rubra, Betula alleghaniensis
Ostrya virginiana.

Soil: SCS Soil Survey Mapping Unit: Ridgebury Whitman + Leicester (RF)
On Hydric Soils List? (Y/N) Yes.

Soil Profile (Note wetland flag no. nearest soil test pit): ~ South fr. WF-209

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
	0-4"	10YR2/2			
	4-16"	10YR4/3-4/4	7.5YR 4/6 d.s.m.		
			fine, few		

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.): "d.s.m" = diffuse soft masses

Landscape position:

Altered/atypical situation? (Describe):

Comments:

Wetland Edge Delineation Data Form (Wetland)

Applicant: National Grid

Wetland No.: 148

Project: NEENS

Flag No. Sequence: 101-111

City/Town: Barrillville

Date: Delin 10/25/07 } P.L.
Data 3/11/08 }

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1. Tsuga canadensis	FACU	1. Osmunda cinnamomea	FACW-
2. Betula lenta	FACU	2.	
3. Acer rubrum	FAC	3.	

Saplings/Shrubs		Woody Vines
1. Tsuga canaclensis	FACU	1.
2. Hamamelis virginiana	FAC-	2.
3. Betula lenta	FACU	3.

List other vegetative species noted which may have affected determination of the wetland edge:

(*) → Sphagnum (abundant)

Soil: SCS Soil Survey Mapping Unit: Ridgebury Whitman + Leicester (Rf)
On Hydric Soils List? (Y/N) Yes.

Soil Profile (Note wetland flag no. nearest soil test pit): 6p. SW (220° Mag.) fr. WF-106
3p. E (100° Mag.) fr. WF-105

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
	0-3"	7.5YR 3/2			▽ @ 1"
	3-12"	2.5Y6/2 to	10YR4/2		

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.): Buttressing and exposed roots (birch)

Landscape position:

Altered/atypical situation? (Describe):

Comments:

Wetland Edge Delineation Data Form (Wetland)

Applicant: National Grid

Wetland No.: 148

Project: NEEWS

Flag No. Sequence: 111-120

City/Town: Burrillville

Date: Delin 10/25/07 } P.L.
Data 3/11/08 }

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1.		1. Solidago sp.	--
2.		2. Scirpus cyperinus	FACW+
3.		3.	

Saplings/Shrubs		Woody Vines
1. Lyonia ligustrina	FAC	1.
2. Vaccinium corymbosum	FACW-	2.
3. Tsuga canadensis	FACU	3.

List other vegetative species noted which may have affected determination of the wetland edge: Sphagnum sp. moss (abundant), Spiraea spp., Carex spp., Calamagrostis canadensis

Soil: SCS Soil Survey Mapping Unit: Ridgebury Whitman + Leicester (Rf)
On Hydric Soils List? (Y/N) Yes.

Soil Profile (Note wetland flag no. nearest soil test pit): 7p. WSW (235° Mag.) fr. WF-119

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
	0-3"	10YR2/1		Surface	
AB	3-8"	10YR3/4			
Bw	8-16"	10YR5/2-4/3			∇ = 9"

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Landscape position:

Altered/atypical situation? (Describe): ATV disturbance throughout

Comments: Very stony.

Wetland Edge Delineation Data Form (Wetland)

Applicant: National Grid

Wetland No.: 148

Project: NEEWS

Flag No. Sequence: 208-212

City/Town: Burrillville

Date: Delin 10/30/07 } P.L.
Data. 3/11/08 }

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1.		1. Agrostis sp.	
2.		2.	
3.		3.	

Saplings/Shrubs		Woody Vines
1. Spiraea tomentosa	FACW	1.
2. Spiraea latifolia	FAC+	2.
3. Clethra alnifolia	FAC+	3.

List other vegetative species noted which may have affected determination of the wetland edge: Sphagnum sp. moss, Lyonia ligustrina, Onoclea sensibilis, Scirpus cyperinus

Soil: SCS Soil Survey Mapping Unit: Ridgebury Whitman + Leicester (RF)
On Hydric Soils List? (Y/N) YES.

Soil Profile (Note wetland flag no. nearest soil test pit): Vicinity of structure 34

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
* C1	0-5"	10YR5/4			
* C2	5-14"	10YR5/3-4/3	10YR5/8 s.m.		
2Ab	14-17"	10YR3/1			
	17"	refusal			

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Landscape position:

Altered/atypical situation? (Describe): (*) fill for structure work (graded in)

Comments:

Wetland Edge Delineation Data Form (Upland)

Applicant: National Grid | Wetland No. 148

Project: NEEWS | Flag No. Sequence: 208-212

City/Town: Burrillville | Date: 10/30/07 - PL

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1.		1. Solidago rugosa	FAC
2.		2. Panicum [Panvginosum]	-
3.		3.	

Saplings/Shrubs	Woody Vines
1. Hamamelis virginiana FAC-	1.
2. Clethra alnifolia FAC+	2.
3. Betula populifolia (seedl.) FAC	3.

List other vegetative species noted which may have affected determination of the wetland edge: Prunus serotina, Dennstaedtia punctilobula, Pteridium aquilinum, Rubus allegheniensis, Comptonia peregrina.

Soil: SCS Soil Survey Mapping Unit: Ridgebury Whitman + Leicester (Rf)
On Hydric Soils List? (Y/N) YES.

Soil Profile (Note wetland flag no. nearest soil test pit): 4p. SW fr. WF-212

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
A	0-2"	10YR 3/2-4/2			
Bw1	2-8+"	10YR 4/6	No redox		

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Landscape position:

Altered/atypical situation? (Describe):

Comments:

Wetland Edge Delineation Data Form (Upland)

Applicant: National Grid

Wetland No. 148

Project: NEEWS

Flag No. Sequence: 212-218

City/Town: Bernardville

Date: Delin. 10/30/07 } P.L.
Data. 3/11/08 }

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1. Tsuga canadensis	FACU	1.	
2. Acer rubrum	FAC	2.	
3. Quercus rubra	FACU	3.	
Saplings/Shrubs		**Woody Vines**	
1. Tsuga canadensis	FACU	1.	
2.		2.	
3.		3.	

List other vegetative species noted which may have affected determination of the wetland edge: Gaultheria procumbens, Mitchella repens.

Soil: SCS Soil Survey Mapping Unit: Ridgebury Whitman + Leicester (Rf)
On Hydric Soils List? (Y/N) Yes.

Soil Profile (Note wetland flag no. nearest soil test pit): 8p. NW (315° Mag.) fr. WF-215

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
AE	0-3"	10YR 3/3-4/3			
E	3-7"	10YR 4/2-4/1			
Bs	7-9"	7.5YR 4/6			
Bw	9-16"+	10YR 4/4			∇@12"

↳ Depths are approximate

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Landscape position:

Altered/atypical situation? (Describe):

Comments: Substantial disturbance from ATVs - vicinity

Wetland Edge Delineation Data Form (Upland)

Applicant: National Grid

Wetland No. 148

Project: NELWS

Flag No. Sequence: 101-111

City/Town: Barrilville

Date: Delin 10/25/07 } P.L.
Data 3/11/08 }

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1. Tsuga canadensis	FACU	1.	
2.		2.	
3.		3.	

Saplings/Shrubs		Woody Vines
1. Tsuga canadensis	FACU	1.
2.		2.
3.		3.

List other vegetative species noted which may have affected determination of the wetland edge:
Gaultheria procumbens, Mitchella repens
* Sphagnum sp. moss, Quercus rubra

Soil: SCS Soil Survey Mapping Unit: Canton + Charlton (CeC)
On Hydric Soils List? (Y/N) No.

Soil Profile (Note wetland flag no. nearest soil test pit): Sp. NE (50° Mag.) fr. WF-106

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
Oe		5YR 3/2			
E	0-3"	10YR 4/1			
Bw	3-16"+	10YR 5/4	5YR 5/8 few, med. cones.		

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Landscape position:

Altered/atypical situation? (Describe):

Comments: Hemlock dominant in all strata

Wetland Edge Delineation Data Form (Upland)

Applicant: National Grid

Wetland No. 148

Project: NEEWS

Flag No. Sequence: 111-120

City/Town: Bernardville

Date: Delin 10/25/07 } P.L.
Data 3/11/08 }

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1.		1. Calamagrostis canadensis	FACW+
2.		2. Solidago	
3.		3.	

Saplings/Shrubs		Woody Vines	
1. Tsuga canadensis	FACU	1. Rubus flagellaris	UPL
2. Betula populifolia	FAC	2.	
3. Lyonia ligustrina	FAC	3.	

List other vegetative species noted which may have affected determination of the wetland edge: Lycopodium obscurum, Sassafras albidum, Hamamelis virginiana Quercus sp. seedl/sprouts

Soil: SCS Soil Survey Mapping Unit: Woodbridge (WoB)
On Hydric Soils List? (Y/N) NO (MWD)

Soil Profile (Note wetland flag no. nearest soil test pit): 6p. E (80° Mag.) fr. WF-119

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
A1	0-3"	10YR3/2			
A2	3-6"	10YR2/1			
AB	6-9"	10YR3/3-3/2			
Bw	9-18+"	10YR4/3			

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Landscape position:

Altered/atypical situation? (Describe):

Comments: Topo break to W at this location

Wetland Edge Delineation Data Form (Wetland)

Applicant: National Grid

Wetland No.: 146

Project: NEEWS

Flag No. Sequence: 401 to 419

City/Town: Burrillville

Date: Delin. 10/25/07 } P.L.
Data. 3/11/08 }

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1.		1. Solidago spp.	— —
2.		2.	
3.		3.	

Saplings/Shrubs		Woody Vines	
1. Hamamelis virginiana	FAC-	1. Vitis labrusca	FACU
2. Betula populifolia	FAC	2.	
3. Viburnum recognitum	FACW-	3.	

List other vegetative species noted which may have affected determination of the wetland edge:
Sphagnum sp., Polytrichum sp., Spiraea spp., Ostrya, Lycopus

Soil: SCS Soil Survey Mapping Unit: Ridgebury Whitman & Leicester (RF)
On Hydric Soils List? (Y/N) YES.

Soil Profile (Note wetland flag no. nearest soil test pit): 8p. NW (310° Mag.) fg. WF-416

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
A	0-2"			surface	▽ = 0"
C	2-6"	10YR3/4			
2Ab	6-11"	10YR2/0			
2Bw	11-16"	10YR4/2			

lcos – vfsl/sil–

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):
ASSF - diffuse flow through from ▽ 144.

Landscape position:

Altered/atypical situation? (Describe):

Comments: Stone arch culvert in stone wall.
ATV disturbance

Wetland Edge Delineation Data Form (Upland)

Applicant: National Grid

Wetland No. 146

Project: NEEWS

Flag No. Sequence: 401 - 419

City/Town: Bernardsville

Date: Delin 10/25/07 } P.L.
Data 3/11/08 }

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1. Betula lenta	FACU	1. Lycopodium obscurum	FACU
2. Tsuga canadensis	FACU	2. Dennstaedtia punctilobula	NL
3.		3.	

Saplings/Shrubs		Woody Vines
1. Corylus sp.	FACU-	1.
2. Vaccinium corymbosum	FACW-	2.
3.		3.

List other vegetative species noted which may have affected determination of the wetland edge:
Pinus Strobus, Calamagrostis canadensis, Lyonia ligustrina
Kalmia latifolia

Soil: SCS Soil Survey Mapping Unit: Woodbridge (WoB)
On Hydric Soils List? (Y/N) No - MWD.

Soil Profile (Note wetland flag no. nearest soil test pit): 5 p. ESE (110° Mag.) fr. WF-416

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
Bw	to 18"+/-	10YR 4/6-5/4			∑ at 11"

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Landscape position:

Altered/atypical situation? (Describe):

Comments:

Wetland Edge Delineation Data Form (Wetland)

Applicant: National Grid

Wetland No.: 145

Project: NEEWS

Flag No. Sequence: 301-308

City/Town: Burrillville

Date: Delin 10/25/07 } P.L.
Data: 3/11/08 }

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1. Quercus rubra	FACU	1. Osmunda cinnamomea	FACW-
2. Acer rubrum	FAC	2.	
3.		3.	

Saplings/Shrubs		Woody Vines
1. Kalmia latifolia	FAC	1.
2. Tsuga canadensis	FACU	2.
3.		3.

List other vegetative species noted which may have affected determination of the wetland edge:
Sphagnum (occas.), Ilex verticillata, Nyssa sylvatica

Soil: SCS Soil Survey Mapping Unit: Woodbridge (WoB)
On Hydric Soils List? (Y/N) NO - MWD with SPD inclusions

Soil Profile (Note wetland flag no. nearest soil test pit): 6 ft. SE (138° Mag.) fr. WF-305

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
A	0-4"	10YR2/0			▽ at 0"
Bw	4-13"	10YR5/2-5/1			

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.): Episaturation, localized surface ponding
lower B horizon = firm + dense med. fine sand.

Landscape position:

Altered/atypical situation? (Describe):

Comments: Ledge outcrops to N and E.

Wetland Edge Delineation Data Form (Upland)

Applicant: National Grid

Wetland No. 145

Project: NEEWS

Flag No. Sequence: 301-308

City/Town: Bernardville

Date: Delin: 10/25/07 } P.L.
Data: 3/11/08 }

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1. Acer rubrum	FAC	1.	
2. Quercus alba	FACU	2.	
3. Quercus coccinea	NL	3.	

Saplings/Shrubs		Woody Vines
1. Tsuga canadensis	FACU	1.
2. Rhododendron viscosum	OBL	2.
3. Hamamelis virginiana	FAC-	3.

List other vegetative species noted which may have affected determination of the wetland edge:
Vaccinium corymbosum, Sassafras albidum, Gaylussacia baccata, Castanea dentata

Soil: SCS Soil Survey Mapping Unit: _____
On Hydric Soils List? (Y/N) _____

Soil Profile (Note wetland flag no. nearest soil test pit): 6 p. N (10° Mag.) fm. WF-305

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
Bw	~8 to 10"	~10YR4/3			

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Landscape position: – Nearby ledge outcropping

Altered/atypical situation? (Describe): – Extremely stony

Comments:

Wetland Edge Delineation Data Form (Wetland)

Applicant: National Grid

Wetland No.: 144

Project: NEEWS

Flag No. Sequence: 301-318

City/Town: Bernardville

Date: Delin 10/24/07, 10/25/07
Data 3/11/08 P.L.

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1. Quercus rubra	FACU	1. Osmunda cinnamomea	FACW-
2. Acer rubrum	FAC	2.	
3.		3.	

Saplings/Shrubs	Woody Vines
1. Hamamelis virginiana FAC-	1.
2. Vaccinium corymbosum FACW	2.
3. Rhododendron viscosum OBL	3.

List other vegetative species noted which may have affected determination of the wetland edge:
Sphagnum sp. moss,

Soil: SCS Soil Survey Mapping Unit: Ridgebury Whitman + Leicester (RF)
On Hydric Soils List? (Y/N) YES.

Soil Profile (Note wetland flag no. nearest soil test pit): Sp. NW (305° Mag.) fr. WF-306

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
A	0-6"			Surface	
B_1	6-12"				∇ = 10"
B_2	12-18"				

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.): watercourse (ASSF?) w/ meandering or braided channels - localized scour and wrack deposits.

Landscape position:

Altered/atypical situation? (Describe):

Comments: Very stony - seas. sat. to locally seas. flooded

Wetland Edge Delineation Data Form (Wetland)

Applicant: National Grid

Wetland No.: 144

Project: NEEWS

Flag No. Sequence: 319-328

City/Town: Burrillville

Date: Delineation 10/25/07 } P.L.
Data 3/11/08 ✓

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1.		1. Scirpus cyperinus	FACW+
2.		2. Solidago sp.	
3.		3. Calamagrostis canadensis	FACW+

Saplings/Shrubs		Woody Vines
1. Spiraea tomentosa	FACW	1.
2. Clethra alnifolia	FAC+	2.
3. Lycania ligustrina	FAC	3.

List other vegetative species noted which may have affected determination of the wetland edge:
Inclusions of Rubus allegheniensis, Dennstaedtia punctilobula, and Quercus seedlings

Soil: SCS Soil Survey Mapping Unit: Woodbridge (WoB)
On Hydric Soils List? (Y/N) No (MWD)

Soil Profile (Note wetland flag no. nearest soil test pit):

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

N + W from Structure 35.

Landscape position:

Altered/atypical situation? (Describe):

Comments: ~ A mosaic of ASSFs, wrack deposits, braided scours
~ Extremely stony (boulders)

Wetland Edge Delineation Data Form (Upland)

Applicant: National Grid

Wetland No. 144

Project: NEEWS

Flag No. Sequence: 328-333

City/Town: Burrillville

Date: Delin 10/25/07 } P.L.
Data 3/11/08 }

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1. Acer rubrum	FAC	1. Osmunda cinnamomea	FACW-
2. Quercus rubra	FACU	2.	
3. Carya ovata	FACU-	3.	
Saplings/Shrubs		**Woody Vines**	
1. Tsuga canadensis	FACU	1.	
2. Vaccinium corymbosum	FACW-	2.	
3. Kalmia latifolia	FACU	3.	

List other vegetative species noted which may have affected determination of the wetland edge:
Betula lenta

Soil: SCS Soil Survey Mapping Unit: Woodbridge (WoB)
On Hydric Soils List? (Y/N) NO (MWD)

Soil Profile (Note wetland flag no. nearest soil test pit): Bp. NW (305° Mag.) fr. WF-331

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
Bw	~18"	10YR5/3-4/3	10YR 5/8		▽ = 6"

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Landscape position:

Altered/atypical situation? (Describe): Soil is marginal - transitional to hydric

Comments:

Transition to upland forest comprised of a mixed hardwood canopy (oak/maple) over hemlock.

Wetland Edge Delineation Data Form (Upland)

Applicant: National Grid

Wetland No. 144

Project: NEEWS

Flag No. Sequence: 350-357

City/Town: Berrillville

Date: Delin 10/25/07 } P.L.
Data 3/11/08 }

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1. Quercus rubra	FACU	1.	
2. Acer rubrum	FAC	2.	
3.		3.	

Saplings/Shrubs		Woody Vines
1. Hamamelis virginiana	FAC-	1.
2. Betula lenta	FACU	2.
3.		3.

List other vegetative species noted which may have affected determination of the wetland edge:
Tsuga canadensis, Nyssa sylvatica

Soil: SCS Soil Survey Mapping Unit: Woodbridge (WoB)
On Hydric Soils List? (Y/N) No - MWD

Soil Profile (Note wetland flag no. nearest soil test pit): 5p. NW (305° Mag.) fr. WF-351

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
A	0-3"	10YR 3/1			
Bw1	3-15"	10YR 4/6			
Bw2	15+"	10YR 4/6	7.5YR 5/8		
			diffuse soft masses		

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Landscape position: Very stony w/ ledge outcropping

Altered/atypical situation? (Describe):

Comments: Forested portion of Wetland 144 dominated by maple and red oak with an understory of witch hazel and hemlock.

Wetland Edge Delineation Data Form (Upland)

Applicant: National Grid Wetland No. 144

Project: NEWS Flag No. Sequence: 301-318

City/Town: Bunnilville Date: Delin 10/24/07, 10/25/07 Data 3/11/08

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1. Quercus coccinea	NL	1. Osmunda cinnamomea	FACW-
2. Acer rubrum	FAC	2.	
3.		3.	

Saplings/Shrubs		Woody Vines
1. Hamamelis virginiana	FAC-	1.
2. Betula lenta	FACU	2.
3.		3.

List other vegetative species noted which may have affected determination of the wetland edge:
Clethra (occas.) Gaultheria procumbens, Sassafras albidum, Kalmia latifolia, Pinus strobus (seedl.)

Soil: SCS Soil Survey Mapping Unit: Woodbridge (WoB)
On Hydric Soils List? (Y/N) No

Soil Profile (Note wetland flag no. nearest soil test pit): 6p. SE (123° Mag.) fr. WF-306

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Landscape position: W boundary is fairly evident due to topography.

Altered/atypical situation? (Describe):

Comments: Hemlock (Tsuga) = common to abundant in upland.

Wetland Edge Delineation Data Form (Upland)

Applicant: National Grid

Wetland No. 143

Project: NEEWS

Flag No. Sequence: 310-319

City/Town: Burrillville

Date: Delin 10/24/07 } P.L.
Data 3/6/08 }

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1.		1. Pteridium aquilinum	FACU
2.		2. Dennstaedtia punctilobula	N.L.
3.		3.	

Saplings/Shrubs		Woody Vines
1. Clethra alnifolia	FAC+	1.
2. Quercus rubra	FACU	2.
3. Hamamelis virginiana	FAC-	3.

List other vegetative species noted which may have affected determination of the wetland edge:
Rubus allegheniensis, Lyonia ligustrina

Soil: SCS Soil Survey Mapping Unit: Woodbridge (WoB)
On Hydric Soils List? (Y/N) YES.

Soil Profile (Note wetland flag no. nearest soil test pit): 5p. NW (299° Mag.) fr. WF-318

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
Bw		10YR5/6-5/8			

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Landscape position:

Altered/atypical situation? (Describe):

Comments:

Wetland Edge Delineation Data Form (Wetland)

Applicant: National Grid

Wetland No.: 143

Project: NEEWS

Flag No. Sequence: 310-319

City/Town: Burrillville

Date: Delin 10/24/07 } P.L.
Data 3/6/08 }

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1.		1. Soliclago rugosa	FAC
2.		2. Onoclea sensibilis	FACW
3.		3. Typha latifolia	OBL
Saplings/Shrubs		**Woody Vines**	
1. Spiraea tomentosa	FACW	1. Rubus hispidus	FACW
2.		2.	
3.		3.	

List other vegetative species noted which may have affected determination of the wetland edge:
Sphagnum sp. moss

Soil: SCS Soil Survey Mapping Unit: Ridgebury Whitman + Leicester (Rf)
On Hydric Soils List? (Y/N) YES.

Soil Profile (Note wetland flag no. nearest soil test pit): S p. E (78° Mag.) fr. WF-318

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
Ap	0-9"	10YR 2/0			▽ = surface
Bg	9-18"	10YR 5/2			

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Landscape position:

Altered/atypical situation? (Describe):

Comments:

Wetland Edge Delineation Data Form (Upland)

Applicant: National Grid

Wetland No. 143

Project: NEEWS

Flag No. Sequence: 319-327

City/Town: Bernardville

Date: Delin 10/24/07
Data 3/11/08

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1. Quercus rubra	FACU	1. Lycopodium obscurum	FACU
2. Quercus coccinea	N.L.	2. Carex pennsylvanica	N.L.
3. Acer rubrum	FAC	3.	

Saplings/Shrubs		Woody Vines
1. Hamamelis virginiana	FAC-	1.
2. Kalmia latifolia	FACU	2.
3. Acer rubrum	FAC	3.

List other vegetative species noted which may have affected determination of the wetland edge:
Gaylussacia baccata, Liriodendron tulipifera

Soil: SCS Soil Survey Mapping Unit: Woodbridge (WoB)
On Hydric Soils List? (Y/N) No - MWD.

Soil Profile (Note wetland flag no. nearest soil test pit): 5p. WNW (285° Mag.) fr. WF-322

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
	0-4"	10YR 3/2			
	4-16"	10YR 4/6			
	16-20"	10YR 4/4			

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Landscape position:

Altered/atypical situation? (Describe):

Comments:

Wetland Edge Delineation Data Form (Wetland)

Applicant: National Grid

Wetland No.: 143

Project: NEEWS

Flag No. Sequence: 319-327

City/Town: Burrillville

Date: Delin 10/24/07 } P.L.
Data 3/11/08 }

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1. Quercus rubra	FACU	1. Osmunda cinnamomea	FACW-
2. Acer rubrum	FAC	2.	
3.		3.	

Saplings/Shrubs		Woody Vines
1. Hamamelis virginiana	FAC-	1.
2. Clethra alnifolia	FAC+	2.
3.		3.

List other vegetative species noted which may have affected determination of the wetland edge:
Nyssa sylvatica, Sphagnum sp. moss, Ostrya

Soil: SCS Soil Survey Mapping Unit: Ridgebury Whitman + Leicester (Rf)
On Hydric Soils List? (Y/N) YES.

Soil Profile (Note wetland flag no. nearest soil test pit): Sp. NE (55° Mag.) fr. WF-322

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
A	0-6"	10YR 2/1		Surface	~ 4"
Bw	6-14"	10YR 5/2			

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.): root crown buttressing (maple + oak)

Landscape position:

Altered/atypical situation? (Describe):

Comments: dominant trees to 24" dbh.

Wetland Edge Delineation Data Form (Wetland)

Applicant: National Grid

Wetland No.: 142

Project: NEEWS

Flag No. Sequence: 301-305

City/Town: Burrillville

Date: Delin 10/24/07 } P.L.
Data 3/6/08 }

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1. Quercus rubra	FACU	1.	
2. Acer saccharum	FACU-	2.	
3. Fraxinus pennsylvanica	FACW	3.	

Saplings/Shrubs		Woody Vines	
1. Clethra alnifolia	FAC+	1.	
2. Hamamelis virginiana	FAC-	2.	
3.		3.	

List other vegetative species noted which may have affected determination of the wetland edge:
Carya spp., Ostrya, Liriodendron, Sphagnum sp. moss

Soil: SCS Soil Survey Mapping Unit: Ridgebury Whitman + Leicester (Rf)
On Hydric Soils List? (Y/N) yes.

Soil Profile (Note wetland flag no. nearest soil test pit): 8p. W (258° Mag.) fr. WF-302

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
	0-8(10)"	10YR 2/0			
	8-14"	10YR 4/1	10YR 5/6 few,	co. s.m.	

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.): - buttressing of tree root crowns
- some wind throw (heaving), shallow roots

Landscape position:

Altered/atypical situation? (Describe): - very stony wetland drainageway.

Comments: Abrupt, short slope defines E boundary of W
- Upland to East w/ Q. rubra, Gaultheria, Gaylussacia, and Smilax glauca.

Wetland Edge Delineation Data Form (Upland)

Applicant: National Grid

Wetland No. 142

Project: NEEWS

Flag No. Sequence: 315-326

City/Town: Berrillville

Date: Delin 10/24/07 } P.L.
Data 3/6/08 }

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1. Quercus rubra	FACU	1. Gaultheria procumbens	FACU
2. Acer saccharum	FACU-	2.	
3.		3.	

Saplings/Shrubs		Woody Vines	
1. Hamamelis virginiana	FAC-	1. Smilax rotundifolia	FAC
2. Clethra alnifolia	FAC+	2.	
3.		3.	

List other vegetative species noted which may have affected determination of the wetland edge:
Sassafras albidum, Kalmia latifolia, Quercus alba occas. Prunus serotina

Soil: SCS Soil Survey Mapping Unit: Woodbridge (WoB)
On Hydric Soils List? (Y/N) Yes

Soil Profile (Note wetland flag no. nearest soil test pit): 6 p. SW (230° Mag.) fr. 319

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
A	0-3"	10YR2/1			
AB	3-6"	10YR3/3-4/3			
Bw_1	6-18"	10YR4/3			
Bw_2	18-20+"	10YR4/3	10YR4/6 few, co.	S.M.	

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Landscape position:

Altered/atypical situation? (Describe):

Comments: greater predominance of oaks in Upland.

Wetland Edge Delineation Data Form (Wetland)

Applicant: National Grid

Wetland No.: 142

Project: NEEWS

Flag No. Sequence: 306-315

City/Town: Burrillville

Date: Delin 10/24/07 } P.L.
Data 3/6/08 }

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1.		1. Onoclea sensibilis	FACW
2.		2. Eupatoria delphus	FACW
3.		3.	

Saplings/Shrubs		Woody Vines	
1. Spiraea latifolia	FAC+	1. Rubus hispidus	FACW
2. Spiraea tomentosa	FACW	2. Smilax rotundifolia	FAC
3.		3.	

List other vegetative species noted which may have affected determination of the wetland edge:
Sphagnum sp. moss, Solidago rugosa, Lycopus americana, Thelypteris palustris

Soil: SCS Soil Survey Mapping Unit: Ridgebury Whitman + Leicester (RF)
On Hydric Soils List? (Y/N) Yes.

Soil Profile (Note wetland flag no. nearest soil test pit): 6 p. W (255° Mag.) fr. WF-306

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
A	0-10"	10YR 2/0			∑ @ 0"
Bg	10+"	10YR 5/2-5/1			

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):
Evidence of prolonged ponding.

Landscape position:

Altered/atypical situation? (Describe):

Comments: Very stony drainage way.

Wetland Edge Delineation Data Form (Upland)

Applicant: National Grid

Wetland No. 142

Project: NEEWS

Flag No. Sequence: 306-315

City/Town: Burrillville

Date: Delin: 10/24/07 } P.L.
Data: 3/6/08 }

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1.		1. Solidago spp.	–
2.		2. Osmunda cinnamomea	FACW-
3.		3.	

Saplings/Shrubs		Woody Vines	
1. Clethra alnifolia	FAC+	1. Rubus hispidus	FACW
2.		2.	
3.		3.	

List other vegetative species noted which may have affected determination of the wetland edge: Sassafras albidum, Gaultheria procumbens, Crataegus sp., Hamamelis virginiana

Soil: SCS Soil Survey Mapping Unit: Woodbridge (WoB)
On Hydric Soils List? (Y/N) NO - mud w/ SPD incl.

Soil Profile (Note wetland flag no. nearest soil test pit): 7p. NE (60° Mag.) fr. WF-307

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
Ap	0-7"	10YR 2/0			
Bw	7-17"	10YR 4/3	10YR 4/6 few, fine		∇ ca. 9"

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Landscape position:

Altered/atypical situation? (Describe):

Comments: Clethra dominant ~ ca. 85% cover.

Wetland Edge Delineation Data Form (Wetland)

Applicant: National Grid

Wetland No.: 141

Project: NEEWS

Flag No. Sequence: 401-419

City/Town: Burrillville

Date: Delin 10/23/07 } PL
Data 3/6/08 }

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1.		1. Scirpus cyperinus	FACW+
2.		2. Solidago rugosa	FAC
3.		3.	

Saplings/Shrubs		Woody Vines
1. Spiraea latifolia	FAC+	1.
2. Acer rubrum	FAC	2.
3. Spiraea tomentosa	FACW	3.

List other vegetative species noted which may have affected determination of the wetland edge:
Sphagnum and Polytrichum sp. moss, Kalmia angustifolia
Clethra alnifolia

Soil: SCS Soil Survey Mapping Unit: Ridgebury Whitman + Leicester (Rf)
On Hydric Soils List? (Y/N) Yes.

Soil Profile (Note wetland flag no. nearest soil test pit): near WF-414

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.): - 10YR 2/1 muck accum. in stone interstices at low points, subsoil is depleted with polyvalue colors.

Landscape position:

Altered/atypical situation? (Describe):

Comments: - Ponded to >6" near culvert to W 138;

Wetland Edge Delineation Data Form (Upland)

Applicant: National Grid

Wetland No. 141

Project: NEEWS

Flag No. Sequence: 401-419

City/Town: Bernardsville

Date: Delin 10/23/07
Data 3/6/08

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1. Quercus rubra	FACU	1. Gaultheria procumbens	FACU
2. Acer rubrum	FAC	2. Mitchella repens	FACU
3. Acer saccharum	FACU-	3.	

Saplings/Shrubs		Woody Vines	
1. Betula lenta	FACU	1. Smilax rotundifolia	FAC
2. Hamamelis virginiana	FAC-	2.	
3. Vaccinium corymbosum	FACW-	3.	

List other vegetative species noted which may have affected determination of the wetland edge:
Kalmia latifolia, Liriodendron tulipifera, Tsuga canadensis, Sassafras albidum, Carya glabra

Soil: SCS Soil Survey Mapping Unit: Woodbridge (WoB)
On Hydric Soils List? (Y/N) No - MWD

Soil Profile (Note wetland flag no. nearest soil test pit): 17 p. NNW (340° Mag.) fr. WF-414

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
	0-7"	10YR 3/2			∇ = 6"
	7-18"	10YR 4/4	10YR 5/8 few, co.		
	18+"	10YR 4/3	10YR 5/2 comm-many, med.		
			5YR 5/8 few, co.		

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Landscape position: very stony w/ irregular microtopography.

Altered/atypical situation? (Describe):

Comments: Soil does not meet NEHSTC criteria XI or XII

Wetland Edge Delineation Data Form (Wetland)

Applicant: National Grid Wetland No.: 140

Project: NEEWS Flag No. Sequence: 301-310

City/Town: Burrillville Date: Delin: 10/23/07 } P.L.
Data: 3/6/08 }

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1. Quercus rubra	FACU	1.	
2. Fraxinus pennsylvanica	FACW	2.	
3. Acer rubrum	FAC	3.	

Saplings/Shrubs		Woody Vines	
1. Betula lenta	FACU	1.	
2. Carpinus caroliniana	FAC	2.	
3. Ilex verticillata	FACW+	3.	

List other vegetative species noted which may have affected determination of the wetland edge: Sphagnum sp. moss, Acer saccharum,

Soil: SCS Soil Survey Mapping Unit: Ridgebury, Whitman & Leicester (Rf)
On Hydric Soils List? (Y/N) YES.

Soil Profile (Note wetland flag no. nearest soil test pit): 7 p. W (283° Mag.) fr. WF-303

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
A	~8-10"	10YR4/1			0-2"
Bg	~10"	10YR5/1			
		- refusal			

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.): Obsv'd overland flow to ⩢ 141 - meandering surface channel w/ wrack deposits (ASSF)

Landscape position: - Some darkened + reduced leaf litter

Altered/atypical situation? (Describe): - ⩢ drainage patterns

Comments:

- Q. rubra to 26" dbh

Wetland Edge Delineation Data Form (Upland)

Applicant: National Grid

Wetland No. 140

Project: NEEWS

Flag No. Sequence: 301-310

City/Town: Burrillville

Date: Delin - 10/23/07 } P.L.
Data - 3/16/08 }

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1. Quercus rubra	FACU	1. Lycopodium obscurum	FACU
2. Acer rubrum	FAC	2.	
3. Acer saccharum	FACU-	3.	
Saplings/Shrubs		**Woody Vines**	
1. Hamamelis virginiana	FAC-	1. Smilax rotundifolia	FAC
2. Kalmia latifolia	FACU	2.	
3. Acer rubrum	FAC	3.	

List other vegetative species noted which may have affected determination of the wetland edge:
Betula lenta, Sassafras albidum

Soil: SCS Soil Survey Mapping Unit: Woodbridge (WoB)
On Hydric Soils List? (Y/N) No - MWD with SPD inclusions.

Soil Profile (Note wetland flag no. nearest soil test pit): 4p. SE (130° Mag.) fr WF-303

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
A	0-6"	10YR 3/1-3/2			
Bw	6-20"	10YR 4/4			

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Landscape position: Upland - mountain laurel under red oak canopy (typ.)

Altered/atypical situation? (Describe):

Comments: Very stony.

Wetland Edge Delineation Data Form (Wetland)

Applicant: National Grid

Wetland No.: 139

Project: NEEWS

Flag No. Sequence: 401-407

City/Town: Burrillville

Date: Delin 10/23/07 } P.L.
Data 3/6/08 }

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1.		1. Eupatoriadelphus	FACW
2.		2. Solidago rugosa	FAC
3.		3.	

Saplings/Shrubs		Woody Vines	
1. Acer rubrum	FAC	1. Vitis labrusca	FACU
2. Lyonia ligustrina	FAC	2. Rubus hispidus	FACW
3. Kalmia angustifolia	FAC	3.	

List other vegetative species noted which may have affected determination of the wetland edge:
Spiraea latifolia, S. tomentosa, Sphagnum sp. moss, Lycopus

Soil: SCS Soil Survey Mapping Unit: Ridgebury Whitman + Leicester (RL)
On Hydric Soils List? (Y/N) YES.

Soil Profile (Note wetland flag no. nearest soil test pit): 4p. E (100° Mag.) fr. WF-407

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
Bw	0-10"	10YR3/3-4/2	7.5YR4/4 oxi	rhizo.	∇ = 1"
2Bw	10-18"	10YR4/3-4/2	10YR 5/1		

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):
- Ponded ruts from mowing equipment
- Sandy w/ polyvalue colors, streaking, redox.

Landscape position:

Altered/atypical situation? (Describe):

Comments: Edge is fairly evident. Upland with Rubus, Mountain Laurel, Sassafras + abundant Smilax.

Wetland Edge Delineation Data Form (Wetland)

Applicant: National Grid

Wetland No.: 138

Project: NEENS

Flag No. Sequence: 316-329

City/Town: Burrillville

Date: Delin 10/23/07 & P.L.
Data 3/6/08

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1.		1. Scirpus sp.	--
2.		2. Carex sp.	--
3.		3. Solidago rugosa	FAC

Saplings/Shrubs		Woody Vines
1. Spiraea tomentosa	FACW	1.
2.		2.
3.		3.

List other vegetative species noted which may have affected determination of the wetland edge:
Sphagnum sp. moss, Euthamia graminifolia, Rubus hispidus, Agrostis sp., Onoclea sensibilis, Polygonum sagittatum

Soil: SCS Soil Survey Mapping Unit: Ridgebury Whitman & Leicester (Rf)
On Hydric Soils List? (Y/N) YES.

Soil Profile (Note wetland flag no. nearest soil test pit): 9p W (273° Mag.) fr. WF-319
5p ENE (70° Mag.) fr. A37-South

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
AC	0-4"	10YR3/2-3/3			∇ < 2"
2Ab	4-11"	10YR3/1			
2Bg	11-20+"	10YR5/2			

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.): Ponding in ruts. Obsv'd diffuse flow passing through from culvert to WL 141

Landscape position:

Altered/atypical situation? (Describe): Disturbed area (historically) in close proximity to structure 37.

Comments:

Wetland Edge Delineation Data Form (Upland)

Applicant: National Grid

Wetland No. 138

Project: NEEWS

Flag No. Sequence: 316-329

City/Town: Bumillville

Date: Delin 10/23/07 } P.L.
Data 3/6/08 }

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1.		1. Dennstaedtia punctilobula	N.L.
2.		2. Pteridium aquilinum	FACU
3.		3. Solidago rugosa	FAC

Saplings/Shrubs		Woody Vines	
1. Vaccinium corymbosum	FACW-	1. Vitis labrusca	FACU
2. Betula populifolia	FAC	2.	
3.		3.	

List other vegetative species noted which may have affected determination of the wetland edge:
Kalmia latifolia, Lyonia ligustrina, Rubus allegheniensis
Dichanthelium clandestinum, Quercus sprouts.

Soil: SCS Soil Survey Mapping Unit: Woodbridge (WoB)
On Hydric Soils List? (Y/N) NC - MWB

Soil Profile (Note wetland flag no. nearest soil test pit): 5 p. SE (105° Mag.) fr. WF-318

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
Bw	to 20"+	10YR 4/4-5/4	no redox		∇ @ 12"

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Landscape position:

Altered/atypical situation? (Describe):

Comments: Very stony.

Wetland Edge Delineation Data Form (Upland)

Applicant: National Grid

Wetland No. 138

Project: NEEWS

Flag No. Sequence: 301-316, 329-348

City/Town: Burrillville

Date: Deliv. 10/23/07 } P.L.
Data. 3/6/08 }

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1. Quercus rubra	FACU	1. Osmunda cinnamomea	FACW-
2.		2. Lycopodium obscurum	FACU
3.		3.	

Saplings/Shrubs		Woody Vines
1. Ilex verticillata	FACW+	1.
2. Hamamelis virginiana	FAC-	2.
3.		3.

List other vegetative species noted which may have affected determination of the wetland edge:
Quercus alba, Carya glabra, Castanea dentata

Soil: SCS Soil Survey Mapping Unit: Woodbridge (WoB)
On Hydric Soils List? (Y/N) No - MWD

Soil Profile (Note wetland flag no. nearest soil test pit): 7 p. NE (55° Mag.) fr. WF-313

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
	0-4"	10YR 3/1			
	4-7"	10YR 3/3			∇ = 6"
	7-13"	10YR 4/4-4/3			
	13-20"	10YR 4/3			

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Landscape position:

Altered/atypical situation? (Describe):

Comments: Very stony.

Wetland Edge Delineation Data Form (Wetland)

Applicant: National Grid

Wetland No.: 138

Project: NEEWS

Flag No. Sequence: 301-316, 329-348

City/Town: Bernardston

Date: Delin 10/23/07 } P.L.
Data 3/6/08 }

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1. Acer rubrum	FAC	1. Osmunda cinnamomea	FACW-
2. Quercus rubra	FACU	2.	
3. Fraxinus pennsylvanica	FACW	3.	
Saplings/Shrubs		**Woody Vines**	
1. Ilex verticillata	FACW+	1. Smilax rotundifolia	FAC
2. Viburnum recognitum	FACW-	2.	
3. Hamamelis virginiana	FAC-	3.	

List other vegetative species noted which may have affected determination of the wetland edge:
Sphagnum sp. moss, Ostrya
Occas. pignut hickory + black cherry in U

Soil: SCS Soil Survey Mapping Unit: Ridgebury Whitman + Leicester (RF)
On Hydric Soils List? (Y/N) YES.

Soil Profile (Note wetland flag no. nearest soil test pit): 11p. WSW (240°Mag) fr. WF-313

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
Ap	0-8"	10YR3/1-4/1			
Bw1	8-12"	10YR4/2-4/1		Saturated	

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.): Buttressed root crowns, Localized ponding
Shallow roots

Landscape position:

Altered/atypical situation? (Describe): Episaturation. Slope-controlled hydrol.

Comments: Very stony, + rock outcroppings. Upl island (flags 401-407) with (e.g.) Q. rubra, Carya, Q alba seedl., Castanea, Amelanchier

Wetland Edge Delineation Data Form (Wetland)

Applicant: National Grid | Wetland No.: 137

Project: NEENS | Flag No. Sequence: 401-405

City/Town: Bumlville | Date: 10/22/07 - PL

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1. Acer rubrum		1. Osmunda cinnamomea	
2.		2.	
3.		3.	

Saplings/Shrubs	Woody Vines
1. Vaccinium corymbosum	1. Smilax rotundifolia
2. Clethra alnifolia	2.
3.	3.

List other vegetative species noted which may have affected determination of the wetland edge:
some Sphagnum sp. moss

Soil: SCS Soil Survey Mapping Unit: Woodbridge (WoB)
On Hydric Soils List? (Y/N) No - MWD w/ SPD inclusions

Soil Profile (Note wetland flag no. nearest soil test pit):

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.): - wetland microtopography

Landscape position: - depleted subsoil matrix under a very dark Ap.

Altered/atypical situation? (Describe): - very stony.

Comments:

Location of wetland: South @ 185° Mag. from structure no. 39

Wetland Edge Delineation Data Form (Wetland)

Applicant: National Grid

Wetland No.: 136

Project: NEEWS

Flag No. Sequence: 301-309

City/Town: Burrillville

Date: Delin 10/22/07 } P.L.
Data 3/6/08 }

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1. Acer rubrum	FAC	1. Osmunda cinnamomea	FACW-
2. Quercus rubra	FACU	2.	
3. Quercus alba	FACU	3.	

Saplings/Shrubs		Woody Vines
1. Hamamelis virginiana	FAC-	1.
2. Clethra alnifolia	FAC+	2.
3. Vaccinium corymbosum	FACW-	3.

List other vegetative species noted which may have affected determination of the wetland edge:
Sphagnum sp. moss, Coptis trifolia

Soil: SCS Soil Survey Mapping Unit: Ridgebury Whitman + Leicester (RL)
On Hydric Soils List? (Y/N) YES.

Soil Profile (Note wetland flag no. nearest soil test pit): 6p. NW (310° Mag) fr. WF-307

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):
- ▽ at surface
- localized ponding } 3/6/08

Landscape position:

Altered/atypical situation? (Describe):

Comments: Wetland under powerlines is predominantly PSS w/ Clethra and Blueberry.

Wetland Edge Delineation Data Form (Wetland)

Applicant: National Grid

Wetland No.: 136

Project: NEEWS

Flag No. Sequence: 309-327

City/Town: Bernardsville

Date: Delin 10/22/07 } P.L.
Data 3/6/08 }

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1.		1. Onoclea sensibilis	FACW
2.		2. Eupatorium sp.	FACW
3.		3. Osmunda cinnamomea	FACW-

Saplings/Shrubs		Woody Vines	
1. Sassafras albidum	FACU	1. Vitis labrusca	FACU
2. Viburnum recognitum	FACW-	2.	
3.		3.	

List other vegetative species noted which may have affected determination of the wetland edge:
Sphagnum sp. moss, Clethra, Lyonia, NY fern, Sambucus etc.

Soil: SCS Soil Survey Mapping Unit: Ridgebury Whitman + Leicester (Rf)
On Hydric Soils List? (Y/N) Yes.

Soil Profile (Note wetland flag no. nearest soil test pit): 7 p. NW (305° Mag.) fr. WF-312

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
					Surface

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):
Subsoil is depleted.

Landscape position:

Altered/atypical situation? (Describe):

Comments: Flag 318 at culverts +/-

Wetland Edge Delineation Data Form (Upland)

Applicant: National Grid

Wetland No. 136

Project: NEENS

Flag No. Sequence: 301 - 309

City/Town: Burrillville

Date: Delin. 10/22/07 } P.L.
Data 3/6/08 }

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1. Quercus rubra	FACU	1. Osmunda cinnamomea	FACW-
2. Quercus alba	FACU	2. Gaultheria procumbens	FACU
3.		3. Lycopodium obscurum	FACU

Saplings/Shrubs		Woody Vines
1. Acer rubrum	FAC	1.
2. Hamamelis virginiana	FAC-	2.
3. Clethra alnifolia	FAC+	3.

List other vegetative species noted which may have affected determination of the wetland edge:
Vaccinium corymbosum, Prunus serotina, Quercus coccinea
Kalmia angustifolia

Soil: SCS Soil Survey Mapping Unit: Woodbridge (WoB)
On Hydric Soils List? (Y/N) No - MWD

Soil Profile (Note wetland flag no. nearest soil test pit): Sp. SE (128° Mag.) fr. WF-307

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
Ap	0-5"	10YR			
Bw	5-18"	10YR4/6	10YR 5/4		
2Bw	18-20+"	2.5Y 6/2	10YR5/4-5/8 s.m.		

CO sl
vfsl

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Landscape position:

Altered/atypical situation? (Describe):

Comments: - subsoil exhibits a textural discontinuity
- abruptly to a depleted matrix ca. 18-20"

Wetland Edge Delineation Data Form (Upland)

Applicant: National Grid

Wetland No. 136

Project: NEEWS

Flag No. Sequence: 309-327

City/Town: Bernardsville

Date: Delin 10/22/07 } P.L.
Data 3/6/08 }

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1.		1. Solidago rugosa	FAC
2.		2. Osmunda cinnamomea	FACW -
3.		3.	

Saplings/Shrubs		Woody Vines	
1. Clethra alnifolia	FAC+	1. Rubus hispidus	FACW
2. Vaccinium corymbosum	FACW-	2.	
3. Kalmia latifolia	FACU	3.	

List other vegetative species noted which may have affected determination of the wetland edge:
Dennstaedtia punctilobula, Polytrichum sp. moss, Pteridium aquilinum, Vitis labrusca, Rubus alleghaniensis

Soil: SCS Soil Survey Mapping Unit: Woodbridge (WoB)
On Hydric Soils List? (Y/N) No - MWD w/ SPD inclusions

Soil Profile (Note wetland flag no. nearest soil test pit): Sp. E (71° Mag.) fr. WF-312

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
	0-5"	10YR 3/2		Surface	1"
	5-12"	10YR4/6			
	12-18"	10YR4/4	10YR3/6 oxi rhizos		
	18-23"	10YR5/3			

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Landscape position:

Altered/atypical situation? (Describe):

Comments:

Wetland Edge Delineation Data Form (Upland)

Applicant: National Grid

Wetland No. 135

Project: NEEWS

Flag No. Sequence: 301-328

City/Town: Berrillville

Date: Delia 10/22/07 } P.L.
Data 3/6/08 }

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1. Quercus rubra	FACU	1. O. cinnamomea	FACW-
2.		2.	
3.		3.	

Saplings/Shrubs		Woody Vines
1. Acer rubrum	FAC	1.
2. Hamamelis virginiana	FAC-	2.
3. Clethra alnifolia	FAC+	3.

List other vegetative species noted which may have affected determination of the wetland edge:
Nyssa sylvatica, Lycopodium obscurum, Gaultheria procumbens

Soil: SCS Soil Survey Mapping Unit: _____
On Hydric Soils List? (Y/N) _____

Soil Profile (Note wetland flag no. nearest soil test pit): 10 p. E (80° Mag.) fr. WF-304

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
Ap	0-5"	10YR 2/1			
E	5-8"	10YR 5/2			
B_{w1}	8-12"	10YR 3/3			
B_{w2}	12+"	10YR 4/3	10YR 5/6 few, medium		

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Landscape position:

Altered/atypical situation? (Describe):

Comments: Area upslope from flagged edge does not have a predominance of hydrophytic vegetation.

Wetland Edge Delineation Data Form (Upland)

Applicant: National Grid | Wetland No. 135 - West of

Project: NEEWS | Flag No. Sequence: N/A

City/Town: Burrillville | Date: 10/22/07 - P.L.

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1.		1. Solidago rugosa	FAC
2.		2. Agrostis	--
3.		3. Onoclea sensibilis (occas.)	FACW
Saplings/Shrubs		**Woody Vines**	
1. Lyonia ligustrina	FAC	1.	
2.		2.	
3.		3.	

List other vegetative species noted which may have affected determination of the wetland edge:

Soil: SCS Soil Survey Mapping Unit: Woodbridge (WoB)
On Hydric Soils List? (Y/N) No

Soil Profile (Note wetland flag no. nearest soil test pit): N/A

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
Bw	12+"	10YR 5/6	no redox		

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Landscape position:

Altered/atypical situation? (Describe):

Comments: Area east of pole structure #39

Wetland Edge Delineation Data Form (Wetland)

Applicant: National Grid

Wetland No.: 135

Project: NEENS

Flag No. Sequence: 301-328

City/Town: Berrilliville

Date: Delin 10/22/07 } P.L.
Data 3/6/08 }

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1. Acer rubrum	FAC	1. Osmunda cinnamomea	FACW-
2. Quercus rubra	FACU	2.	
3. Fraxinus pennsylvanica	FACW	3.	
Saplings/Shrubs		**Woody Vines**	
1. Clethra alnifolia	FAC+	1. Smilax rotundifolia	FAC
2. Vaccinium corymbosum	FACW-	2.	
3. Lindera benzoin	FACW-	3.	

List other vegetative species noted which may have affected determination of the wetland edge:
Nyssa sylvatica, Betula alleghaniensis, Hamamelis virginiana
Ilex verticillata
- Sphagnum in association w/ water course

Soil: SCS Soil Survey Mapping Unit: Ridgebury Whitman + Leicester (Rf)
On Hydric Soils List? (Y/N) Yes

Soil Profile (Note wetland flag no. nearest soil test pit): Sp. W (255° Mag.) fr. WF-304

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
Ap		10YR 2/1		Surface	
Bw		10YR 4/1-5/1			

Typ.

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Landscape position: very stony.

Altered/atypical situation? (Describe):

Comments:

Wetland Edge Delineation Data Form (Wetland)

Applicant: National Grid

Wetland No.: 134

Project: NEEWS

Flag No. Sequence: 301-310

City/Town: Bernardsville

Date: Delin 10/18/07 } P.L.
Data 3/4/08 }

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1. Acer rubrum	FAC	1.	
2. Quercus rubra	FACU	2.	
3. Betula alleghaniensis	FAC	3.	

Saplings/Shrubs		Woody Vines	
1. Viburnum cassinoides	FACW	1. Rubus hispidus	FACW
2. Corylus cornuta	FACU-	2.	
3. Vaccinium corymbosum	FACW-	3.	

List other vegetative species noted which may have affected determination of the wetland edge:
Sphagnum sp. moss., Fraxinus pennsylvanica, Osmunda cinn., Ilex verticillata, Toxicodendron radicans

Soil: SCS Soil Survey Mapping Unit: Woodbridge (WoB)
On Hydric Soils List? (Y/N) No (MWD w/ SPD inclusions)

Soil Profile (Note wetland flag no. nearest soil test pit): SE (125° Mag.) fr WF-309

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.): Darkened leaf litter. High OM (mucky) epipedon.

Landscape position: Till upland. Extremely stony

Altered/atypical situation? (Describe):

Comments: Wetland drains overland to the east and north.

Wetland Edge Delineation Data Form (Upland)

Applicant: National Grid

Wetland No. 134

Project: NEEWS

Flag No. Sequence: 301-310

City/Town: Burrillville

Date: Delin 10/18/07 } P.L.
Data 3/4/08 }

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1. Acer rubrum	FAC	1.	
2. Quercus rubra	FACU	2.	
3. Carya sp.		3.	

Saplings/Shrubs	Woody Vines
1. Hamamelis virginiana FAC-	1.
2.	2.
3.	3.

List other vegetative species noted which may have affected determination of the wetland edge: Acer saccharum, Vaccinium angustifolium, Castanea dentata occas. Prunus serotina

Soil: SCS Soil Survey Mapping Unit: Woodbridge (WoB)
On Hydric Soils List? (Y/N) No (MWD w/ SPD inclusions)

Soil Profile (Note wetland flag no. nearest soil test pit): NE (65° Mag.) fr. WF-301 approx. 13 paces...

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
Bw	≤ 16"	10YR5/6	no redox		

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Landscape position:

Altered/atypical situation? (Describe):

Comments:

Wetland Edge Delineation Data Form (Upland)

Applicant: National Grid

Wetland No. 133

Project: NEENS

Flag No. Sequence: 301-312

City/Town: Burrillville

Date: Delin. 10/18/07 } P.L.
Data. 3/4/08 }

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1. Acer rubrum	FAC	1. Lycopodium obscurum	FACU
2. Betula lenta	FACU	2.	
3. Betula alleghaniensis	FAC	3.	
Saplings/Shrubs		**Woody Vines**	
1. Kalmia latifolia	FACU	1.	
2. Pinus strobus	FACU	2.	
3.		3.	

List other vegetative species noted which may have affected determination of the wetland edge:

Soil: SCS Soil Survey Mapping Unit: Paxton (PbB)
On Hydric Soils List? (Y/N) No

Soil Profile (Note wetland flag no. nearest soil test pit): 5p. ESE (105° Mag.) fr. WF-310

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
A	0-4"	10YR 3/1			
Bw1	4-10"	10YR 4/4			
Bw2	10-14"	10YR 5/6			

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Landscape position: Sloping to wetland

Altered/atypical situation? (Describe): ~ 100% Snow Cover

Comments:

Wetland Edge Delineation Data Form (Upland)

Applicant: National Grid | Wetland No. 133

Project: NEEWS | Flag No. Sequence: 314-326

City/Town: Burrillville | Date: 10/18/07 - P.L.

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1. Quercus rubra	FACU	1. Lycopodium obscurum	FACU
2. Acer rubrum	FAC	2.	
3.		3.	

Saplings/Shrubs		Woody Vines
1. Clethra alnifolia	FAC+	1.
2. Vaccinium corymbosum	FACW-	2.
3. Hamamelis virginiana	FAC-	3.

List other vegetative species noted which may have affected determination of the wetland edge:
Betula lenta, Sassafras albidum, Carya

Soil: SCS Soil Survey Mapping Unit: Woodbridge (WoB)
On Hydric Soils List? (Y/N) No.

Soil Profile (Note wetland flag no. nearest soil test pit): 7p. NE (20° Mag.) fr. WF-321

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
A	0-4"	10YR 3/2			
E	4-8"	10YR 7/2			
Bw	8-12"	10YR 5/6			

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Landscape position:

Altered/atypical situation? (Describe):

Comments:

Wetland Edge Delineation Data Form (Wetland)

Applicant: National Grid

Wetland No.: 133

Project: NEEWS

Flag No. Sequence: 301-312

City/Town: Burrillville

Date: Delin: 10/18/07
Data: 3/4/08

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1. Acer rubrum	FAC	1.	
2. Betula alleghaniensis	FAC	2.	
3. Fraxinus pennsylvanica	FACW	3.	

Saplings/Shrubs		Woody Vines
1. Vaccinium corymbosum	FACW	1.
2. Betula alleghaniensis	FAC	2.
3. Carpinus caroliniana	FAC	3.

List other vegetative species noted which may have affected determination of the wetland edge: Sphagnum, Clethra

Soil: SCS Soil Survey Mapping Unit: Ridgebury Whitman+Leicester (RG)
On Hydric Soils List? (Y/N) Yes.

Soil Profile (Note wetland flag no. nearest soil test pit): Westerly from WF-310

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.): ↓ Drainage patterns, Windthrow, buttressing on yellow birch.

Landscape position:

Altered/atypical situation? (Describe):

Comments: Very Stony.

Wetland Edge Delineation Data Form (Wetland)

Applicant: National Grid | Wetland No.: 133

Project: NEEWS | Flag No. Sequence: 335-343

City/Town: Bernardsville | Date: 10/18/07 - P.L.

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1. Acer rubrum	FAC	1. Osmunda cinnamomea	FACW-
2.		2. Thelypteris noveboracensis	FAC
3.		3.	

Saplings/Shrubs		Woody Vines
1. Clethra alnifolia	FAC+	1.
2. Vaccinium corymbosum	FACW-	2.
3. Hamamelis virginiana	FAC-	3.

List other vegetative species noted which may have affected determination of the wetland edge:
Sphagnum sp. moss.

Soil: SCS Soil Survey Mapping Unit: Woodbridge (WoB)
On Hydric Soils List? (Y/N) No - MWD with SPD inclusions.

Soil Profile (Note wetland flag no. nearest soil test pit): 10 p. NE (60° Mag.) fr. WF-343

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
Oa	+4-0"	10YR 3/2			
A	0-7"	10YR 2/1			
Bg	7-16"	10YR 6/1 to			
		2.5YR 8/0			

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):
⊻ microtopography

Landscape position:

Altered/atypical situation? (Describe):

Comments: Upland to west w/ Q. rubra, some Clethra (near ⊻ boundary), Carya, Q. velutina, Castanea, Corylus, Pteridium

Wetland Edge Delineation Data Form (Wetland)

Applicant: National Grid

Wetland No.: 132

Project: NEEWS

Flag No. Sequence: 355-359

City/Town: Burrillville

Date: Delin 10/18/07 } P.L.
Data 3/4/08 }

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1. Acer rubrum	FAC	1. Osmunda cinnamomea	FACW-
2. Liriodendron tulipifera	FACU	2.	
3. Betula alleghaniensis	FAC	3.	
Saplings/Shrubs		**Woody Vines**	
1. Hamamelis virginiana	FAC-	1.	
2. Lindera benzoin	FACW	2.	
3.		3.	

List other vegetative species noted which may have affected determination of the wetland edge: Ulmus americana, Sphagnum sp. moss

Soil: SCS Soil Survey Mapping Unit: Ridgebury Whitman + Leicester (RJ)
On Hydric Soils List? (Y/N) YES.

Soil Profile (Note wetland flag no. nearest soil test pit): Sp. fr. WF-358 @ 85° Mag.

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.): Saturated to Surface. Edge is predom based on topo and plant community composition

Landscape position:

Altered/atypical situation? (Describe): Ponding / Seas. Flooding.

Comments:

Wetland Edge Delineation Data Form (Wetland)

Applicant: National Grid

Wetland No.: 132

Project: NEEWS

Flag No. Sequence: 314 – 331 +/-

City/Town: Burrillville

Date: Delin 10/16/08 } PL
Data 3/4/08 }

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1.		1. Polygonum sagittatum	OBL
2.		2. Scirpus cyperinus	FACW+
3.		3.	

Saplings/Shrubs		Woody Vines
1. Betula populifolia	FAC	1.
2. Clethra alnifolia	FAC+	2.
3. Lyonia ligustrina	FAC	3.

List other vegetative species noted which may have affected determination of the wetland edge:
Acer rubrum, Spiraea latifolia, Spiraea tomentosa, Carex spp., Sphagnum sp. moss.

Soil: SCS Soil Survey Mapping Unit: Ridgebury, Whitman + Leicester (Rf)
On Hydric Soils List? (Y/N) YES.

Soil Profile (Note wetland flag no. nearest soil test pit): NW (330° Mag.) fr. WF-328

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.): Ponded w/ diffuse flow to the east - 3/4/08

Landscape position:

Altered/atypical situation? (Describe):

Comments:

Wetland Edge Delineation Data Form (Wetland)

Applicant: National Grid | Wetland No.: 132

Project: NEEWS | Flag No. Sequence: 331-351 +/-

City/Town: Bernardsville | Date: 10/18/07 - P.L.

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1.		1. Solidago rugosa	FAC
2.		2.	
3.		3.	

Saplings/Shrubs		Woody Vines	
1. Clethra alnifolia	FAC+	1. Rubus hispidus	FACW
2. Spiraea latifolia	FAC+	2.	
3. Spiraea tomentosa	FACW	3.	

List other vegetative species noted which may have affected determination of the wetland edge: Rubus allegheniensis, Betula populifolia, Sphagnum sp. moss Lycopus americana, Euthamia graminifolia, Triadenum virginicum Salix discolor, Scirpus sp., Lyonia ligustrina

Soil: SCS Soil Survey Mapping Unit: Ridgebury Whitman + Leicester (Rf)
On Hydric Soils List? (Y/N) YES.

Soil Profile (Note wetland flag no. nearest soil test pit): 3 p. SE (125° Mag.) fr. WF-338

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Landscape position:

Altered/atypical situation? (Describe):

Comments: Upland to west w/ Betula populifolia, Dennstaedtia, Vitis labrusca, Rubus allegheniensis, Quercus sp. sprouts and occas. Populus tremuloides

Wetland Edge Delineation Data Form (Wetland)

Applicant: National Grid

Wetland No.: 132

Project: NEEWS

Flag No. Sequence: 351-355

City/Town: Burrillville

Date: Delin 10/18/07 } P.L.
Data 3/4/08 }

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1.		1. Osmunda cinnamomea	FACW-
2.		2.	
3.		3.	

Saplings/Shrubs		Woody Vines	
1. Acer rubrum	FAC	1. Rubus hispidus	FACW
2. Betula populifolia	FAC	2.	
3. Clethra alnifolia	FAC+	3.	

List other vegetative species noted which may have affected determination of the wetland edge: Spiraea latifolia, Lycopus ligustrina, Sphagnum sp. moss

Soil: SCS Soil Survey Mapping Unit: Ridgebury, Whitman + Leicester (Rf)
On Hydric Soils List? (Y/N) _____

Soil Profile (Note wetland flag no. nearest soil test pit): 7p. ENE (65° Mag.) from WF-353

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
A	0-4"	10YR3/1			▽ = 2"
AB	4-7"	10YR4/2			
Bg	7-13"	2.5Y6/2	2.5Y 6/4		

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Landscape position:

Altered/atypical situation? (Describe):

Comments:

Wetland Edge Delineation Data Form (Upland)

Applicant: National Grid

Wetland No. 132

Project: NEENS

Flag No. Sequence: 351-355

City/Town: Bernardsville

Date: Delin 10/18/07 } P.L.
Data 3/4/08 }

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1.		1. Osmunda cinnamomea	FACW-
2.		2.	
3.		3.	

Saplings/Shrubs		Woody Vines	
1. Betula populifolia	FAC	1. Rubus hispidus	FACW
2. Acer rubrum	FAC	2.	
3. Vaccinium corymbosum	FACW-	3.	

List other vegetative species noted which may have affected determination of the wetland edge:
Quercus [rubra?] sprouts, Lyonia ligustrina, Clethra alnifolia
Dennstaedtia punctilobula

Soil: SCS Soil Survey Mapping Unit: Woodbridge (WoB)
On Hydric Soils List? (Y/N) No - MWD w/ SPD inclusions

Soil Profile (Note wetland flag no. nearest soil test pit): 5p. W. (245° Mag.) fp. WF-353

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
A/B	0-6"	10YR3/1- 10YR4/4			
2E	6-9"	10YR5/2			
$2B_g$	9-12"	~7.5YR 4/4			
$2B_w$	12-18"	10YR5/4	10YR5/6 diffuse	soft masses	

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Landscape position:

Altered/atypical situation? (Describe):

Comments:

Wetland Edge Delineation Data Form (Upland)

Applicant: National Grid

Wetland No. 132

Project: NEEWS

Flag No. Sequence: 355-359

City/Town: Bernardsville

Date: Delin 10/16/07 } P.L.
Data 3/4/08 }

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1. Quercus rubra	FACU	1. Osmunda cinnamomea	FACW-
2. Acer rubrum	FAC	2.	
3. Liriodendron tulipifera	FACU	3.	

Saplings/Shrubs		Woody Vines
1. Hamamelis virginiana	FAC-	1.
2. Vaccinium corymbosum	FACW-	2.
3.		3.

List other vegetative species noted which may have affected determination of the wetland edge:
Betula lenta, Betula alleghaniensis, Kalmia latifolia, Quercus alba

Soil: SCS Soil Survey Mapping Unit: Woodbridge (WoB)
On Hydric Soils List? (Y/N) No. (MWB w/ SPD inclusions)

Soil Profile (Note wetland flag no. nearest soil test pit): Sp. SW (235° Mag.) fr. WF-357

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
Bw	≤ 20"	10YR4/3-5/2	typ.		
	16-20"	10YR6/2	occas. depl. matrix		

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Landscape position:

Altered/atypical situation? (Describe): ~ 90% Snow Cover 3/4/08

Comments: Soils break located approx 20 ft upslope from flagged edge.

Wetland Edge Delineation Data Form (Upland)

Applicant: National Grid

Wetland No. 132

Project: NEEWS

Flag No. Sequence: 318-331 +/-

City/Town: Bernardsville

Date: Delin 10/18/08 } P.L.
Data 3/4/08 }

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1.		1. Osmunda cinnamomea	FACW-
2.		2.	
3.		3.	

Saplings/Shrubs		Woody Vines	
1. Betula populifolia	FAC	1. Smilax rotundifolia	FAC
2. Rubus allegheniensis	FACU	2.	
3. Acer rubrum	FAC	3.	

List other vegetative species noted which may have affected determination of the wetland edge:
Hamamelis virginiana, Clethra alnifolia, Quercus sp. sprouts, Lyonia ligustrina

Soil: SCS Soil Survey Mapping Unit: Poxton (PbB)
On Hydric Soils List? (Y/N) No

Soil Profile (Note wetland flag no. nearest soil test pit): Sp. NE (45° Mag.) fr. WF-331

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
A	0-6"	10YR 3/1			
Bw	6-14"	10YR 4/4	10YR 5/3		

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Landscape position:

Altered/atypical situation? (Describe):

Comments:

Wetland Edge Delineation Data Form (Upland)

Applicant: National Grid

Wetland No. 132

Project: NEEWS

Flag No. Sequence: 301-314

City/Town: Bernardville

Date: Delin 10/18/07
Data 3/4/08

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1. Quercus rubra	FACU	1.	
2. Quercus alba	FACU	2. ~100% Snow Cover	
3. Acer rubrum	FAC	3.	

Saplings/Shrubs		Woody Vines
1. Hamamelis virginicina	FAC-	1.
2. Vaccinium corymbosum	FACW-	2.
3. Kalmia latifolia	FACU	3.

List other vegetative species noted which may have affected determination of the wetland edge:
Nyssa sylvatica, Lycopodium obscurum, Gaultheria procumbens
Clethra alnifolia, Lyonia ligustrina, Rhodo. viscosum.

Soil: SCS Soil Survey Mapping Unit: _____
On Hydric Soils List? (Y/N) _____

Soil Profile (Note wetland flag no. nearest soil test pit): 5p. NE (35° Mag.) fr. WF-304

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Landscape position:

Altered/atypical situation? (Describe):

Comments: Soils w/ redox features extending upslope - flagged edge based on vegetation community composition

Wetland Edge Delineation Data Form (Wetland)

Applicant: National Grid

Wetland No.: 131

Project: NEEWS

Flag No. Sequence: 301-310

City/Town: Bernardville

Date: Delin 10/17/07 } P.L.
Data 3/4/08 }

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1. Acer rubrum	FAC	1. Osmunda cinnamomea	FACW-
2. Betula alleghaniensis	FAC	2.	
3. Fraxinus pensylvanica	FACW	3.	
Saplings/Shrubs		**Woody Vines**	
1. Clethra alnifolia	FAC+	1.	
2. Nyssa sylvatica	FAC	2.	
3.		3.	

List other vegetative species noted which may have affected determination of the wetland edge: Sphagnum sp. mosses, Occas. Betula lenta + Quercus rubra Polystichum acrostichoides, Hamamelis virginiana, Occasional V. corymbosum, Clethra, Lindera

Soil: SCS Soil Survey Mapping Unit: Ridgebury Whitman Leicester (Rf)
On Hydric Soils List? (Y/N) YES.

Soil Profile (Note wetland flag no. nearest soil test pit): 6 p. NW (320° Mag.) fr. WF-307

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.): Buttressing. ⩒ obsv'd ponded w/ flow 3/4/08

Landscape position:

Altered/atypical situation? (Describe): Q. rubra = canopy dominant in ⩒

Comments: ~ 80% Snow Cover 3/4/08

Wetland Edge Delineation Data Form (Wetland)

Applicant: National Grid

Wetland No.: 131

Project: NEEWS

Flag No. Sequence: 310-315

City/Town: Burrillville

Date: Delin 10/17/07 } P.L.
Data. 3/4/08

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1.		1. Carex [scoparia]	[FACW]
2.		2. Panicum sp.	
3.		3.	

Saplings/Shrubs		Woody Vines
1. Betula populifolia	FAC	1.
2. Clethra alnifolia	FAC+	2.
3. Vaccinium corymbosum	FACW-	3.

List other vegetative species noted which may have affected determination of the wetland edge:
Osmunda cinnamomea, Scirpus cyperinus, Carex stricta

Soil: SCS Soil Survey Mapping Unit: _____
On Hydric Soils List? (Y/N) _____

Soil Profile (Note wetland flag no. nearest soil test pit): 5p. NW (320°) fr. WF-312

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
A	0-4"	10YR 3/2			▽=0"
B_W	4-14"	10YR 5/2			
	14"	refusal			

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Landscape position:

Altered/atypical situation? (Describe):

Comments:

Wetland Edge Delineation Data Form (Wetland)

Applicant: National Grid

Wetland No.: 131

Project: NEEWS

Flag No. Sequence: 315-333

City/Town: Bernardville

Date: Delin 10/17/07 } P.L.
Data 3/4/08 }

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1.		1. Carex spp.	— —
2.		2. Aster sp.	— —
3.		3.	

Saplings/Shrubs		Woody Vines	
1. Betula populifolia	FAC	1. Rubus hispidus	FACW
2. Acer rubrum	FAC	2.	
3. Vaccinium corymbosum	FACW-	3.	

List other vegetative species noted which may have affected determination of the wetland edge:
Spiraea latifolia + S. tomentosa, Sphagnum sp. moss

Soil: SCS Soil Survey Mapping Unit: Ridgebury Whitman + Leicester (Rf)
On Hydric Soils List? (Y/N) YES.

Soil Profile (Note wetland flag no. nearest soil test pit): 4 paces S from WF-320

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Landscape position:

Altered/atypical situation? (Describe):

Comments:

Wetland Edge Delineation Data Form (Upland)

Applicant: National Grid

Wetland No. 131

Project: NEEWS

Flag No. Sequence: 315-333

City/Town: Burrillville

Date: Delin 10/17/07 } P.L
Data 3/4/08 }

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1.		1. Osmunda cinnamomea	FACW-
2.		2.	
3.		3.	

Saplings/Shrubs		Woody Vines	
1. Vaccinium corymbosum	FACW-	1.	
2. Populus grandidentata	FACU	2.	
3. Acer rubrum	FAC	3.	

List other vegetative species noted which may have affected determination of the wetland edge:
Betula populifolia

Soil: SCS Soil Survey Mapping Unit: Woodbridge (WoB)
On Hydric Soils List? (Y/N) No

Soil Profile (Note wetland flag no. nearest soil test pit): 4 p. N. (350° Mag.) fr. WF-320

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
A	0-6"	10YR 3/1			
A/C	6-12"	10YR5/6-4/2			
2Ab	12-18"	10YR 3/2	strong oxi rhizo's		
2Bw	18-22"	10YR5/3	" " "		

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Landscape position:

Altered/atypical situation? (Describe): probably unconsolidated mineral soil material from adjacent access road.

Comments:

Wetland Edge Delineation Data Form (Upland)

Applicant: National Grid

Wetland No. 131

Project: NEEWS

Flag No. Sequence: 310-315

City/Town: Burrillville

Date: Delin 10/17/07 } P.L.
Data 3/4/08 }

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1.		1.	
2.		2. ~80% Snow Cover	
3.		3.	

Saplings/Shrubs		Woody Vines
1. Betula populifolia	FAC	1.
2. Clethra alnifolia	FAC+	2.
3. Vaccinium corymbosum	FACW-	3.

List other vegetative species noted which may have affected determination of the wetland edge:
Kalmia angustifolia, Rubus flagellaris, Kalmia latifolia, Smilax rotundifolia

Soil: SCS Soil Survey Mapping Unit: Woodbridge (WoB)
On Hydric Soils List? (Y/N) NO. MWD w/ SPD inclusions

Soil Profile (Note wetland flag no. nearest soil test pit): 5 p. E (100° Mag.) fr. WF-312

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
	0-3"	10YR 3/2			
	3-12"	10YR 5/6-5/4	7.5YR 5/8		
	12"	refusal	few, med.		

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Landscape position:

Altered/atypical situation? (Describe):

Comments: Adjacent upland woods to south w/ Liriodendron tulipifera, Betula lenta, Fagus grandifolia, Quercus spp.

Wetland Edge Delineation Data Form (Upland)

Applicant: National Grid

Wetland No. 131

Project: NEEWS

Flag No. Sequence: 301-310

City/Town: Burrillville

Date: Delin 10/17/07 } P.L.
Data 3/4/08 }

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1. Fagus grandifolia	FACU	1.	
2. Quercus rubra	FACU	2.	
3. Acer rubrum	FAC	3.	

Saplings/Shrubs		Woody Vines
1. Fagus grandifolia	FACU	1.
2. Hamamelis virginiana	FAC-	2.
3.		3.

List other vegetative species noted which may have affected determination of the wetland edge:
Liriodendron tulipifera, Kalmia latifolia

Soil: SCS Soil Survey Mapping Unit: Woodbridge (WoB)
On Hydric Soils List? (Y/N) No.

Soil Profile (Note wetland flag no. nearest soil test pit): 5p. SE (140° Mag.) fr. WF-307

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Landscape position: Very Stony.

Altered/atypical situation? (Describe):

Comments: Some large canopy-dominant tulip trees.

Wetland Edge Delineation Data Form (Wetland)

Applicant: National Grid

Wetland No.: 130

Project: NEEWS

Flag No. Sequence: 401-405

City/Town: Burrillville

Date: Delin 10/17/07 } P.L.
Data 3/4/08 }

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1.		1. Osmunda cinnamomea	FACW-
2.		2. Scirpus cyperinus	FACW+
3.		3.	

Saplings/Shrubs		Woody Vines
1. Spiraea latifolia	FAC+	1.
2. Spiraea tomentosa	FACW	2.
3. Salix discolor	FACW	3.

List other vegetative species noted which may have affected determination of the wetland edge:
Acer rubrum

Soil: SCS Soil Survey Mapping Unit: Ridgebury Whitman Leicester (RF)
On Hydric Soils List? (Y/N) yes.

Soil Profile (Note wetland flag no. nearest soil test pit):

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.): - reduced lf litter, water-stained lvs - 10/17/07
- ponded ca. 4" depth + frozen - 3/4/08
- mottled subsoil

Landscape position:

Altered/atypical situation? (Describe): - trailside depression

Comments: Adjacent Upland to north with Betula populifolia, Quercus sp. sprouts, and Dennstaedtia punctilobula.

Wetland Edge Delineation Data Form (Wetland)

Applicant: National Grid

Wetland No.: W03-PR-129 129

Project: NEEWS

Flag No. Sequence: 401-414

City/Town: Burrillville

Date: Delin. 10/17/07 } P.L.
Data. 3/4/08 }

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1.		1. Osmunda cinnamomea	FACW-
2.		2. Agrostis sp.	—
3.		3.	

Saplings/Shrubs		Woody Vines	
1. Acer rubrum (sapl.)	FAC	1. Rubus hispidus	FACW
2. Betula populifolia (sapl.)	FAC	2. Vitis labrusca	FACU
3. Vaccinium corymbosum	FACW-	3.	

List other vegetative species noted which may have affected determination of the wetland edge: Sphagnum sp. moss, Spiraea latifolia, Thelypteris noveboracensis

Soil: SCS Soil Survey Mapping Unit: Ridgebury Whitman Leicester (RF)
On Hydric Soils List? (Y/N) YES.

Soil Profile (Note wetland flag no. nearest soil test pit): SSE (165° Mag.) fr. WF-413

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
Ap	0-10"	10YR 2/1			0"

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.): ponded, with flow to ₩131 thru 15" culvert nr. flag. 404

Landscape position: Extremely Stony.

Altered/atypical situation? (Describe):

Comments: Also included in ₩: A very stony low spot at edge of woods w/ Betula lenta, Acer rubrum, Sphagnum, occasional Ilex verticillata, and occas. Fagus.

Wetland Edge Delineation Data Form (Upland)

Applicant: National Grid

Wetland No. 129

Project: NEEWS

Flag No. Sequence: 401-414

City/Town: Bernardsville

Date: Delin: 10/17/07 } P.L.
Data: 3/4/08 }

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1. Carya ovata	FACU-	1. Osmunda cinnamomea	FACW-
2. Betula lenta	FACU	2.	
3. Acer rubrum	FAC	3.	

Saplings/Shrubs		Woody Vines	
1. Hamamelis virginiana	FAC-	1. Smilax rotundifolia	FAC
2. Fagus grandifolia	FACU	2.	
3.		3.	

List other vegetative species noted which may have affected determination of the wetland edge: Populus grandidentata, Acer saccharum, Fraxinus pensylvanica, Carya glabra, Quercus rubra

Soil: SCS Soil Survey Mapping Unit: Woodbridge (WoB)
On Hydric Soils List? (Y/N) MWD w/ SPD inclusions – No.

Soil Profile (Note wetland flag no. nearest soil test pit): 6 p. N (350° Mag) fr. WF-412

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Landscape position: Extremely Stony

Altered/atypical situation? (Describe): ~ 60% Snow Cover 3/4/08

Comments: Shrub + tree strata w/o a predom. of hydrophytic veg.

Wetland Edge Delineation Data Form (Wetland)

Applicant: National Grid

Wetland No.: 128

Project: NEEWS

Flag No. Sequence: 301-306

City/Town: Berrillville

Date: Delin. 10/16/07 - PL
Data. 2/15/08 - JG

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1. Acer rubrum	FAC	1. Coptis trifolia	
2. Pinus strobus	FACU	2. Osmunda cinnamomea	FACW-
3. Betula lenta	FACU	3.	
Saplings/Shrubs		**Woody Vines**	
1. Acer rubrum (sapl.)	FAC	1.	
2. Clethra alnifolia	FAC+	2.	
3. Lindera benzoin	FACW-	3.	

List other vegetative species noted which may have affected determination of the wetland edge:
Sphagnum sp. moss, Ilex verticillata

Soil: SCS Soil Survey Mapping Unit: Ridgebury Whitman + Leicester (Rf)
On Hydric Soils List? (Y/N) YES.

Soil Profile (Note wetland flag no. nearest soil test pit): 15 p. S. (170° Mag.) fr. WF-303

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.): Nearby brook has 4-6" of flow (2/15/08)

Landscape position:

Altered/atypical situation? (Describe):

Comments: Mowry Brook floodplain

Wetland Edge Delineation Data Form (Wetland)

Applicant: National Grid

Wetland No.: 128

Project: NEEWS

Flag No. Sequence: 316-327

City/Town: Burrillville

Date: Delin 10/16/07 - PL
Data 2/15/08 - JG

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1. Betula lenta	FACU	1.	
2. Nyssa sylvatica	FAC	2.	
3. Betula alleghenienses	FAC	3.	
Saplings/Shrubs		**Woody Vines**	
1. Hamamelis virginiana	FAC-	1.	
2. Clethra alnifolia	FAC+	2.	
3. Ilex verticillata	FACW+	3.	

List other vegetative species noted which may have affected determination of the wetland edge:
Acer sp., Fraxinus pennsylvanica

Soil: SCS Soil Survey Mapping Unit: Ridgebury Whitman + Leicester (RF)
On Hydric Soils List? (Y/N) Yes.

Soil Profile (Note wetland flag no. nearest soil test pit): East (100° Mag.) fr. WF-322

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
A	0-12"	10YR3/1		≤ 12"	
		refusal	stony		

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.): Drainage patterns, water-stained lvs.

Landscape position:

Altered/atypical situation? (Describe):

Comments: Mowry Brook floodplain

Wetland Edge Delineation Data Form (Upland)

Applicant: National Grid

Wetland No. 128

Project: NEEWS

Flag No. Sequence: 316-327

City/Town: Bumillville

Date: Delin. 10/16/07 - PL
Data. 2/15/08 - JG

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1. Betula lenta	FACU	1. Osmunda cinnamomea	FACW-
2. Betula alleghenicusis	FAC	2.	
3. Quercus velutina	NL	3.	
Saplings/Shrubs		**Woody Vines**	
1. Hamamelis virginiana	FAC-	1.	
2.		2.	
3.		3.	

List other vegetative species noted which may have affected determination of the wetland edge:
Liriodendron tulipifera

Soil: SCS Soil Survey Mapping Unit: Woodbridge (WoB)
On Hydric Soils List? (Y/N) No - mwd w/ SPD inclusions...

Soil Profile (Note wetland flag no. nearest soil test pit): 15 p. fr. WF-322

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
A	0-8"	10YR 2/1			
B	8-15"	10YR 4/4			

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Landscape position:

Altered/atypical situation? (Describe):

Comments:

Wetland Edge Delineation Data Form (Upland)

Applicant: National Grid

Wetland No. 128

Project: NEENS

Flag No. Sequence: 301-306

City/Town: Bernardsville

Date: Delin 10/16/07 - P.L.
Data 2/15/08 - J.G.

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1. Pinus strobus	FACU	1. Lycopodium obscurum	FACU
2.		2.	
3.		3.	

Saplings/Shrubs		Woody Vines	
1. Kalmia latifolia	FACU	1. Smilax rotundifolia	FAC
2. Clethra alnifolia	FAC+	2.	
3.		3.	

List other vegetative species noted which may have affected determination of the wetland edge:

Soil: SCS Soil Survey Mapping Unit: Paxton (PbB)
On Hydric Soils List? (Y/N) No.

Soil Profile (Note wetland flag no. nearest soil test pit): 15 p. fr. WF-303

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
O	+1-0"				
Ap	0-12"	10YR 4/2			
B	12-15"	10YR 6/6			

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Landscape position:

Altered/atypical situation? (Describe):

Comments:

Wetland Edge Delineation Data Form (Wetland)

Applicant: National Grid

Wetland No.: 127

Project: NEEWS

Flag No. Sequence: 307 - 325

City/Town: Burrillville

Date: Delin 10/16/07 - PL
Data 2/15/08 - JG

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1.		1. Scirpus cyperinus	FACW+
2.		2. [Calamagrostis canadensis]	FACW+
3.		3.	

Saplings/Shrubs		Woody Vines	
1. Clethra alnifolia	FAC+	1. Rubus hispidus	FACW
2. Betula populifolia	FAC	2.	
3. Spiraea tomentosa	FACW	3.	

List other vegetative species noted which may have affected determination of the wetland edge:
Spiraea latifolia, Sphagnum sp. moss, Kalmia angustifolia

Soil: SCS Soil Survey Mapping Unit: Ridgebury Whitman + Leicester (Rf)
On Hydric Soils List? (Y/N) Yes.

Soil Profile (Note wetland flag no. nearest soil test pit): 15p. W (250° Mag.) fr WF-309

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
O	+2-0"			≤ 12"	
A	0-8"	10YR 2/2			
B	8-12"	10YR 4/1			

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):
- some areas of standing water
- drainage patterns

Landscape position:

Altered/atypical situation? (Describe):

Comments: Cutover area - PSS/PEM at plot.

Wetland Edge Delineation Data Form (Wetland)

Applicant: National Grid

Wetland No.: 127

Project: NEEWS

Flag No. Sequence: 301-307, 326-334

City/Town: Bumillville

Date: 10/16/07 - PL

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1. Quercus rubra		1. Brachyelytrum erectum	
2. Betula alleghaniensis		2. Osmunda cinnamomea	
3. Nyssa sylvatica		3. Thelypteris noveboracensis	
Saplings/Shrubs		**Woody Vines**	
1. Hamamelis virginiana		1. Rubus hispidus	
2. Vaccinium corymbosum		2.	
3. Clethra alnifolia		3.	

List other vegetative species noted which may have affected determination of the wetland edge:
Acer rubrum, Sphagnum sp. moss, Fraxinus pennsylvanica
Occasional: Betula lenta, Liriodendron tulipifera, Fagus grandifolia

Soil: SCS Soil Survey Mapping Unit: Ridgebury, Whitman + Leicester (Rf)
On Hydric Soils List? (Y/N) YES.

Soil Profile (Note wetland flag no. nearest soil test pit): Area of Sphagnum microrelief

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
Oa	+8-0"	10YR 3/3			
A	0-6"	10YR 3/1-3/2			
Bg	6-12"	10YR 5/2-5/1			

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Landscape position:

Altered/atypical situation? (Describe):

Comments:

Wetland Edge Delineation Data Form (Wetland)

Applicant: National Grid

Wetland No.: 127

Project: NEEWS

Flag No. Sequence: 301-307

City/Town: Berrilville

Date: Delin: 10/16/07 - PL
Data: 2/15/08 - JG

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1. Acer rubrum	FAC	1. Osmunda cinnamomea	FACW-
2. Betula alleghaniensis	FAC	2. Carex sp.	—
3.		3.	

Saplings/Shrubs		Woody Vines
1. Ilex verticillata	FACW+	1.
2. Betula alleghaniensis	FAC	2.
3.		3.

List other vegetative species noted which may have affected determination of the wetland edge:
Sphagnum sp. moss,

Soil: SCS Soil Survey Mapping Unit: Ridgebury Whitman + Leicester (Rf)
On Hydric Soils List? (Y/N) Yes.

Soil Profile (Note wetland flag no. nearest soil test pit): 15 p. W. (270° Mag.) fr WF-305

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
A	0-8"	10YR2/1			
		refusal	(stony)		

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.): Drainage patterns, water marks, water stained lvs.

Landscape position: Braided stream (Mowry Brook) - vicinity of documentation plot.

Altered/atypical situation? (Describe):

Comments:

4-6" flow in stream

Wetland Edge Delineation Data Form (Wetland)

Applicant: National Grid

Wetland No.: 127

Project: NEEWS

Flag No. Sequence: 326-334

City/Town: Burrillville

Date: Delin: 10/16/07 - P.L. Data: 2/15/08 - J.G.

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1. Quercus rubra	FACU	1. Osmunda cinnamomea	FACW-
2. Fraxinus pensylvanica	FAC	2.	
3. Liriodendron tulipifera	FACU	3.	

Saplings/Shrubs		Woody Vines
1. Hamamelis virginiana	FAC-	1.
2. Clethra alnifolia	FAC+	2.
3. Nyssa sylvatica	FAC	3.

List other vegetative species noted which may have affected determination of the wetland edge: Sphagnum sp. moss, Acer rubrum

Soil: SCS Soil Survey Mapping Unit: Ridgebury Whitman + Leicester (Rf)
On Hydric Soils List? (Y/N) YES.

Soil Profile (Note wetland flag no. nearest soil test pit): 15 p. E (90° Mag.) fr. WF-329

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
O	+2-0"			≤12"	
A	0-8"	10YR 2/1			
		refusal	(stones)		

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.): Drainage patterns in ⊻

Landscape position:

Altered/atypical situation? (Describe):

Comments: Very stony.

Wetland Edge Delineation Data Form (Upland)

Applicant: National Grid

Wetland No. 127

Project: NEEWS

Flag No. Sequence: 326-334

City/Town: Burrillville

Date: Delin - 10/16/07 P.L.
Data - 2/15/08 J.G.

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status
1. Quercus rubra	FACU
2. Liriodendron tulipifera	FACU
3.	

Herbs:	Indicator Status
1. Gaultheria procumbens	FACU
2.	
3.	

Saplings/Shrubs	
1. Hamamelis virginiana	FAC-
2. Clethra alnifolia	FAC+
3. Nyssa sylvatica	FAC

Woody Vines	
1. Smilax rotundifolia	FAC
2.	
3.	

List other vegetative species noted which may have affected determination of the wetland edge:

Soil: SCS Soil Survey Mapping Unit: Woodbridge (WoB)
On Hydric Soils List? (Y/N) NO (MWD w/ SPD inclusions)

Soil Profile (Note wetland flag no. nearest soil test pit): 15 paces fr. WF-329

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
A	0-8"	10YR 2/1			
B	8-12"	2.5YR 2.5/2			
	12-15"	refusal			

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Landscape position:

Altered/atypical situation? (Describe):

Comments:

Wetland Edge Delineation Data Form (Upland)

Applicant: National Grid

Wetland No. 127

Project: NEEWS

Flag No. Sequence: 307-325

City/Town: Burrillville

Date: Delin 10/16/07 - PL
Data 2/15/08 - JG

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1.		1. Dennstaedtia punctilobula	NL
2.		2.	
3.		3.	

Saplings/Shrubs	Indicator Status	Woody Vines	Indicator Status
Sapl. 1. Betula alleghaniensis	FAC	1. Rubus hispidus	FACW
2. Pinus strobus	FACU	2.	
3.		3.	

List other vegetative species noted which may have affected determination of the wetland edge:

Soil: SCS Soil Survey Mapping Unit: Paxton (PbB)

On Hydric Soils List? (Y/N) NO.

Soil Profile (Note wetland flag no. nearest soil test pit): 15 paces from WF-309

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
A	0-8"	10YR 2/1			
B	8-12"	10YR 5/3			

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Landscape position:

Altered/atypical situation? (Describe):

Comments:

Wetland Edge Delineation Data Form (Upland)

Applicant: National Grid

Wetland No. 127

Project: NEELWS

Flag No. Sequence: 301-307

City/Town: Bumlville

Date: Delin: 10/16/07 - PL
Data: 2/15/08 - JG

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1. Acer rubrum	FAC	1. Lycopodium [complanatum]	FACU
2. Tsuga canadensis	FACU	2.	
3. Nyssa sylvatica	FAC	3.	

Saplings/Shrubs	Woody Vines
1.	1.
2.	2.
3.	3.

List other vegetative species noted which may have affected determination of the wetland edge:
Betula lenta, Juniperus virginiana, Pinus strobus

Soil: SCS Soil Survey Mapping Unit: Paxton (PbB)
On Hydric Soils List? (Y/N) No.

Soil Profile (Note wetland flag no. nearest soil test pit): 15 paces fr. WF-305

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
O	+3-0"				
A	0-8"	10YR 3/2			
B	8-15"	10YR 4/6			

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Landscape position:

Altered/atypical situation? (Describe):

Comments:

Wetland Edge Delineation Data Form (Wetland)

Applicant: National Grid

Wetland No.: 126

Project: NEEWS

Flag No. Sequence: 401-415

City/Town: Bernardsville

Date: Delin: 10/16/07 - P.L.
Data: 2/14/08 - J.G.

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1.		1.	
2.		2.	
3.		3.	

Saplings/Shrubs
1. Clethra alnifolia
2. Spiraea latifolia
3. Spiraea tomentosa

Woody Vines
1. Rubus hispidus
2.
3.

List other vegetative species noted which may have affected determination of the wetland edge: Sphagnum sp. moss, Lyonia ligustrina, Pinus strobus (Sapl.)

Soil: SCS Soil Survey Mapping Unit: Ridgebury Whitman & Leicester (Rf)
On Hydric Soils List? (Y/N) Yes.

Soil Profile (Note wetland flag no. nearest soil test pit): 15 p. E (110° Mag.) fr. WF-409

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
A	0-8"	10YR 3/1		0"	0"
B	8-15"	10YR 4/1	"light"		

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.): - Drainage patterns in ⊻
- Some areas of standing water

Landscape position:

Altered/atypical situation? (Describe):

Comments:

Wetland Edge Delineation Data Form (Wetland)

Applicant: National Grid | Wetland No.: 126

Project: NEEWS | Flag No. Sequence: 401-415

City/Town: Burrillville | Date: 10/15/07 - PL

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1.		1. Lycopus americana	OBL
2.		2. Panicum rigidulum	FACW+
3.		3. Calamagrostis canadensis	FACW+

Saplings/Shrubs		Woody Vines	
1. Clethra alnifolia	FAC+	1. Rubus flagellaris	FACU
2. Spiraea tomentosa	FACW	2. Vitis labrusca	FACU
3. Spiraea latifolia	FAC+	3. Rubus hispidus	FACW

List other vegetative species noted which may have affected determination of the wetland edge:
Vaccinium macrocarpon

Soil: SCS Soil Survey Mapping Unit: Ridgebury Whitman + Leicester (Rf)
On Hydric Soils List? (Y/N) YES.

Soil Profile (Note wetland flag no. nearest soil test pit): ~ West of A46

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
A	0-3"	10YR3/1			
AB	3-5"				
B_{w1}	5-12"	10YR5/3-5/2	SL		
B_{w2}	12-15"	10YR6/1-4/2	fSL		

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):
– polyvalue colors

Landscape position:

Altered/atypical situation? (Describe):

Comments:

Wetland Edge Delineation Data Form (Upland)

Applicant: National Guard | Wetland No. 126

Project: NEELWS | Flag No. Sequence: 401-415

City/Town: Burrillville | Date: Delin. 10/16/07 - P.L. Data. 2/14/08 - J.G.

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1.		1. Solidago sp.	— —
2.		2.	
3.		3.	

Saplings/Shrubs	Woody Vines
1. Rubus allegheniensis FACU	1.
2.	2.
3.	3.

List other vegetative species noted which may have affected determination of the wetland edge: Polytrichum sp. moss

Soil: SCS Soil Survey Mapping Unit: Ridgebury Whitman + Leicester (Rf)
On Hydric Soils List? (Y/N) Yes.

Soil Profile (Note wetland flag no. nearest soil test pit): 15 paces from WF-409

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Landscape position:

Altered/atypical situation? (Describe): Cutover area - disturbed soils.

Comments:

Wetland Edge Delineation Data Form (Upland)

Applicant: National Grid Wetland No. 126

Project: NEEWS Flag No. Sequence: 401-415

City/Town: Burrillville Date: 10/15/07 - PL

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1.		1. Solidago rugosa	FAC
2.		2.	
3.		3.	

Saplings/Shrubs		Woody Vines	
1. Rubus allegheniensis	FACU	1. Rubus flagellaris	FACU
2. Spiraea latifolia	FAC+	2.	
3. Clethra alnifolia	FAC+	3.	

List other vegetative species noted which may have affected determination of the wetland edge:
Pinus strobus
Other areas locally with Betula populifolia, Polytrichum sp. moss, Dennstaedtia punctilobula, Lysimachia quadrifolia + misc. lichens

Soil: SCS Soil Survey Mapping Unit: Paxton (PbB)
On Hydric Soils List? (Y/N) No.

Soil Profile (Note wetland flag no. nearest soil test pit):

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Landscape position:

Altered/atypical situation? (Describe):

Comments: General vegetation notes from west of W 126

Wetland Edge Delineation Data Form (Wetland)

Applicant: National Grid

Wetland No.: 125

Project: NEEWS

Flag No. Sequence: 309-312

City/Town: Bernardville

Date: 10/15/07 - PL

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1.		1. Panicum rigidulum	FACW+
2.		2. Muhlenbergia uniflora	OBL
3.		3. Juncus canadensis	OBL

Saplings/Shrubs		Woody Vines	
1. Spiraea tomentosa	FACW	1. Rubus hispidus	FACW
2.		2.	
3.		3.	

List other vegetative species noted which may have affected determination of the wetland edge:
Bidens frondosa, Scirpus cyperinus, Sphagnum sp. moss

Soil: SCS Soil Survey Mapping Unit: Ridgebury Whitman + Leicester (Rf)
On Hydric Soils List? (Y/N) YES.

Soil Profile (Note wetland flag no. nearest soil test pit): vicinity flags 309-312

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.): - ruts and drainage patterns

Landscape position: - ASSF flows through puddle in road

Altered/atypical situation? (Describe): from WF125-308 into ⊻ 126

Comments: ⊻ veg in ROW - north side of access road to NW of structure 46.

Wetland Edge Delineation Data Form (Wetland)

Applicant: National Grid

Wetland No.: 125

Project: NEEWS

Flag No. Sequence: 301-316

City/Town: Burrillville

Date: Delin: 10/15/07 - P.L.
Data: 2/14/08 - J.G.

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1. Acer rubrum	FAC	1.	
2. Fraxinus pensylvanica	FAC	2.	
3.		3.	

Saplings/Shrubs		Woody Vines
1. Vaccinium corymbosum	FACW-	1.
2. Clethra alnifolia	FAC+	2.
3. Hamamelis virginiana	FAC-	3.

List other vegetative species noted which may have affected determination of the wetland edge:

Soil: SCS Soil Survey Mapping Unit: Ridgebury Whitman + Leicester (Rf)
On Hydric Soils List? (Y/N) YES.

Soil Profile (Note wetland flag no. nearest soil test pit): 15p. NE (50° Mag.) fr. WF-313

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
A	0-8"	10YR 2/1		0"	0"
B_1	8-12"	10YR 6/2	10YR 4/1		
B_2	12"-15"+	2.5Y 6/2			

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.): - Drainage patterns in ⊻
- Water stained leaves

Landscape position:

Altered/atypical situation? (Describe):

Comments:

Wetland Edge Delineation Data Form (Upland)

Applicant: National Grid

Wetland No. 125

Project: NEEWS

Flag No. Sequence: 301-316

City/Town: Burrillville

Date: Delin: 10/15/07-PL
Data: 2/14/08 -JG

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1. Betula lenta		1.	
2. Pinus strobus		2.	
3. Quercus rubra		3.	

Saplings/Shrubs	Woody Vines
1. Pinus strobus	1.
2. Kalmia latifolia	2.
3.	3.

List other vegetative species noted which may have affected determination of the wetland edge: Nyssa sylvatica

Soil: SCS Soil Survey Mapping Unit: Ridgebury Whitman + Leicester (Rf)
On Hydric Soils List? (Y/N) Yes.

Soil Profile (Note wetland flag no. nearest soil test pit): 15 paces from WF-313

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
O	+2-0"				
A	0-6"	10YR 2/1			
B	6-12"	10YR 4/4			

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Landscape position:

Altered/atypical situation? (Describe):

Comments:

Wetland Edge Delineation Data Form (Wetland)

Applicant: National Grid

Wetland No.: 124

Project: NEEWS

Flag No. Sequence: 301-311

Delin: 10/15/07 - P.L.

City/Town: Bernardsville

Date: Data 10/15/07 - P.L.

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1. Acer rubrum	FAC	1. Osmunda cinnamomea	FACW-
2. Quercus rubra	FACU	2.	
3.		3.	

Saplings/Shrubs		Woody Vines
1. Hamamelis virginiana	FAC-	1.
2. Kalmia latifolia	FACU	2.
3. Clethra alnifolia	FAC+	3.

List other vegetative species noted which may have affected determination of the wetland edge: Sphagnum sp. moss, Vaccinium corymbosum, Nyssa sylvatica

Soil: SCS Soil Survey Mapping Unit: Ridgebury, Whitman + Leicester (Rf)
On Hydric Soils List? (Y/N) Yes.

Soil Profile (Note wetland flag no. nearest soil test pit): Sp. NW (330° Mag.) fr. WF-304

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
Bw	6-15"	10YR6/2-7/2			

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):
- darkened lf. litter
- moderate degree of ≤ microtopography.

Landscape position:

Altered/atypical situation? (Describe):

Comments:

Wetland Edge Delineation Data Form (Upland)

Applicant: National Grid

Wetland No. 124 - North of

Project: NEEWS

Flag No. Sequence:

City/Town: Burrillville

Date: 10/15/07 - P.L.

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1.		1. Solidago rugosa	FAC
2.		2. Calamagrostis canadensis	FACW+
3.		3. Lycopodium obscurum	FACU
Saplings/Shrubs		**Woody Vines**	
1. Clethra alnifolia	FAC+	1. Rubus flagellaris	FACU
2. Kalmia latifolia	FACU	2. Rubus hispidus	FACW
3.		3.	

List other vegetative species noted which may have affected determination of the wetland edge: Dennstaedtia punctilobula, Gaylussacia baccata, Onoclea sensibilis, Lycopodium clavatum, Kalmia angustifolia

Soil: SCS Soil Survey Mapping Unit: Ridgebury Whitman + Leicester (Rf)

On Hydric Soils List? (Y/N) Yes.

Soil Profile (Note wetland flag no. nearest soil test pit): See comments below.

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
Bw	≤ 20"	10YR5/6-4/4	no redox (typ.)		

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.): no hydro-indicators (typ.)

Landscape position:

Altered/atypical situation? (Describe): - not fun.

Comments: General description of area to north of W124

Wetland Edge Delineation Data Form (Upland)

Applicant: National Grid

Wetland No. 124

Project: NEELWS

Flag No. Sequence: 301-311

City/Town: Burrillville

Date: Delin 10/15/07 - PL
Data 2/14/08 - JG

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1. Quercus rubra	FACU	1.	
2. Fagus grandifolia	FACU	2.	
3.		3.	

Saplings/Shrubs		Woody Vines	
1. Kalmia latifolia	FACU	1.	
2. Clethra alnifolia	FAC+	2.	
3.		3.	

List other vegetative species noted which may have affected determination of the wetland edge:
Quercus alba

Soil: SCS Soil Survey Mapping Unit: Ridgebury Whitman + Leicester (Rf)
On Hydric Soils List? (Y/N) Yes.

Soil Profile (Note wetland flag no. nearest soil test pit): 15 p. from WF-306

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
O	+2-0"				
A	0-8"	10YR 2/1			
B	8-15+"	10YR 4/2			

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Landscape position:

Altered/atypical situation? (Describe):

Comments:

Wetland Edge Delineation Data Form (Wetland)

Applicant: National Grid

Wetland No.: 124

Project: NEEWS

Flag No. Sequence: 301-311

City/Town: Burrillville

Date: Delin: 10/15/07 - P. Lakewood
Data: 2/14/08 - J. Gass

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1. Acer rubrum	FAC	1.	
2. Quercus rubra	FACU	2.	
3. Nyssa sylvatica	FAC	3.	

Saplings/Shrubs		Woody Vines
1. Hamamelis virginiana	FAC-	1.
2. Kalmia latefolia	FACU	2.
3. Clethra alnifolia	FAC+	3.

List other vegetative species noted which may have affected determination of the wetland edge:

Soil: SCS Soil Survey Mapping Unit: Ridgebury Whitman + Leicester (Rf)
On Hydric Soils List? (Y/N) Yes

Soil Profile (Note wetland flag no. nearest soil test pit): 15p. S. (170° Mag.) fr. WF-306

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
	0-8"	10YR2/2			
	8-15"	10YR3/2	"light"		

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.): - Drainage patterns in Ψ - Some areas of standing water
- Water-stained leaves

Landscape position: - Receives seasonal flow

Altered/atypical situation? (Describe):

Comments:

Wetland Edge Delineation Data Form (WETLAND)

Applicant: National Grid

Wetland No. WOSPR0002

Project: RI IRP

Flag No. Sequence: 300 - 320

City/Town: Burrillville

Date: 4/28/2011

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree	Indicator Status	Herbs	Indicator Status
1.		1. Spiraea tomentosa	FACW
2.		2. Scirpus cyperinus	FACW
3.		3. Solidago sigantea	FACW
Saplings/Shrubs		**Woody Vines**	
1. Cuthra alnifolia	FACW	1.	
2. Rosa multiflora	FACU	2.	
3.		3.	

List other vegetative species noted which may have affected determination of the wetland edge: Onoclea sensibilis.

Soil: SCS Soil Survey Mapping Unit: RF - Ridgebury, Whitman & Leicester

On Hydric Soils List? (Y/N) _____

Soil Profile (Note wetland flag no. nearest soil test pit): _____

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
	0-2"	10YR 3/2			
	2-4"	2.5Y 5/2	5Y 6/8		
	4-18+"	2.5Y 4/2			

Other hydrological indicators (e.g. water marks, drainage patterns, root rhizospheres, etc.; see Appendix 4(A)(4) of the Rules):

Landscape position:

Altered/atypical situation? (describe)

Comments:

Wetland Edge Delineation Data Form (UPLAND)

Applicant: National Grid

Wetland No. WO5PR002

Project: RI IRP

Flag No. Sequence: 300-320

City/Town: Burrillville

Date: 4/28/2011

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree	Indicator Status
1.	
2.	
3.	

Herbs	Indicator Status
1. Pteridium aquilinum	FACU
2. Onoclea sensibilis	FACW
3.	

Saplings/Shrubs	
1. Rubus allegheniensis	FACU
2. Viburnum recognitum	FACW
3. Clethra alnifolia	FACW

Woody Vines
1.
2.
3.

List other vegetative species noted which may have affected determination of the wetland edge: _____.

Soil: SCS Soil Survey Mapping Unit: RF- Ridgebury, Whitman & Leicester
On Hydric Soils List? (Y/N) _____

Soil Profile (Note wetland flag no. nearest soil test pit): _____

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
A	0-6"	10YR 4/2			
B	6-16"	10YR 6/6			

Other indicators exhibiting an absence of wetland hydrology (e.g. absence of water marks, lack of redoximorphic features, lack of oxidized rhizospheres, etc.): _____

Landscape position: _____

Altered/atypical situation? (describe) _____

Comments: _____

Wetland Edge Delineation Data Form (Wetland)

Applicant: National Grid

Wetland No.: 123

Project: NEEWS

Flag No. Sequence: 301-343

City/Town: Burrillville

Date: Delin 9/6/07 } P.L.
Data 10/15/07 }

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1. Acer rubrum	FAC	1. Osmunda cinnamomea	FACW-
2. Quercus rubra	FACU	2. Thelypteris noveboracensis	FAC
3. Quercus alba	FACU	3.	

Saplings/Shrubs		Woody Vines	
1. Hamamelis virginiana	FAC-	1. Smilax rotundifolia	FAC
2. Vaccinium corymbosum	FACW-	2.	
3. Ilex verticillata	FACW+	3.	

List other vegetative species noted which may have affected determination of the wetland edge:
Nyssa sylvatica, Clethra alnifolia, Sphagnum sp. moss.

Soil: SCS Soil Survey Mapping Unit: Ridgebury Whitman + Leicester (Rf)
On Hydric Soils List? (Y/N) YES

Soil Profile (Note wetland flag no. nearest soil test pit): 7 paces NE (30° Mag.) fr. WF-342

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
	0-4"	10YR3/2			
	4-10+	2.5Y6/2	7.5YR5/6 few, med.		

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Landscape position: Very stony - Rf inclusion in MWD landscape setting.

Altered/atypical situation? (Describe):

Comments:

Wetland Edge Delineation Data Form (Wetland)

Applicant: National Grid

Wetland No.: 123

Project: NELWS

Flag No. Sequence: 301-343

City/Town: Burrillville

Date: Delin 9/6/07 } P.L.
Data 10/15/07 }

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1.		1. Solidago rugosa	FAC
2.		2. Euthamia graminifolia	FAC
3.		3. Agrostis sp.	

Saplings/Shrubs		Woody Vines	
1. Clethra alnifolia	FAC+	1. Rubus hispidus	FACW
2. Spiraea tomentosa	FACW	2.	
3.		3.	

List other vegetative species noted which may have affected determination of the wetland edge:
Thelypteris palustris, Lycopus americana

Soil: SCS Soil Survey Mapping Unit: Ridgebury Whitman + Leicester (Rf)
On Hydric Soils List? (Y/N) Yes

Soil Profile (Note wetland flag no. nearest soil test pit): 6 paces from 123-334

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
Oe	+4-0"	10YR 3/3			
A	0-3"	10YR 2/1	high OM		
A/Bg	3-5"	10YR 2/1	and 10YR 6/1		

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Landscape position:

Altered/atypical situation? (Describe):

Comments: Very stony.

Wetland Edge Delineation Data Form (Wetland)

Applicant: National Grid

Wetland No.: 123

Project: NEEWS

Flag No. Sequence: 301-343

City/Town: Bumlville

Date: Delineation 9/6/07 – PL
Data Forms 2/14/08 – JG

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1.		1. Onoclea sensibilis	FACW
2.		2. Calamagrostis canadensis	FACW+
3.		3.	

Saplings/Shrubs		Woody Vines	
1. Clethra alnifolia	FAC+	1. Rubus hispidus	FACW
2. Spiraea tomentosa	FACW	2.	
3.		3.	

List other vegetative species noted which may have affected determination of the wetland edge:
Sphagnum sp. moss
Sapl. - Acer rubrum, Pinus strobus

Soil: SCS Soil Survey Mapping Unit: Ridgebury Whitman + Leicester (RF)
On Hydric Soils List? (Y/N) Yes.

Soil Profile (Note wetland flag no. nearest soil test pit): 15p. SE (140° Mag.) fr. WF-333

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
A	0-8"	10YR 2/1		surface	+4-6"
B	8-12"	10YR 4/1			

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):
4-6" of standing water – 2/14/08

Landscape position:

Altered/atypical situation? (Describe):

Comments:

Wetland Edge Delineation Data Form (Upland)

Applicant: National Grid

Wetland No. 123

Project: NEEWS

Flag No. Sequence: 301-343

City/Town: Bernardsville

Date: Delin 9/6/07 } P.L.
Data 10/15/07 }

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1.		1. Pteridium aquilinum	FACU
2.		2.	
3.		3.	

Saplings/Shrubs		Woody Vines	
1. Clethra alnifolia	FAC+	1. Mikania scandens	FACW+
2. Rubus allegheniensis	FACU	2.	
3. Viburnum recognitum	FACW-	3.	

List other vegetative species noted which may have affected determination of the wetland edge:
Quercus sp. seedlings

Soil: SCS Soil Survey Mapping Unit: Woodbridge (WoB)
On Hydric Soils List? (Y/N) No - MWD w/ inclusions...

Soil Profile (Note wetland flag no. nearest soil test pit): 5 paces W (270° Mag.) fr. WF-335

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
Ap	0-4"	10YR4/2			
Bw	4-14"	10YR6/6	---4/4 no redox		

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Landscape position:

Altered/atypical situation? (Describe):

Comments: gradual reduction in chroma w/ depth.

Wetland Edge Delineation Data Form (Upland)

Applicant: National Grid

Wetland No. 123

Project: NEEWS

Flag No. Sequence: 301-343

City/Town: Burrillville

Date: Delin 9/6/07, Data 10/15/07 } P.L.

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1. Betula lenta	FACU	1. Osmunda cinnamomea	FACW-
2. Acer rubrum	FAC	2.	
3. Quercus alba	FACU	3.	

Saplings/Shrubs		Woody Vines
1. Clethra alnifolia	FAC+	1.
2. Hamamelis virginiana	FAC-	2.
3. Thelypteris noveboracensis	FAC	3.

List other vegetative species noted which may have affected determination of the wetland edge:
Aralia nudicaulis, Kalmia latifolia

Soil: SCS Soil Survey Mapping Unit: Woodbridge (WoB)
On Hydric Soils List? (Y/N) No (MWD w/ inclusions)

Soil Profile (Note wetland flag no. nearest soil test pit): 10p. W(280°Mag) fr. WF341

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
	0-4"	10YR 3/2			
	4-8"	10YR 4/3-4/4	no redox		
	8-10"	— — —	refusal (stones		

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Landscape position:

Altered/atypical situation? (Describe):

Comments:

Wetland Edge Delineation Data Form (Upland)

Applicant: National Grid

Wetland No. 123

Project: NEEWS

Flag No. Sequence: 301-343

City/Town: Burrillville

Date: Delin 9/6/07 – P.L. Data 2/14/08 – J.G.

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1.		1. Solidago	
2.		2. Dennstaedtia punctilobula	NL
3.		3.	

Saplings/Shrubs		Woody Vines
1. Clethra alnifolia	FAC+	1.
2. Rubus allegheniensis	FACU	2.
3.		3.

List other vegetative species noted which may have affected determination of the wetland edge: Polytrichem sp. moss

Soil: SCS Soil Survey Mapping Unit: Woodbridge (WoB)

On Hydric Soils List? (Y/N) No (MWD w/ inclusions)

Soil Profile (Note wetland flag no. nearest soil test pit): 15 paces from 333

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Landscape position:

Altered/atypical situation? (Describe):

Comments: very stony.

Wetland Edge Delineation Data Form (Upland)

Applicant: National Grid

Wetland No. 123

Project: NEEWS

Flag No. Sequence: 301-343

City/Town: Bumlville

Date: Delin 9/6/07 - P.L.
Data 2/14/08 - J.G.

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1. Quercus alba		1.	
2. Pinus strobus		2.	
3. Acer rubrum		3.	

Saplings/Shrubs	Woody Vines
1. Pinus strobus	1.
2. Clethra alnifolia	2.
3. Hamamelis virginiana	3.

List other vegetative species noted which may have affected determination of the wetland edge:

Soil: SCS Soil Survey Mapping Unit: _____
On Hydric Soils List? (Y/N) _____

Soil Profile (Note wetland flag no. nearest soil test pit): 15 paces fr. WF-313

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
O	+4-0"	10YR2/1			
A	0-8"	10YR 4/4			

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Landscape position:

Altered/atypical situation? (Describe):

Comments:

Wetland Edge Delineation Data Form (Wetland)

Applicant: National Grid

Wetland No.: 123

Project: NEEWS

Flag No. Sequence: 301-343

City/Town: Burrillville

Date: Delin 9/6/07
Data 2/14/08

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1. Acer rubrum	FAC	1.	
2.		2.	
3.		3.	

Saplings/Shrubs		Woody Vines
1. Acer rubrum	FAC	1.
2. Rhodo. viscosum	OBL	2.
3. Ilex verticillata	FACW+	3.

List other vegetative species noted which may have affected determination of the wetland edge:

Soil: SCS Soil Survey Mapping Unit: Ridgebury Whitman + Leicester (Rf)
On Hydric Soils List? (Y/N) YES.

Soil Profile (Note wetland flag no. nearest soil test pit): 15 paces N (10° Mag.) fr. WF-313

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
A	0-10"	10YR2/1			+6-8"
B	10-12"	10YR4/1			

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.): Inundated, water-stained leaves.

Landscape position:

Altered/atypical situation? (Describe):

Comments:

Wetland Edge Delineation Data Form (Upland)

Applicant: National Grid

Wetland No. 122

Project: NEEWS

Flag No. Sequence: 301-319

City/Town: Burrillville

Date: Delin 9/6/07 - PL
Data 2/14/08 - JG

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1. Pinus strobus	FACU	1.	
2. Quercus alba	FACU	2.	
3. Quercus rubra	FACU	3.	
Saplings/Shrubs		**Woody Vines**	
1. Nyssa sylvatica	FAC	1.	
2. Clethra alnifolia	FAC+	2.	
3. Vaccinium corymbosum	FACW-	3.	

List other vegetative species noted which may have affected determination of the wetland edge:

Soil: SCS Soil Survey Mapping Unit: Woodbridge (WoB)
On Hydric Soils List? (Y/N) No (MWD w/ inclusions)

Soil Profile (Note wetland flag no. nearest soil test pit): 15p. fr. WF-310

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
	+2-0"				
	0-10"	10YR3/1			
	10-15"	10YR5/3			

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Landscape position:

Altered/atypical situation? (Describe):

Comments: Broad transition zone through here

Wetland Edge Delineation Data Form (Wetland)

Applicant: National Grid

Wetland No.: 122

Project: NEEWS

Flag No. Sequence: 301-319

City/Town: Burrillville

Date: Delin 9/6/07 - P.T.L.
Data 2/14/08 - J. Glass

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1. Acer rubrum	FAC	1.	
2.		2.	
3.		3.	

Saplings/Shrubs		Woody Vines
1. Acer rubrum	FAC	1.
2. Rhododendron viscosum	OBL	2.
3. Vaccinium corymbosum	FACW-	3.

List other vegetative species noted which may have affected determination of the wetland edge:
Ilex verticillata

Soil: SCS Soil Survey Mapping Unit: Ridgebury Whitman Leicester (Rf)
On Hydric Soils List? (Y/N) YES.

Soil Profile (Note wetland flag no. nearest soil test pit): 15p. SE (130° Mag.) fr. WF-310

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
O	0-24"	10YR2/2			+8-10"

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):
Inundated.

Landscape position:

Altered/atypical situation? (Describe):

Comments: Organic soil

Wetland Edge Delineation Data Form (WETLAND)

Applicant: National Grid

Wetland No. WA5PR005

Project: RI - IRP

Flag No. Sequence: 400-417

City/Town: Burrillville

Date: 4/28/2004

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree	Indicator Status	Herbs	Indicator Status
1. Acer rubrum	FAC	1.	
2. Betula populifolia	FAC	2.	
3. Quercus rubra	FACU	3.	
Saplings/Shrubs		**Woody Vines**	
1. Vaccinium corymbosum	FACW	1.	
2. Lyonia ligustrina	FACW	2.	
3. Pinus strobus	FACU	3.	

List other vegetative species noted which may have affected determination of the wetland edge: _____.

Soil: SCS Soil Survey Mapping Unit: RF - Ridgebury, Whitman & Leicester
On Hydric Soils List? (Y/N) Yes

Soil Profile (Note wetland flag no. nearest soil test pit): 416-417

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
	0-4"	10YR 2/1			
	4-6"	10YR 3/1			
	6-14"	2.5Y 3/2	10YR 5/6		

Other hydrological indicators (e.g. water marks, drainage patterns, root rhizospheres, etc.; see Appendix 4(A)(4) of the Rules):

Landscape position:

Altered/atypical situation? (describe)

Comments:

Wetland Edge Delineation Data Form (UPLAND)

Applicant: National Grid

Wetland No. W05PR005

Project: RI - IRP

Flag No. Sequence: 400 - 417

City/Town: Burrillville

Date: 4/28/2011

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree	Indicator Status	Herbs	Indicator Status
1. Quercus alba	FACU	1.	
2. Pinus strobus	FACU	2.	
3. Quercus rubra	FACU	3.	

Saplings/Shrubs		Woody Vines
1. Pinus strobus	FACU	1.
2. Vaccinium corymbosum	FACW	2.
3. Hamamelis virginiana	FAC	3.

List other vegetative species noted which may have affected determination of the wetland edge: _____.

Soil: SCS Soil Survey Mapping Unit: Rf - Ridgebury, Whitman & Leicester

On Hydric Soils List? (Y/N) _____

Soil Profile (Note wetland flag no. nearest soil test pit): 416 - 417

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
A	0-8"	10YR 4/2			
B	8-16"	10YR 4/4			

Other indicators exhibiting an absence of wetland hydrology (e.g. absence of water marks, lack of redoximorphic features, lack of oxidized rhizospheres, etc.):

Landscape position:

Altered/atypical situation? (describe)

Comments:

Wetland Edge Delineation Data Form (Wetland)

Applicant: National Grid

Wetland No.: 121

Project: NEEWS

Flag No. Sequence: 301 - 306

City/Town: Burrillville

Date: Delin 9/5/07 - Lockwood
Data 2/14/08 - J. Gass

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1. Acer rubrum	FAC	1.	
2.		2.	
3.		3.	

Saplings/Shrubs		Woody Vines
1. Clethra alnifolia	FAC+	1.
2. Hamamelis virginiana	FAC-	2.
3. Vaccinium corymbosum	FACW-	3.

List other vegetative species noted which may have affected determination of the wetland edge:
Sphagnum sp. moss, Betula lenta

Soil: SCS Soil Survey Mapping Unit: Ridgebury Whitman + Leicester (RF)
On Hydric Soils List? (Y/N) Yes.

Soil Profile (Note wetland flag no. nearest soil test pit): 10 paces N (10° Mag.) fr. WF-304

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
A	0-4"	10YR 2/1		++	++
B	4-10"	10YR 5/2			

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.): Drainage patterns in W
Water-stained leaves

Landscape position:

Altered/atypical situation? (Describe):

Comments: 2-3" standing water

Wetland Edge Delineation Data Form (Upland)

Applicant: National Grid

Wetland No. 121

Project: NEEWS

Flag No. Sequence: 301-306

City/Town: Burrillville

Date: 9/5/07 - delin (PL)
2/14/08 - data (JG)

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1. Pinus strobus	FACU	1.	
2. Quercus alba	FACU	2.	
3. Acer rubrum	FAC	3.	

Saplings/Shrubs		Woody Vines
1. Kalmia latifolia	FACU	1.
2. Hamamelis virginiana	FAC-	2.
3. Clethra alnifolia	FAC+	3.

List other vegetative species noted which may have affected determination of the wetland edge: Quercus rubra

Soil: SCS Soil Survey Mapping Unit: Canton + Charlton (CeC)
On Hydric Soils List? (Y/N) No.

Soil Profile (Note wetland flag no. nearest soil test pit): 15 paces fr. WF-304

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
A	0-8"	10YR 3/2			
B	8-15"	10YR 4/4			

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Landscape position:

Altered/atypical situation? (Describe):

Comments:

Wetland Edge Delineation Data Form (Upland)

Applicant: National Grid

Wetland No. 120

Project: NEEWS

Flag No. Sequence: 301-323

City/Town: Burrillville

Date: Delin 9/5/07 - P.L. Data 2/12/08 - J.G.

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1. Pinus strobus	FACU	1.	
2. Quercus rubra	FACU	2.	
3. Acer rubrum	FAC	3.	

Saplings/Shrubs		Woody Vines
1. Hamamelis virginiana	FAC-	1.
2. Kalmia latifolia	FACU	2.
3.		3.

List other vegetative species noted which may have affected determination of the wetland edge:
Quercus alba

Soil: SCS Soil Survey Mapping Unit: Canton + Charlton (CeC)
On Hydric Soils List? (Y/N) No

Soil Profile (Note wetland flag no. nearest soil test pit): 15 p. SW fr. WF120-320

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
O	+2-0"	7.5Y			
A	0-4"	7.5YR3/3			
B	4-15"	2.5Y 5/4			

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Landscape position:

Altered/atypical situation? (Describe):

Comments:

Wetland Edge Delineation Data Form (Wetland)

Applicant: National Grid

Wetland No.: 120

Project: NEEWS

Flag No. Sequence: 301-323

City/Town: Burrillville

Date: Delin 9/5/07 - PL
Data 2/12/08 - JG

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1. Acer rubrum	FAC	1.	
2. Betula alleghenicinsis	FAC	2.	
3.		3.	

Saplings/Shrubs		Woody Vines
1. Hamamelis virginiana	FAC-	1.
2. Clethra alnifolia	FAC+	2.
3.		3.

List other vegetative species noted which may have affected determination of the wetland edge:
Sphagnum sp. moss

Soil: SCS Soil Survey Mapping Unit: Ridgebury Whitman + Leicester (Rf)
On Hydric Soils List? (Y/N) Yes.

Soil Profile (Note wetland flag no. nearest soil test pit): 15 p. NE from WF120-320

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
A	0-8"	10YR 2/1		0"	6" +/-
B	8-12"	10YR 4/1			
	12"		refusal		

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.): Water-stained leaves

Landscape position:

Altered/atypical situation? (Describe):

Comments:

Wetland Edge Delineation Data Form (Upland)

Applicant: National Grid

Wetland No. 119

Project: NEEWS

Flag No. Sequence: 401-408

City/Town: Burrillville

Date: Delin: 9/5/07 - P.L.
Data: 2/12/08 - J.G.

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1.		1. Gaultheria procumbens	FACU
2.		2.	
3.		3.	

Saplings/Shrubs		Woody Vines
1. Clethra alnifolia	FAC+	1.
2. Pinus strobus	FACU	2.
3. Kalmia latifolia	FACU	3.

List other vegetative species noted which may have affected determination of the wetland edge: Polytrichum sp. moss, Cornus florida, Juniperus communis

Soil: SCS Soil Survey Mapping Unit: Canton + Charlton (CeC)
On Hydric Soils List? (Y/N) No.

Soil Profile (Note wetland flag no. nearest soil test pit): 15p. SW fr. WF119-401

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Landscape position:

Altered/atypical situation? (Describe): cutover area

Comments:

Wetland Edge Delineation Data Form (Wetland)

Applicant: National Grid

Wetland No.: 119

Project: NEEWS

Flag No. Sequence: 401-408

City/Town: Burrillville

Date: Delin: 9/5/07 - P.L.
Data: 2/12/08 - J.G.

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1.		1. [Lycopus]	
2.		2.	
3.		3.	

Saplings/Shrubs		Woody Vines	
1. Spiraea tomentosa	FACW	1. Rubus hispidus	FACW
2. Clethra alnifolia	FAC+	2.	
3. Spiraea latifolia	FAC+	3.	

List other vegetative species noted which may have affected determination of the wetland edge:
Kalmia angustifolia

Soil: SCS Soil Survey Mapping Unit: Canton + Charlton (CeC)
On Hydric Soils List? (Y/N) No.

Soil Profile (Note wetland flag no. nearest soil test pit): 10 paces NE fr. WF-119-401

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
	0-8"	2.5Y 4/3		0"	0"
	8-15"	5Y 6/2	concretions		

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Landscape position:

Altered/atypical situation? (Describe):

Comments:

Wetland Edge Delineation Data Form (Wetland)

Applicant: National Grid

Wetland No.: 118

Project: NEEWS

Flag No. Sequence: 401-420

City/Town: Bernardsville

Date: Delin: 9/4/07 - P. Lockwood
Data: 2/18/08 - J. Gass

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1.		1. Scirpus cyperinus	FACW+
2.		2.	
3.		3.	

Saplings/Shrubs		Woody Vines	
1. Clethra alnifolia	FAC+	1. Rubus hispidus	FACW
2. Lyonia ligustrina	FAC	2.	
3. Kalmia angustifolia	FAC	3.	

List other vegetative species noted which may have affected determination of the wetland edge: Sphagnum sp. moss, Vaccinium corymbosum, Kalmia latifolia

Soil: SCS Soil Survey Mapping Unit: Canton + Charlton (CeC)
On Hydric Soils List? (Y/N) No - see comment below

Soil Profile (Note wetland flag no. nearest soil test pit): 15 paces N. of WF 118-401

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
O	+2-0"			0"	0"
A	0-6"	2.5Y 2.5/1			
B	6-15"	7.5YR 4/1			

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.): Drainage patterns in ⩛ / Inundated

Landscape position:

Altered/atypical situation? (Describe):

Comments: Illustrated as a "wet spot" on soil survey mapping → ⩛

Wetland Edge Delineation Data Form (Upland)

Applicant: National Grid

Wetland No. 118

Project: NEELWS

Flag No. Sequence: 401-420

City/Town: Burrillville

Date: Delin: 9/4/07 - Lockwood
Data: 2/18/08 - J. Grass

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1.		1.	
2.		2.	
3.		3.	

Saplings/Shrubs		Woody Vines
1. Clethra alnifolia	FAC+	1.
2. Kalmia latifolia	FACU	2.
3. Betula lenta	FACU	3.

List other vegetative species noted which may have affected determination of the wetland edge:
Hamamelis virginiana, Pinus strobus

Soil: SCS Soil Survey Mapping Unit: Canton + Charlton (CeC)
On Hydric Soils List? (Y/N) No

Soil Profile (Note wetland flag no. nearest soil test pit): 15 p. South of WF118-401

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Landscape position:

Altered/atypical situation? (Describe): Cut over area

Comments:

Wetland Edge Delineation Data Form (Wetland)

Applicant: National Grid

Wetland No.: 117

Project: NEEWS

Flag No. Sequence: 401-423

City/Town: Burrillville

Date: Delin: 9/4/07 - P.L.
Data: 2/18/08 - J.G.

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1.		1. Onoclea sensibilis	FACW
2.		2.	
3.		3.	

Saplings/Shrubs		Woody Vines	
1. Spiraea tomentosa	FACW	1. Rubus hispidus	FACW
2. Spiraea latifolia	FAC+	2. Vitis labrusca	FACU
3. Clethra alnifolia	FAC+	3.	

List other vegetative species noted which may have affected determination of the wetland edge:
Sphagnum sp. moss

Soil: SCS Soil Survey Mapping Unit: Canton + Charlton (CeC)
On Hydric Soils List? (Y/N) No

Soil Profile (Note wetland flag no. nearest soil test pit): Sp. SW fz. 117-401

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
A	0-3"	10YR2/1		0"	0"
B	3-15"	10YR6/2	10YR4/1		

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.): Drainage patterns in ⩛, water stained leaves

Landscape position:

Altered/atypical situation? (Describe):

Comments: Shown as a wet spot (⩛) on soil survey mapping

Wetland Edge Delineation Data Form (Upland)

Applicant: National Grid

Wetland No. 117

Project: NEEWS

Flag No. Sequence: 401-423

City/Town: Burrillville

Date: Delin: 9/4/07 – P.L.
Data: 2/18/08 – J.G.

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1.		1. Pteridium aquilinum	FACU
2.		2.	
3.		3.	

Saplings/Shrubs	Woody Vines
1. Rubus allegheniensis FACU	1.
2.	2.
3.	3.

List other vegetative species noted which may have affected determination of the wetland edge:

Soil: SCS Soil Survey Mapping Unit: Canton + Charlton (CeC)
On Hydric Soils List? (Y/N) No – See note below

Soil Profile (Note wetland flag no. nearest soil test pit): 15 paces NE from WF 117-401

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Landscape position: sloping.

Altered/atypical situation? (Describe): cut-over

Comments: vicinity shown as "wet spot" on soil survey mapping

Wetland Edge Delineation Data Form (Wetland)

Applicant: National Grid

Wetland No.: 116

Project: NEEWS

Flag No. Sequence: 301-314

City/Town: Burrillville

Date: Delin 9/4/07 - P.L. Data 2/12/08 - J.G.

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1.		1.	
2.		2.	
3.		3.	

Saplings/Shrubs		Woody Vines
1. Betula populifolia	FAC	1.
2. Acer rubrum	FAC	2.
3. Clethra alnifolia	FAC+	3.

List other vegetative species noted which may have affected determination of the wetland edge: Sphagnum sp. moss, Betula lenta, Rhododendron viscosum,

Soil: SCS Soil Survey Mapping Unit: Ridgebury Whitman Leicester (Rf)

On Hydric Soils List? (Y/N) Yes.

Soil Profile (Note wetland flag no. nearest soil test pit): South from WF 309

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
O	+2-0"			0"	0"
A	0-12"	2.5Y/2.5/1			
B	12-15"	10YR 4/1			

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.): Drainage patterns in WF

Landscape position:

Altered/atypical situation? (Describe):

Comments:

Wetland Edge Delineation Data Form (Upland)

Applicant: National Grid

Wetland No. 116

Project: NEEWS

Flag No. Sequence: 301-314

City/Town: Bumlville

Date: Delin. 9/4/07 - P. Lakewood
Data 2/12/08 - J. Gass

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1. Acer rubrum	FAC	1.	
2. Quercus alba	FACU	2.	
3. Tsuga canadensis	FACU	3.	

Saplings/Shrubs		Woody Vines
1. Pinus strobus	FACU	1.
2. Hamamelis virginiana	FAC-	2.
3. Clethra alnifolia	FAC+	3.

List other vegetative species noted which may have affected determination of the wetland edge:
Quercus rubra

Soil: SCS Soil Survey Mapping Unit: Canton + Charlton (CeC).
On Hydric Soils List? (Y/N) No.

Soil Profile (Note wetland flag no. nearest soil test pit): 15 p. N. from WF-309

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
A	0-8"	10YR3/2			
B	8-15"	10YR5/8			

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Landscape position:

Altered/atypical situation? (Describe):

Comments:

Wetland Edge Delineation Data Form (Wetland)

Applicant: National Grid

Wetland No.: 115

Project: NEEWS

Flag No. Sequence: 301-314

City/Town: Burrillville

Date: Delin: 9/4/07 - P.L.
Data: 2/12/08 - J.G.

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1. Acer rubrum	FAC	1.	
2. Quercus rubra	FACU	2.	
3. Betula lenta	FACU	3.	

Saplings/Shrubs		Woody Vines
1. Clethra alnifolia	FAC+	1.
2. Vaccinium corymbosum	FACW-	2.
3. Ilex verticillata	FACW+	3.

List other vegetative species noted which may have affected determination of the wetland edge: Sphagnum sp. moss, Hamamelis virginiana

Soil: SCS Soil Survey Mapping Unit: Ridgebury Whitman Leicester (RF)
On Hydric Soils List? (Y/N) Yes!

Soil Profile (Note wetland flag no. nearest soil test pit): 15p. W. fr. WF-309

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
O	+3-0"			0"	0"
A	0-8"	10YR 2/1			
B	8-12"	10YR 4/1			

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.): Drainage patterns in WL

Landscape position:

Altered/atypical situation? (Describe):

Comments:

Wetland Edge Delineation Data Form (Upland)

Applicant: National Grid

Wetland No. 115

Project: NEEWS

Flag No. Sequence: 301-314

City/Town: Burrillville

Date: Delin: 9/4/07 - R.L.
Data: 2/12/08 - J.G.

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status
1. Quercus alba	FACU
2. Quercus rubra	FACU
3. Pinus strobus	FACU

Herbs:	Indicator Status
1. Gaultheria procumbens	FACU
2. Mitchella repens	FACU
3. Lycopodium obscurum	FACU

Saplings/Shrubs	
1. Clethra alnifolia	FAC+
2. Hamamelis virginiana	FAC-
3.	

Woody Vines
1.
2.
3.

List other vegetative species noted which may have affected determination of the wetland edge:

Soil: SCS Soil Survey Mapping Unit: Canton + Charlton (CeC)
On Hydric Soils List? (Y/N) No.

Soil Profile (Note wetland flag no. nearest soil test pit): 15 p. due E of WF-305

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
O	+3-0"				
A	0-6"	10YR3/1			
B	6-15"	10YR5/8			

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Landscape position:

Altered/atypical situation? (Describe):

Comments:

Wetland Edge Delineation Data Form (Wetland)

Applicant: National Grid

Wetland No.: 114

Project: NEEWS

Flag No. Sequence: 307-326

City/Town: Burrillville

Date: Delin: 8/28/07 - Lockwood
Data: 2/12/08 - J. Gass

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1.		1.	
2.		2.	
3.		3.	

Saplings/Shrubs
1. Clethra alnifolia FAC+
2. Kalmia latifolia FACU
3. Kalmia angustifolia FAC

Woody Vines
1. Rubus hispidus
2.
3.

List other vegetative species noted which may have affected determination of the wetland edge: Sphagnum sp. moss

Soil: SCS Soil Survey Mapping Unit: Ridgebury Whitman + Leicester (RF)
On Hydric Soils List? (Y/N) yes.

Soil Profile (Note wetland flag no. nearest soil test pit): 15p. East (approx.) fr. WF-324.

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
O	+3-0"				
A	0-6"	10YR3/1			
B	6-15"	10YR6/2	2.5Y4/1		

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.): B horiz: "strongly mottled"

Landscape position:

Altered/atypical situation? (Describe):

Comments:

Wetland Edge Delineation Data Form (Wetland)

Applicant: National Grid

Wetland No.: 114

Project: NEEWS

Flag No. Sequence: 301-307

City/Town: Burrillville

Date: Delin.: 8/28/07 - Lockwood
Data.: 2/12/08 - J. Gass.

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1. Quercus rubra	FACU	1. Osmunda cinnamomea	FACW
2. Tsuga canadensis	FACU	2. Coptis trifolia	FACW
3. Acer rubrum	FAC	3. Lycopodium obscurum	FACU

Saplings/Shrubs		Woody Vines
1. Tsuga canadensis	FACU	1.
2. Vaccinium corymbosum	FACW-	2.
3. Clethra alnifolia	FAC+	3.

List other vegetative species noted which may have affected determination of the wetland edge:

Soil: SCS Soil Survey Mapping Unit: Ridgebury Whitman + Leicester (Rf)
On Hydric Soils List? (Y/N) yes.

Soil Profile (Note wetland flag no. nearest soil test pit): Approx. West fr. WF-305

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
O	+6-0"	10YR 2/1			
A	0-12"	2.5Y 2.5/1		3"	6" +/-
B	12-15"	10YR 4/2			

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.): fibrous organic material 0-8"
H_2O stained leaves

Landscape position: drainage patterns in

Altered/atypical situation? (Describe):

Comments:

Wetland Edge Delineation Data Form (Upland)

Applicant: National Grid

Wetland No. 114

Project: NEENS

Flag No. Sequence: 307-326

City/Town: Burrillville

Date: Delin: - Lockwood 8/28/07
Data - J. Gass 2/12/08

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1.		1. Pteridium aquilinum	FACU
2.		2. Solidago spp.	–
3.		3.	

Saplings/Shrubs		Woody Vines
1. Quercus sp.	(FACU)	1.
2. Betula populifolia	FAC	2.
3. Clethra alnifolia	FAC+	3.

List other vegetative species noted which may have affected determination of the wetland edge:
Rubus allegheniensis, Kalmia latifolia

Soil: SCS Soil Survey Mapping Unit: Canton & Charlton fsl (CeC)
On Hydric Soils List? (Y/N) No.

Soil Profile (Note wetland flag no. nearest soil test pit): 15 p. W (approx.) fr. WF-324

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Landscape position: Slope

Altered/atypical situation? (Describe):

Comments: cutover area

Wetland Edge Delineation Data Form (Upland)

Applicant: National Grid

Wetland No. 114

Project: NEEWS

Flag No. Sequence: 301-307

City/Town: Burrillville

Date: Delin: 8/28/07 - Lockwood
Data: 2/12/08 - J. Grass

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1. Quercus rubra	FACU	1.	
2. Acer rubrum	FAC	2.	
3. Pinus strobus	FACU	3.	

Saplings/Shrubs	Woody Vines
1. Hamamelis virginiana FAC-	1.
2. Kalmia latifolia FACU	2.
3. Clethra alnifolia FAC+	3.

List other vegetative species noted which may have affected determination of the wetland edge:
Tsuga canadensis (sapl.)

Soil: SCS Soil Survey Mapping Unit: Canton + Charlton VS fsl (ChC)
On Hydric Soils List? (Y/N) No

Soil Profile (Note wetland flag no. nearest soil test pit): 15 p. East (approx.) fr. 114 (sic.)

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
O	+2-0"				
A	0-8"	2.5Y 3/1			
B	8-15"	7.5YR 5/6			

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Landscape position:

Altered/atypical situation? (Describe):

Comments:

Wetland Edge Delineation Data Form (Wetland)

Applicant: National Grid

Wetland No.: 113

Project: NEEWS

Flag No. Sequence: 401-407

City/Town: Burrillville

Date: Delin: 8/27/07 - P. Lockwood
Data: 2/11/08 - J. Gass

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1.		1. Scirpus cyperinus	FACW+
2.		2. Carex [stricta]	[OBL]
3.		3. Onoclea sensibilis	FACW

Saplings/Shrubs		Woody Vines
1. Kalmia angustifolia	FAC	1.
2. Spiraea tomentosa	FACW	2.
3. Cornus sp.	–	3.

List other vegetative species noted which may have affected determination of the wetland edge:

Soil: SCS Soil Survey Mapping Unit: Canton + Charlton (CeC)
On Hydric Soils List? (Y/N) No

Soil Profile (Note wetland flag no. nearest soil test pit): 15 p. S. (190°) fr. WF-401

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
A	0-4"	10YR 4/2			
B	4-15"	10YR 6/6			

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.): plot area inundated 2/11/08
oxidized rhizospheres <12"

Landscape position:

Altered/atypical situation? (Describe): Cut over Area (powerline ROW)

Comments: Soil is marginal - some redox features <12"

Wetland Edge Delineation Data Form (Upland)

Applicant: National Grid

Wetland No. 113

Project: NEEWS

Flag No. Sequence: 401-407

City/Town: Burrillville

Date: Delin: 8/27/07 - Lockwood
Data: 2/11/08 - J. Gass

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1.		1. Solidago spp.	—
2.		2. Pteridium aquilinum	FACU
3.		3.	

Saplings/Shrubs		Woody Vines
1. Rubus allegheniensis	FACU	1.
2. Kalmia latifolia	FACU	2.
3.		3.

List other vegetative species noted which may have affected determination of the wetland edge:

Soil: SCS Soil Survey Mapping Unit: Canton + Charlton (CeC)
On Hydric Soils List? (Y/N) No

Soil Profile (Note wetland flag no. nearest soil test pit): 15 p. fr. WF-401

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Landscape position:

Altered/atypical situation? (Describe):

Comments:

Wetland Edge Delineation Data Form (Wetland)

Applicant: National Grid

Wetland No.: 112

Project: NEEWS

Flag No. Sequence: 301 - 306

City/Town: Burrillville

Date: Delin: 8/24/07 - P.L.
Data: 2/11/08 - J. Grass

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1. Acer rubrum	FAC	1.	
2. Quercus alba	FACU	2.	
3. Betula populifolia	FAC	3.	
Saplings/Shrubs		**Woody Vines**	
1. Acer rubrum	FAC	1.	
2. Kalmia angustifolia	FAC	2.	
3. Ilex verticillata	FACW+	3.	

List other vegetative species noted which may have affected determination of the wetland edge:
Vaccinium corymbosum

Thelypteris palustris (P.L. 8/24/07)

Soil: SCS Soil Survey Mapping Unit: Hinckley (HkC) w/ nearby OW unit
On Hydric Soils List? (Y/N) (No)

Soil Profile (Note wetland flag no. nearest soil test pit): SW (230°) from WF-302

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.): flooded at time of data collection

Landscape position:

Altered/atypical situation? (Describe):

Comments: water marks on trees - Aug. 07

Wetland Edge Delineation Data Form (Upland)

Applicant: National Grid

Wetland No. 112

Project: NEEWS

Flag No. Sequence: 301-306

City/Town: Burrillville

Date: Delin: 8/24/07 - PL
Data: 2/11/08 - JGass

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1. Quercus rubra	FACU	1.	
2. Pinus rigida	FACU	2.	
3. Quercus alba	FACU	3.	
Saplings/Shrubs		**Woody Vines**	
1. Pinus strobus	FAC	1.	
2.		2.	
3.		3.	

List other vegetative species noted which may have affected determination of the wetland edge:

Soil: SCS Soil Survey Mapping Unit: HKC - Hinckley

On Hydric Soils List? (Y/N) No

Soil Profile (Note wetland flag no. nearest soil test pit): 15 paces fr. WF-302

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
O	+1-0"	organic, fibrous			
A	0-8"	10YR 4/2			
B	8-15"	10YR 4/6			

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Landscape position:

Altered/atypical situation? (Describe):

Comments:

Wetland Edge Delineation Data Form (Wetland)

Applicant: Natural Gas Wetland No.: 111

Project: NEEWS Flag No. Sequence: 301 - 310

City/Town: Burrillville Date: Delin: 8/22/07 - P.L.
Data: 2/8/08 - J. Gass

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1.		1. Onoclea sensibilis	FACW
2.		2.	
3.		3.	

Saplings/Shrubs		Woody Vines
1. Alnus sp.	OBL	1.
2. Rosa multiflora	FACU	2.
3. Cornus amomum	FACW	3.

List other vegetative species noted which may have affected determination of the wetland edge:
Pinus strobus (sapl.), Fraxinus sp., Athyrium filix-femina, Vaccinium corymbosum, Lycopus sp., Viburnum recognitum, Sphagnum sp. moss

Soil: SCS Soil Survey Mapping Unit: Woodbridge (WhB)
On Hydric Soils List? (Y/N) No (MWD w/ inclusions)

Soil Profile (Note wetland flag no. nearest soil test pit): 10 p. S. (200°) fr. WF-304

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
Ap	0-8"	10YR 3/2		0"	
B	8-15"	10YR 5/4			12" +/-

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.): oxidized rhizospheres - 12" to 15"

Landscape position: Associated w/ watercourse S03PR060

Altered/atypical situation? (Describe):

Comments: Flags 305 to 307 in mowed, lawn-like area.

Wetland Edge Delineation Data Form (Upland)

Applicant: National Grid

Wetland No. 111

Project: NEEWS

Flag No. Sequence: 301-310

City/Town: Burrillville

Date: Delin: 8/22/07 - P.L.
Data: 2/8/08 - J. Gass

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1. Pinus virgicla	FACU	1. Unid. Grass sp.	—
2. Pinus strobus	FACU	2.	
3.		3.	

Saplings/Shrubs		Woody Vines
1. Pinus strobus	FACU	1.
2.		2.
3.		3.

List other vegetative species noted which may have affected determination of the wetland edge:

Soil: SCS Soil Survey Mapping Unit: Woodbridge (WhB)
On Hydric Soils List? (Y/N) NO (MWD w/ inclusions)

Soil Profile (Note wetland flag no. nearest soil test pit): 15 p. fr. WF-304

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Landscape position:

Altered/atypical situation? (Describe): maintained lawn area

Comments:

Wetland Edge Delineation Data Form (Upland)

Applicant: National Grid

Wetland No. 110

Project: NEEWS

Flag No. Sequence: 305-313

City/Town: Burrillville

Date: Delin: 8/22/07 P.L.
Data: 2/8/08 - J.Gass

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1. Pinus strobus	FACU	1. Lycopodium obscurum	FACU
2.		2.	
3.		3.	

Saplings/Shrubs		Woody Vines
1. Acer rubrum	FAC	1.
2. Kalmia latifolia	FACU	2.
3.		3.

List other vegetative species noted which may have affected determination of the wetland edge:

Soil: SCS Soil Survey Mapping Unit: Walpole (Wa)
On Hydric Soils List? (Y/N) YES (PD)

Soil Profile (Note wetland flag no. nearest soil test pit): upslope fr. WF-308

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Landscape position:

Altered/atypical situation? (Describe):

Comments:

Wetland Edge Delineation Data Form (Upland)

Applicant: National Grid

Wetland No. 110

Project: NEEWS

Flag No. Sequence: 400 Series

City/Town: Burrillville

Date: Delin: 8/22/07 - RL.
Data: 2/8/08 - JG.

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1. Pinus strobus	FACU	1.	
2. Prunus serotina	FACU	2.	
3. Acer rubrum	FAC	3.	
Saplings/Shrubs		**Woody Vines**	
1. Pinus strobus	FACU	1.	
2.		2.	
3.		3.	

List other vegetative species noted which may have affected determination of the wetland edge: Juniperus virginiana, Carpinus caroliniana, Quercus alba,

Soil: SCS Soil Survey Mapping Unit: Woodbridge fsl (WhB)
On Hydric Soils List? (Y/N) NO (MWD w/ inclusions)

Soil Profile (Note wetland flag no. nearest soil test pit): 15 paces off of 409

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Landscape position:

Altered/atypical situation? (Describe):

Comments:

Wetland Edge Delineation Data Form (Upland)

Applicant: National Grid

Wetland No. 110

Project: NEEWS

Flag No. Sequence: 213-231

City/Town: Burrillville

Date: Delin: 8/27/07 - P.L.
Data: 2/11/08 - J. Gass

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1.		1.	
2.		2.	
3.		3.	

Saplings/Shrubs		Woody Vines
1. Kalmia angustifolia	FAC	1.
2. Comptonia peregrina	NL	2.
3. [Rumex sp.]		3.

List other vegetative species noted which may have affected determination of the wetland edge:
Polystichum sp. moss

Soil: SCS Soil Survey Mapping Unit: Hinckley (HkC)
On Hydric Soils List? (Y/N) No

Soil Profile (Note wetland flag no. nearest soil test pit): 15 p. fl. WF-228

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
O	+2-0"	10YR 3/3			
A	0-12"	10YR 5/6			

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Landscape position:

Altered/atypical situation? (Describe):

Comments:

Cutover Area

Wetland Edge Delineation Data Form (Upland)

Applicant: National Grid

Wetland No. 110

Project: NEEWS

Flag No. Sequence: 201-213

City/Town: Burrillville

Date: Delin 8/27/07 - P.L
Data 2/11/08 - J.Gass

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1. Quercus alba	FACU	1. Lycopodium complanatum	FACU-
2. Quercus rubra	FACU	2. Gaultheria procumbens	FACU
3. Pinus rigida	FACU	3. Lycopodium obscurum	FACU

Saplings/Shrubs		Woody Vines
1. Gaylussacia baccata	FACU	1.
2. Pinus strobus	FACU	2.
3.		3.

List other vegetative species noted which may have affected determination of the wetland edge:

Soil: SCS Soil Survey Mapping Unit: Hinckley (HkC)
On Hydric Soils List? (Y/N) No

Soil Profile (Note wetland flag no. nearest soil test pit):

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Landscape position:

Altered/atypical situation? (Describe):

Comments:

Wetland Edge Delineation Data Form (Upland)

Applicant: National Grid

Wetland No. 110

Project: NEEWS

Flag No. Sequence: 101-110

City/Town: Burrillville

Date: Delin 8/22/07 P.L. Data 2/6/08 J.G.

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1. Quercus rubra	FACU	1. Lycopodium obscurum	FACU
2. Quercus alba	FACU	2.	
3. Populus grandidentata	FACU-	3.	

Saplings/Shrubs		Woody Vines
1. Kalmia latifolia	FACU	1.
2. Pinus strobus	FACU	2.
3.		3.

List other vegetative species noted which may have affected determination of the wetland edge: Prunus serotina, Lycopodium obscurum

Soil: SCS Soil Survey Mapping Unit: Canton + Charlton (CeC)

On Hydric Soils List? (Y/N) No

Soil Profile (Note wetland flag no. nearest soil test pit): 15 p. upslope fr. WF-105

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Landscape position:

Altered/atypical situation? (Describe):

Comments:

Wetland Edge Delineation Data Form (Wetland)

Applicant: National Grid

Wetland No.: 110

Project: NEEWS

Flag No. Sequence: 101 - 110

City/Town: Burrillville

Date: Delin: 8/22/07 - Lockwood
Data: 2/8/08 - J. Gass.

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1. Tsuga canadensis	FACU	1.	
2. Acer rubrum	FAC	2.	
3. Betula alleghaniensis	FAC	3.	
Saplings/Shrubs		**Woody Vines**	
1. Carpinus caroliniana	FAC	1.	
2.		2.	
3.		3.	

List other vegetative species noted which may have affected determination of the wetland edge:
Sphagnum sp. moss

Soil: SCS Soil Survey Mapping Unit: Walpole (Wa)
On Hydric Soils List? (Y/N) Yes (PD)

Soil Profile (Note wetland flag no. nearest soil test pit): 15p. SW (240°) fr. WF-105

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
Ap	0-15"	10YR3/1		0"	0"
B	15+"	10YR5/2			

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.): Drainage patterns, H_2O stained leaves -

Landscape position:

Altered/atypical situation? (Describe):

Comments:

Wetland Edge Delineation Data Form (Wetland)

Applicant: National Grid

Wetland No.: 110

Project: NEEWS

Flag No. Sequence: 201-213

City/Town: Burrillville

Date: Delin: 8/27/07 - P.L.
Data: 2/11/08 - J. Gass

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1. Acer rubrum	FAC	1. Carex stricta	OBL
2. Pinus strobus	FACU	2. Osmunda cinnamomea	FACW
3. Tsuga canadensis	FACU	3. Symplocarpus foetidus	OBL
Saplings/Shrubs		**Woody Vines**	
1. Ilex verticillata	FACW+	1.	
2. Lyonia ligustrina	FACW	2.	
3.		3.	

List other vegetative species noted which may have affected determination of the wetland edge:
Sphagnum sp. moss

Soil: SCS Soil Survey Mapping Unit: Walpole (Wa)
On Hydric Soils List? (Y/N) Yes (PD

Soil Profile (Note wetland flag no. nearest soil test pit): Southeast (130°) fr. WF-205

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
A	0-24"	10YR2/1		0"	0"

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.): muck/histosol
water stained leaves

Landscape position:

Altered/atypical situation? (Describe):

Comments: Round Top Brook

Wetland Edge Delineation Data Form (Wetland)

Applicant: National Grid

Wetland No.: 110

Project: NEENS

Flag No. Sequence: 213-231

City/Town: Burrillville

Date: Delin: 8/27/07 - P.L.
Data: 2/11/08 - J. Gass

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1.		1. Carex stricta	OBL
2.		2. Scirpus cyperinus	FACW+
3.		3.	

Saplings/Shrubs		Woody Vines
1. Spiraea latifolia	FAC+	1.
2. Cyonia ligustrina	FACW	2.
3. Acer rubrum	FAC	3.

List other vegetative species noted which may have affected determination of the wetland edge:
Sphagnum sp. moss

Soil: SCS Soil Survey Mapping Unit: Walpole (Wa)
On Hydric Soils List? (Y/N) YES (PD)

Soil Profile (Note wetland flag no. nearest soil test pit): 15 p. NE (30°) fr. WF-228

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
A	0-8"	10YR 5/3	10YR 4/1	0"	0"
B	8-15"	10YR 3/1			

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):
Inundated 6"-8"
Organic soils 8-15"

Landscape position:

Altered/atypical situation? (Describe):

Comments:

Cutover Area

Wetland Edge Delineation Data Form (Wetland)

Applicant: National Grid

Wetland No.: 110

Project: NEEWS

Flag No. Sequence: 305 - 313

City/Town: Burrillville

Date: Delin: 8/22/07 - P. Lockwood
Data: 2/8/08 - J. Gass

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1.		1. Carex stricta	OBL
2.		2. Scirpus cyperinus	FACW+
3.		3.	

Saplings/Shrubs		Woody Vines
1. Vaccinium corymbosum	FACW-	1.
2. Clethra alnifolia	FAC+	2.
3. Ilex verticillata	FACW+	3.

List other vegetative species noted which may have affected determination of the wetland edge:

Soil: SCS Soil Survey Mapping Unit: Walpole (Wa)
On Hydric Soils List? (Y/N) YES (PD

Soil Profile (Note wetland flag no. nearest soil test pit): 15 p. South (160°) fr. WF-308

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Landscape position: Plot is within floodplain of River

Altered/atypical situation? (Describe): (many standing snags)

Comments: Plot flooded - soil sample not possible

Wetland Edge Delineation Data Form (Wetland)

Applicant: National Grid

Wetland No.: 110

Project: NEEWS

Flag No. Sequence: 400 Series

City/Town: Burrillville

Date: Delin: 8/22/07 PL
Data: 2/8/08 JG

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1.		1. Onoclea sensibilis	FACW
2.		2. Typha sp.	OBL
3.		3. Carex stricta	OBL

Saplings/Shrubs	Woody Vines
1. Spiraea tomentosa FACW	1.
2.	2.
3.	3.

List other vegetative species noted which may have affected determination of the wetland edge:
Scirpus cyperinus

Soil: SCS Soil Survey Mapping Unit: Walpole (Wa)
On Hydric Soils List? (Y/N) YES (PD)

Soil Profile (Note wetland flag no. nearest soil test pit): Sp. NW (310°) fr. WF-409

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
A	0-6"	10YR 3/1		0"	0"
B_{w1}	6-8"	2.5Y 5/3			
B_{w2}	8-12"	2.5Y 6/4	2.5Y 5/1		

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):
many concretions: 8"-12"
drainage patterns in W

Landscape position: Water stained leaves.

Altered/atypical situation? (Describe): Area is cut over

Comments: Plot is within PEM area near 400 series Upland island.

Wetland Edge Delineation Data Form (Upland)

Applicant: National Grid Wetland No. W-03-PR-109

Project: New England East-west solution. Flag No. Sequence: 101-131

City/Town: Burrillville Date: Depth: 2/8/08

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1.		1. unid. grasses	
2.		2. unid. goldenrods	
3.		3.	

Saplings/Shrubs	Woody Vines
1.	1.
2.	2.
3.	3.

List other vegetative species noted which may have affected determination of the wetland edge:

Soil: SCS Soil Survey Mapping Unit: Woodbridge FSL

On Hydric Soils List? (Y/N) No

Soil Profile (Note wetland flag no. nearest soil test pit): 119

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Landscape position: Topographic depression

Altered/atypical situation? (Describe): within maintained powerline R.O.W. Soils disturbed.

Comments: Area cutover.

Wetland Edge Delineation Data Form (Wetland)

Applicant: National Grid Wetland No.: W-03-PR-109

Project: New England East-west Solution Flag No. Sequence: 101-131

City/Town: Burrillville Date: Data: 2/8/08

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1. Acer rubrum	FAC	1.	
2. Tsuga canadensis	FACU	2.	
3.		3.	

Saplings/Shrubs	Woody Vines
1. Ilex verticillata FACW+	1.
2. Viburnum dentatum FAC	2.
3. Vaccinium corymbosum FAC	3.

List other vegetative species noted which may have affected determination of the wetland edge:

Soil: SCS Soil Survey Mapping Unit: Canton and Charlton FSL

On Hydric Soils List? (Y/N) NO

Soil Profile (Note wetland flag no. nearest soil test pit): 103

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
Ap	0-12"	10YR 3/1		Surface	Surface
B	12-15"	2.5Y 5/2	faint		

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.): Inundated, Saturated in upper 12", Drift lines, Drainage patterns in wetland, water-stained leaves.

Landscape position: Topographic depression/floodplain.

Altered/atypical situation? (Describe): No

Comments: Associated with stream 059.

Wetland Edge Delineation Data Form (Wetland)

Applicant: National Grid Wetland No.: W-03-PR-109

Project: New England East-west Solution Flag No. Sequence: 101-131

City/Town: Burrillville Date: Data: 2/8/08

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1.		1. Carex lurida	OBL
2.		2. Bidens frondosa	FACW
3.		3. Juncus effusus	FACW+

Saplings/Shrubs	Woody Vines
1.	1.
2.	2.
3.	3.

List other vegetative species noted which may have affected determination of the wetland edge:
Typha latifolia, Onoclea sensibilis

Soil: SCS Soil Survey Mapping Unit: Walpole Sandy Loam
On Hydric Soils List? (Y/N) Yes

Soil Profile (Note wetland flag no. nearest soil test pit): 119

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
O	2-0"			surface	surface
A	0-6"	10YR 3/1			
B	6-15"	2.5Y 5/2	10YR 4/1		

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.): Saturated in upper 12", Drainage patterns in wetland.

Landscape position: Topographic depression/floodplain.

Altered/atypical situation? (Describe): within maintained Powerline ROW. Area cutover.

Comments: Areas of standing water.

Wetland Edge Delineation Data Form (Upland)

Applicant: National Grid Wetland No. W-03-PR-109

Project: New England East-west Solution Flag No. Sequence: 101-131

City/Town: Burrillville Date: Date: 2/8/08

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1. Tsuga canadensis	FACU	1. Lycopodium obscurum	FACU
2. Acer rubrum	FAC	2.	
3.		3.	

Saplings/Shrubs		Woody Vines
1. Pinus strobus	FACU	1.
2.		2.
3.		3.

List other vegetative species noted which may have affected determination of the wetland edge: Quercus rubra

Soil: SCS Soil Survey Mapping Unit: Canton and Charlton FSL

On Hydric Soils List? (Y/N) NO

Soil Profile (Note wetland flag no. nearest soil test pit): 103

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
O	1-0"				
A	0-8"	10YR 3/1			
B	8-15"	10YR 4/4			

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Landscape position: Broad transitional zone.

Altered/atypical situation? (Describe): No.

Comments:

Wetland Edge Delineation Data Form (Wetland)

Applicant: National Grid

Wetland No.: W-03-PR-108

Project: New England East-west Solution

Flag No. Sequence: 301-310

City/Town: Burrillville

Date: Data: 2/7/08

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1. Acer rubrum	FAC	1.	
2.		2.	
3.		3.	

Saplings/Shrubs		Woody Vines
1. Ilex verticillata	FACW+	1.
2. Viburnum dentatum	FAC	2.
3.		3.

List other vegetative species noted which may have affected determination of the wetland edge:
Sphagnum sp., fraxinus pennsylvanica

Soil: SCS Soil Survey Mapping Unit: Canton and Charlton FSL

On Hydric Soils List? (Y/N) NO

Soil Profile (Note wetland flag no. nearest soil test pit): 309

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
Ap	0-12"	10YR3/2		Surface	surface
B	12-15"	2.5Y6/3	10YR 4/1		

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.): Inundated, saturated in upper 12"
Drainage patterns in wetland, water-stained leaves, oxidized rhizospheres.

Landscape position: topographic depression/floodplain.

Altered/atypical situation? (Describe): NO.

Comments: wetland has 3-4" of flow. Floodplain of brook/ASSF.

Wetland Edge Delineation Data Form (Upland)

Applicant: National Grid Wetland No. W-03-PR-108

Project: New England East-west Solution Flag No. Sequence: 301-310

City/Town: Burrillville Date: Data: 2/7/08

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1. Acer rubrum	FAC	1. Lycopodium obscurum	FACU
2. Pinus strobus	FACU	2.	
3.		3.	

Saplings/Shrubs	Woody Vines
1.	1.
2.	2.
3.	3.

List other vegetative species noted which may have affected determination of the wetland edge: Prunus serotina, fraxinus americana

Soil: SCS Soil Survey Mapping Unit: Canton and Charlton FSL

On Hydric Soils List? (Y/N) ND

Soil Profile (Note wetland flag no. nearest soil test pit): 309

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
Ap	0-12"	10YR 3/2			
B	12-15"	10YR 4/4			

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Landscape position: broad transitional zone.

Altered/atypical situation? (Describe): No.

Comments:

Wetland Edge Delineation Data Form (Wetland)

Applicant: National Grid — Wetland No.: W-03-PR-107

Project: New England East-west Solution — Flag No. Sequence: 301-316

City/Town: Burrillville — Date: Data: 2/7/08

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1. Acer rubrum	FAC	1. Sphagnum sp.	OBL
2.		2.	
3.		3.	

Saplings/Shrubs		Woody Vines	
1. Acer rubrum	FAC	1. Smilax glauca	FACU
2.		2.	
3.		3.	

List other vegetative species noted which may have affected determination of the wetland edge: Betula lutea, Ilex verticillata, Vaccinium corymbosum.

Soil: SCS Soil Survey Mapping Unit: Woodbridge FSL

On Hydric Soils List? (Y/N) NO

Soil Profile (Note wetland flag no. nearest soil test pit): 302

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
O	2-0"	10YR 2/1		Surface	Surface
A	0-8"	10YR 4/1			
	refusal @ 8"				

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.): Inundated, Saturated in upper 12"; Drainage patterns in wetland.

Landscape position: Topographic depression.

Altered/atypical situation? (Describe): NO, PFO @ plot

Comments: wetland/plot has 4-6" of flow.

Wetland Edge Delineation Data Form (Upland)

Applicant: National Grid Wetland No. W-03-PR-107

Project: New England East-west solution Flag No. Sequence: 301-316

City/Town: Burrillville Date: Date: 2/7/08

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1. Quercus alba	FACU-	1. Gaultheria procumbens	FACU
2.		2.	
3.		3.	

Saplings/Shrubs	Woody Vines
1. Hamamelis virginiana FAC-	1.
2.	2.
3.	3.

List other vegetative species noted which may have affected determination of the wetland edge: Quercus rubra, Lycopodium digitatum

Soil: SCS Soil Survey Mapping Unit: Canton and Charlton FSL

On Hydric Soils List? (Y/N) NO

Soil Profile (Note wetland flag no. nearest soil test pit): 302

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Landscape position: slope, upslope of wetland.

Altered/atypical situation? (Describe): NO.

Comments: Forested uplands.

Wetland Edge Delineation Data Form (Wetland)

Applicant: National Grid

Wetland No.: W-03-PR-106

Project: New England East-west solution

Flag No. Sequence: 301-368

City/Town: Burrillville

Date: Data: 2/7/08

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1. Acer rubrum	FAC	1. Sphagnum sp.	OBL
2.		2.	
3.		3.	

Saplings/Shrubs		Woody Vines
1. Pinus strobus	FACU	1.
2.		2.
3.		3.

List other vegetative species noted which may have affected determination of the wetland edge:
Osmunda cinnamomea, Ilex verticillata

Soil: SCS Soil Survey Mapping Unit: Ridgebury, Whitman and Leicester
On Hydric Soils List? (Y/N) Yes

Soil Profile (Note wetland flag no. nearest soil test pit): 352

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
O	1-0"			Surface	Surface
A	0-8"	10YR 2/1			
B	8-15"	2.5Y 5/2	10YR 4/1		

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.): saturated in upper 12", Drainage patterns in wetland, water-stained leaves.

Landscape position: Topographic depression

Altered/atypical situation? (Describe): Partially within maintained Powerline ROW.

Comments: Plot in PFO section of wetland, not altered.

Wetland Edge Delineation Data Form (Wetland)

Applicant: National Grid Wetland No.: W-03-PR-106

Project: New England East-west Solution Flag No. Sequence: 301-368

City/Town: Burrillville Date: Data: 2/7/08

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1.		1. Sphagnum sp.	OBL
2.		2. Osmunda cinnamomea	FACW
3.		3. Onoclea sens. b.12	FACW

Saplings/Shrubs		Woody Vines	
1. Clethra alnifolia	FAC+	1. Vitis labrusca	FACU
2. Spiraea tomentosa	FACW	2.	
3.		3.	

List other vegetative species noted which may have affected determination of the wetland edge: Ilex verticillata, Sambucus canadensis

Soil: SCS Soil Survey Mapping Unit: Ridgebury, Whitman and Leicester

On Hydric Soils List? (Y/N) Yes

Soil Profile (Note wetland flag no. nearest soil test pit): 308

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
A	0-6"	10YR 2/1		Surface	surface
B	6-15"	2.5Y 5/2	light		

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.): saturated in upper 12", water-stained leaves.

Landscape position: topographic depression.

Altered/atypical situation? (Describe): Partially within maintained powerline ROW.

Comments:

Wetland Edge Delineation Data Form (Wetland)

Applicant: National Grid

Wetland No.: W-03-PR-106

Project: New England East-west Solution

Flag No. Sequence: 301-368

City/Town: Burrillville

Date: Data: 2/7/08

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1. Acer rubrum	FAC	1. Sphagnum sp.	OBL
2. Fraxinus pennsylvanica	FACW	2. Osmunda cinnamomea	FACW
3.		3.	

Saplings/Shrubs	Woody Vines
1. Clethra alnifolia FAC+	1.
2. Ilex verticillata FACW+	2.
3.	3.

List other vegetative species noted which may have affected determination of the wetland edge:

Soil: SCS Soil Survey Mapping Unit: Ridgebury, Whitman and Leicester

On Hydric Soils List? (Y/N) Yes

Soil Profile (Note wetland flag no. nearest soil test pit): 320

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
A	0-8"	10YR 2/1		surface	surface
B	8-15"	2.5Y 6/2	faint		

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.): saturated in upper 12", Drainage patterns in wetland, water-stained leaves.

Landscape position: Topographic depression.

Altered/atypical situation? (Describe): wetland partially within maintained powerline ROW.

Comments: Plot in PFO section of wetland, not altered.

Wetland Edge Delineation Data Form (Upland)

Applicant: National Grid Wetland No. W-03-PR-106

Project: New England East-west solution Flag No. Sequence: 301-368

City/Town: Burrillville Date: Data: 2/7/08

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1. Prunus serotina	FACU	1.	
2.		2.	
3.		3.	

Saplings/Shrubs		Woody Vines	
1. Pinus strobus	FACU	1.	
2. Hamamelis virginiana	FAC-	2.	
3.		3.	

List other vegetative species noted which may have affected determination of the wetland edge:
Lycopodium obscurum

Soil: SCS Soil Survey Mapping Unit: Canton and Charlton FSL
On Hydric Soils List? (Y/N) NO

Soil Profile (Note wetland flag no. nearest soil test pit): 320

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
A	0-8"	10YR 3/2			
B	8-15+"	10YR 4/4			

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Landscape position: Broad, sloping transitional zone.

Altered/atypical situation? (Describe): Wetland partially within maintained Powerline ROW.

Comments: Plot not in altered area.

Wetland Edge Delineation Data Form (Upland)

Applicant: National Grid | Wetland No. W-03-PR-106

Project: New England East-west solution | Flag No. Sequence: 301-368

City/Town: Burrillville | Date: Data: 2/7/08

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1.		1.	
2.		2.	
3.		3.	

Saplings/Shrubs		Woody Vines	
1. Rubus allegheniensis	FACU-	1. Smilax glauca	FACU
2.		2. Vitis labrusca	FACU
3.		3.	

List other vegetative species noted which may have affected determination of the wetland edge: Unid. Solidago sp., Pinus strobus

Soil: SCS Soil Survey Mapping Unit: Canton and Charlton FSL

On Hydric Soils List? (Y/N) NO

Soil Profile (Note wetland flag no. nearest soil test pit): 308

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Landscape position: slope, upslope of wetland

Altered/atypical situation? (Describe): Partially within maintained powerline ROW.

Comments:

Wetland Edge Delineation Data Form (Upland)

Applicant: National Grid

Wetland No. W-03-PR-106

Project: New England East-west Solution

Flag No. Sequence: 301-368

City/Town: Burrillville

Date: Data: 2/7/08

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1. Pinus strobus	FACU	1.	
2.		2.	
3.		3.	

Saplings/Shrubs		Woody Vines
1. Pinus strobus	FACU	1.
2.		2.
3.		3.

List other vegetative species noted which may have affected determination of the wetland edge: Prunus serotina, Quercus velutina, Lycopodium obscurum

Soil: SCS Soil Survey Mapping Unit: Canton and Charlton FSL

On Hydric Soils List? (Y/N) No

Soil Profile (Note wetland flag no. nearest soil test pit): 352

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Landscape position: Slope, upslope of wetland.

Altered/atypical situation? (Describe): Partially within maintained Powerline ROW.

Comments: Plot in un-altered section.

Wetland Edge Delineation Data Form (Wetland)

Applicant: National Grid Wetland No.: W-03-PR-105

Project: New England Eastwest Solution Flag No. Sequence: 401-412

City/Town: Burrillville Date: Data: 2/7/08

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1.		1. Rubus hispidus	FACW
2.		2. Sphagnum sp.	OBL
3.		3.	

Saplings/Shrubs		Woody Vines
1. Clethra alnifolia	FAC+	1.
2.		2.
3.		3.

List other vegetative species noted which may have affected determination of the wetland edge: Scirpus cyperinus, Calamagrostis canadensis

Soil: SCS Soil Survey Mapping Unit: Woodbridge FSL

On Hydric Soils List? (Y/N) NO

Soil Profile (Note wetland flag no. nearest soil test pit): 411

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
O	2-0"			surface	surface
A	0-4"	10YR 3/1			
A	4-8"	10YR 4/1			
B	8-15"	10YR 5/2	faint		

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.): Inundated, saturated in upper 12"; Drainage patterns in wetland.

Landscape position: Topographic depression.

Altered/atypical situation? (Describe): within maintained Powerline ROW.

Comments: 4-6" of flow through wetland/plot.

Wetland Edge Delineation Data Form (Upland)

Applicant: National Grid Wetland No. W-03-PR-105

Project: New England East-west Solution Flag No. Sequence: 401-412

City/Town: Burrillville Date: Data: 2/7/08

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1.		1.	
2.		2.	
3.		3.	

Saplings/Shrubs		Woody Vines
1. Pinus strobus	FACU	1.
2. Rubus allegheniensis	FACU-	2.
3.		3.

List other vegetative species noted which may have affected determination of the wetland edge:
Comptonia peregrina, Unid. Solidago sp., Smilax glauca, Rhus sp.

Soil: SCS Soil Survey Mapping Unit: Woodbridge FSL
On Hydric Soils List? (Y/N) No

Soil Profile (Note wetland flag no. nearest soil test pit): 411

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Landscape position: slope, upslope of wetland

Altered/atypical situation? (Describe): within maintained powerline ROW.

Comments:

Wetland Edge Delineation Data Form (Wetland)

Applicant: National Grid

Wetland No.: W-03-PR-104

Project: New England East-west solution

Flag No. Sequence: 101-140, 201-223

City/Town: Burrillville

Date: Data: 2/7/08

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1. Acer rubrum	FAC	1. Sphagnum sp.	OBL.
2.		2. Rubus hispidus	FACW
3.		3.	

Saplings/Shrubs		Woody Vines
1. Ilex verticillata	FACW+	1.
2. Pinus strobus	FACU	2.
3.		3.

List other vegetative species noted which may have affected determination of the wetland edge:

Soil: SCS Soil Survey Mapping Unit: Woodbridge FSL

On Hydric Soils List? (Y/N) NO

Soil Profile (Note wetland flag no. nearest soil test pit): 121

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
O	2-0"			Surface	surface
A	0-8"	10YR 2/1			

Refusal @ 8"

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.): Inundated, Saturated in upper 12", Drainage patterns in wetland.

Landscape position: Topographic depression

Altered/atypical situation? (Describe): NO.

Comments: 2-3" of flow through plot. PFO.

Wetland Edge Delineation Data Form (Upland)

Applicant: National Grid Wetland No. W-03-PR-104

Project: New England East-west solution Flag No. Sequence: 101-140, 201-223

City/Town: Burrillville Date: Data: 2/7/08

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1. Pinus strobus	FACU	1. Gaylussacia baccata	FACU
2.		2.	
3.		3.	

Saplings/Shrubs		Woody Vines
1. Pinus strobus	FACU	1.
2.		2.
3.		3.

List other vegetative species noted which may have affected determination of the wetland edge: Carya Ovata

Soil: SCS Soil Survey Mapping Unit: Woodbridge FSL

On Hydric Soils List? (Y/N) NO

Soil Profile (Note wetland flag no. nearest soil test pit):

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
O	2-0"				
0-6"	A	10YR 2/1			
6-15"	B	10YR 4/4			

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Landscape position: topographic depression.

Altered/atypical situation? (Describe): NO.

Comments: Upland woods.

Wetland Edge Delineation Data Form (Wetland)

Applicant: National Grid
Wetland No.: W-03-PR-103

Project: New England East-west Solution
Flag No. Sequence: 301-319

City/Town: Burrillville
Date: Data: 2/4/08

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1. Acer rubrum	FAC	1. Sphagnum sp.	OBL
2.		2.	
3.		3.	

Saplings/Shrubs		Woody Vines
1. Vaccinium Corymbosum	FACW	1.
2.		2.
3.		3.

List other vegetative species noted which may have affected determination of the wetland edge:

Soil: SCS Soil Survey Mapping Unit: Woodbridge FSL
On Hydric Soils List? (Y/N) NO

Soil Profile (Note wetland flag no. nearest soil test pit): 302

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
A	0-15"	10YR2/1		Surface	surface

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.): Histosol, Inundated, saturated in upper 12"; Drainage Patterns in wetland.

Landscape position: Topographic depression

Altered/atypical situation? (Describe): NO

Comments: 6-8" of standing water; PFO

Wetland Edge Delineation Data Form (Upland)

Applicant: National Grid Wetland No. W-03-PR-103

Project: New England East-west Solution Flag No. Sequence: 301-319

City/Town: Burrillville Date: Data: 2/4/08

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1. Pinus strobus	FACU	1. Lycopodium digitatum	NL
2. Quercus alba	FACU-	2. Gaultheria procumbens	FACU
3.		3.	

Saplings/Shrubs	Woody Vines
1.	1.
2.	2.
3.	3.

List other vegetative species noted which may have affected determination of the wetland edge:

Soil: SCS Soil Survey Mapping Unit: Woodbridge FSL

On Hydric Soils List? (Y/N) NO

Soil Profile (Note wetland flag no. nearest soil test pit): 302

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Landscape position: Slope, upslope of wetland.

Altered/atypical situation? (Describe): NO

Comments: Upland woods.

Wetland Edge Delineation Data Form (Wetland)

Applicant: National Grid
Wetland No.: W-03-PR-102

Project: New England East-west solution
Flag No. Sequence: 301-316

City/Town: Burrillville
Date: Data: 2/4/08

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1. Acer rubrum	FAC	1. Osmunda cinnamomea	FACW
2.		2. Sphagnum sp.	OBL
3.		3. Coptis trifolia	FACW

Saplings/Shrubs	Woody Vines
1. Clethra alnifolia FAC+	1.
2. Vaccinium Corymbosum FACW	2.
3. Ilex verticillata FACW+	3.

List other vegetative species noted which may have affected determination of the wetland edge:
Lyonia ligustrina

Soil: SCS Soil Survey Mapping Unit: Walpole
On Hydric Soils List? (Y/N) Yes

Soil Profile (Note wetland flag no. nearest soil test pit): 311

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
O	2-0"			Surface	Surface
A	0-4"	10YR 2/1			
B	4-10"	10YR 6/2	10YR 4/1		

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.): Inundated, saturated in upper 12", Drainage Patterns in wetland, water-stained leaves.

Landscape position: Topographic depression

Altered/atypical situation? (Describe): NO

Comments: PFO

Wetland Edge Delineation Data Form (Upland)

Applicant: National Grid Wetland No. W-03-PR-102

Project: New England East-west Solution Flag No. Sequence: 301-316

City/Town: Bumiville Date: Data: 2/4/08

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1. Quercus alba	FACU-	1.	
2. Pinus Strobus	FACU	2.	
3.		3.	

Saplings/Shrubs		Woody Vines
1. Pinus Strobus	FACU	1.
2. Hamamelis Virginiana	FAC-	2.
3.		3.

List other vegetative species noted which may have affected determination of the wetland edge: Lycopodium obscurum, Gaultheria procumbens

Soil: SCS Soil Survey Mapping Unit: Hinckley Gravelly SL

On Hydric Soils List? (Y/N) NO

Soil Profile (Note wetland flag no. nearest soil test pit): 311

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Landscape position: Slope, upslope of wetland.

Altered/atypical situation? (Describe): NO

Comments: Upland woods.

Wetland Edge Delineation Data Form (Wetland)

Applicant: National Grid Wetland No.: W-03-PR-101

Project: New England East-west Solution Flag No. Sequence: 401-406

City/Town: Burrillville Date: Data: 2/4/08

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1.		1.	
2.		2.	
3.		3.	

Saplings/Shrubs		Woody Vines
1. Cornus racemosa	NL	1.
2. Lyonia ligustrina	FACW	2.
3. Vaccinium Corymbosum	FACW	3.

List other vegetative species noted which may have affected determination of the wetland edge: Spiraea tomentosa, Salix discolor

Soil: SCS Soil Survey Mapping Unit: Hinckley Gravelly SL

On Hydric Soils List? (Y/N) NO

Soil Profile (Note wetland flag no. nearest soil test pit): 404

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.): Inundated

Landscape position: Topographic depression.

Altered/atypical situation? (Describe): Within maintained Powerline ROW.

Comments: Plot/wetland B inundated/submerged under 6-8" of water, unable to collect soil data.

Wetland Edge Delineation Data Form (Upland)

Applicant: National Grid Wetland No. W-03-PR-101

Project: New England East-west Solution Flag No. Sequence: 401-406

City/Town: Burrillville Date: Data: 2/4/08

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1. Quercus velutina	NL	1. Lycopodium digitatum	NL
2.		2.	
3.		3.	

Saplings/Shrubs	Woody Vines
1. Gaylussacia baccata FACU	1.
2.	2.
3.	3.

List other vegetative species noted which may have affected determination of the wetland edge:
Quercus alba

Soil: SCS Soil Survey Mapping Unit: Hinckley Gravelly SL
On Hydric Soils List? (Y/N) NO

Soil Profile (Note wetland flag no. nearest soil test pit): 404

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Landscape position: Slope, upslope of wetland.

Altered/atypical situation? (Describe): NO.

Comments:

Wetland Edge Delineation Data Form (Wetland)

Applicant: National Grid Wetland No.: W-03-PR-100

Project: New England East-west Solution Flag No. Sequence: 101-128

City/Town: Burrillville Date: Data: 2/4/08

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status
1. Acer rubrum	FAC
2. Pinus strobus	FACU
3.	

Herbs:	Indicator Status
1. Coptis trifolia	FACW
2. Sphagnum sp.	OBL
3. Osmunda cinnamomea	FACW

Saplings/Shrubs
1.
2.
3.

Woody Vines
1.
2.
3.

List other vegetative species noted which may have affected determination of the wetland edge:
Ilex verticillata, Carpinus Caroliniana

Soil: SCS Soil Survey Mapping Unit: Walpole
On Hydric Soils List? (Y/N) yes

Soil Profile (Note wetland flag no. nearest soil test pit): 123

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
O	2-0"			Surface	+/- 12"
0-10"	A	10YR 2/1			
10-15"	B	2.5Y 5/2			

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.): Saturated in upper 12" Drainage patterns in wetland, water-stained leaves.

Landscape position: Topographic depression.

Altered/atypical situation? (Describe): NO

Comments: PFO

Wetland Edge Delineation Data Form (Wetland)

Applicant: National Grid

Wetland No.: W-03-PR-100

Project: New England East-west Solution

Flag No. Sequence: 101-128

City/Town: Burrillville

Date: Data: 2/4/08

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1.		1. Carex Stricta	OBL
2.		2. Sphagnum sp.	OBL
3.		3. Rubus hispidus	FACW

Saplings/Shrubs		Woody Vines
1. Spiraea tomentosa	FACW	1.
2. Alnus incana	NL	2.
3.		3.

List other vegetative species noted which may have affected determination of the wetland edge:
Vaccinium corymbosum, Scirpus cyperinus, Ilex verticillata

Soil: SCS Soil Survey Mapping Unit: Walpole

On Hydric Soils List? (Y/N) NO

Soil Profile (Note wetland flag no. nearest soil test pit): 110

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
O	1-0"			Surface	6-8"
A	0-6"	10YR 2/1			
B	6-15"	10YR 4/2	light		

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.): Saturated in upper 12", Drainage Patterns in wetland, water-stained leaves

Landscape position: Topographic depression

Altered/atypical situation? (Describe): within maintained Powerline ROW

Comments:

Wetland Edge Delineation Data Form (Upland)

Applicant: National Grid Wetland No. W-03-PR-100

Project: New England East-west Solution Flag No. Sequence: 101-128

City/Town: Burrillville Date: Data: 2/4/08

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1.		1. Unid. goldenrod	
2.		2.	
3.		3.	

Saplings/Shrubs		Woody Vines	
1. Rubus alleghenienSIS	UPL	1.	
2.		2.	
3.		3.	

List other vegetative species noted which may have affected determination of the wetland edge: Verbascum thapsis, Lycopodium obscurum, Pinus strobus, Bracken aquilinum, Juniperus communis.

Soil: SCS Soil Survey Mapping Unit: Canton-Charlton

On Hydric Soils List? (Y/N) NO

Soil Profile (Note wetland flag no. nearest soil test pit): 110

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Landscape position: Slope, upslope of wetland.

Altered/atypical situation? (Describe): within maintained Powerline ROW.

Comments:

Wetland Edge Delineation Data Form (Upland)

Applicant: National Grid Wetland No. W-03-PR-100

Project: New England East-west solution Flag No. Sequence: 101-128

City/Town: Burrillville Date: Data: 2/4/08

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1. Acer rubrum	FAC	1. Lycopodium digitatum	NL
2.		2. Gaultheria procumbens	FACU
3.		3.	

Saplings/Shrubs	Woody Vines
1. Hamamelis virginiana FAC-	1.
2. Pinus strobus FACU	2.
3.	3.

List other vegetative species noted which may have affected determination of the wetland edge:
Pinus strobus (tree), Quercus alba, Quercus rubra,

Soil: SCS Soil Survey Mapping Unit: Hinckley gravelly SL
On Hydric Soils List? (Y/N) NO

Soil Profile (Note wetland flag no. nearest soil test pit): 123

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Landscape position: Slope, upslope of wetland.

Altered/atypical situation? (Describe): NO

Comments: Upland woods.

Wetland Edge Delineation Data Form (Wetland)

Applicant: National Grid

Wetland No.: W-03-PR-099

Project: New England East-west Solution

Flag No. Sequence: 301-369

Data:

City/Town: Burrillville

Date: 2/4/08

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1.		1. Carex Stricta	OBL
2.		2. Sphagnum sp.	OBL
3.		3.	

Saplings/Shrubs		Woody Vines
1. Alnus incana	NI	1.
2. Lyonia ligustrina	FACW	2.
3. Chamaedaphne Calyculata	OBL	3.

List other vegetative species noted which may have affected determination of the wetland edge:
Spiraea latifolia, Chamaecyparis thyoides

Soil: SCS Soil Survey Mapping Unit: Walpole

On Hydric Soils List? (Y/N) Yes

Soil Profile (Note wetland flag no. nearest soil test pit): 338

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
A	0-8"	10YR 3/1		Surface	surface
B	8-12"	10YR 3/1	2.5Y 6/3		

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.): Inundated, Saturated within 12", drainage patterns

Landscape position: topographic depression / river floodplain

Altered/atypical situation? (Describe): within maintained powerline ROW

Comments: Beaver flow; large wetland complex associated w/ Chockalog River.

Wetland Edge Delineation Data Form (Wetland)

Applicant: National Grid

Wetland No.: W-03-PR-099

Project: New England east-west solution

Flag No. Sequence: 301-369

City/Town: Burrillville

Date: Data: 2/4/08

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1.		1. Phalaris arundinacea	FACW+
2.		2.	
3.		3.	

Saplings/Shrubs		Woody Vines
1. Alnus incana	NI	1.
2. Rosa palustris	OBL	2.
3.		3.

List other vegetative species noted which may have affected determination of the wetland edge:
Spiraea latifolia

Soil: SCS Soil Survey Mapping Unit: Walpole

On Hydric Soils List? (Y/N) Yes

Soil Profile (Note wetland flag no. nearest soil test pit): 352

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
				surface	surface

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.): Inundated

Landscape position: Topographic depression / River floodplain

Altered/atypical situation? (Describe):

Comments: Soil sample not possible; plot inundated. Large wetland complex associated with Chockalog River.

Wetland Edge Delineation Data Form (Wetland)

Applicant: National Grid

Wetland No.: W-03-PR-099

Project: New England East-west Solution

Flag No. Sequence: 301-369

City/Town: Burrillville

Date: Data: 2/4/08

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1.		1. Phragmites australis	FACW
2.		2. Carex Strata	OBL
3.		3.	

Saplings/Shrubs	Woody Vines
1. Alnus incana NI	1.
2. Cornus amomum FACW	2.
3.	3.

List other vegetative species noted which may have affected determination of the wetland edge:
Acer rubrum, Betula populifolia

Soil: SCS Soil Survey Mapping Unit: Walpole

On Hydric Soils List? (Y/N) Yes

Soil Profile (Note wetland flag no. nearest soil test pit): 214

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.): Inundated

Landscape position: Topographic depression.

Altered/atypical situation? (Describe): Within maintained powerline ROW.

Comments: Could not take soil data, wetland inundated/submerged under 6-8" of water.

Wetland Edge Delineation Data Form (Upland)

Applicant: National Grid Wetland No. W-03-PR-099

Project: New England East-west solution Flag No. Sequence: 301-369

City/Town: Burrillville Date: Data: 2/4/08

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1.		1. Verbascum Thapsus	NL
2.		2. Unid. grass	
3.		3. Rumex acetosella	UPL

Saplings/Shrubs	Woody Vines
1.	1.
2.	2.
3.	3.

List other vegetative species noted which may have affected determination of the wetland edge:
Unid. goldenrod.

Soil: SCS Soil Survey Mapping Unit: Canton-charlton
On Hydric Soils List? (Y/N) NO

Soil Profile (Note wetland flag no. nearest soil test pit):

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Landscape position: Slope, upslope of wetland.

Altered/atypical situation? (Describe): Within maintained powerline ROW

Comments:

Wetland Edge Delineation Data Form (Upland)

Applicant: National Grid Wetland No. W-03-PR-099

Project: New England East-west Solution Flag No. Sequence: 301-369

City/Town: Burrillville Date: 2/4/08 Data:

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1. Pinus strobus	FACU	1. Gaultheria procumbens	FACU
2.		2.	
3.		3.	

Saplings/Shrubs		Woody Vines
1. Quercus velutina	NL	1.
2.		2.
3.		3.

List other vegetative species noted which may have affected determination of the wetland edge:
Quercus alba, Lycopodium obscurum

Soil: SCS Soil Survey Mapping Unit: Hinckley gravelly sandy loam
On Hydric Soils List? (Y/N) NO

Soil Profile (Note wetland flag no. nearest soil test pit): 352

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Landscape position: topographic depression

Altered/atypical situation? (Describe): within maintained powerline ROW

Comments:

Wetland Edge Delineation Data Form (Upland)

Applicant: Natural Grid

Wetland No. W-03-PR-099

Project: New England East-west Solution

Flag No. Sequence: 301-369 Data:

City/Town: Burrillville

Date: 2/4/08

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1.		1. Pteridium aquilinum	FACU
2.		2. Lycopodium obscurum	FACU
3.		3.	

Saplings/Shrubs		Woody Vines
1. Kalmia angustifolia	FAC	1.
2. Comptonia peregrina	NL	2.
3.		3.

List other vegetative species noted which may have affected determination of the wetland edge:
Rubus allegheniensis

Soil: SCS Soil Survey Mapping Unit: Hinckley Gravelly Sandy Loam
On Hydric Soils List? (Y/N) NO

Soil Profile (Note wetland flag no. nearest soil test pit): 338

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
O	2-0"				
A	0-6"	10YR 4/3			
B	6-12"	10YR 4/6			

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Landscape position: topographic depression/slope

Altered/atypical situation? (Describe): cutbank maintained powerline ROW

Comments:

Wetland Edge Delineation Data Form (Wetland)

Applicant: National Grid

Wetland No.: W-03-PR-097

Project: New England East-west solution

Flag No. Sequence: 301-312

City/Town: Burrillville

Date: Data: 2/4/08

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1.		1. Carex stricta	OBL
2.		2. Lythrum salicaria	FACW+
3.		3.	

Saplings/Shrubs		Woody Vines
1. Alnus incana	NI	1.
2. Salix discolor	FACW	2.
3.		3.

List other vegetative species noted which may have affected determination of the wetland edge: Sambucus canadensis, Typha latifolia, Phalaris arundinacea, Spiraea latifolia

Soil: SCS Soil Survey Mapping Unit: Ridgebury, whitman and leicester

On Hydric Soils List? (Y/N) Yes

Soil Profile (Note wetland flag no. nearest soil test pit): 309

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
O	.5-0"			Surface	Surface
A	0-8"	10YR 4/2			
B	8-15"	10YR 3/1			

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.): Inundated, saturated within 12"; drift lines, Drainage Patterns, water-stained leaves

Landscape position: topographic depression

Altered/atypical situation? (Describe): within maintained powerline ROW

Comments: Culverted

Wetland Edge Delineation Data Form (Upland)

Applicant: National Grid Wetland No. W-03-PR-097

Project: New England East-west solution Flag No. Sequence: 301-312

City/Town: Burrillville Date: 2/4/08 Data:

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1.		1. Schizachirium scoparium	FACU-
2.		2.	
3.		3.	

Saplings/Shrubs	Woody Vines
1. Pinus strobus FACU	1.
2. Comptonia peregrina NL	2.
3. Kalmia angustifolia FAC	3.

List other vegetative species noted which may have affected determination of the wetland edge:

Soil: SCS Soil Survey Mapping Unit: Canton and Charlton

On Hydric Soils List? (Y/N) NO

Soil Profile (Note wetland flag no. nearest soil test pit): 309

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Landscape position: topographic depression/slope

Altered/atypical situation? (Describe): within maintained powerline ROW

Comments:

Wetland Edge Delineation Data Form (WETLAND)

Applicant: National Grid
Wetland No. W03PR097A

Project: RIIRP
Flag No. Sequence: 300 - 309

City/Town: Burrillville
Date: 7/12/2011

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree	Indicator Status	Herbs	Indicator Status
1. Acer rubrum	FAC	1.	
2. Quercus bicolor	FACW	2.	
3. Pinus strobus	FACU	3.	
Saplings/Shrubs		**Woody Vines**	
1. Cuthra alnifolia	FAC	1.	
2. Vaccinium corymbosum	FACW	2.	
3. Rhododendron viscosum	OBL	3.	

List other vegetative species noted which may have affected determination of the wetland edge: _____.

Soil: SCS Soil Survey Mapping Unit: RS - Ridgebury, Whitman & Leicester
On Hydric Soils List? (Y/N) Y

Soil Profile (Note wetland flag no. nearest soil test pit): 306

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
O	0 - 4"	Black Organic		Surface	Surface
Oe	4 - 20"+	Black Organic			

Other hydrological indicators (e.g. water marks, drainage patterns, root rhizospheres, etc.; see Appendix 4(A)(4) of the Rules): Inundated, Histosol

Landscape position:

Altered/atypical situation? (describe)

Comments:

Wetland Edge Delineation Data Form (UPLAND)

Applicant: National Grid

Wetland No. W03PR097A

Project: RI IRP

Flag No. Sequence: 300 - 309

City/Town: Burrillville

Date: 7/12/2011

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree	Indicator Status	Herbs	Indicator Status
1. Acer rubrum	FAC	1.	
2. Quercus rubra	FACU	2.	
3. Pinus strobus	FACU	3.	

Saplings/Shrubs		Woody Vines
1. Hamamelis virginiana	FAC	1.
2. Clethra alnifolia	FAC	2.
3. Vaccinium corymbosum	FACW	3.

List other vegetative species noted which may have affected determination of the wetland edge: _____

Soil: SCS Soil Survey Mapping Unit: RL - Ridgebury, Whitman & Leicester
On Hydric Soils List? (Y/N) yes

Soil Profile (Note wetland flag no. nearest soil test pit): 306

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
A	0 - 3"	10YR 3/3			
B	3 - 18"	10YR 4/4			

Other indicators exhibiting an absence of wetland hydrology (e.g. absence of water marks, lack of redoximorphic features, lack of oxidized rhizospheres, etc.): _____

Landscape position: _____

Altered/atypical situation? (describe) _____

Comments: _____

Wetland Edge Delineation Data Form (Wetland)

Applicant: National Grid

Wetland No.: W-03-PR-096

Project: New England East-West Solution

Flag No. Sequence: 301-350

City/Town: Burrillville

Data: Date: 2/4/08

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1. Acer rubrum	FAC	1. Phragmites australis	FACW
2.		2. Phalaris arundinacea	FACW+
3.		3. Osmunda cinnamomea	FACW

Saplings/Shrubs		Woody Vines
1. Clethra alnifolia	FAC+	1.
2. Ilex verticillata	FACW+	2.
3. Pinus strobus	FACU	3.

List other vegetative species noted which may have affected determination of the wetland edge: Spiraea tomentosa

Soil: SCS Soil Survey Mapping Unit: Walpole
On Hydric Soils List? (Y/N) Yes

Soil Profile (Note wetland flag no. nearest soil test pit): 316

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
A	0-8"	2.5Y 5/2		Surface	Surface
B	8-12"	10YR 6/2	Faint		
B	12-15"	10YR 5/2	Heavy		

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.): Inundated, saturated in upper 12 inches, Drainage patterns, water-stained leaves

Landscape position: topographic depression

Altered/atypical situation? (Describe): within maintained powerline ROW

Comments:

Wetland Edge Delineation Data Form (Upland)

Applicant: National Grid

Wetland No. W-03-PR-096

Project: New England East-west Solution

Flag No. Sequence: 301-350

City/Town: Burrillville

Date: 2/4/08 Drty:

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1. Pinus strobus	FACU	1. Lycopodium obscurum	FACU
2. Acer rubrum	FAC	2.	
3.		3.	

Saplings/Shrubs	Woody Vines
1.	1.
2.	2.
3.	3.

List other vegetative species noted which may have affected determination of the wetland edge:

Soil: SCS Soil Survey Mapping Unit: Canton FSL

On Hydric Soils List? (Y/N) No

Soil Profile (Note wetland flag no. nearest soil test pit): 316

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Landscape position: topographic depression/slope

Altered/atypical situation? (Describe): within maintained power line ROW

Comments: upland Island

Wetland Edge Delineation Data Form (WETLAND)

Applicant: National Grid

Wetland No. W03 PR099A

Project: RI - IRP

Flag No. Sequence: 400-404

City/Town: Burrillville

Date: 7/6/2011

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree	Indicator Status	Herbs	Indicator Status
1. Acer rubrum	FAC	1.	
2.		2.	
3.		3.	

Saplings/Shrubs		Woody Vines
1. Ilex verticillata	FACW	1.
2. Hamamelis virginiana	FAC	2.
3. Lythrum salicaria	FACW	3.

List other vegetative species noted which may have affected determination of the wetland edge: _____.

Soil: SCS Soil Survey Mapping Unit: Canton & Charlton FSL

On Hydric Soils List? (Y/N) No

Soil Profile (Note wetland flag no. nearest soil test pit): 404-403

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
Oe	0 - 6	Black			
	6 - 14	10YR 4/1			
	14 - 16+	10YR 2/3	10YR 4/4		

Other hydrological indicators (e.g. water marks, drainage patterns, root rhizospheres, etc.; see Appendix 4(A)(4) of the Rules): _____

Landscape position: _____

Altered/atypical situation? (describe) _____

Comments: _____

Wetland Edge Delineation Data Form (UPLAND)

Applicant: National Grid

Wetland No. W03RR099A

Project: RI - IRP

Flag No. Sequence: 400 - 404

City/Town: Burrillville

Date: 7/6/2018

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree	Indicator Status
1. Pinus strobus	FACU
2. Acer rubrum	FAC
3. Quercus rubra	FACU

Herbs	Indicator Status
1.	
2.	
3.	

Saplings/Shrubs	Woody Vines
1. Hamamelis virginiana FAC	1.
2.	2.
3.	3.

List other vegetative species noted which may have affected determination of the wetland edge: _____.

Soil: SCS Soil Survey Mapping Unit: Canton & Charlton

On Hydric Soils List? (Y/N) No

Soil Profile (Note wetland flag no. nearest soil test pit): 404 - 403

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
A	0 - 6"	10YR 2/1			
B	6 - 12"	10YR 4/3			

Other indicators exhibiting an absence of wetland hydrology (e.g. absence of water marks, lack of redoximorphic features, lack of oxidized rhizospheres, etc.): _____

Landscape position: _____

Altered/atypical situation? (describe) _____

Comments: _____

Wetland Edge Delineation Data Form (UPLAND)

Applicant: National Grid

Wetland No. W03PR098A

Project: Irrilability Project - RI

Flag No. Sequence: 300-313

City/Town: Burrillville

Date: 3/12/2014

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree	Indicator Status
1. Pinus strobus	FACU
2.	
3.	

Herbs	Indicator Status
1.	
2.	
3.	

Saplings/Shrubs	
1. Hamamelis virginiana	FAC
2.	
3.	

Woody Vines
1.
2.
3.

List other vegetative species noted which may have affected determination of the wetland edge: _____

Soil: SCS Soil Survey Mapping Unit: CeC Canton and Charlton

On Hydric Soils List? (Y/N) NO

Soil Profile (Note wetland flag no. nearest soil test pit): _____

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
A	0-6"	10YR 4/3			
B	6-12"	10YR 4/4			

Other indicators exhibiting an absence of wetland hydrology (e.g. absence of water marks, lack of redoximorphic features, lack of oxidized rhizospheres, etc.): _____

Landscape position: _____

Altered/atypical situation? (describe) _____

Comments: _____

Wetland Edge Delineation Data Form (WETLAND)

Applicant: National Grid

Wetland No. W03PR0984

Project: RI IRP

Flag No. Sequence: 300 - 313

City/Town: Burrillville

Date: 7/12/2004

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree	Indicator Status
1. Acer rubrum	FAC
2. Salix discolor	FACW
3. Pinus strobus	FACU
Saplings/Shrubs	
1. Hamamelis virginiana	FAC
2.	
3.	

Herbs	Indicator Status
1. Equisetum hyemale	FACW
2. Osmunda cinnamomea	FACW
3. Dennstaedtia punctilobula	OBL
Woody Vines	
1.	
2.	
3.	

List other vegetative species noted which may have affected determination of the wetland edge: _____.

Soil: SCS Soil Survey Mapping Unit: CeC Canton and Charlton

On Hydric Soils List? (Y/N) _____

Soil Profile (Note wetland flag no. nearest soil test pit): 300

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
A	0 - 4"	10YR 2/1			
B	4 - 8"	10YR 4/1	Root Channels		
	8 - 10"	10YR 5/3	Mottling & Depletions		

Other hydrological indicators (e.g. water marks, drainage patterns, root rhizospheres, etc.; see Appendix 4(A)(4) of the Rules): _____

Landscape position: _____

Altered/atypical situation? (describe) _____

Comments: Refusal at 10"

Wetland Edge Delineation Data Form (Wetland)

Applicant: National Grid

Wetland No.: 95a

Project: NEENS

Flag No. Sequence: 401 – 409

City/Town: Bernalville

Date: Delin 8/8/07 P.L.
Data 2/28/08

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1.		1. Phragmites australis	FACW
2.		2. Lythrum salicaria	FACW+
3.		3.	

Saplings/Shrubs	Woody Vines
1. Sambucus canadensis FACW-	1.
2.	2.
3.	3.

List other vegetative species noted which may have affected determination of the wetland edge:

Soil: SCS Soil Survey Mapping Unit: Canton + Charlton fsl/VV (CeC)
On Hydric Soils List? (Y/N) No.

Soil Profile (Note wetland flag no. nearest soil test pit):

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Edge is distinct, based +/- on topography.

Landscape position:

Altered/atypical situation? (Describe):

Comments: Wetland bounded by Substation to north, and ringed with shrubs (e.g. sumac, witch hazel) to southeast. Upland to south is a mowed gas pipeline dominated by grasses and forbs (e.g. goldenrod) and early successional shrubs (Rubus allegheniensis, e.g.)

Wetland Edge Delineation Data Form (Wetland)

Applicant: National Grid Wetland No.: 956

Project: NEENS Flag No. Sequence: 420-443

City/Town: Burrillville Date: 2/21/08 P.L.

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1.		1. Typha latifolia	OBL
2.		2. Carex stricta	OBL
3.		3. Lythrum salicaria	FACW+

Saplings/Shrubs		Woody Vines
1. Clethra alnifolia	FAC+	1.
2. Vaccinium corymbosum	FACW-	2.
3. Rhododendron viscosum	OBL	3.

List other vegetative species noted which may have affected determination of the wetland edge:
Osmunda cinnamomea, Acer rubrum

Soil: SCS Soil Survey Mapping Unit: Canton + Charlton fsl/VR (CeC)
On Hydric Soils List? (Y/N) No

Soil Profile (Note wetland flag no. nearest soil test pit):

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Landscape position:

Altered/atypical situation? (Describe):

Comments: Identified as a "wet spot" symbol on soil survey.

Wetland Edge Delineation Data Form (Upland)

Applicant: National Grid Wetland No. 95b

Project: NEEWS Flag No. Sequence: 420-443

City/Town: Burrillville Date: 2/21/08 P.L.

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1. Pinus strobus	FACU	1.	
2. Quercus rubra	FACU	2.	
3. Quercus alba	FACU	3.	

Saplings/Shrubs		Woody Vines	
1. Hamamelis virginiana	FAC-	1.	
2. Vaccinium corymbosum	FACW-	2.	
3.		3.	

List other vegetative species noted which may have affected determination of the wetland edge:
Acer rubrum (sapl.), P. strobus (sapl.)

Soil: SCS Soil Survey Mapping Unit: Canton + Charlton fsl/VR (CeC)
On Hydric Soils List? (Y/N) No

Soil Profile (Note wetland flag no. nearest soil test pit): 7 paces W. (280° Mag.) fr. 95-441

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
A	0-4"	10YR3/2			
Bw	4-18"	10YR4/3-4/4	no redox		

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Landscape position: Edge is distinct into Typha (dom.) wetland.

Altered/atypical situation? (Describe):

Comments:

Wetland Edge Delineation Data Form (Wetland)

Applicant: National Grid

Wetland No.: 95C

Project: NEEWS

Flag No. Sequence: 450-458

City/Town: Burrillville

Date: Delin: 2/21/08 P.L.
Data: 2/28/08

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1. Acer rubrum	FAC	1.	
2. Pinus strobus	FACU	2.	
3. Nyssa sylvatica	FAC	3.	
Saplings/Shrubs		**Woody Vines**	
1. Clethra alnifolia	FAC+	1.	
2. Pinus strobus	FACU	2.	
3.		3.	

List other vegetative species noted which may have affected determination of the wetland edge:
Lindera benzoin, Hamamelis virginiana, Vaccinium corymbosum

Soil: SCS Soil Survey Mapping Unit: Canton + Charlton fsl/VR (CeC
On Hydric Soils List? (Y/N) No.

Soil Profile (Note wetland flag no. nearest soil test pit): 6 paces N. (340° Mag.) fr. 95-350

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
					Surf – 6"
Bw	16-20"	10YR4/3	high chroma s.m.		

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.): Area flooded at time of delineation - Stormwater ditch flows through from wetland to the east.

Landscape position:

Altered/atypical situation? (Describe): possible altered hydrology

Comments: Some tree mortality (white pine) - likely due to flooding

Wetland Edge Delineation Data Form (Upland)

Applicant: National Grid

Wetland No. 95C

Project: NEEWS

Flag No. Sequence: 450-458

City/Town: Bernardville

Date: Delin: 2/21/08 P.L.
Data: 2/28/08

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree:	Indicator Status	Herbs:	Indicator Status
1. Pinus strobus	FACU	1. Lycopodium obscurum	FACU
2. Acer rubrum	FAC	2. /	
3.		3.	

Saplings/Shrubs		Woody Vines
1. Clethra alnifolia	FAC+	1.
2. Pinus strobus	FACU	2.
3. Vaccinium corymbosum	FACW	3.

List other vegetative species noted which may have affected determination of the wetland edge:
Sassafras albidum, Quercus rubra, Quercus alba, Gaylussacia baccata, Pinus strobus

Soil: SCS Soil Survey Mapping Unit: Canton + Charlton fsl/VR (CeC)
On Hydric Soils List? (Y/N) No.

Soil Profile (Note wetland flag no. nearest soil test pit): 5 paces NW (305° Mag.) fr. 95-454

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
Bw1	7-20"	10YR 4/4	no redox		

Other indicators of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres(etc.):

Landscape position:

Altered/atypical situation? (Describe):

Comments:

Appendix D

Wetland Photo Log

Photograph No.: 1
Northwestern Wetland 1

Photograph No.: 2
Woods road in eastern project area. Wetland 1 located to the left.

Photograph No.: 3
Iron Mine Brook at Wallum Lake Road, Wetland 1

Photograph No.: 4
Unnamed intermittent stream in northeastern Wetland 1

Photograph No.: 5
Wetland 2, eastern arm, south of woods road

Photograph No.: 6
Eastern hemlock stand in northeastern portion of Wetland 2

Photograph No.: 7
Perennial stream in western arm of Wetland 2

Photograph No.: 8
Upland adjacent to western arm of Wetland 2

Photograph No.: 9
Wetland 2 shrub/emergent wetland in Algonquin Gas Transmission Line

Photograph No.: 10
Wetland 3

Wetland W-03-PR-095a, Photo taken 09/16/09

Wetland W-03-PR-095b, Photo taken 09/16/09

Wetland W-03-PR-096, Photo taken 09/17/09

Wetland W-03-PR-097, Photo taken 09/17/09

Wetland W-03-PR-098, Photo taken 09/17/09

Wetland W-03-PR-099 & S-03-PR-053, Photo taken 09/17/09

Wetland W-03-PR-100, Photo taken 09/17/09

Wetland W-03-PR-101, Photo taken 09/17/09

Wetland W-03-PR-102, Photo taken 09/17/09

Wetland W-03-PR-103, Photo taken 09/17/09

Wetland W-03-PR-104, Photo taken 09/17/09

Wetland W-03-PR-105, Photo taken 09/17/09

Wetland W-03-PR-106, Photo taken 09/17/09

Wetland W-03-PR-107, Photo taken 09/17/09

Wetland W-03-PR-108, Photo taken 09/17/09

Wetland W-03-PR-109, Photo taken 09/17/09

Wetland W-03-PR-110, Photo taken 04/17/08

Wetland W-03-PR-112, Photo taken 04/17/08

Wetland W-03-PR-113, Photo taken 09/17/09

Wetland W-03-PR-114, Photo taken 09/17/09

Wetland W-03-PR-115, Photo taken 09/16/09

Wetland W-03-PR-116, Photo taken 09/16/09

Wetland W-03-PR-117, Photo taken 09/16/09

Wetland W-03-PR-118, Photo taken 09/16/09

Wetland W-03-PR-119, Photo taken 09/16/09

Wetland W-03-PR-120, Photo taken 09/16/09

Wetland W-03-PR-121, Photo taken 09/16/09

Wetland W-03-PR-122, Photo taken 09/16/09

Wetland W-03-PR-124, Photo taken 09/16/09

Wetland W-03-PR-125, Photo taken 09/16/09

Wetland W-03-PR-126, Photo taken 09/16/09

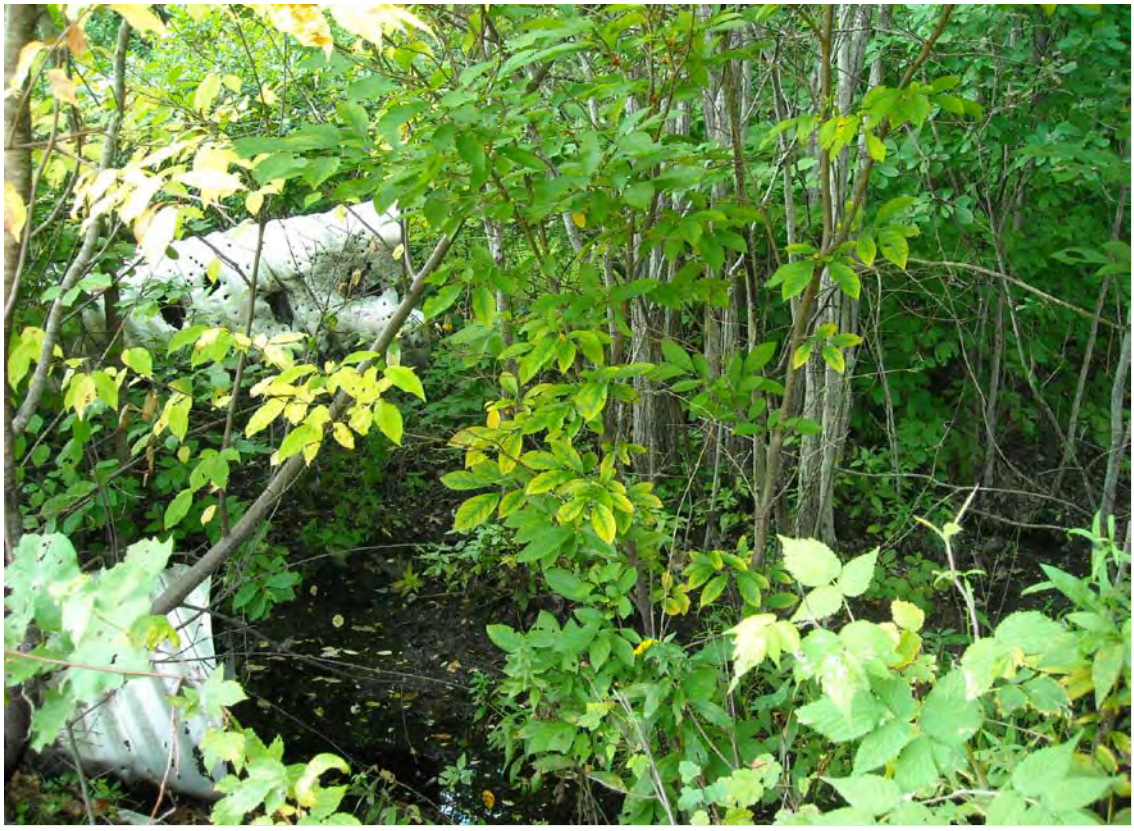
Wetland W-03-PR-127, Photo taken 09/16/09

Wetland W-03-PR-128, Photo taken 09/16/09

Wetland W-03-PR-131, Photo taken 09/16/09

Wetland W-03-PR-132, Photo taken 09/16/09

Wetland W-03-PR-133, Photo taken 09/16/09



Wetland W-03-PR-135, Photo taken 09/16/09

Wetland W-03-PR-136, Photo taken 09/16/09

Wetland W-03-PR-138, Photo taken 09/23/09

Wetland W-03-PR-139, Photo taken 09/23/09

Wetland W-03-PR-141, Photo taken 09/23/09

Wetland W-03-PR-142, Photo taken 09/23/09

Wetland W-03-PR-143, Photo taken 09/23/09

Wetland W-03-PR-144, Photo taken 09/23/09

Wetland W-03-PR-146, Photo taken 09/23/09

Wetland W-03-PR-148, Photo taken 09/23/09

Wetlands W-03-PR-149 & W-03-PR-150, Photo taken 09/23/09

Wetland W-03-PR-151, Photo taken 09/23/09

Wetland W-03-PR-152, Photo taken 09/23/09

Wetland W-03-PR-153, Photo taken 09/23/09

Wetland W-03-PR-154, Photo taken 09/23/09

Wetland W-03-PR-155, Photo taken 09/23/09

Wetland W-03-PR-156 & S-03-PR-083, Photo taken 09/23/09

Wetland W-03-PR-157, Photo taken 09/23/09

Wetland W-03-PR-158, Photo taken 09/23/09

Wetland W-03-PR-159, Photo taken 09/23/09

Wetland W-03-PR-160, Photo taken 09/23/09

Wetland W-03-PR-161, Photo taken 09/23/09

Wetland W-03-PR-162, Photo taken 09/23/09

Wetland W-03-PR-163, Photo taken 09/23/09

Appendix E

List of Vegetation and Relative Abundance

List of Vegetation and Relative Abundance Observed Within CREC Site and 0.8-mile ROW

Species/Stratum	Scientific Name	Wetland 1	Wetland 2	Wetland 3	Wetland 4	Special Aquatic Site 1	Special Aquatic Site 2	Staging Area	Other Upland
Trees									
ash, green	*Fraxinus pennsylvanica*		O						
aspen, bigtooth	*Populus grandidentata*								O
birch, black	*Betula lenta*	O	O	O					C
birch, grey	*Betula populifolia*			C	C				
birch, yellow	*Betula alleghaniensis*	O	O						
cherry, black	*Prunus serotina*								O
elm, american	*Ulmus americana*	O							
gum, black	*Nyssa sylvatica*	O	O		O				O
hemlock	*Tsuga canadensis*		O						O
hop hornbeam	*Ostrya virginiana*		O						
maple, red	*Acer rubrum*	A	A	A	A		F	O	C
oak, black	*Quercus velutina*							F	C
oak, red	*Quercus rubra*	F	F	C	C	O		C	C
oak, scarlet	*Quercus coccinea*				O				O
oak, white	*Quercus alba*	O	O					O	O
pine, white	*Pinus strobus*	C	C		C	O		C	C
sassafras	*Sassafras albidum*		O	O			O		O
Shrubs									
barberry	*Berberis thunbergii*						O		
birch, black	*Betula lenta*			O	C		C		
blueberry, highbush	*Vaccinium corymbosum*	F	C	C	C			C	F
blueberry, lowbush	*Vaccinium angustifolium*							O	O
chestnut, American	*Castanea dentata*							O	
chokeberry, red	*Aronia arbutifolia*		O						
greenbriar	*Smilax sp.*		O					O	
huckleberry	*Gaylussacia frondosa*						O	O	O
laurel, mountain	*Kalmia latifolia*	C	F	C		O		C	F
laurel, sheep	*Kalmia angustifolia*								O
maleberry	*Lyonia ligustrina*		O						
swamp azalea	*Rhododendron viscosum*		O				F		
sweet pepperbush	*Clethra alnifolia*	A	C	C	F			C	C
Virginia creeper	*Parthenocissus quinquefolia*			O					O
wild raisin	*Viburnum cassinoides*			O					
winterberry	*Ilex verticillata*	O	O		O				
pussy willow	*Salix discolor*	O	O						
witchhazel	*Hamamelis virginiana*	C	O	C				O	O
Herbs									
aster, New England	*Symphyotrichum novae-angliae)*		O						
beggar ticks	*Bidens sp.*	O	O						
bugleweed	*Lycopus uniflorus*	O	O						
Canada mayflower	*Maianthemum canadense*	O							
deer-tongue	*Dichanthelium clandestinum*		O						
dogwood, silky	*Cornus amomum*						O		
fern, bracken	*Pteridium sp.*								O
fern, cinnamon	*Osmunda cinnamomea*	F	C		C		O		
fern, hay-scented	*Dennstaedtia punctilobula*	O	O						
fern, marsh	*Thylepteris palustris*		O	O					
fern, New York	*Thylepteris noveboracensis*	O	O	C	O			F	
fern, royal	*Osmunda regalis*	C	O				O		
fern, sensitive	*Onoclea sensibilis*	O					C		
fern, wood spinulose	*Dryopteris carthusiana*	O						O	O
goldenrod, Canada	*Solidago canadensis*		O				O		
goldenrod, wrinkle-leaved	*Solidago rugosa*		O						
goldthread	*Coptis trifolia*	O							
woodgrass	*Brachyelytrum erectum*	O		C					O
greenbrier	*Smilax sp.*	C	O						
marsh dewberry	*Rubus flagellaris*			O					
marsh st. john's wort	*Triadenum viginicum*								
meadowsweet	*Spiraea latifolia*		O						
moss, haircap	*Polystricum spp.*								O
moss, sphagnum	*Sphagnum spp.*	C	C	C	C		C		
multiflora rose	*Rosa multiflora*						O		
oat-grass	*Arrhenatherum elatius*		O						
partridgeberry	*Mitchella repens*								O
poison ivy	*Toxicodendron radicans*	O							O
rush, Canadian	*Juncus candensis*		O						
rush, slender	*Junus tenuis*		O						
rush, soft	*Juncus effusus*		O						
sedge, fringed	*Carex crinata*	O	O				O		
sedge, broom	*Carex scoparia*		O						
sedge, Pennsylavania	*Carex pennsylvanica*								

sedge, shallow	*Carex lurida*	O					O		O
sedge, tussock	*Carex stricta*		O						
sessile-leaved bellwort	*Uvularia sessifolia*	O							O
skunk cabbage	*Symplocarpus foetidus*	O	O						
snakeroot	*Ageratina altissima*		O						
starflower	*Trientalis borealis*	O		O				O	O
steeplebush	*Spiraea tomentosa*		O				O		
sundew, roundleaved	*Drosera rotundifolia*		O						
swamp candles	*Lysimachia terrestris*								
swamp dewberry	*Rubus hispidus*	O	O		C		O		
wild grape	*Vitis sp.*		O				O		
woolgrass	*Scirpus cyperinus*		O						
* A=Abundant >75%, F=Frequent 50-75%, C=Common 15-50%, O=Occasional <15%									

Appendix F

Floodplain Analysis

Technical Memorandum

Date:	Friday, January 20, 2017
Project:	Clear River Energy Center Town of Burrillville, Providence County, Rhode Island
To:	Type recipient(s) here
From:	Type sender(s) here
Subject:	Revised HEC-RAS Model of Dry Arm Brook and Iron Mine Brook

1.0 INTRODUCTION

The purpose of this technical memorandum is to describe the modeling completed by HDR in support of the determination of the base flood elevations (BFEs) for Dry Arm Brook and Iron Mine Brook in Burrillville, Rhode Island. Hodge WaterResources (HWR) determined the BFEs for these two brooks upstream of Wallum Lake Road in a Technical Memorandum dated October 11, 2016. HDR utilized this base model to show the effects of the culverts under Algonquin Road which allow water to flow from the Dry Arm Brook Basin into the Iron Mine Branch Basin. HDR completed the modeling using the Hydrologic Engineering Center's River Analysis System (HEC-RAS), which is developed and maintained by the United States Army Corps of Engineers (USACE) Hydrologic Engineering Center (HEC).

2.0 MODEL SETUP

The process of setting up a steady-flow HEC-RAS model includes four components.

- Development of Model Geometry
- Inclusion of Structures
- Determination of Upstream Flow Boundary Condition
- Determination of Downstream Water Level Boundary Condition

Model Geometry

HDR developed the channel geometry by digitizing the stream centerline; stream bank lines and cross-section locations for each brook based on HWR's October 11, 2016 Technical Memorandum.
In addition, HDR added a stream from Algoquin Road to Iron Mine Branch to help model any spillover from Dry Arm Brook to Iron Mine Branch and a stream was added parallel to Wallum Lake Road to help model the spillover from Iron Mine Branch south to another road crossing. The HEC-RAS geometric model was developed from the stream centerlines, edge of banks, and cross-sections that were mapped by Lidar furnished by the ESS Group, Inc. (ESS). Modifications were made to the cross-sections just above and below the culvert crossings to ensure the ground matched the entrance and exit of the culverts. The attached drawing "HEC-RAS Model Geometry and Floodplain Delineation" shows the locations of the cross-sections. For clarity, not all of the model is shown.

Inclusion of Structures

Both Dry Arm Brook and Iron Mine Branch cross under Wallum Lake Road through culverts. The culvert for Dry Arm Brook is a box culvert with a height of 2.42 ft, a width of 5.76 ft, and an upstream invert of 537.33 ft relative to the North American Vertical Datum of 1988 (NAVD88). The culvert for Iron Mine Brook is a double-barreled circular pipe culvert. Each pipe has a diameter of 2.5 ft and an upstream invert of 513.56 ft NAVD88. These dimensions were measured by ESS during a site survey conducted in August and October 2015. HDR used these measurements to incorporate the culverts into the HEC-RAS model. The culvert survey information was provided to HDR by ESS.

In addition to the culverts, HDR used a lateral structure in the modeling of Algonquin Road. The lateral structure allows water to flow under Algonquin Road when the flood waters back up high enough from the Dry Arm Brook culvert and flows into the Iron Mine Branch basin. Also, at the location where Iron Mine Brook enters the culvert under Wallum Lake Road, the topography of the surrounding area is such that if a surcharge were to occur at the upstream end of the culvert, water would flow east, parallel to Wallum Lake Road and away from the culvert. HDR modeled the potential for water to flow away from the culvert by including another stream adjacent to where Iron Mine Brook meets Wallum Lake Road.

Determination of Upstream Flow Boundary Conditions

In order to determine the BFE for a stretch of either brook, it is necessary to make a determination of the flow in the brook during a 1% annual chance storm event (commonly called a 100-year storm event). StreamStats estimates flows in Rhode Island based on studies completed by the USGS (Zarriello et al., 2012; Bent et al., 2014). The prediction of flow from StreamStats depends on the size of the watershed upstream of the requested point. StreamStats has a recommended minimum drainage area limit of 4 sq. miles. Both the Dry Arm Basin and the Iron Mine Basin are below this limit and therefore StreamStats was not used.

Dry Arm Brook has a stream gage on it by Wallum Lake Road so this data was used for the Dry Arm Book flows. In order to provide an appropriately conservative upstream steady-flow boundary for the model, HDR distributed the flow between the flow from the stream gage of Dry Arm Brook based on the relative sizes of their contributing watersheds. HDR drew the drainage areas based on the provided Lidar and calculated the flows for Iron Mine Branch using HydroCAD version 10.0. The subsequent flow values were applied to the boundary of Iron Mine Brook.

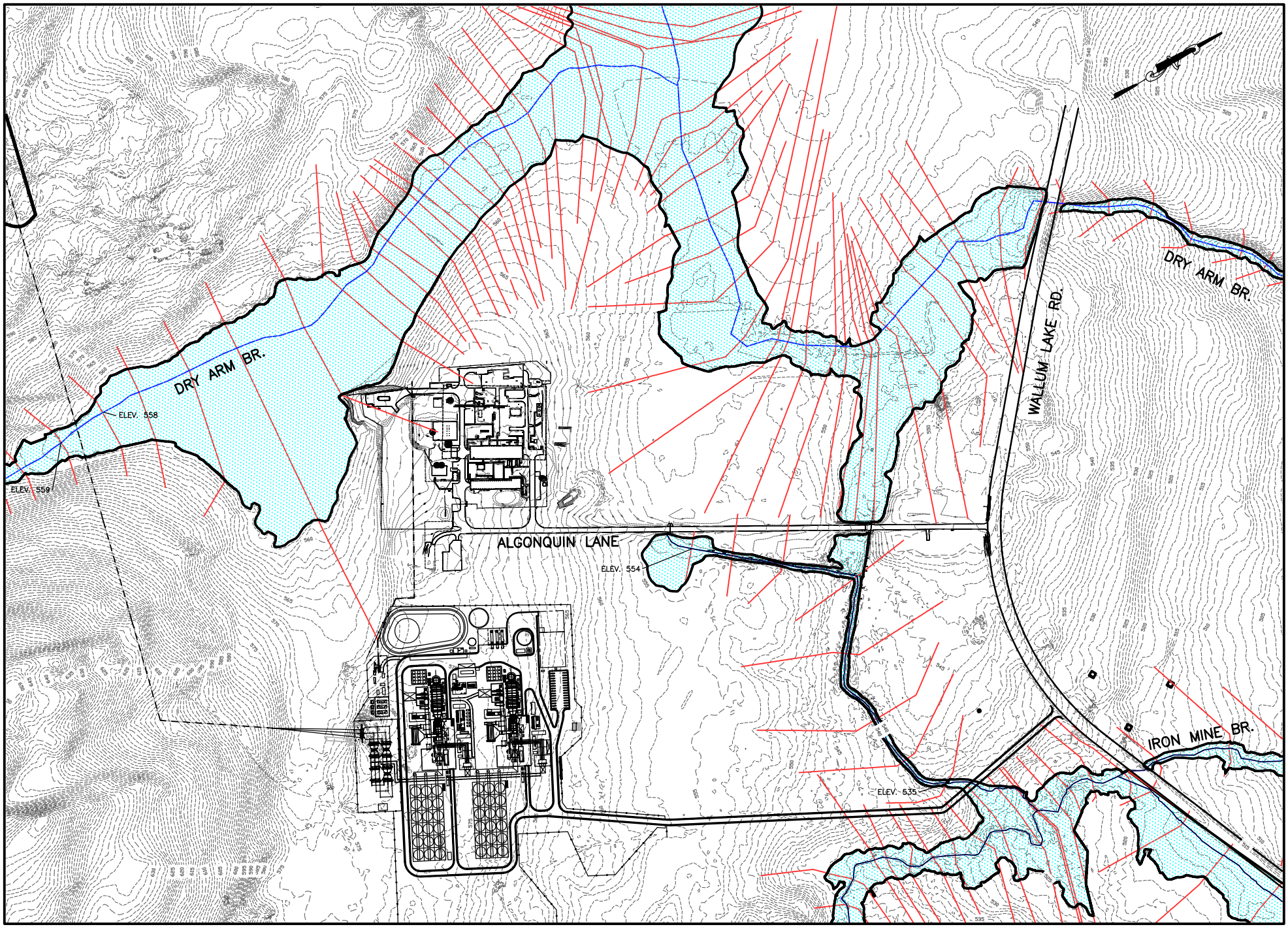
Determination of Downstream Water Level Boundary Condition

Dry Arm Brook and Iron Mine Brook drain to the western end of Wilson Reservoir, which in turn drains to the Clear River. The effective Flood Insurance Study (FIS) for Providence County (FEMA, 2015) provides a 1% annual chance flood profile of the Clear River, and the upstream limit is the outfall of Wilson Reservoir under East Wallum Lake Road. The 1% annual chance flood elevation at Wilson Reservoir at the location where Clear River flows from the Reservoir is 444 ft NAVD88. HDR used this water level as the downstream water level boundary condition in the HEC-RAS model.

After developing the model geometry, including all relevant structures, and specifying boundary conditions, HDR ran the HEC-RAS model in the steady flow condition in order to determine the BFEs for Dry Arm Brook and Iron Mine Brook. See Figure 1 for additional detail.

3.0 MODEL RESULTS

The HEC-RAS model shows that 4.64 cfs during the 100 year storm flows from the Dry Arm Brook to the Iron Mine Branch. This additional water has no appreciable effect on the Iron Mine Branch Basin.



LEGEND

CENTERLINE

CROSS-SECTIONS

FLOODPLAIN

SCALE IN FEET

0 250 500

CLEAR RIVER ENERGY LLC
TOWN OF BURRILLVILLE,
PROVIDENCE COUNTY, RHODE ISLAND

FIGURE 1
HEC-RAS MODEL GEOMETRY
AND FLOODPLAIN DELINEATION

FILENAME HEC-RAS MAP.DWG

SCALE AS SHOWN

1 of 1

Appendix G

Vernal Pool Data Forms

POOL # SA52

CLEAR RIVER ENERGY CENTER VERNAL POOL/AMPHIBIAN BREEDING HABITAT DATA FORM

2016 FIELD SEASON

WEATHER CONDITIONS	65°F, mostly sunny	TIME OF DAY	11:30
		TIME SPENT AT POOL	~2 hrs
DATE	3/31/16	OBSERVERS	Joshua Burgoyne, Craig Wood
POOL CHARACTERISTICS			
WETLAND # MAPSHEET #		TOWN	Burrillville, RI
		LENGTH / WIDTH	150'/15'
ISOLATED POOL (Y / N)	Y	DOMINANT COVER TYPE	PEM PSS PFO
CLOSEST EXISTING STRUCTURE NUMBER	NA	AVG. WATER DEPTH	8"
		MAX WATER DEPTH	18"
		PRESENCE OF FISH (Y/N)	N

SUBSTRATE:

- ☐ Mud/Muck
- ☑ Leaf litter
- ☐ Sand
- ☐ Gravel
- ☐ Cobble
- ☐ Peat

DOMINANT VEGETATION POOL BY STRATUM:

Herbaceous: Onoclea sensibilis, Thelypteris noveboracensis

Shrub/Sapling: Clethra alnifolia, Vaccinium corymbosum, Kalmia latifolia

Tree: Acer rubrum

Breeding Criteria Codes

1	Breeding chorus
2	Egg masses
3	Frog tadpoles
4	Salamander larvae
5	Presence of adults
6	Spermatophores

	OBLIGATE SPECIES	CODE	QUANTITY
	Wood frog	2	14
	Spotted salamander	2	5
	Jefferson salamander		
	Blue-spotted salamander		
	Spadefoot toad		
	Fingernail clams		
	Marbled salamander		
	Unidentified mole salamander		
	Fairy shrimp		

FACULATIVE SPECIES:

- ☐ Red-spotted newt (adult)
- ☐ Spotted turtle
- ☐ Blanding's turtle
- ☐ Painted turtle
- ☐ Snapping turtle
- ☐ Predacious diving beetle (adult)
- ☐ Predacious diving beetle (larva)
- ☐ Amphibious snails
- ☐ Spring peeper
- ☐ American toad
- ☐ Fowler's toad
- ☐ Caddis fly case/larvae
- ☐ Dragonfly nymph
- ☐ Damselfly nymph
- ☐ Leech
- ☐ Pickerel frog

Additional Species Observed:

water strider

Photo Documentation (note direction):

see Appendix F

Conclusions / Comments:

This area is a historic cart path that holds a relatively small amount of standing water during early spring only.

☐ Vernal Pool ☒ Amphibian Breeding Habitat

COVER TYPE (100 FEET FROM EDGE OF POOL):

____% PSS
85 % UF
15 % PFO
____% OF
____% PEM
____% Other / define

____% of pool w/in managed portion of ROW ____% of pool within forested area of ROW

POOL # SAS1

CLEAR RIVER ENERGY CENTER VERNAL POOL/AMPHIBIAN BREEDING HABITAT DATA FORM

2016 FIELD SEASON

WEATHER CONDITIONS	65°F, mostly sunny	TIME OF DAY	14:00
		TIME SPENT AT POOL	1 hr
DATE	3/31/16	OBSERVERS	Joshua Burgoyne, Craig Wood
POOL CHARACTERISTICS			
WETLAND # MAPSHEET #		TOWN	Burrillville, RI
		LENGTH / WIDTH	40'/20'
ISOLATED POOL (Y / N)	Y	DOMINANT COVER TYPE	PEM PSS PFO
CLOSEST EXISTING STRUCTURE NUMBER	NA	AVG. WATER DEPTH	8"
		MAX WATER DEPTH	18"
		PRESENCE OF FISH (Y/N)	N

SUBSTRATE:

- ☐ Mud/Muck
- ☑ Leaf litter
- ☐ Sand
- ☐ Gravel
- ☐ Cobble
- ☐ Peat

DOMINANT VEGETATION POOL BY STRATUM:

Herbaceous: Polystrichum spp., Pinus strobus

Shrub/Sapling: Kalmia latifolia, Hamamelis virginiana

Tree: Quercus rubra

Breeding Criteria Codes

1	Breeding chorus
2	Egg masses
3	Frog tadpoles
4	Salamander larvae
5	Presence of adults
6	Spermatophores

	OBLIGATE SPECIES	CODE	QUANTITY
	Wood frog	2,5	12,1
	Spotted salamander	2	13
	Jefferson salamander		
	Blue-spotted salamander		
	Spadefoot toad		
	Fingernail clams		
	Marbled salamander		
	Unidentified mole salamander		
	Fairy shrimp		

FACULATIVE SPECIES:

- ☐ Red-spotted newt (adult)
- ☐ Spotted turtle
- ☐ Blanding's turtle
- ☐ Painted turtle
- ☐ Snapping turtle
- ☐ Predacious diving beetle (adult)
- ☐ Predacious diving beetle (larva)
- ☐ Amphibious snails
- ☐ Spring peeper
- ☐ American toad
- ☐ Fowler's toad
- ☐ Caddis fly case/larvae
- ☐ Dragonfly nymph
- ☐ Damselfly nymph
- ☐ Leech
- ☐ Pickerel frog

Additional Species Observed:

water strider

Photo Documentation (note direction):

see Appendix F

Conclusions / Comments:

This area is a man-made depression that was part of a historic gravel operation. It holds a small amount of standing water in th spring

☐ Vernal Pool ☒ Amphibian Breeding Habitat

COVER TYPE (100 FEET FROM EDGE OF POOL):

____% PSS
100% UF

____% PFO
____% OF

____% PEM
____% Other / define

____% of pool w/in managed portion of ROW ____% of pool within forested area of ROW

Appendix H

Agency Correspondence

Joshua Burgoyne

From: vonOettingen, Susi <susi_vonoettingen@fws.gov>
Sent: Friday, December 18, 2015 8:53 AM
To: Matt Robertson
Cc: charles.brown@dem.ri.gov; Mike Feinblatt
Subject: Re: NLEB Acoustic Report - Burrillville, Rhode Island

Good morning, Matt.

I just reviewed the report, thank you very much for sending it. I agree, the survey was consistent with Service guidelines (and thank you for the conservative approach). I also appreciate that the bat call data were vetted. Based on your analyses, I would agree that NLEB are not present in the project area and no minimization or mitigation measures will be necessary.

Susi

****

Susi von Oettingen
Endangered Species Biologist
New England Field Office
70 Commercial Street, Suite 300
Concord, NH 03301
(W) 603-223-2541 ext. 6418
Please note my new extension.

www.fws.gov/newengland

On Mon, Dec 14, 2015 at 12:09 PM, Matt Robertson <MRobertson@essgroup.com> wrote:

Good Afternoon,

ESS Group, Inc., on behalf of Invenergy Thermal Development, LLC., is pleased to submit the results of an acoustic bat survey conducted at a proposed energy development site in Burrillville, Rhode Island. If you have any questions or concerns please feel free to contact me at any time. Also, could you please provide an approximate timeframe for your review of the report?

Best Regards,

Matt Robertson | Project Scientist

ESS Group, Inc.

10 Hemingway Drive, 2nd Floor, East Providence, RI 02915 | p 401.330.1212

www.essgroup.com

Joshua Burgoyne

From: Brown, Charles (DEM) <charles.brown@dem.ri.gov>
Sent: Wednesday, March 16, 2016 1:33 PM
To: Matt Robertson
Subject: RE: NLEB Acoustic Report - Burrillville, Rhode Island

Hi Matt,
There are no known maternity roost trees in Rhode Island and there are no known hibernacula in Burrillville or Providence County. Feel free to cal if you have any questions.
Charlie Brown
Wildlife Biologist
DEM Division of Fish and Wildlife
401-789-0281

From: Matt Robertson [mailto:MRobertson@essgroup.com]
Sent: Wednesday, March 16, 2016 1:25 PM
To: Brown, Charles (DEM) <charles.brown@dem.ri.gov>
Subject: RE: NLEB Acoustic Report - Burrillville, Rhode Island

Good Afternoon Mr. Brown,

Since we submitted the NLEB acoustic report (see email below), the ruling on NLEBs has been updated. To remain in compliance with the new rule can you please provide any information on any known hibernacula or maternity roost tree locations in or adjacent to the town of Burrillville? In previous research I could not identify any hibernacula or roost trees in Providence County at large. More recent research has shown that you have been doing surveys and identified some overwintering locations in the state so I wanted to confirm the status on hibernacula and roost tree locations. Thank you very much for your time.

All the Best,

Matt Robertson
ESS Group, Inc.
mrobertson@essgroup.com

From: Brown, Charles (DEM) [mailto:charles.brown@dem.ri.gov]
Sent: Tuesday, December 15, 2015 7:47 AM
To: Matt Robertson
Subject: RE: NLEB Acoustic Report - Burrillville, Rhode Island

HI Matt,
Thank you. I will try to review it this week or next and get back to you with any comments or questions.
Charlie Brown

From: Matt Robertson [mailto:MRobertson@essgroup.com]
Sent: Monday, December 14, 2015 12:09 PM
To: Brown, Charles (DEM) <charles.brown@dem.ri.gov>; vonOettingen, Susi <susi_vonoettingen@fws.gov>
Cc: Mike Feinblatt <MFeinblatt@essgroup.com>
Subject: NLEB Acoustic Report - Burrillville, Rhode Island

Good Afternoon,

ESS Group, Inc., on behalf of Invenergy Thermal Development, LLC., is pleased to submit the results of an acoustic bat survey conducted at a proposed energy development site in Burrillville, Rhode Island. If you have any questions or concerns please feel free to contact me at any time. Also, could you please provide an approximate timeframe for your review of the report?

Best Regards,

Matt Robertson | Project Scientist
ESS Group, Inc.
10 Hemingway Drive, 2nd Floor, East Providence, RI 02915 | p 401.330.1212
www.essgroup.com

IPaC **U.S. Fish & Wildlife Service**

IPaC resource list

Location

Providence County, Rhode Island

Local office

New England Ecological Services Field Office

(603) 223-2541
(603) 223-0104

70 Commercial Street, Suite 300
Concord, NH 03301-5094

http://www.fws.gov/newengland

Endangered species

This resource list is for informational purposes only and should not be used for planning or analyzing project level impacts.

Section 7 of the Endangered Species Act **requires** Federal agencies to *"request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action"* for any project that is conducted, permitted, funded, or licensed by any Federal agency.

A letter from the local office and a species list which fulfills this requirement can only be obtained by requesting an official species list either from the Regulatory Review section in IPaC or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by creating a project and making a request from the Regulatory Review section.

Listed species[1] are managed by the Endangered Species Program of the U.S. Fish and Wildlife Service.

1. Species listed under the Endangered Species Act are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the listing status page for more information.

The following species are potentially affected by activities in this location:

Mammals

NAME	STATUS
Northern Long-eared Bat Myotis septentrionalis **No critical habitat** has been designated for this species. http://ecos.fws.gov/ecp/species/9045	Threatened

Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

THERE ARE NO CRITICAL HABITATS AT THIS LOCATION.

Migratory birds

Birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any activity that results in the take (to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct) of migratory birds or eagles is prohibited unless authorized by the U.S. Fish and Wildlife Service[3]. There are no provisions for allowing the take of migratory birds that are unintentionally killed or injured.

Any person or organization who plans or conducts activities that may result in the take of migratory birds is responsible for complying with the appropriate regulations and implementing appropriate conservation measures.

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.
3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

Additional information can be found using the following links:

- Birds of Conservation Concern http://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php
- Conservation measures for birds http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php
- Year-round bird occurrence data http://www.birdscanada.org/birdmon/default/datasummaries.jsp

The migratory birds species listed below are species of particular conservation concern (e.g. Birds of Conservation Concern) that may be potentially affected by activities in this location, not a list of every bird species you may find in this location. Although it is important to try to avoid and minimize impacts to all birds, special attention should be made to avoid and minimize impacts to birds of priority concern. To view available data on other bird species that may occur in your project area, please visit the AKN Histogram Tools and Other Bird Data Resources.

NAME	SEASON(S)
American Bittern Botaurus lentiginosus http://ecos.fws.gov/ecp/species/6582	Breeding
American Oystercatcher Haematopus palliatus http://ecos.fws.gov/ecp/species/8935	Breeding
Bald Eagle Haliaeetus leucocephalus http://ecos.fws.gov/ecp/species/1626	Year-round
Black-billed Cuckoo Coccyzus erythropthalmus http://ecos.fws.gov/ecp/species/9399	Breeding
Blue-winged Warbler Vermivora pinus	Breeding
Canada Warbler Wilsonia canadensis	Breeding
Fox Sparrow Passerella iliaca	Wintering
Least Bittern Ixobrychus exilis http://ecos.fws.gov/ecp/species/6175	Breeding
Olive-sided Flycatcher Contopus cooperi http://ecos.fws.gov/ecp/species/3914	Breeding

Peregrine Falcon Falco peregrinus http://ecos.fws.gov/ecp/species/8831	Wintering
Pied-billed Grebe Podilymbus podiceps	Year-round
Prairie Warbler Dendroica discolor	Breeding
Purple Sandpiper Calidris maritima	Wintering
Short-eared Owl Asio flammeus http://ecos.fws.gov/ecp/species/9295	Wintering
Upland Sandpiper Bartramia longicauda http://ecos.fws.gov/ecp/species/9294	Breeding
Willow Flycatcher Empidonax traillii http://ecos.fws.gov/ecp/species/3482	Breeding
Wood Thrush Hylocichla mustelina	Breeding
Worm Eating Warbler Helmitheros vermivorum	Breeding

What does IPaC use to generate the list of migratory bird species potentially occurring in my specified location?

Landbirds:

Migratory birds that are displayed on the IPaC species list are based on ranges in the latest edition of the National Geographic Guide, Birds of North America (6th Edition, 2011 by Jon L. Dunn, and Jonathan Alderfer). Although these ranges are coarse in nature, a number of U.S. Fish and Wildlife Service migratory bird biologists agree that these maps are some of the best range maps to date. These ranges were clipped to a specific Bird Conservation Region (BCR) or USFWS Region/Regions, if it was indicated in the 2008 list of Birds of Conservation Concern (BCC) that a species was a BCC species only in a particular Region/Regions. Additional modifications have been made to some ranges based on more local or refined range information and/or information provided by U.S. Fish and Wildlife Service biologists with species expertise. All migratory birds that show in areas on land in IPaC are those that appear in the 2008 Birds of Conservation Concern report.

Atlantic Seabirds:

Ranges in IPaC for birds off the Atlantic coast are derived from species distribution models developed by the National Oceanic and Atmospheric Association (NOAA) National Centers for Coastal Ocean Science (NCCOS) using the best available seabird survey data for the offshore Atlantic Coastal region to date. NOAANCCOS assisted USFWS in developing seasonal species ranges from their models for specific use in IPaC. Some of these birds are not BCC species but were of interest for inclusion because they may occur in high abundance off the coast at different times throughout the year, which potentially makes them more susceptible to certain types of development and activities taking place in that area. For more refined details about the abundance and richness of bird species within your project area off the Atlantic Coast, see the Northeast Ocean Data Portal. The Portal also offers data and information about other types of taxa that may be helpful in your project review.

About the NOAANCCOS models: the models were developed as part of the NOAANCCOS project: Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf. The models resulting from this project are being used in a number of decision-support/mapping products in order to help guide decision-making on activities off the Atlantic Coast with the goal of reducing impacts to migratory birds. One such product is the Northeast Ocean Data Portal, which can be used to explore details about the relative occurrence and abundance of bird species in a particular area off the Atlantic Coast.

All migratory bird range maps within IPaC are continuously being updated as new and better information becomes available.

Can I get additional information about the levels of occurrence in my project area of specific birds or groups of birds listed in IPaC?

Landbirds:

The Avian Knowledge Network (AKN) provides a tool currently called the "Histogram Tool", which draws from the data within the AKN (latest,survey, point count, citizen science datasets) to create a view of relative abundance of species within a particular location over the course of the year. The results of the tool depict the frequency of detection of a species in survey events, averaged between multiple datasets within AKN in a particular week of the year. You may access the histogram tools through the Migratory Bird Programs AKN Histogram Tools webpage.

The tool is currently available for 4 regions (California, Northeast U.S., Southeast U.S. and Midwest), which encompasses the following 32 states: Alabama, Arkansas, California, Connecticut, Delaware, Florida, Georgia, Illinois, Indiana, Iowa, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, New Hampshire, New Jersey, New York, North, Carolina, Ohio, Pennsylvania, Rhode Island, South Carolina, Tennessee, Vermont, Virginia, West Virginia, and Wisconsin.

In the near future, there are plans to expand this tool nationwide within the AKN, and allow the graphs produced to appear with the list of trust resources generated by IPaC, providing you with an additional level of detail about the level of occurrence of the species of particular concern potentially occurring in your project area throughout the course of the year.

Atlantic Seabirds:

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAANCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Facilities

Wildlife refuges

Any activity proposed on National Wildlife Refuge lands must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGES AT THIS LOCATION.

Fish hatcheries

THERE ARE NO FISH HATCHERIES AT THIS LOCATION.

Wetlands in the National Wetlands Inventory

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

This location overlaps the following wetlands:

FRESHWATER EMERGENT WETLAND
- PEM1E

FRESHWATER FORESTED/SHRUB WETLAND
- PFO4E
- PFO1E

FRESHWATER POND
- PUBHh

A full description for each wetland code can be found at the National Wetlands Inventory website: https://ecos.fws.gov/ipac/wetlands/decoder

Data limitations

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

Data exclusions

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

Data precautions

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local

RHODE ISLAND
DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
235 Promenade Street, Providence, RI 02908-5767 TDD 401-222-4462

December 22, 2015

Algonquin Gas Transmission, LLC
Mike J. Dirrane, Director Marketing
890 Winter Street
Waltham, MA 02451

Re: Application No. 15-0239 in reference to the location below:

Approximately 500 feet west and south of Algonquin Road and approximately 1,000 feet southwest of its intersection with Wallum Lake Road, Assessor's Plat No. 135, Lot No. 002, Plat 137, Lot Nos. 002 and 003 and Assessor's Plat 153, Lot Nos. 001 and 002, Burrillville, RI.

Dear Mr. Dirrane:

Kindly be advised that the Department of Environmental Management's Freshwater Wetlands Program ("Program) is unable to complete our review of your application at this time. The enclosed review comments indicate what must be revised and/or provided so that we may continue to process your application. Please provide this information as soon as possible. If the application you filed is a Request for a Preliminary Determination or an Application to Alter, you must provide this information within (1) one year of the date of this letter. Please be advised that if we do not receive the requested information within the applicable time frame, your application will be closed pursuant to the Rules and Regulations Governing the Administration and Enforcement of the Freshwater Wetlands Act.

Please reference the application number provided above in all communications regarding your application. If you have any questions or require clarification of any enclosed comments, please call Nancy Freeman at (401) 222-6820, ext. 7408.

Please note that this letter should not be interpreted as a permit to alter wetlands, or as any indication that a permit for a project will ultimately be granted. The enclosed comments are intended to obtain additional information so that we are able to complete our review of your application.

Thank you in advance for your anticipated cooperation in addressing the enclosed comments.

Sincerely,

Charles A. Horbert, Permitting Supervisor
Office of Water Resources
Freshwater Wetlands Program
CAH/NLF/nlf

Enclosure: Review comments

xc: Craig Wood, PWS, ESS Group, Inc.
Alexander H. Patterson, ESS Group, Inc.

RHODE ISLAND DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
OFFICE OF WATER RESOURCES
FRESHWATER WETLANDS PROGRAM

Technical Review Comments of Documents Received by RI DEM on November 4, 2015

APPLICANT: Algonquin Gas Transmission, LLC

APPLICATION NO: 15-0239

DATE: December 22, 2015

BIOLOGIST REVIEW COMMENTS: Additional wetland was observed beyond the delineated edge in a few areas, which are described and enumerated below. Please note that some corrections have been provided for individual flag locations. However, other revisions encompass more than one flag. I have noted these general areas per flag sequence. These areas of additional wetland observed range from approximately 10-50 feet beyond the wetland edge. Please re-inspect the areas identified below and re-flag and survey locate additional wetland onto revised site plans. If you choose, please contact me to arrange a site meeting to facilitate the verification process. Based on the extent of wetlands present and the characteristics of some of the wetlands on-site, a site meeting with your consultant would likely expedite the review. Please address the following:

Wetland 1 (Sheets 6, 8, 9, 10 and 12):

1. Additional wetland observed beyond the flagged edge between Flags 1-27a and 1-29a2 (Sheet 9 of 12);
2. Flag 1-30a should connect to 132a ,omitting 131-a (Sheet 9 of 12);
3. Additional wetland observed beyond the flagged edge between 1-32a2 and 1-33c (Sheet 9 of 12);
4. Additional wetland observed beyond the flagged edge between flags 1-35a through 1-138a and 1-40d2 through 142d (Sheet 9 of 12);
5. Add a flag 20 feet west of 1-12c (Sheet 9 of 12);
6. Additional wetland was observed beyond the flagged edge between 1-034b and 1-32 (Sheets 9 and 10 of 12).
7. Omit Flag 1-31 and connect 1-30 to 1-32 (Sheet 10 of 12);
8. Flags 1a-1 through 1a-6 (swamp remnant west of cart path). Add a flag 20 feet southwest of Flag 1a-6 and connect to 1a-7 (Sheet 10 of 12).
9. Please Add a flag 15 feet south, half way between 1-38b and 1-38b2 (Sheet 8 f 12);
10. Re-flag additional wetland to beyond Flags 1-42a2 through 1-45a. The swamp extends up a seepage slope to the west of the stonewall where a pocket of wetland is present. (Sheet 8 of 10);
11. Relocate Flag 1-50a, 12 feet west (Sheet 8 of 10).

Wetland 2 (Sheets 5, 6, 7 and 8):

12. Between Flags 2-31 and 2-34 (Sheet 8 of 12) there is additional swamp beyond the flagged edge. Please re-flag to encompass additional wetland.
13. Add an additional flag approximately 25 feet south/southwest of Flag 2-54 and then connect back to 2-55 (Sheet 7 of 12).

Wetland 3 (Sheet 2):

14. Omit Flags 3-23 through 3-26. The wetland edge trends to the northeast from Flag 3-27.

CONCLUDING COMMENTS:

1. Please submit two (2) sets of revised site plans.

2. If you have any questions regarding this letter or the processing of your application, or with respect to any of the above-noted biological review comments, please contact Nancy Freeman at 401-222-6820, extension 7408.

Thank you for your anticipated cooperation in this matter.

RHODE ISLAND
DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
235 Promenade Street, Providence, RI 02908-5767 TDD 401-222-4462

January 28, 2016

Algonquin Gas Transmission, LLC
Michael J. Dirrane, Director Marketing
890 Winter Street
Waltham, MA 02451

RE: Application No. 15-0239 in reference to the property located:

Approximately 500 feet west and south of Algonquin Road and approximately 1,000 feet southwest of its intersection with Wallum Lake Road, Assessor's Plat No. 135, Lot No. 002, Plat 137, Lot Nos. 002 and 003 and Assessor's Plat 153, Lot Nos. 001 and 002, Burrillville, RI

Dear Mr. Dirrane:

Kindly be advised that the Department of Environmental Management's ("DEM") Freshwater Wetlands Program ("Program") has completed its review of your **Request to verify the delineated edge of freshwater wetlands**. This review included an inspection of the above referenced property ("subject property") as described by the site plans submitted with your application and received on January 12, 2016.

Based upon the Program's observations and review, it is our determination that freshwater wetlands are present on or are in close proximity to the subject property. These freshwater wetlands are regulated by this Department and include, but are not limited to, at least the following types:

- Swamps and associated 50-foot Perimeter Wetland (that area of land within 50 feet of the edge of any bog, marsh, swamp, or pond)
- Forested Wetlands
- Rivers (unnamed tributaries to Dry Arm Brook), 100-foot Riverbank Wetland (that area of land within one hundred feet (100') of the edge of any flowing body of water having a width of less than ten feet (10') during normal flow) and Floodplain
- River (Iron Mine Brook), 200-foot Riverbank Wetland (that area of land within two hundred feet (200') feet of the edge of any flowing body of water having a width of ten feet (10') or more) and Floodplain
- Stream(s) with 100-foot Riverbank Wetland and Floodplain
- Area(s) Subject to Storm Flowage (ASSF channels)

The DEM has completed an inspection and review of the requested wetland edges delineated by you on-site. It is our determination that:

The wetland edges delineated on-site are accurate. These requested wetland edges have been shown on the site plans in red submitted with your application and are referenced below by a brief description of the general locus of the verified delineated edges and the corresponding flag number sequence:

Wetland 1: Delineated swamp edge south and east of the existing dirt cart path ("woods road") on Sheets 8, 9, 10 and 12, starting at Wallum Lake Road:

1. Flags 1-1 through 1-52a, including flag nos. 1-34, 1-34a through 1-34c, 1-16c though 1-1c/1-37, 1-38a, 1-38b, 1-38b1, 1-38b2, 1-39a through142a, 142a2, 1-43a to 1-50a, 150a2, 151a to 1-52a.

Wetland 1: Delineated swamp edge north and west of the woods road on Sheets 6, 8, 9 and 10:

1. Flags 1-18 through 1-33, including flag nos. 1-18 through 1-29, 1-29a, 1-30 through 1-33, delineating a fringe of swamp along stream corridor near Wallum Lake Road on Sheet 10.
2. Flags 1a-1 through 1a-7 (patch of swamp north of the woods path culverted to the other side, Sheet 10).
3. Flags 1-16a through 1-42d, including flag nos. 1-16a through 122a, 123, 1-24a through 1-26a2, 1-26a, 1-27a, 1-28a2, 1-28a, 1-29a2, 1-29a, 1-30a2, 1-30a, 1-31a, 1-32a2, 1-32a, 1-33a, 1-33b, 1-33c, 1-33d, 1-34a, through 1-37a, 1-37a1, 1-37a2, 1-37a3, 1-37a4, 1-37a5, 1-37a6, 1-37a7,1-38a, 1-39a, 1-39a2 to 1-40d, 1-40d1a, 1-40d1, 1-40d2, 1-4d3,1-40d4,1-41d, 1-42d verified on Sheets 6 and 9.
4. Forested Wetland: Flags 1b-1 through 1b-5 (Sheet 8).

Wetland 2: Delineated Swamp edge (Sheets 3, 4, 5, 6, 7, 8) - further west from Wetland 1

1. Flags 2-2a through 2-2e and 2-1a through 2-1g (small fringe of swamp along portions of maintained right-of-way (ROW) associated with a stream (Sheet 3).
2. Flags 2-95, 2-96g through 2-96a, 2-97 through 2-100 (Sheets 3 and 4).
3. Flags 2-69 through 2-75 (Sheets 3 and 4).
4. Flags 2-2 through 2-34, including 2-2 through 2-25, 2-25a, 2-25b, 2-26, 2-27, 2-27a, 2-27b, 2-28 through 2-32, 2-32a, 2-33, 2-33a, 2-34 on Sheets 5, 7 and 8.
5. Wetland 2 (western portion of edge opposite the above sequence) flags 2-42 through 2-57, including Flags 2-42 through 2-53, 2-53a, 2-54, 2-54a, 2-55 through 2-57 on Sheets 5 and 7.

Wetland 3: Delineated Forested Wetland edge: Flag Nos. 3-1 through 3-4 and 3-27 through 3-32.

Wetland 4: Delineated Forested Wetland edge: Flags 4-1 through 4-11.

Please note that our inspection of the subject property has revealed the presence of other freshwater wetlands not specifically delineated by you. Therefore, you should not infer that any verification of wetland edges carried out by this Department to date represents a determination that this is the extent of all wetlands on your property. The Department has verified only those requested edges delineated and shown by you on-site and on site plans submitted with your application and as qualified in this letter. Should you wish to verify the edge of these additional wetlands, an additional application will be required. Please note that an ASSF (not depicted) flows down the woods path into Wetland 2 near Flag 2-74.

This letter <u>does not</u> constitute an approval or permit for any proposed project on the subject property. Pursuant to Section 2-1-21(a) of the Freshwater Wetlands Act and the Rules and Regulations Governing the Administration and Enforcement of the Freshwater Wetlands Act (Rules) a permit is required from this Program prior to the commencement of any activity which impacts or alters freshwater wetlands.

This Program assumes that the edges of freshwater wetlands, as flagged or marked on site, have been accurately surveyed and portrayed on site plans submitted in support of your application. This Program makes no guarantee or representation that such survey is accurate.

In addition, you should note that freshwater wetlands are present on this property which may be regulated under Section 404 of the Clean Water Act (Federal Water Pollution Control Act, as amended 33 U.S.C. 1344). Accordingly, a permit may be required from the U.S. Army Corps of Engineers for alteration of these wetland areas.

In accordance with Rule 8.03(H) of the Rules, this verification of the delineated edge of freshwater wetlands is valid for a limited period of four (4) years from the date of issue. **You are hereby advised** that on July 10, 2015, significant revisions to the RI Freshwater Wetlands Act (R.I.G.L. Section 2-1-18 *et. seq.*) were signed into law. These revisions modify, among other things, the "jurisdictional areas" recognized by the State of Rhode Island. The Department is currently in the process of amending the Rules. If you are contemplating a project on your property, and submit the application prior to the promulgation of the revised Rules, you can expect the wetlands jurisdictional areas to correspond as described in this verification letter.

Any application submitted after promulgation of the Rules will be expected to conform to the then existing and duly promulgated Rules. While these changes will not affect the location of flagged wetland edges as verified in this letter, they may affect how activities located in adjacent jurisdictional upland areas will be regulated. You are advised, in the meantime, to monitor the rulemaking process, which will include opportunities for public input and comment.

Please contact me at telephone: (401-222-6820, ext. 7408) should you have any questions regarding this letter.

Sincerely,

Nancy L. Freeman

Nancy L. Freeman, Senior Environmental Scientist
Office of Water Resources
Freshwater Wetlands Program
NLF/nlf

xc: Craig Wood, PWS, ESS Group, Inc.
Alexander H. Patterson, ESS Group, Inc.

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
HISTORICAL PRESERVATION & HERITAGE COMMISSION
Old State House • 150 Benefit Street • Providence, R.I. 02903-1209
TEL (401) 222-2678 FAX (401) 222-2968
TTY / Relay 711 Website www.preservation.ri.gov

28 June, 2016

Christopher Donta
Gray & Pape, Inc.
60 Valley Street, Suite 103
Providence RI 02909

Re: Phase I and Phase II Archeological Survey
Clear River Energy Center, Invenergy LLC, Burrillville, RI

Dear Mr. Donta,

The Rhode Island Historical Preservation and Heritage Commission has reviewed the results of the Phase I archaeological identification surveys and the Phase II archaeological site examination of the Iron Mine Brook Dune Site (RI 2757) conducted by Gray & Pape. The survey resulted in the discovery of several artifact scatters, both historic and Native American, in the Power Block, Frontage, and PUD Well Site survey areas, a Native American site (the Iron Mine Brook Dune Site) and one historic site (a nineteenth-century structure location).

We agree with your assessment that the artifact scatters do not constitute significant cultural resources; no further archaeological investigation of them is warranted. We further agree that, based on the results of the Phase II archaeological survey, the Iron Mine Brook Dune Site is not eligible for listing on the National Historic Places, but that the historic foundation located during the Phase I survey (assigned RI 2758) is a potentially significant cultural resource. In as much as the project proponent plans to avoid RI 2758, the Clean River Energy Center will not affect it.

The RIHPHC therefore concludes that unless this project's construction impacts change, the construction of the Clear River Energy Center will have no effect on any significant cultural resources (those listed on or eligible for listing on the National Register of Historic Places).

These comments are provided in accordance with Section 106 of the National Historic Preservation Act. If you have any questions, please contact Charlotte Taylor, Senior Archaeologist at this office.

Very truly yours,

Edward F. Sanderson
Executive Director
State Historic Preservation Officer

Cc: Todd Bianco, Rhode Island Energy Facility Siting Board
John Brown, NTHPO

160628.01

Appendix I

Wetland Functional Evaluation Forms

Wetland Function-Value Evaluation Form

Total area of wetland 35 Human made? No Is wetland part of a wildlife corridor? Yes or a "habitat island"? No

Adjacent land use Residential, Mixed Deciduous Forest, Industrial Distance to nearest roadway or other development 5 ft.

Dominant wetland systems present PFO1E Contiguous undeveloped buffer zone present Yes

Is the wetland a separate hydraulic system? No If not, where does the wetland lie in the drainage basin? Upper

How many tributaries contribute to the wetland? 1 Wildlife & vegetation diversity/abundance (see attached list)

Wetland I.D. Wetland 1

Latitude 41.966798 Longitude -71.752007

Prepared by: JB Date 6/28/2016

Wetland Impact:
Type _____ Area _____

Evaluation based on:
Office [X] Field [X]

Corps manual wetland delineation completed? Y [X] N [ ]

Function/Value	Suitability Y	Suitability N	Rationale (Reference #)*	Principal Function(s)/Value(s)	Comments
Groundwater Recharge/Discharge	X		1,4,5,7,9,11,12,15	X	wetland is upstream from designated groundwater recharge areas, aquifer, and WHPA
Floodflow Alteration	X		1,2,5,6,7,10,11,13,14,15,18	X	wetland is upstream of downtown Pascoag, which has some floodplain development
Fish and Shellfish Habitat	X		1,2,4,8.10,11,14.16,17	X	~1 mile upstream of Wilson Reservoir, perennial stream bisects wetland
Sediment/Toxicant Retention	X		3,4,6,7,8,10,13,14,16	X	some clayey loams exist, dense vegetation and perennial stream have sediment trapping potential
Nutrient Removal	X		1-3, 7-14	X	wetland has high potential for nutrient attenuation
Production Export	X		1,2,4,6, 7,10,12	X	wetland has high potential for primary and secondary production
Sediment/Shoreline Stabilization	X		6-7, 12-15		wetland provides bank and sediment stabilization to Iron Mine Brook
Wildlife Habitat	X		1-8,10,11,13,15,17-19,21	X	designated by RIDEM as a wildlife corridor and contiguous forest patch >500 acres
Recreation		X	5, 6		wetland is located on private property and access is restricted
Educational/Scientific Value		X	2, 4-5		wetland is located on private property and access is restricted
Uniqueness/Heritage		X			wetland is located on private property and access is restricted
Visual Quality/Aesthetics		X	8		wetland is located on private property and access is restricted
ES Endangered Species Habitat		X			no endangered species present during surveys
Other					

Notes:

* Refer to backup list of numbered considerations.

Wetland Function-Value Evaluation Form

Total area of wetland 103 ac Human made? No Is wetland part of a wildlife corridor? Yes or a "habitat island"? No

Adjacent land use Residential, Mixed Deciduous Forest, Industrial Distance to nearest roadway or other development crosses transmission line

Dominant wetland systems present PFO4, PF01E Contiguous undeveloped buffer zone present Yes

Is the wetland a separate hydraulic system? No If not, where does the wetland lie in the drainage basin? Upper

How many tributaries contribute to the wetland? 2 Wildlife & vegetation diversity/abundance (see attached list)

Wetland I.D. Wetland 2

Latitude 41.96729 Longitude -71.75972

Prepared by: JB Date 6/29/2016

Wetland Impact:
Type _____ Area _____

Evaluation based on:
Office [X] Field [X]

Corps manual wetland delineation completed? Y [X] N [ ]

Function/Value	Suitability Y	Suitability N	Rationale (Reference #)*	Principal Function(s)/Value(s)	Comments
Groundwater Recharge/Discharge	X		1,4,5,7,9,11,12,15	X	wetland is upstream from designated groundwater recharge areas, aquifer, and WHPA
Floodflow Alteration	X		1,2,5,6,7,10,11,13,14,18	X	wetland is upstream of downtown Pascoag, which has some floodplain development
Fish and Shellfish Habitat	X		1,2,4,8.10,11,14-17		~1 mile upstream of Wilson Reservoir, perennial stream bisects wetland
Sediment/Toxicant Retention	X		3,6,7,8,9,10,13,14,16	X	dense vegetation and perennial stream have sediment trapping potential
Nutrient Removal	X		1-3, 8-14	X	wetland has potential for nutrient attenuation
Production Export	X		1,2,4,6, 7,10,12	X	wetland has high potential for primary and secondary production
Sediment/Shoreline Stabilization	X		6-7, 12-15		wetland provides bank and sediment stabilization to Dry Arm Brook
Wildlife Habitat	X		1-9,11,13,14,15,17-19,21	X	Designated by RIDEM as a wildlife corridor and contiguous forest patch >500 acres
Recreation		X	5-6		wetland is located on private property and access is restricted
Educational/Scientific Value		X	2, 4-5		wetland is located on private property and access is restricted
Uniqueness/Heritage		X			wetland is located on private property and access is restricted
Visual Quality/Aesthetics		X	8		wetland is located on private property and access is restricted
ES Endangered Species Habitat		X			no endangered species present during surveys
Other					

Notes:

* Refer to backup list of numbered considerations.

Wetland Function-Value Evaluation Form

Total area of wetland 3 Human made? No Is wetland part of a wildlife corridor? No or a "habitat island"? No

Adjacent land use Residential, Mixed Deciduous Forest, Transmission Line Distance to nearest roadway or other development 500 ft.

Dominant wetland systems present PFO1E Contiguous undeveloped buffer zone present Yes

Is the wetland a separate hydraulic system? Yes If not, where does the wetland lie in the drainage basin?

How many tributaries contribute to the wetland? None Wildlife & vegetation diversity/abundance (see attached list)

Wetland I.D. Wetland 3

Latitude 41.968307 Longitude -71.765734

Prepared by: JB Date 6/29/2016

Wetland Impact:
Type Area

Evaluation based on:
Office [X] Field [X]

Corps manual wetland delineation completed? Y [X] N [ ]

Function/Value	✓ Suitability Y	N	Rationale (Reference #)*	Principal Function(s)/Value(s)	Comments
Groundwater Recharge/Discharge	X		1-2, 4-6		wetland is small but has some groundwater recharge potential
Floodflow Alteration	X		5-6, 8-9, 18		wetland has some flood storage capacity
Fish and Shellfish Habitat		X			no open water habitat
Sediment/Toxicant Retention		X			wetland is small and does not appear to have major sources of sediment
Nutrient Removal		X			wetland is small and does not appear to have major sources of nutrients
Production Export		X			does not appear to have high potential for export
Sediment/Shoreline Stabilization		X			no open water shorelines associated with wetland
Wildlife Habitat	X		1, 3-5, 7,8,11,13,15, 19, 21	X	wetland is small but located within a large unfragmented forest (>500 acres)
Recreation		X			Wetland is located on private property and access is restricted
Educational/Scientific Value		X			wetland is located on private property and access is restricted
Uniqueness/Heritage		X			wetland is located on private property and access is restricted
Visual Quality/Aesthetics		X			wetland is located on private property and access is restricted
ES Endangered Species Habitat		X			no endangered species present during surveys
Other					

Notes:

* Refer to backup list of numbered considerations.

Wetland Function-Value Evaluation Form

Total area of wetland 0.29 Human made? No Is wetland part of a wildlife corridor? No or a "habitat island"? No

Adjacent land use Residential, Mixed Deciduous Forest, Transmission Line Distance to nearest roadway or other development 1250 ft.

Dominant wetland systems present PFO1E Contiguous undeveloped buffer zone present Yes

Is the wetland a separate hydraulic system? Yes If not, where does the wetland lie in the drainage basin?

How many tributaries contribute to the wetland? None Wildlife & vegetation diversity/abundance (see attached list)

Wetland I.D. Wetland 4

Latitude Longitude

Prepared by: JB Date 6/29/2016

Wetland Impact:
Type Area

Evaluation based on:
Office X Field X

Corps manual wetland delineation completed? Y N

Function/Value	✓ Suitability Y	N	Rationale (Reference #)*	Principal Function(s)/Value(s)	Comments
Groundwater Recharge/Discharge	X		1-2, 4-6		wetland is small but has some groundwater recharge capacity
Floodflow Alteration	X		5-6, 8-9, 18		wetland is small and does not appear to hold standing water during most of the season
Fish and Shellfish Habitat		X			no open water habitat
Sediment/Toxicant Retention		X			wetland is small and does not appear to have major sources of sediment
Nutrient Removal		X			wetland is small and does not appear to have major sources of nutrients
Production Export		X			does not appear to have high potential for export
Sediment/Shoreline Stabilization		X			no open water shorelines associated with wetland
Wildlife Habitat	X		1, 3-5, 7,8,11,13,15, 19, 21	X	wetland is small but located within a large unfragmented forest (>500 acres)
Recreation		X			Wetland is located on private property and access is restricted
Educational/Scientific Value		X			wetland is located on private property and access is restricted
Uniqueness/Heritage		X			wetland is located on private property and access is restricted
Visual Quality/Aesthetics		X			wetland is located on private property and access is restricted
ES Endangered Species Habitat		X			no endangered species present during surveys
Other					

Notes:

* Refer to backup list of numbered considerations.

Appendix J

Stormwater Management Plan for Clear River Energy Center

For Appendix J, please see the separately bound volume entitled *Stormwater Management Plan for Clear River Energy Center* included with the filing of this application.

Appendix K

Stormwater Management Plan for Burrillville Interconnection Project

For Appendix K, please see the separately bound volume entitled *Stormwater Management Plan for Burrillville Interconnection Project* included with the filing of this application

Appendix L

Right-of-Way Access, Maintenance, and Construction Best Management Practices

SCOPE: This specification provides Environmental Procedures and Best Management Practices (BMPs) for work on electric and natural gas transmission and distribution rights-of-way (ROWs), fee-owned and easement, cross-country, and public/private roadways, as well as substations, company facilities and on customer-owned projects, and other facilities in New England.

Note that project-specific permits may have other BMPs/constraints that differ from this Environmental Guidance (EG). The projects shall be constructed in accordance with the project-specific permits and this specification. For maintenance work in New Hampshire, there is a state specific BMP manual which supersedes EG-303NE, where applicable[1]. For work in Vermont, there is a state specific BMP manual which may supersede EG-303NE, where applicable[2]. The Massachusetts Runoff, Erosion & Sedimentation Control Field Guide published by the Massachusetts Association of Conservation Commissions (MACC) is incorporated herein as a reference. The MACC Guide is intended as a supplement to EG-303NE and shall be superseded by EG-303NE in the case of an inconsistency or conflict.

PURPOSE: The purpose of this specification is to provide National Grid personnel, consultants and contractors with BMPs to support work that is protective of the environment and that complies with all applicable environmental laws, regulations and company policies and procedures. Environmental policies require the Company to avoid, minimize and mitigate negative impacts to the environment.

POLICY: These BMPs are to be effectively and consistently followed by all personnel accessing Company facilities, ROWs, and customer projects for inspection, maintenance and construction work purposes.

If there are any questions on this guidance, contact the local or project National Grid Environmental Scientist.

These BMPs do not apply to Company employees and contractors performing routine vegetation management activities that are not part of a construction or maintenance project. Employees and contractors maintaining vegetation on Company ROWs and substations shall follow the National Grid Right-of-Way Vegetation Management Plan; Right-of-Way Vegetation Management Specification; Substation, Switch Yard, and Pole Yard Vegetation Management Specification; and Right-of-Way Vegetation Mowing Specification. For more information regarding routine vegetation management, please contact a National Grid Forester.

[1] The "Best Management Practices Manual For Utility Maintenance In And Adjacent To Wetlands and Waterbodies in New Hampshire"

[2] Vermont DEC, 2006. The Vermont Standards and Specifications for Erosion Prevention and Sediment Control.

APPLICABLE REGULATIONS: Refer to Applicable Regulations in state-specific EG-301 documents.

CONTACTS: If there are any questions on this guidance, contact the National Grid Environmental Scientist.

1.0 Definitions

Refer to **Glossary in Appendix 1** and **Acronyms in Appendix 2**.

2.0 Project Planning

Prior to the start of any project (proposed new facilities or maintenance of existing facilities), the Project Engineer or other project planner shall determine whether any environmental permits or approvals are required, per the state-specific EG-301 environmental checklists. Any questions regarding which activities may be conducted in regulated areas or within environmentally sensitive areas shall be referred to the National Grid Environmental Scientist or Project Environmental Consultant

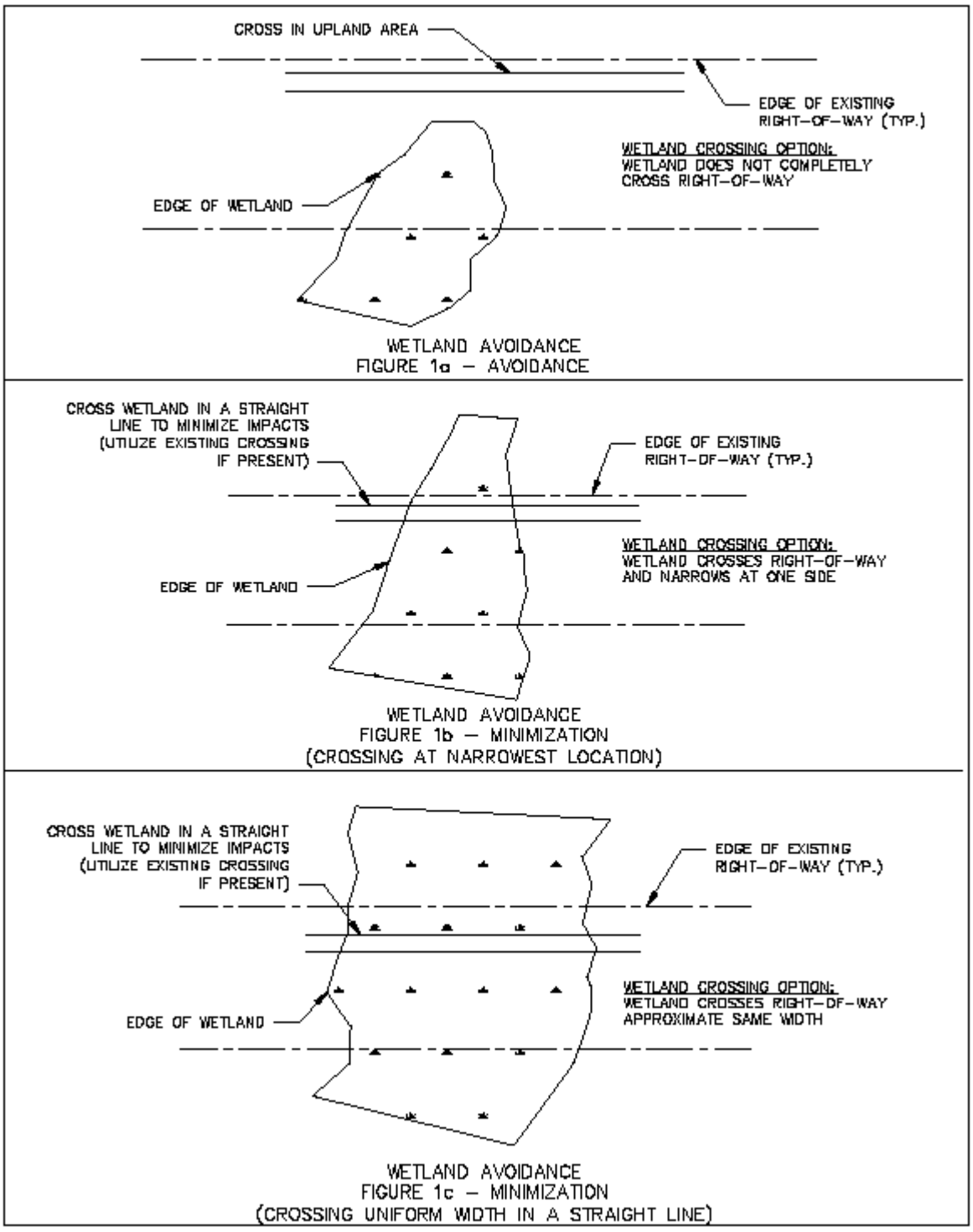
All new construction and maintenance projects shall follow clear and enforceable environmental performance standards, which is the purpose for which these BMPs have been compiled.

2.1 Avoidance and Minimization

Measures shall always be taken to avoid impacts to wetlands, waterways, rare species habitats, known below and above ground historical/archeological resources and other environmentally sensitive areas. If avoidance is not possible, then measures shall be taken to minimize the extent of impacts. Alternate access routes or staging areas shall always be considered. Below is a list of methods that shall be considered where impacts are unavoidable:

- Use existing ROW access where available. Keep to approved routes and roads without deviating from them or making them wider.
- Off-ROW access shall never be assumed and shall be coordinated through National Grid Real Estate before being implemented.
- Where no existing ROW access is present, avoid wetlands and if a wetland crossing is necessary, cross wetlands at the most narrow point possible or at the location of a previously used crossing (if evident). Figure 1 below illustrates this minimization technique.
- Avoid and minimize stream crossings;
- Minimize the width of typical access roads through wetlands to a maximum width of 16 feet;
- Conduct work manually (without using motorized equipment) in wetlands, wherever possible;

- Use swamp, timber, or similar mats in wetlands to minimize soil disturbance and rutting when crossing or working within wetlands. When not using mats for access, standard vehicles shall not be allowed to drive across wetlands without the prior approval of the National Grid Environmental Scientist. Use of a low ground pressure (LGP) vehicle may be a feasible alternative to mats provided that such LGP vehicle use has been reviewed and approved by the National Grid Environmental Scientist. See Section 8.5.
- Coordinate the timing of work to cause the least impacts during the regulatory low-flow period under normal conditions, when water/ground is frozen, after the spring songbird nesting season, and, outside of the anticipated amphibian migration window (mid-February to mid-June). The United States Army Corps of Engineers (USACE) defines the low-flow period as July 1 through August 30 in MA, July 1 through October 1 in RI, July 1 through October 1 in NH, and July 1 through October 1 in VT.
- Seek alternative routes or work methods to minimize impact.


CROSS IN UPLAND AREA
EDGE OF EXISTING RIGHT-OF-WAY (TYP.)
WETLAND CROSSING OPTION:
WETLAND DOES NOT COMPLETELY CROSS RIGHT-OF-WAY
EDGE OF WETLAND
WETLAND AVOIDANCE
FIGURE 1a – AVOIDANCE
CROSS WETLAND IN A STRAIGHT LINE TO MINIMIZE IMPACTS (UTILIZE EXISTING CROSSING IF PRESENT)
EDGE OF EXISTING RIGHT-OF-WAY (TYP.)
WETLAND CROSSING OPTION:
WETLAND CROSSES RIGHT-OF-WAY AND NARROWS AT ONE SIDE
EDGE OF WETLAND
WETLAND AVOIDANCE
FIGURE 1b – MINIMIZATION
(CROSSING AT NARROWEST LOCATION)
CROSS WETLAND IN A STRAIGHT LINE TO MINIMIZE IMPACTS (UTILIZE EXISTING CROSSING IF PRESENT)
EDGE OF EXISTING RIGHT-OF-WAY (TYP.)
WETLAND CROSSING OPTION:
WETLAND CROSSES RIGHT-OF-WAY APPROXIMATE SAME WIDTH
EDGE OF WETLAND
WETLAND AVOIDANCE
FIGURE 1c – MINIMIZATION
(CROSSING UNIFORM WIDTH IN A STRAIGHT LINE)

2.2 Historically Significant Areas

Areas that have been identified as historically and/or culturally significant shall be avoided in accordance with site-specific avoidance plans, as applicable. Refer to the project-specific Environmental Field Issue (EFI) for any applicable avoidance plans or consult with the National Grid Environmental Scientist. Demarcation of these areas to be avoided shall use staked orange snow fencing or an equivalent physical barrier (not just ribbon flagging) and signage. Refer to Section 16.0 for signage guidance.

2.3 Rare Species Habitat

Work within areas that have been identified as mapped rare species habitat shall follow site-specific requirements, as applicable. In Massachusetts, maintenance activities within mapped habitat (known as Priority Habitat of Rare Species) shall follow the BMPs outlined in the Natural Heritage Endangered Species Program (NHESP)-approved National Grid Operation and Maintenance Plan. Work in mapped rare species habitat may require, at a minimum, turtle training for crews and sweeps of work areas for turtles, botanist identification of rare plant locations and avoidance of these locations, and protection of vernal pools, all prior to the start of work. Demarcation of these areas to be avoided (e.g., rare plant populations, overwintering turtles, nests) shall use staked orange snow fencing or an equivalent physical barrier (not just ribbon flagging) and signage. Refer to Section 16.0 for signage guidance.

Other requirements may apply in NH, VT and RI. Refer to the project-specific EFI for any applicable measures or consult with the National Grid Environmental Scientist.

2.4 Meetings

Pre-permitting meetings shall take place early in the project development process to determine what permits are triggered by the proposed work and the timeline required for permitting. During these meetings, the team shall develop access plans and BMPs to be used during construction of the project.

Field / Constructability review meetings shall take place on-site to evaluate construction site access and job site set-up, to ensure that the project can proceed as permitted. It is at this point in time where work areas, pulling locations, laydown areas, parking areas, and equipment storage areas are evaluated and located. Off-ROW areas under consideration should be included in this discussion.

Prior to submitting permit plans to regulatory authorities, the construction group (contractor or National Grid) shall review the plans for final sign off.

Pre-construction meetings are typically held prior to the commencement of all work to appoint responsible parties, discuss timing of work, and further consider options to avoid and/or minimize impacts to sensitive areas. These meetings can occur on- or off-site and shall include all the willing and available stakeholders (i.e., utility employees, contractors, consultants,

inspectors, and/or monitors, and regulatory personnel). Training of crews and supervisors of the EFI, Stormwater Pollution Prevention Plan (SWPPP), rare species, and other permit requirements shall be conducted at a pre-construction meeting.

Pre-job briefings shall be conducted daily or otherwise routinely scheduled meetings shall be conducted on-site with the work crew throughout the duration of the work. These meetings are a way of keeping everyone up to date, confirming there is consensus on work methods and responsibilities, and ensuring that tasks are being fulfilled with as little impact to the environment as possible.

The Project Environmental Scientist/Monitor and Construction Project Manager shall communicate regularly (e.g. weekly or bi-weekly meetings or phone conversations) to discuss the work completed since last communication (i.e. work locations, wetland impacts, equipment used, and unexpected delays or work conditions). These meetings or calls shall include the expected schedule of construction for the upcoming week, the long term construction plans, and planned methods for working near/in wetlands. Both the Project Environmental Scientist/Monitor and Construction Project Manager shall work together so the Project complies with all environmental permits and regulations. When changes to the Project scope or agreed work plan are proposed they shall be done so with the final approval of the National Grid Environmental Scientist.

2.5 Communication of Project Specific Environmental Requirements

Project specific environmental concerns, to include sensitive resources, permits, approved access and time-of-year or other restrictions, shall be communicated to the project team and be included as part of the Pre-Bid and Pre-Construction Meetings. Project specific requirements shall be communicated to the project manager/construction manager/engineering group using the following guidelines:

Environmental Field Issue – The EFI will be a full document consisting of narrative, project permits, access and matting plans. A table summarizing pertinent (but not all) permit conditions and the responsible party for those conditions shall be included in the EFI. Copies of all permits should be included as attachments. This will be prepared for most projects with multiple permits or large, complex projects (siting board, Section 404, 401 WQC, SWPPP). There should be EFI training at the pre-construction meeting. Appendix 3 is a sample EFI template.

Simplified Environmental Field Issue – The Simplified EFI is a memorandum containing environmental resources present, project permit(s), access and matting plans and a table summarizing relevant permit conditions and responsible party for those conditions. Copies of all permits should be included as attachments. The Simplified EFI will be prepared for most projects with 1 or 2 permits (Order of Conditions, S404 Cat 1). The Simplified EFI should also be provided for projects that have environmental resources present, but the scope of the project

does not trigger environmental permitting (e.g., the scope of work qualifies for maintenance exemption(s)). The resources present shall be discussed at the Pre-Bid and Pre-Construction meetings and any changes in scope will require additional review by the National Grid project team.

E-mail delivery of Permit and any Sediment/Erosion control or BMP plan – For those projects with only one permit (eg., MA Order of Conditions, RI DEM permit, RI CRMC permit, NH Utility Notification) or projects with a sediment & erosion control plan (local town requirement or for exempt maintenance work), a copy of the permit and any applicable plan will be emailed to the PM (and the project team where deemed necessary) to be incorporated into the Construction Field Issue.

STORMS work management system input – For STORMS work, no EFI is prepared unless multiple permits are required for the project (see guidance above). If only a MA Order of Conditions, MA Determination of Applicability, RI DEM permit, RI CRMC permit, RI SESC Approval, or NH Utility Notification is required, then the permit is attached in Documents tab and conditions noted in Remarks/comments section. Appendix 5 contains standard STORMS boilerplate language.

2.6 Timing of Work

Regulatory authorities may place seasonal or time-of-year restrictions on project construction elements. These time-of-year restrictions may be state or permit-specific, and shall be adhered to.

Work during frozen conditions. Activities conducted once wetland areas are frozen sufficient to minimize rutting and other impacts to the surrounding environment may be authorized by the National Grid Environmental Scientist. Work during this time also generally reduces disturbance of aquatic and terrestrial wildlife movement by avoiding sensitive breeding and nesting seasons. When not using mats for access, vehicles shall not be allowed to drive across wetlands without the prior approval of the National Grid Environmental Scientist.

Work during the regulatory low-flow period. Conducting work during the low-flow period can reduce impacts to surface water and generally avoids spawning and breeding seasons of aquatic organisms. If the water is above normal seasonal levels, adjustments to work activities and methods are required.

2.7 Alternate Access

2.7.1 Manual Access

In some cases such as for smaller projects, work areas can be accessed manually. This includes access on foot through upland and shallow wetland areas, access by boat through open water or ponded areas, and climbing of structures where possible. Smaller projects, such as repair of individual structures, or parts of structures, that do

not categorically require the use of heavy machinery, shall be accessed manually to the greatest extent practicable.

2.7.2 Use of Overhead/Aerial Access

Using helicopters can be expensive and is not always feasible, but it may be appropriate in some situations in order to get workers and equipment to a site that otherwise may be very difficult to access. The use of overhead and/or aerial equipment may be beneficial for work in areas where larger water bodies, deep crevices, or mountainous areas hinder ground access. The landing area for helicopters shall be reviewed for environmentally sensitive resources. Use of helicopters requires Project Manager and Senior Management approval.

3.0 Inspection, Monitoring and Maintenance

All construction practices and controls shall be inspected on a regular basis and in accordance with all applicable permits and local, state, and federal regulations to avoid and correct ANY damage to sensitive areas.

The construction crews shall be responsible for completing daily inspections, and IMMEDIATELY bring any **damage or observed erosion, or failed erosion controls** to the attention of the Person-In-Charge and the National Grid Environmental Scientist. Where applicable and/or as directed by environmental permits issued for the project, the Project Environmental Consultant shall conduct weekly (at a minimum) inspections of the project work areas and shall document their inspection using the Stormwater, Wetlands & Priority Habitat Environmental Compliance Site Inspection / Monitoring Report form found in Appendix 6 and issue the report within 24 hours. The Person-in-Charge shall work with the National Grid Environmental Scientist and the Project Environmental Consultant to determine when and how the repairs shall be made.

Project-specific Action Logs and Long-Term Restoration Logs are prepared as needed by the National Grid Environmental Scientist or the Project Environmental Consultant to track issues and/or repairs and assign responsible parties.

4.0 Best Management Practices

The BMP sections presented in this EG address access, construction, snow and ice management, structures in wetlands, access road maintenance and repair, clean-up and restoration standards, ROW gates, field refueling and maintenance operations, management of spills/releases, and a summary of key construction BMPs.

Note that BMPs shown on any permit drawings for a specific project may need to be revised and or supplemented during the execution of a project based on unforeseen or unexpected factors such as extreme weather or unknown subsurface conditions. It is the responsibility of the Contractor to work with the National Grid Environmental Scientist and/or the Project

Environmental Consultant to identify necessary changes and to ensure that construction-related impacts to wetlands, water bodies and other environmentally sensitive areas are avoided.

Any deviation from the approved Best Management Practices shown in the EFI and/or SWPPP plans shall be communicated immediately to the National Grid Environmental Scientist as it may require additional permitting or could result in a permit violation.

4.1 Wetland Boundary Demarcation

Prior to the start of any activity conducted under an environmental permit, wetland boundaries shall be reviewed. Flagging for wetland boundaries, stream banks and other resource areas shall be refreshed as needed. This may become particularly important when the original flagging was placed in previous seasons and now may have become obscured.

4.2 Sedimentation and Erosion Controls

Appropriate sedimentation and erosion control devices shall be installed at work sites, in accordance with permit conditions and/or regulatory approvals, and as needed to prevent adverse impacts to water resources and adjacent properties.

The overall purpose of such controls is to prevent and control the movement of disturbed soil and sediment from work sites to adjacent, undisturbed areas, and particularly to water resources, public roads and adjacent properties. All proprietary controls shall be installed per manufacturer's recommendations and specifications.

Appropriate sedimentation and erosion control devices include but are not limited to: silt fencing, straw bales, wood chip bags, straw wattles, compost socks, erosion control blankets, mulch, slope interruption practices, flocculent powder/blocks and storm drain/catch basin inlet protection. Such controls shall be installed between the work area and environmentally sensitive areas such as wetlands, streams, drainage courses, roads and adjacent property when work activities shall disturb soils and result in a potential for causing sedimentation and erosion.

Staked straw bales often serve as the demarcation of the limits of work and/or sensitive areas to be avoided. Work shall never be conducted outside the limit of erosion controls without prior approval from the National Grid Environmental Scientist.

Project plans depict proposed erosion controls, however field conditions may warrant additional practices be implemented (e.g., wet conditions, frozen conditions, poorly drained soils, steep slopes, materials used for work pads, transition areas to swamp mats, number of trips across work areas, etc.).

Any deviation from the approved erosion controls shown in the EFI and/or SWPPP plans needs to be communicated immediately to the National Grid Environmental Scientist as it may require additional permitting or result in a permit violation.

Appendix 7 provides typical sketches of common sedimentation and erosion controls. If a SWPPP is required for the project, maintenance and inspection of erosion controls shall follow the SWPPP requirements. Sedimentation and erosion controls shall be properly maintained and inspected on a periodic basis, until work sites are properly stabilized and restored. Inspections shall be documented using the Inspection Form "Storm Water, Wetlands & Priority Habitat Environmental Compliance Site Inspection/Monitoring Report" (**Appendix 6**).

The sequence and timing of the installation of sedimentation and erosion control measures is critical to their success. Sedimentation and erosion controls shall be installed prior to commencing construction activities that may result in any soil disturbance or cause otherwise polluted site runoff. Inspection of these devices may be required by the National Grid Environmental Scientist or by regulators prior to the start of work. The installation of water bars and other erosion control measures shall be installed shortly thereafter.

4.3 Concrete Wash Outs

Concrete wash outs shall be used for management of concrete waste. Concrete and concrete washout water shall not be deposited or discharged directly on the ground, in wetlands or waterbodies, or in catch basins or other drainage structures. Where possible, concrete washouts shall be located away from wetlands or other sensitive areas. Consult the National Grid Environmental Scientist on proposed concrete wash out locations prior to their use. Following the completion of concrete pouring operations, the wash outs shall be disposed of off-site with other construction debris. Refer to BMPs in Appendix 7.

4.4 Construction Activities in Standing Water

The use of silt curtains or turbidity barriers may be required when working in or adjacent to standing water such as ponds, reservoirs, low flowing rivers/streams, or coastal areas. Silt curtains and turbidity barriers prevent sediment from migrating beyond the immediate work area into the resource areas.

Coffer dams constructed using sheet piling or large sandbags (Trade names such as "the Big Bag" or "DamItDams") may be used to temporarily isolate and contain a work area in standing water.

When working in standing water, an oil absorbent boom, in addition to a silt curtain or other temporary barrier, shall be placed around the work area for spill prevention.

Work in drinking water reservoirs or other waters may require extensive regulatory agency review, even for maintenance work, which could result in additional time required for permitting, review and material procurement prior to the start of work.

4.5 Dewatering

Where excavations require the need for dewatering of groundwater or accumulated stormwater, the water shall be treated before discharge. Appropriate controls include dewatering basins, flocculent blocks, filter bags, filter socks, or weir tanks. Schematics of these BMPs are included as in Appendix 7. Water trucks or fractionation tanks may be utilized if watertight containers are desired for controlled on-site discharge or for off-site discharge into an approved dewatering area when site restrictions make it difficult to utilize other dewatering methods on-site. Dewatering discharge water shall never be directed into wetlands, streams/rivers, other sensitive resource areas, catch basins, other stormwater devices, or substation Trenwa trenches. Dewatering flow shall be controlled so that it does not cause scouring or erosion through the use of a dewatering basin, filter sock, or equivalent. If it is determined that the chosen controls are not appropriately filtering the fine sediment from the dewatering pumpate then the National Grid Environmental Scientist shall be notified immediately and the controls shall be revised or supplemented.

When establishing a dewatering basin, consideration should be given to the anticipated volume of water and rate of pumping in determining the size of the dewatering basin. Dewatering basins shall be constructed on level ground. Once pumping commences, the basin shall be monitored frequently to assure that the rate of water delivery to the structure is low enough to prevent water from flowing, unfiltered, over the top of the basin walls. The basin shall be monitored throughout the dewatering process because the rate of filtration shall decrease as sediment clogs the filter fabric. If the basin is not appropriately filtering the fine sediment from the dewatering pumpate then the basin may need to be supplemented with a flocculent block. Field conditions shall dictate how often the basin should be inspected.

Distance to sensitive areas, direction of flow (toward or away from protected, or sensitive areas, such as wetlands, ponds, or streams), amount of vegetative ground cover between the basin and nearby sensitive areas, ground conditions (ledge, frozen, etc.), volume of water being pumped, and pump-rate, are some of the factors to be considered when determining an inspection frequency. Clogged filter fabric shall be replaced and accumulated sediment shall be removed as necessary from the basins to maintain efficacy.

Unattended dewatering shall never be allowed. If 24-hour dewatering is required for on-site construction activities, a designated attendee shall be trained by the National Grid Environmental Scientist.

Basins shall be cleaned and removed as soon as dewatering is complete. Sediment removed from the dewatering basin shall be allowed to dry before being disposed of by evenly spreading it over unvegetated upland areas where erosion is not a concern if clean or removing it from the site for proper disposal. Off-site trucking of wet soils is prohibited. The sediment disposal area shall be approved by the National Grid Environmental Scientist or the Project Environmental Consultant prior to use. Stabilization measures shall also need to implemented and approved

by the National Grid Environmental Scientist or the Project Environmental Consultant. Soils/sediments shall be dewatered or mixed with dry material such that they are appropriate for off-site transport.

Any new dewatering location (not previously reviewed and approved by the National Grid Environmental Scientist during project planning or permitting) shall be reviewed and the discharge location approved by the National Grid Environmental Scientist before use.

Complex projects that require large scale dewatering shall require individual review by the National Grid Environmental Scientist and may trigger additional permitting.

Dewatering in areas of known chemical contamination may require a separate NPDES permit, or other approval, and treatment or containment system. Consult with the National Grid Environmental Scientist.

4.6 Check Dams

Check dams are a porous physical barrier installed perpendicular to concentrated storm water flow. They are used to reduce erosion in a swale by reducing runoff energy (velocity), while filtering storm water, thereby aiding in the removal of suspended solids.

Check dams should only be used in small drainage swales that shall not be overtopped by flow once the dams are constructed. These dams should not be placed in streams. Check dams are typically installed in ROWs or on other construction sites prior to the start of soil disturbing work. Per the Rhode Island Soil Erosion and Sediment Control Handbook, no formal design is required for a check dam if the contributing drainage area is 2 acres or less and its intended use is shorter than 6 months; however, the following criteria should be adhered to when specifying check dams.

- The drainage area of the ditch or swale being protected should not exceed 10 acres.
- The maximum height of the check dam should be 2 feet.
- The center of the check dam must be at least 6 inches lower than the outer edges.
- The maximum spacing between the dams should be such that the toe at the upstream dam is at the same elevation as the top of the downstream dam.

Per the NHDES stormwater manual, the use of check dams should be limited to swales with longitudinal slopes that range between 2 to 5 percent that convey drainage from an area less than 1 acre. Existing conditions that exceed these limitations should be assessed in the field and discussed with the National Grid Environmental Scientist to determine the viability of this BMP for the specific application. Check dams are often comprised of stone, straw bales, sand bags, or compost/silt socks. Use of check dams should be coordinated with the National Grid Environmental Scientist to ensure that the material selection, spacing and construction method are appropriate for the site. Check dams composed of biodegradable materials (e.g. straw bales

or wattles, wood chip bags) may require periodic replacement for continued proper functioning[3]. Refer to BMPs in Appendix 7.

4.7 Water Bars

Water bars should be used on sloping ROWs to divert storm water runoff from unstabilized or active access roads when needed to prevent erosion. Surface disturbance and tire compaction promote gully formation by increasing the concentration and velocity of runoff. Water bars are constructed by forming a ridge or ridge and channel diagonally across the sloping ROW. Each outlet should be stable. The height and side slopes of the ridge and channel are designed to divert water and to allow vehicles to cross. When siting water bars, consideration shall be given to the sensitivity of the area receiving the diverted runoff. For example, runoff should not be directed into a wetland, waterbody, other environmentally sensitive areas, or to private property or public roadways. Refer to BMPs in Appendix 7.

4.8 Retaining Walls

In some situations, retaining walls comprised of concrete blocks, gabions, boulders or other comparable materials may be required to stabilize the shoulder of existing access roads and/or supplement required erosion controls. Installation of such measures shall not be allowed as a maintenance activity. Should these controls be considered for a project, it shall be reviewed by the National Grid Environmental Scientist, as design and additional permitting may be required.

4.9 Slope Stabilization

Temporary slope stabilization practices help to keep exposed, erodible soils stabilized while vegetation is becoming established. Acceptable temporary slope stabilization practices may include the use of erosion control blankets, or hydraulic erosion control. Erosion control blankets, often comprised of natural fibers (e.g., jute, straw, coconut, or other degradable materials) are a useful slope stabilization, erosion control and vegetation establishment practice for ditches or steep slopes. Blankets are typically installed after final grading and seeding for temporary or permanent seeding applications. Hydraulic erosion control practices, including Bonded Fiber Matrix or hydroseed with a soil stabilizer (e.g., tackifier and/or mulch) may be an acceptable or desirable alternative form of temporary slope stabilization. For all practices, manufacturer's specifications should be followed for installation depending on slope and other field conditions. Consult the National Grid Environmental Scientist prior to selecting and installing any slope stabilization practices. Refer to BMPs in Appendix 7.

4.10 Maintenance of Sedimentation and Erosion Controls

Sedimentation and erosion controls shall be maintained in good operational condition during the course of the work. This includes , but is not limited to, replacing straw bales that are no

[3] Grass growth on a biodegradable type check dam is evidence that the material is decomposing. While this doesn't mean it is no longer functioning, it means it may be in a weakened condition and could potentially fail under high flow velocity. It is acceptable for grass to be growing on a stone check dam.

longer in good condition, re-staking straw bales, replacing or re-staking silt fence, and removing accumulated sediment. Remove sediment before it has accumulated to one half the height of any exposed silt fence fabric, straw bales, other filter berm, check dams or water bars. Accumulated sediment shall be removed from sedimentation basins to maintain their efficacy. Manage the removed sediment by evenly spreading it over unvegetated upland areas where erosion is not a concern, by stockpiling and stabilizing, or by disposing of off-site. Stabilization measures shall also need to be implemented and approved by the National Grid Environmental Scientist or the Project Environmental Consultant. Where a SWPPP has been prepared for a specific site, the guidelines documented therein shall govern the management of sediment.

5.0 Right-of-Way (ROW) Access

Whenever possible, access shall be gained along existing access routes or roads within the ROW. However, in some cases there is no existing access. In many cases, temporary access can be utilized. The following practices provide general guidance on accessing a ROW. Check with a National Grid Environmental Scientist to determine if any environmental permitting is required before utilizing a temporary access.

National Grid operates substations and has cross-country ROW with overhead electric power lines in four New England States. MA, NH and RI also have transmission and distribution natural gas pipelines. Access is needed to substations, ROWs, and customer property, for inspection, maintenance and construction activities. Many projects are located in or near environmentally sensitive areas, such as rivers/streams, wetlands, floodplains, or rare species habitat, etc., which are protected from activities that may disturb these resources.

Note that the building of new roads or enlargement of existing roads is **prohibited** unless this activity is allowed by a project-specific permit, and the new roads appear on the Site Plans that were authorized in the regulatory approvals.

5.1 Off-ROW Access

Off-ROW access shall be evaluated for wetlands, rare species, cultural resources and other potential sensitive receptors, as applicable. National Grid Real Estate and Stakeholder Relations shall also be contacted as soon as possible once off-ROW access is determined to be needed.

5.2 Stabilized Construction Entrance/Exit for Access to ROWs from Public or Private Roads

A suitable (minimum 15-foot wide by 50-foot long) construction entrance/exit shall be installed at the intersection of the ROW access road/route with public/private paved roads, or other such locations where equipment could track mud or soil onto paved roads. The construction entrance/exit should be comprised of clean stone installed over a geotextile fabric. Geotextile

fabric may be omitted for permanent construction entrances/exits on a case-by-case basis with the approval of the National Grid Environmental Scientist. Refer to BMPs in Appendix 7.

Construction entrance areas shall be monitored and maintained to ensure that stone or other material is not deposited onto the roadway, causing a safety concern. Where track-out of sediment has occurred onto a roadway, it shall be swept off the road by the end of that same work day.

If a construction entrance/exit is clogged with sediment and no longer functions, the sediment and stone may require removal and replacement with additional clean stone (clean stone refreshment) to ensure this tracking pad is performing its intended function adequately. Heavier traffic use may require this clean stone refreshment multiple times throughout a project. Reinforcement of these stabilized construction entrance/exits with asphalt binder or asphalt millings is not likely to be considered "maintenance" and may trigger additional permitting requirements[4]. In some cases, heavily used construction entrances/exits may benefit from the installation of a 5-15 foot strip of asphalt binder or asphalt millings closest to the paved roadway to capture any stone that is tracked from the stone apron. Such cases shall be evaluated on an individual basis with the National Grid Environmental Scientist.

Once work is complete, the construction entrance/exit shall either be removed or retained, depending upon future maintenance-related access needs, property ownership, and/or project-specific approvals. If removed, the area shall be graded, seeded (if adequate root and seed stock are absent) and mulched. Proper approvals for leaving access roads in place shall be obtained; contact the National Grid Environmental Scientist and Property Legal.

5.3 Maintenance of Existing Access Roads

In many cases, the existing access road may need to be maintained to allow passage of the heavy equipment required for scheduled maintenance work. Access roads cannot deviate from the approved and permitted access plans. Maintenance of these roads may include adding clean gravel or clean crushed stone to fill depressions and eroded areas. This activity shall be conducted only within the width of the existing access road footprint and does not include widening existing access roads

If gravel begins to migrate onto the existing vegetated road shoulder, this gravel shall be removed during the project and/or after the completion of use of the road to ensure the road fill is not spreading into adjacent resource areas, or resulting in the road becoming much wider than its pre-existing or permitted condition. In some areas of mapped rare species habitat or other sensitive areas where project-specific permit conditions require the prevention of the migration of sediments into adjacent resources, an engineered stabilization system (e.g.,

[4] Depending on the road, use of an asphalt binder or asphalt millings as a construction entrance/exit may trigger state or local permit requirements.

GeoWeb or similar) may be suitable to prevent sedimentation while allowing for unrestricted wildlife migration.

Major reconstruction projects may require multiple permits. In all cases, the fill to be used for existing access roads shall be clean and free of construction debris, trash or woody debris. Use of processed gravel may be approved by the Person-In-Charge or the National Grid Environmental Scientist, on a case-by-case basis. If clean stone is used then addition of more erosion controls may not be necessary.

5.4 Maintenance of Existing Access Routes (Cross Country Routes)

Ruts and depressions along existing access routes and within the existing ROW may only be leveled and graded. Addition of fill or stone may require permitting as well as additional erosion controls, and needs to be approved by the National Grid Environmental Scientist

5.5 Maintenance of Existing Culverts

Damaged culverts may not be repaired or replaced without consulting with the National Grid Environmental Scientist to determine if a permit is required. For functioning culverts, care shall be taken to protect adjacent wetlands and watercourses by installing appropriate sedimentation and erosion controls around the downstream end of the culvert. Culverts shall be repaired/replaced in kind and shall not be changed in size unless approval has been obtained from the National Grid Environmental Scientist. In-kind replacement is replacement using the same material, functional inverts, diameter and length as the existing culvert. Changes to any of these characteristics shall require permitting. Installation of any **new** culvert is not allowed without obtaining all necessary permits first. Refer to BMPs in Appendix 7.

If, at the time of anticipated replacement, there is heavy flow through the culvert, the Person-In-Charge shall consult with the National Grid Environmental Scientist, to verify whether the culvert shall be replaced at that time. Water may need to be temporarily diverted during culvert repair/replacement. There typically are seasonal restrictions limiting both the replacement of existing culverts as well as installation of new culverts to the low-flow period. The low-flow period can vary from state to state. If any unexpected conditions are encountered during culvert replacement, the National Grid Environmental Scientist shall be contacted immediately prior to the work being completed for additional consultation.

5.6 Temporary Construction Access over Drainage Ditch or Swale

In some situations, construction access from paved roads onto ROWs may require the crossing of drainage ditches or swales along the road shoulder. In these situations, the installation of swamp mats, mat bridges or temporary culverts may facilitate construction access over the ditches or swales. These culverts shall be temporary only, sized for peak flow, and shall be removed after construction is complete. Consult with the National Grid Environmental

Scientist prior to installation. In addition, if access over existing culverts may require extending the culvert, consult with the National Grid Environmental Scientist. Refer to BMPs in Appendix 7.

5.7 Construction Material along ROW

After preparing a site by clearing and/or installing any necessary erosion and sediment controls and prior to the start of construction, material such as poles, cross-arms, cable, insulators, stone and other engineered backfill materials may be placed along the ROW, as part of the project. The stockpiling of stone and other unconsolidated material on swamp mats shall be avoided, if determined necessary due to access and workpad constraints, the material must be placed on a geotextile fabric and be properly contained with a sedimentation barrier such as straw wattle. No construction material shall be placed in wetlands or other sensitive resource areas unless authorized by the National Grid Environmental Scientist or Project Environmental Consultant

6.0 Winter Conditions

6.1 Snow Management

DO NOT stockpile or dispose of snow in any water body, including wetlands, rivers/streams, the ocean, reservoirs, ponds, or stormwater catch basins. A buffer of at least 25 feet shall be maintained between any snow disposal area and any the high water mark of any surface water. A silt fence or equivalent barrier shall be securely placed between the snow storage area and the high water mark of rivers, streams, ponds, or the ocean. In addition to water quality impacts and flooding, snow disposed in surface water can cause navigational hazards when it freezes into ice blocks. Some state and local authorities have specific snow management requirements. Consult with the National Grid Environmental Scientist on specific restrictions.

DO NOT deposit snow within a wellhead protection area (e.g., a Zone II), in a high or medium-yield aquifer, or within 200 feet of a private well, where road salt may contaminate water supplies**. Consult with the National Grid Environmental Scientist to determine if a proposed disposal area is located within one of these sensitive areas.**

Avoid disposing of snow on top of storm drain catch basins or in storm water drainage swales or ditches. Snow combined with sand and debris may block a storm drainage system, causing localized flooding. A high volume of sand, sediment, and litter released from melting snow also may be quickly transported through the system into surface water and could also result in fines or a violation being assessed against National Grid.

All debris in a snow storage area shall be cleared from the site and properly disposed of no later than May 15 of each year.

Care shall be taken not to plow road materials away when removing snow.

6.2 De-Icing

Where allowed, calcium chloride is preferred as a de-icing agent when applied according to manufacturer's guidelines in upland areas. Sand shall be used on swamp mats through wetland areas.

Consult with the National Grid Environmental Scientist on de-icing agents when working in a facility or substation close to resource areas. Many municipalities have specific requirements for de-icing agents allowed within 100 feet of wetland resources and other sensitive areas.

6.3 Snow and Ice Management on Swamp Mats

Proper snow removal on swamp mats shall avoid the formation of ice. To avoid the formation of ice, snow shall be removed from swamp mats before applying sand. Prior to their removal from wetlands, sand shall be collected from the swamp mats and disposed of in an upland area. A round street sweeping brush mounted on the front of a truck may be an effective way to remove snow from swamp mats. Propane heaters may also be suitable solutions for snow removal and/or de-icing of swamp mats.

Once swamp mats are removed, wetlands shall be inspected for build up of sand that may have fallen through swamp mats. Care shall be taken to inspect wetland crossings as each mat is removed to ensure sand is properly removed and disposed of off-site.

7.0 Swamp Mats

The use of swamp mats allows for heavy equipment access within wetland areas. The use of swamp mats minimizes the need to remove vegetation beneath the access way and helps to reduce the degree of soil disturbance and rutting in soft wetland soils. Swamp mats most often used by National Grid are wooden timbers bolted together typically into 4-ft by 16-ft sections, wooden lattice mats, or composite mats. In some cases, swamp mats or other mats are used for staging or access in upland areas based on site conditions (e.g., agricultural field access). Refer to BMPs in Appendix 7.

Typically swamp mats may be installed on top of the existing vegetation, however in some instances cutting large woody vegetation may be required. Check with National Grid Environmental Scientist prior to cutting or clearing vegetation for swamp mat placement.

Follow the approved plans in the EFI for swamp mat installation and do not deviate from the plans. **Any deviation from the approved plans needs to be communicated immediately to the National Grid Environmental Scientist as it may require additional permitting, require stopping the project or result in a permit violation or revocation.**

7.1 Swamp Mats and Mowing

Close coordination with the mowing contractor shall be required to ensure that access plans are followed, and swamp mats are utilized when necessary. Sometimes mowing contractors may

have to work off the leading edge of a swamp mat to mow in order to lay the next swamp mat and continue further into the wetland. Under no circumstances shall trees or shrubs be allowed to be pulled out of the wetland by the root ball. The root ball of trees and shrubs shall remain intact. Chipping debris and excessive amounts of slash shall not be placed in wetlands or other resource areas. In some instances, it may be beneficial to pile a reasonable amount of slash within a nearby upland area to create habitat for wildlife. This activity shall be approved by the National Grid Environmental Scientist.

7.2 Stream Crossings and Stream Bank Stabilization

Stream crossings shall be bridged with swamp mats or other temporary minimally-intrusive measures unless fording is acceptable for the site and is authorized by the National Grid Environmental Scientist. Care shall be taken when installing a swamp mat bridge to insure that the stream bed and banks are not damaged during installation and removal and that stream flow is not unduly restricted. An environmental permit may be required to cross or disturb protected waters, depending upon state-specific regulatory requirements. Refer to BMPs in Appendix 7. Immediately following swamp mat removal, all stream banks shall be stabilized and restored to prevent sedimentation and erosion.

7.3 Cleaning of Swamp Mats

Mats shall be certified clean by the vendor prior to installation. The vendor shall use the certification form provided as Appendix 8 to document compliance. Clean is defined as being free of plant matter (stems, flowers, roots, etc), soil, or other deleterious materials prior to being brought to the project site. Any equipment or timber mats that have been placed or used within areas containing invasive species within the project site shall be cleaned of plant matter (stems, flowers, roots, etc), soil, or other deleterious materials at the site of the invasive species prior to being moved to other areas on the project site to prevent the spread of invasive species from one area to another[5]. **Mats shall be cleaned prior to being removed at the completion of the project: exceptions to this requirement may be made on a case-by-case basis.** Consult with the National Grid Environmental Scientist prior to discharging or disposing of any waste water or waste material from the cleaning of swamp mats.

7.4 Stone Removal for Swamp Mat Placement

For situations where the matting contractor determines that stones or boulders must be removed or relocated within wetland areas in order to install safe and level structure work pads or access roads the boulders shall be moved in a manner which does not result in significant soil disturbance (i.e., pushing with a bull dozer is not allowed). The boulders shall not be placed on any existing vegetated areas within wetlands or within vernal pools. When numerous boulders shall be removed from a wetland area, they shall be deposited in an upland area outside of the

[5] On ROW projects where multiple wetlands may be dominated by the same invasive species, cleaning may not be required for movement along the ROW. Check with the National Grid Environmental scientist for guidance.

flagged wetland limits, outside of any cultural resource areas and outside of any RTE species populations. Any boulders that shall be placed within buffers (In MA, the 100-foot buffer zone, and in RI, the 50-foot Perimeter Wetland, 100-foot or 200-foot Riverbank Wetlands) shall be placed to avoid causing soil disturbance and they shall be within an approved limit of work. When there is a significant number of boulders that shall be removed, the National Grid Environmental Scientist shall be consulted for guidance.

7.5 Transition onto Mats

Erosion controls and stone or wood chip ramps shall be installed to promote a smooth transition to and minimize sediment tracking onto swamp mats. Geotextile may be added beneath stone or wood chip transitions to facilitate removal, as necessitated by site or permit conditions. Mat transitions shall be removed once swamp mats have been removed and during restoration. Refer to BMPs in Appendix 7.

7.6 Corduroy Roads

Corduroy roads are a wetland crossing method where logs are cut from the immediate area and used as a road bed to prevent rutting from equipment crossing. This technique is designed to be used in areas of wetland crossings where there is no defined channel or stream flow and should never be used in streams. Corduroy logs shall be placed in the narrowest area practicable for crossing with the logs placed perpendicular to the direction of travel across wet area. The use of corduroy logs shall only be in emergencies when approved by the National Grid Environmental Scientist or when they have been specifically permitted as part of a project. Refer to BMPs in Appendix 7.

7.7 Swamp Mat Removal

Once swamp mats are removed, wetlands shall be inspected for build up of sand or other materials that may have fallen through swamp mats. Care shall be taken to inspect wetland crossings as each mat is removed to ensure any materials are properly removed and disposed of off-site.

7.8 Bridging over other utility facilities

In ROWs where other utility facilities (including but not limited to gas, oil, fiber optic, electric, water, and sewer) are co-located within the transmission ROW, bridging may be required to cross those facilities. The project team shall coordinate with the respective utility company prior to determining if bridging or permanent crossings are required.

8.0 LGP Equipment Use

Only when approved by the National Grid Environmental Scientist on a case-by-case basis shall equipment with LGP of **less than 3 psi when loaded** be allowed to access through wetlands. The National Grid Environmental Scientist's approval of the use of LGP equipment through wetlands depends on several criteria including:

- Time of year. LGP equipment use may be allowed if weather and field conditions at the time of construction are suitable to eliminate/minimize the concern of rutting or other impacts. Frozen, frozen snow pack, low flow, or drought conditions are typically acceptable conditions. Spring and fall construction, due to the typical higher precipitation, are not suitable times of year for LGP equipment use.
- Number of trips. Multiple trips through a wetland have shown to increase the potential for damage and require matting. LGP equipment use shall likely only be approved if trips are limited to one trip in and one trip out.
- Type of wetland system. Some wetlands have harder soils/substrate, and may be passable without causing significant damage. Some of the wetlands along National Grid ROWs have existing hard bottom roads that have been vegetated over time and may be traversed with LGP equipment without swamp mats.
- Emergencies. LGP equipment use may be allowed during emergency or storm conditions for outage restoration.
- State-specific USACE General Permit Performance Standards. The standard is for no impact to the wetland, which may be obtained by using LGP equipment (<3 psi **when loaded**). "*Where construction requires heavy equipment operation in wetlands, the equipment shall either have low ground pressure (<3 psi), or shall not be located directly on wetland soils and vegetation; it shall be placed on swamp mats that are adequate to support the equipment in such a way as to minimize disturbance of wetland soil and vegetation.*"
- Local bylaws. Municipal wetland bylaws, where applicable, shall be reviewed for prohibitive conditions or applicable performance standards.

LGP equipment approval is required **at the time of construction for each wetland crossing** and shall be dependent upon the above conditions. In addition, LGP equipment use and approval shall be assessed by the National Grid Environmental Scientist during construction on a continuing basis; LGP equipment use shall cease immediately if field conditions are found to be unsuitable. ***Please note that if LGP vehicles are used, and wetlands damage occurs, the use of the LGP equipment shall be suspended.***

9.0 Soil Disturbing Activities

9.1 Dust Control

Cutting activities shall be conducted to minimize the impacts of dust on the surrounding areas. Dust suppression is an important consideration. Water or application of calcium chloride or other National Grid approved equivalent in accordance with the manufacturer's guidelines may

be used for dust control along ROWs in upland areas. During application of water for dust control, care shall be taken to ensure that water does not create run-off or erosion issues. Refer to BMPs in Appendix 7.

9.2 Clearing

Clearing is not allowed without specific permission as it constitutes soil disturbance under several regulatory programs and may trigger permitting by increasing the project's footprint of disturbance. If clearing is required for a project, the limit of clearing shall be established with flagging or construction fencing and/or erosion controls. Clearing shall be done in accordance with project specific permits. Following the completion of clearing, the limits of work shall be re-established. Refer to BMPs in Appendix 7.

9.3 Grubbing

Grubbing is not allowed without specific permission as it constitutes soil disturbance under several regulatory programs and likely triggers permitting by increasing the project's footprint of disturbance. If grubbing is required for a project, the limit of grubbing shall be re-established after clearing has been completed. The area of grubbing shall be identified with flagging or construction fencing and/or erosion controls. Grubbing shall be conducted in accordance with project-specific permits.

9.4 Blasting, Noise and Vibration Control

If blasting is anticipated, the project team, including the National Grid Environmental Scientist, shall be consulted.

If possible, plan work in residential areas to avoid noisy activities at night, weekends or during evenings. Emergency work in residential areas should be carried out in such a way as to keep noise to a minimum at night and weekends. Equipment should be maintained as per the manufacturer's guidance to minimize noise and vibration.

Work plans must consider local noise ordinances and provide specific controls to ensure noise levels are maintained within specified limitations.

All equipment shall be maintained in good working condition in order to minimize noise and vibration impacts.

9.5 Site Grading

The work site shall not be graded other than in accordance with project permits. Any proposed grading shall be reviewed by the National Grid Environmental Scientist for wetlands, rare species habitat, areas of cultural and historical significance, and other environmentally sensitive

areas prior to start of work. In some cases, additional testing for cultural or historical resources may be triggered by proposed grading; alternatives to grading may be sought due to protracted time frame of obtaining the permit associated with testing and performing the testing. Grading outside of a regulated area shall be kept to the minimum extent necessary for safe and efficient operations and shall comply with the project permit plans.

Grading shall be performed in a manner which does not increase the erosion potential at the Site (e.g., terraces or slope interruptions shall be utilized). Graded sites shall be promptly stabilized by applying a National Grid approved seed mix (if adequate root and seed stock are absent), and mulching with hay, straw or cellulose (use straw or cellulose hydromulch where the potential introduction of invasive plant species is of concern) to reduce erosion and visual impact, as soon as possible following completion of work at the site. Grading within a regulated area shall be subject to the review and approval of the National Grid Environmental Scientist.

In some municipalities, site grading activities require the prior approval of the Town Engineer, Building and Zoning Official, or Public Works Director. Local ordinances or bylaws should be reviewed for applicable restrictions and permitting thresholds

9.6 Site Staging and Parking

During the project planning and permitting process, locations shall be identified for designated crew parking areas, material storage, and staging areas. Where possible, these areas should be located outside of buffer zones, watershed protection areas, and other environmentally sensitive areas. Any proposed locations shall be evaluated for all sensitive receptors and for new projects requiring permitting, shall be incorporated onto permitting and access plans.

9.7 Soil Stockpiling

Soil stockpiles shall be located in upland areas and, if in close proximity to wetlands and wetland buffers, shall be enclosed by staked straw bales or another erosion control barrier. The stockpiling of stone, drill spoils and other unconsolidated material on swamp mats shall be avoided unless determined necessary due to access and work pad constraints. Additional controls, such as watertight mud boxes and geotextile/filter fabric over or between swamp mats shall be considered for stockpile management. If material is placed on swamp mats and falls through into wetlands, the material must be removed by hand. Saturated soils shall be allowed to dewater prior to off-site transport for sufficient time to ensure that water/sediment is not deposited onto swamp mats or public roads during transport.

9.8 Top Soil/High Organic Content Soil

When the work site requires excavation and grading, the top soil shall be stockpiled separately from the material excavated. This top soil shall be spread as a top dressing over the disturbed area during restoration of the site.

In some instances where work is occurring within wetlands, high organic content soil may be displaced. Such high organic content soil shall be segregated from other excavated materials and stockpiled for use in wetland restoration areas. Care shall be taken to minimize the handling of high organic content soil. Preferably, the soil shall be stockpiled in one location until it is moved to the restoration area.

10.0 Stone Wall Dismantling and Re-building

Removal or alteration of stonewalls shall be avoided, whenever possible. As appropriate, some stonewalls removed or breached by construction activities shall be repaired or rebuilt. Rebuilt stone walls shall be placed on the same alignment that existed prior to temporary removal, to the extent that it shall not interfere with operations. The removal and rebuilding of stone walls requires approval from the National Grid Environmental Scientist and Property Legal, and may require several weeks lead time for coordination. Note that not all states allow this technique. Dismantling may not be allowed at all due to quality or significance of the wall. Once a stone wall has been identified as requiring dismantling, the following procedures shall be followed:

- Identify stone wall that is required to be temporarily dismantled and notify project team that a site visit is warranted to review the stone wall.
- The National Grid Environmental Scientist, with support from Property Legal and/or cultural/historical consultant, shall determine if permitting or additional permissions are required prior to dismantling stone wall.
- Once permit or permissions have been received, full documentation of wall dimensions (measurements and photographs) shall be submitted to the National Grid Environmental Scientist. Documentation of the wall dimensions shall be marked onto a copy of the applicable EFI access plan (or equivalent plan) with a useful reference for future locating such as GPS coordinates and/or measurement from a permanent reference point (closest structure location or closest cross street, etc.). The wall shall be photographed from all sides with a written description of the photograph (i.e. southern side of wall looking north). In addition, documentation of the length of wall to be dismantled shall be recorded. Take special care to note if granite property bounds (or other marker) are located within the wall so additional survey can be accomplished prior to dismantling in cases where the stone wall represents a property boundary. Site visits by project team (which shall include the National Grid Environmental Scientist) are a mandatory requirement prior to dismantling.
- No dismantling shall take place until documentation has been submitted to the National Grid Environmental Scientist and approved as sufficient documentation.

- Stones from the wall shall be removed from the work area and temporarily stored in nearby location, away from wetlands; buffer zones; rare species habitat and other historical/archeological concerns.
- Avoid dismantling via the "bulldozer" method when possible as this method makes it nearly impossible to rebuild the wall in the same alignment due to its uncontrolled nature. Dismantling shall be conducted either by hand, with stones stacked as they are removed, or on less "sensitive" walls to use an excavator with a thumb to grab each stone and build a stockpile. Significant ground disturbance below the wall shall be avoided.

Once construction and access in the area has been completed, the wall shall be rebuilt to pre-dismantled conditions or better. If rebuilding a stone walls can not be placed on the same alignment that existed prior to temporary removal, approval from the National Grid Environmental Scientist and Property Legal is required. **Note that if the wall represents a legal property boundary or is historically or culturally significant (or was previously determined to be in a very high quality condition), a professional stone masonry company may be required to document wall alignment, and conduct the dismantling and rebuilding**

11.0 Avian Nest Removal

Avian nest removal shall be done in accordance with EG-304. Consult the National Grid Environmental Scientist prior to removing any nests. There are seasonal restrictions of the removal of avian nests and federal or state permits may be necessary prior to removal

12.0 Drilling Fluids and Additives

Notify the National Grid Environmental Scientist if drilling fluids/additives are proposed to be used on a project. Use and disposal of spent drilling fluids/slurries shall be approved by the National Grid Environmental Scientist, as regulatory approvals and drinking water wells may be of concern. Deactivation and sampling may be required prior to disposal.

13.0 Grounding Wells

The installation of grounding wells shall require erosion controls and proper soil management. Due to the typical depth required for grounding wells (typically 50 to 200 feet or more), erosion controls shall be installed around the proposed well location when working in buffer zone, in proximity to sensitive resources or near slopes. Also, dewatering basins may be required for the proper management of groundwater. The National Grid Environmental Scientist shall be consulted for the disposal of any excess soil.

14.0 Counterpoise and Cathodic Protection

The installation of counterpoise or cathodic protection shall require erosion controls and proper soil management. The National Grid Environmental Scientist shall be consulted for the disposal of any excess soil.

15.0 Gates

When not in use, gates shall be locked with a company-approved lock or double locked with the property owner's lock. New gates may be installed during a project, however, installation of a gate requires permission from the property owner, and may require environmental permitting. Consult with National Grid Real Estate and the National Grid Environmental Scientist prior to installing a new gate, as well as with the appropriate engineering department for the current company gate specifications. Refer to BMPs in Appendix 7. Installation of ROW access restrictions (e.g., stone, bollards, other) at road crossings also require consultation with the National Grid Environmental Scientist and Property Legal.

16.0 Signage

Specific signage may be required by permits or be specified in the EFI to limit access in certain sensitive areas. Signs shall be used to clarify allowed access and sensitive areas, such as:

- "No snow stockpiling beyond this point,"
- "Approved access (to structures A-F)";
- "Do not cross this area until swamp mats are in place";
- "No vehicle crossing";
- "Areas to avoid"; and
- "Environmentally Sensitive Area – Keep Out."

Signs shall be used in conjunction with snow fencing or other physical barriers as demarcation for sensitive areas (e.g., rare species areas, sensitive archeological locations, etc.) that need to be protected and avoided by construction activities. In addition, permit signs required by the regulatory agencies shall be present (i.e. MADEP, RIDEM, EPA (SWPPP), ACOE, etc) at construction sites and/or ROW access points. Construction signage shall be installed and maintained by the contractor performing the work during the project. Absence of signage does not eliminate the need to comply with access plans, permit conditions, and other regulatory requirements. Refer to BMPs in Appendix 7.

17.0 Refueling and Maintenance Operations

17.1 Spill Prevention and Response Plan

Spill controls shall be provided on every field vehicle. Bulk storage of fuels (55 gallons or greater) shall be approved by the National Grid Environmental Scientist prior to being brought on site. The need for a field spill plan shall be evaluated specific to the project for regulatory requirements under SPCC regulations or local ordinances. A field spill plan would include

information on fuels and oils being used, approximate amounts in each container or type of equipment, location, fueling location, secondary containment, response and notification procedures, including contact phone numbers, etc. All personnel shall be briefed on spill prevention and response prior to the commencement of construction. The state-specific EG-501 and EG-502 shall be followed in the event of a spill.

Typical construction activities do not require the use or storage of large quantities of oil or hazardous materials (i.e., greater than 55 gallons). However, oil and/or hazardous materials (OHM) may be required in limited quantities to support construction or vehicle operations. Best practices shall be followed in the use and storage of OHM which include but are not limited to: storage and refueling greater than 100 feet from resource areas; maintenance of spill response equipment at work locations sufficient to handle incidental releases from operating equipment; general training for on-site personnel for spill clean up response for incidental releases of OHM; and contracting with an on-call spill response contractor that is capable of managing incidental and significant releases of OHM. There may situations that additional precautions shall be required for the storage or use of OHM (i.e., within wellhead protection areas, GA/GAA areas, Zone IIs). Storage of OHM shall be done in accordance with any applicable regulatory requirements.

17.2 Field Refueling

Small equipment such as pumps and generators shall be placed in small swimming pools or on absorbent blankets/pads, to contain any accidental fuel spills. Small swimming pools with absorbent blankets/pads, and/or other secondary containment, shall be used for refueling of fixed equipment in wetlands and should be maintained to prevent accumulation of precipitation.

17.3 Grease, Oil, and Filter Changes

Routine vehicle maintenance shall not be conducted on project sites.

17.4 Other Field Maintenance Operations

When other vehicle or equipment maintenance operations (such as emergency repairs) occur, company personnel or contractors at field locations shall bring vehicles or equipment to an access location a minimum of 100 feet away from environmentally sensitive areas (e.g., wetlands or drinking water sources). A paved area, such as a parking lot or roadway, is a preferred field maintenance location to minimize the possibility of spills or releases to the environment.

Crews shall take all usual and reasonable environmental precautions during repair or maintenance operations. Occasionally, it is infeasible to move the affected vehicle or equipment from an environmentally sensitive area to a suitable access area. When this situation occurs, precautions shall be taken to prevent oil or hazardous material release to the environment. These precautions include (but are not limited to) deployment of portable basins or similar secondary

containment devices, use of ground covers, such as plastic tarpaulins, and precautionary placement of floating booms on nearby surface water bodies.

17.5 Tools and Equipment

Cleaning of tools and equipment shall be conducted away from environmentally sensitive areas (such as wetlands, buffer zones or drinking water sources) to the maximum extent possible. A paved area such as a parking lot or roadway is preferred, to minimize the possibility of spill or release to the environment. Crews shall wipe up all minor drips or spills of grease and oil at field locations.

18.0 Stabilization Deadlines for Projects Subject to EPA Construction General Permit

18.1 Deadlines to Initiate Stabilization Activities (Permanent and Temporary)

Soil stabilization measures shall be implemented immediately whenever earth-disturbing activities have permanently or temporarily ceased on any portion of the project. The following are some examples of activities that constitute initiation of stabilization:

- Preparing the soil for vegetative or non-vegetative stabilization;
- Applying mulch or other non-vegetative product to the exposed area;
- Seeding or planting the exposed area;
- Finalizing the arrangements to have stabilization product fully installed in compliance with the deadlines to complete stabilization in Section 18.2 below.

18.2 Deadlines to Complete Stabilization Activities (Permanent and Temporary)

As soon as practicable, but no later than 14 calendar days or 7 calendar days (for areas discharging to a sensitive water) after the initiation of soil stabilization measures commence the following should be completed:

- For vegetative stabilization, all activities necessary to initially seed or plant the area to be stabilized; and
- For non-vegetative stabilization, the installation or application of all such non-vegetative measures.

18.3 Vegetative Stabilization (all except for arid, semi-arid, or on agricultural lands)

- Provide established uniform vegetation (e.g., evenly distributed without large bare areas), which provides 70% or more of the density of coverage that was provided by vegetation prior to commencing earth-disturbing activities. Avoid the use of invasive species as cover.
- For final stabilization, vegetative cover must be perennial; and
- Immediately after seeding or planting a disturbed area to be vegetatively stabilized, a non-vegetative erosion control must be implemented to the area while the vegetation is becoming established. Examples include; mulch and rolled erosion control products.

18.4 Vegetative Stabilization (Agricultural Lands)

- Disturbed areas on land used for agricultural purposes that are restored to their pre-construction agricultural use are not subject to vegetative stabilization standards.

18.5 Non-Vegetative Stabilization

If using non-vegetative controls to stabilize exposed portions of your site, or if you are using such controls to temporarily protect areas that are being vegetatively stabilized, you must provide effective non-vegetative cover to stabilize any such exposed portions of the site. Examples of non-vegetative stabilization techniques include, but are not limited to, rip-rap, gabions, and geotextiles.

19.0 Clean-up and Restoration Standards

The following steps shall be taken once construction has been completed at each location along the ROW or within the project site. The following are minimum guidelines for clean-up and stabilization standards. Please refer to permit conditions for project-specific related standards. Refer to the EFI for applicable permit requirements andto determine if the site needs to be reviewed and approved by the permitting authorities prior to removal of erosion controls.

19.1 Removal of Sedimentation and Erosion Controls

After all work has been satisfactorily completed and vegetation has been re-established to a minimum of 75% cover, and upon approval by the National Grid Environmental Scientist, all non-biodegradable materials (e.g., siltation fencing, straw bale strings, stakes, straw wattle mesh casing, etc.) shall be disposed of properly off-site.

Dependent on permit requirements, sedimentation and erosion controls may not be allowed to be removed until after inspection and approval by one or more permitting authority. In most cases, removed straw bales may be used to mulch disturbed areas. Remaining straw bales that do not block the flow of water may be left in place unless they are required to be removed pursuant to permit conditions. Straw bales that block the flow of water shall be removed.

Prior to project construction being completed, the project team will develop post-construction inspection intervals to ensure timely removal of temporary BMPs. BMPs will be removed when the area is stabilized, which typically occurs when the area has either naturally stabilized (75 % cover), or seed and mulch that was installed has achieved 75% cover.

19.2 In-Situ Restoration

Unless otherwise specified in permits or prescribed by the National Grid Environmental Scientist or the Project Environmental Consultant, all disturbed areas, including stream banks, wetlands and access routes, shall be restored following the completion of work. When the work is completed and swamp mats have been removed, the National Grid Environmental Scientist or Project Environmental Consultant shall conduct an inspection. Wetlands shall be inspected for build up of sand or other materials that may have fallen through swamp mats. Care shall be taken to inspect wetland crossings carefully after swamp mat removal to ensure any materials are properly removed and disposed of off-site.

Restoration of Soil Compaction. If rutting or soil compaction following swamp mat removal is observed, the area shall be returned to pre-existing conditions, and comparable to the surrounding area, by light hand raking or by back-blading with machinery. Restoration shall be overseen by the Project Environmental Consultant or National Grid Environmental Scientist. Deep ruts (>12") shall be filled in using available, loose soil from the work area.

Seeding and Mulching. If adequate root and seed stock are absent and have been stripped from the area, graded sites shall be promptly stabilized by applying an approved seed mix and mulching with straw to reduce erosion and visual impact. Seeding and mulching shall be completed as soon as possible following completion of work at the site. For some wetland areas, natural re-vegetation may be more appropriate than seeding disturbed sites. Wetland areas where adequate root and seed stock are absent will be seeded using an approved wetland native seed mix. For some wetland areas, natural re-vegetation may be more appropriate than seeding disturbed sites. Refer to BMPs in Appendix 7 for seed mix tables and mulch ratio tables.

If needed, the import of quality topsoil onto the ROW will be required. Topsoil should be tested, and approved by the Project Environmental Consultant or National Grid Environmental Scientist to determine its suitability for site conditions. Fertilizers will be approved on a case-by-case basis.

For upland areas, the disturbed vegetation and soil shall be restored and stabilized[6] by regrading the area to pre-existing conditions, if needed, seeding (if adequate root and seed stock are absent) and mulching the exposed soil, and removing strings and stakes from straw bales and using broken up straw bales for the mulch. Siltation fencing, strings and stakes shall be removed for disposal as ordinary waste. Refer to BMPs in Appendix 7 for seed mix tables and mulch ratio tables.

Excess boulders. Additional boulders could be used at proposed and existing gate locations to use on either side of the gates as a deterrent for unauthorized vehicle access or be placed along the edges of work pads where steep slopes are present for safety purposes. The final placement of boulders should be reviewed prior to installation with Stakeholder Relations and the National Grid Environmental Scientist or Project Environmental Consultant.

[6] For projects subject to the 2012 CGP, stabilization is required within 14 days, or within 7 days for sensitive areas.

Unless otherwise specified in Project-specific permit conditions, the National Grid Environmental Scientist or Project Environmental Consultant shall develop an inspection frequency to monitor restored areas for stabilization, germination and successful revegetation.

19.3 Invasive Species

All equipment shall be certified clean[7] utilizing the attached form (Appendix 8) or equivalent as approved by by the vendor prior to mobilization to the work site. The vendor shall use the certification from provided as Appendix 8 to document compliance with invasive species management BMPs, Clean is defined as being free of plant matter (stems, flowers, roots, etc), soil, or other deleterious materials prior to being brought to the project site. Any equipment that has been placed or used within areas containing invasive species within the project site shall be cleaned of plant matter (stems, flowers, roots, etc), soil, or other deleterious materials at the site of the invasive species prior to being moved to other areas on the project site to prevent the spread of invasive species from one area to another[8]. **Equipment shall be cleaned prior to being removed at the completion of the project: exceptions to this requirement shall be determined on a case-by-case basis.** Consult with the National Grid Environmental Scientist prior to discharging or disposing of any waste water or waste material from the cleaning of equipment.

19.4 Cleaning of Equipment

At the completion of the project, Equipment shall be cleaned prior to being de-mobilized to prevent tracking of material onto roads and causing safety issues. Consult with the National Grid Environmental Scientist prior to discharging or disposing of any waste water or waste material from the cleaning of equipment

19.5 Access Routes (Cross Country Routes)

Cross country access routes shall be returned to pre-construction grade (if needed), seeded (if adequate root and seed stock are absent) and mulched. Pre-existing sandy soils within mapped rare turtle habitat shall not be seeded unless directed by the National Grid Environmental Scientist so as to not alter nesting habitat.

19.6 Access Roads

Constructed gravel roads shall be left in place following project completion unless permit conditions require their removal. Refer to the specific permit conditions for these provisions. If the road is to be removed, the crushed stone and geotextile fabric shall be removed from the work site. This excess material can be retained off-site for future maintenance-related access needs.

[7] The Appendix 8 certification form (or equivalent as approved by National Grid Environmental scientist) shall be used to document the clean certification

[8] On ROW projects where multiple wetlands may be dominated by the same invasive species, cleaning may not be required for movement along the ROW. Check with the National Grid Environmental scientist for guidance.

Seeding and/or mulching of gravel roads is generally not required, unless necessary to prevent erosion.

19.7 Stone Work Pads

Unless permit conditions or property owner's require the removal of constructed stone work pads following project completion, constructed work pads shall be left in place. Refer to the specific permit conditions for these provisions.

19.8 Construction Materials on ROWs

As soon as the structure work has been completed, all used parts and trash are to be picked up and removed from the project site. Retired poles shall be removed in accordance with National Grid Engineering Standard SP,06.01.301. In some cases, the used material from structure work may be temporarily stored at the work area by placing it out of the wetlands or other sensitive resource area until work in the adjacent areas has been completed. However, treated wood poles shall never be stored in standing water or in wetlands. If the project is cancelled, all material shall be removed from the project site. Excess material brought to the project site shall be removed upon project completion. Consult with the National Grid Environmental Scientist on whether the work site shall be restored in addition to the measures outlined in 8.14.1 to 8.14.5 above

19.9 Improved Areas

Yards, lawns, agricultural areas, and other improved areas shall be returned to a condition at least equal to that which existed at the start of the project. Alternately, if requested, the property owner may be reimbursed to perform their own restoration, after the site has been left in an environmentally sound manner. If this option is requested, it shall be documented in a written release signed by the property owner. Consult with National Grid Real Estate and/or Stakeholder Relations for the details on existing agreements. Off-ROW access shall never be assumed and shall be coordinated through Real Estate before being implemented. Depending on the access point, swamp matting, composite matting or other BMPs may be required to prevent ruts, lawn damage, or other property damage. Restoration following the completion of work and any use of improved areas shall be conducted in accordance with 8.14.2 above

19.10 Property Damage

All damage to property occurring as a result of a project shall be immediately repaired or replaced. In some locations, it may be desirable to document pre-existing damage prior to work commencing in that area in order to demonstrate afterwards that the damage did not result from the project. Work crews, the Project Environmental Consultant or the National Grid Environmental Scientist shall document repairs that were performed in response to damage from unauthorized vehicle use.

19.11 Overall Work Site

Upon satisfactory completion of work, the construction personnel shall remove all work-related trailers, buildings, rubbish, waste soil, temporary structures, and unused materials belonging to them or used under their direction during construction, or waste materials from previous construction and maintenance operations. All areas shall be left clean, without any litter or equipment (wire, pole butts, anchors, insulators, cross-arms, cardboard, coffee cups, water bottles, etc.) and restored to a stable condition and as near as possible to its original condition, where feasible. Debris and spent equipment shall be returned to the operating facility or contractor staging area for disposal or recycling (cardboard) as appropriate in accordance with EG-111.

19.12 Material Storage/Staging and Parking Areas

Upon completion of all work, all material storage yards, staging areas, and parking areas shall be completely cleared of all waste and debris. Unless otherwise directed or unless other arrangements have been made with an off ROW or off-property owner, material storage yards and staging areas shall be returned to the condition that existed prior to the installation of the material storage yard or staging area. Regardless of arrangements made with a landowner, all areas shall be restored to their pre-construction condition or better. Also any temporary structures erected by the construction personnel, including fences, shall be removed by the construction personnel and the area restored as near as possible to its original condition, including seeding and mulching as needed.

20.0 Notification of Emergency Work

Because it is sometimes difficult to identify wetlands and other sensitive environmental areas, the National Grid Environmental Scientist shall be notified within 24 hours or by the next working day whenever emergency off-road repair work takes place. Although the routine maintenance and emergency repair work is generally allowed, due to site conditions or the scope of the project, notification to the regulating agencies may be required

21.0 Appendices

APPENDIX 1:	Glossary
APPENDIX 2:	Acronyms
APPENDIX 3:	EFI Template
APPENDIX 4:	Simplified EFI Template
APPENDIX 5:	Standard STORMS boilerplate language
APPENDIX 6:	Storm Water, Wetlands & Priority Habitat Environmental Compliance Site Inspection / Monitoring Report Form
APPENDIX 7:	BMP Drawings and Guidelines
APPENDIX 8:	Certification Sheet for Invasive Species Control

Appendix 1 – Glossary

Access Road – An existing, periodically maintained road often consisting of gravel and/or exposed soils or vegetated with grasses but devoid of woody vegetation, that is visible on aerial photography and shown on ROW T-sheets. May include newly permitted permanent roads (i.e., roads to be constructed in accordance with a project-specific permit).

Access Route - A pathway previously used or proposed to be used by crews for access along the ROW. Routes may be shown on ROW T-sheets or previous project access plans but are not improved as maintained gravel/exposed soil roads. Access routes may be mown and can consist of trails utilized by recreational vehicles.

Action Logs – Project-specific log used to document action items required for permit compliance. The log identifies timeframes for completion and responsible parties. The log is typically updated by the Project Environmental Consultant or the National Grid Environment Scientist and circulated to the project team on a weekly, or more frequent, basis.

Bank – The transitional slope immediately adjacent to the edge of a surface water body, the upper limit of which is usually defined by a break in slope, or, for a wetland, where a line delineated in accordance with applicable state and federal regulations that indicates a change from wetland to upland.

BMP – Best Management Practice. Individual engineered constructions or operating procedures intended to minimize and mitigate soil disturbance, erosion, sedimentation, turbid discharges, and/or impacts to sensitive receptors.

Clean - free of plant matter (stems, flowers, roots, etc), soil, or other deleterious materials prior to being brought to the project site.

Clean Gravel – Gravel is a type of coarse-grained soil that consists of small stones and other mineral particles. Clean Gravel shall meet the requirements in accordance with National Grid Standard Construction Specification for Electric Stations (Engineering Standard SP.08.00.001) Clean Gravel will not have fine materials that could lead to a turbid discharge.

Clean Stone (Crushed Stone) – Clean Stone (Crushed Stone) shall meet the requirements in accordance with National Grid Standard Construction Specification for Electric Stations (Engineering Standard SP.08.00.001). Clean Stone will not have fine materials that could lead to a turbid discharge.

Clearing – The cutting of trees and large bushes by hand and/or mechanical means.

Compost Socks – Tubular devices comprised of non-degradable, photodegradable, or biodegradable mesh tubing containing organic compost matrix. Compost socks are effective for intercepting site runoff, trapping sediment, and treating for soluble pollutants by filtering stormwater runoff. .

Compost socks are a useful sedimentation control device along construction site perimeters, as check dams in drainage channels, as a slope interruption practice on long and/or steep slopes, and around drain or street curb inlets.

Corduroy Road – Corduroy roads are cut trees and/or saplings with the crowns and branches removed, and the trunks lined up next to one another.

Dewatering Basin – An established containment area for saturated materials and pumped discharges. This measure is used for the purpose of de-watering soils prior to transport off site or for use in another location on site, and for allowing suspended sediment to settle out of pumped discharges.

Detention/Retention Basin – A detention/retention basin is designed for the purpose of detaining or retaining water. A dewatering basin is a form of detention basin

Dewatering – Use of a system of pumps, pipes and temporary holding dams to drain or divert waterways or wetlands, or lower the groundwater table before and during excavation activities.

Drainage Ditch or Swale – a clearly noticeable channel that is typically dry, except after precipitation events. Intermittent and perennial streams and rivers are not included in this definition.

Dredge – To dig, excavate, or otherwise disturb the contour or integrity of sediments in the bank or bed of a wetland, a surface water body, or other area within the regulating bodies' jurisdiction.

Dredge Spoils – Material removed as the result of dredging.

Embankment – A protective bank constructed of mounded earth or fill materials located between a roadway (or rail bed) and a seasonal stream or other wetland.

Environmental Field Issue – Document that contains copies of all project-specific environmental permits and summarizes all environmental permit conditions. The EFI is prepared by the Project Environmental Consultant or the National Grid Environment Scientist and copies are provided to the Project Manager, Construction Supervisor(s), and other team members as appropriate.

Environmental Monitoring Records – Examples of checklists and/or monitoring reports suggested for use by the Company Environmental Engineer to document conformance of the project with this Environmental Guidance and or project specific permit/license conditions.

Environmental Scientist – Formerly Environmental Engineer. The National Grid Environmental Department representative for the project or the territory where the work is located. For a map of Environmental Department staff territories, refer to the Environmental page of the National Grid infonet.

Environmentally Sensitive Areas – Examples of environmentally sensitive areas that may be found on National Grid properties are rivers, streams, ponds, lakes, wetlands, bogs, swamps, salt marshes, rare species habitat, wellhead protection areas, cultural sites, parks, preserves, schools and as otherwise defined by Federal, State or local regulations. Refer to EG-301.

Erosion Controls – The utilization of methods to prevent soil detachment and minimize displacement or washing down slopes by rainfall or run-off. Common practices include, but are not limited to:

(a) Temporary and Permanent Seeding

(b) Mulching, Soil Binders, Tackifiers

(c) Erosion Control Blankets

(d) Hydraulic Erosion Control

Excavate/Excavation – To dig, remove, or form a cavity or a hole in an area within the department's jurisdiction.

Fill (n.) – Any rock, soil, gravel, sand or other such material that has been deposited or caused to be deposited by human activity.

Fill (v.) – To place or deposit materials in or on a wetland, surface water body, bank or otherwise in or on an area within the jurisdiction of the department.

Flats – Relatively level landforms composed of unconsolidated mineral and organic sediments usually mud or sand, that are alternately flooded and exposed by the tides and that usually are continuous with the shore.

Frozen condition – Field conditions when the upper portion of the ground surface freezes or when areas of standing water freeze solid such that vehicle passage over these areas is supported without any resulting soil disturbance. The frozen conditions must have been affected by severe cold (maximum daily temperatures less than 32 degrees F) for a continuous 2-week period.

GAA – Rhode Island groundwater classification, groundwater resources that are know or presumed to be suitable for drinking water use without treatment and are located in one of the three areas described below.

a) The state's major stratified drift aquifers that are capable of serving as a significant source for a public water supply ("groundwater reservoirs") and the critical portion of their recharge area as delineated by DEM;

b) The wellhead protection area for each public water system community water supply well. Community watrer supply wells are those that serve resident populations and have at least 15 service connections or serve at least 25 individuals, e. g. municipal wells and wells serving nursing homes, condominiums, mobile home parks, etc.; and

c) Groundwater dependent areas that are physically isolated from reasonable alternative water supplies and where existing groundwater warrants the highest level of protection. At present only Block Island has been designated as meeting this criterion..

GA – Rhode Island groundwater classification, groundwater resources that are know or presumed to be suitable for drinking water use without treatment. However, groundwater classified by GA does not fall within any of the three priority areas described under the GAA classification.

Grade/Grading – The movement of soil and fill material to change the elevation of the land. The term refers to the combined actions of excavating and filling to change elevation or shape.

Grubbing – The removal of stumps/roots by mechanical means during site preparation activities.

Immediately - As soon as practicable, but no later than the end of the next work day, following the day when the earth-disturbing activities have temporarily or permanently ceased.

In-kind replacement - replacement using the same material, functional inverts, diameter and length as the existing item. In-kind replacement includes the substitution of a structure with a similar structure in approximately the same location as is practicable, and is approximately the same in design. The design may be altered to meet applicable utility standards, and may include alternate materials designed to prolong the life of that service.

Intermittent Stream – A stream that flows for sufficient time to develop and maintain a defined channel, but which might not flow during dry portions of the year.

In the Dry – Work done either during periods of low water or behind temporary diversions, such as Earth Dike / Drainage Swale and Lined Ditches designed and installed in accordance with best management practices.

Limit of Work/Disturbance – The approved project limits within regulated areas. All project related activities in regulated areas must be conducted within the approved limit of work/disturbance. The limit of work/disturbance shall be depicted on the approved permit site plans and in the EFI plans. Where it is warranted National Grid may require that these limits be identified in the field by flagging, construction fencing, and/or perimeter erosion controls.

Long-Term Restoration Logs - Project-specific log used to document restoration required following the completion of construction or as areas of the project have been completed (i.e., segments of ROW for a multi-mile project). The log is typically updated by the Project Environmental Consultant or the

National Grid Environment Scientist Environment Scientist and circulated to the project team on a weekly basis.

Low Flow Conditions – Low water flow that generally occurs during the summer, as a result of decreased precipitation and the removal of water by increased evaporation and evapotranspiration by vegetation. Work done under low-flow conditions minimizes the potential for environmental damage. The USACE defines the calendar dates for low flow conditions in its New England state-specific Programmatic General Permits.

Low Ground Pressure – equipment that meets the regulatory requirement of < 3 Pounds per Square Inch (PSI) ground pressure when loaded. Use of LGP equipment ***requires approval*** from the National Grid Environmental Scientist.

Marsh – A wetland:

a) That is distinguished by the absence of trees and shrubs;

b) Dominated by soft-stemmed herbaceous plants such as grasses, reeds, and sedges; and

c) Where the water table is at or above the surface throughout the year, but can fluctuate seasonally.

Methods – Are the construction practices and procedures that take place through choosing the proper equipment, trucks and labor to execute the earth moving activities based on the existing conditions and implementing creative and sensitive scheduling for the daily activities.

NHESP - Natural Heritage Endangered Species Program; a department within the Massachusetts Division of Fisheries and Wildlife that is responsible for protecting the 176 species of vertebrate and invertebrate animals and 259 species of native plants that are officially listed as Endangered, Threatened or of Special Concern in Massachusetts.

Perennial – A stream that contains water at all times except during extreme drought.

Permanently Ceased – Is applicable to earth disturbance activities when clearing and excavation within any area of the Project that will not include permanent structures has been completed.

Person-in-Charge – A National Grid Project Engineer, Manager, Supervisor, Field Construction Coordinator or equivalent Contractor personnel assigned to oversee and coordinate work activities.

Processed Gravel – Processed Gravel shall meet the requirements in accordance with National Grid Standard Construction Specification for Electric Stations (Engineering Standard SP.08.00.001) Processed Gravel will not have fine materials that could lead to a turbid discharge. Gravel consisting of inert material that is hard, durable stone and is free from loam and clay, surface coatings and deleterious materials.

Regulating Body – Federal, State, or local authority that has jurisdiction over resource areas that may be impacted by company operations

Regulated Wetland Area – Those areas that are subject to federal, state or local wetland regulation, including certain buffer or adjacent areas.

Repair – The restoring of an existing legal structure by partial replacement of work, or broken, or unsound parts (Env-Wt 101.73).

Replacement – The substitution of a new structure for an existing legal structure with no change in size, dimensions, location, configuration, construction, or which conforms in all material aspects to the original structure

Right-of-Way – A corridor of land where National Grid has legal rights (either fee ownership, lease or easement) to construct, operate, and maintain an electric power line and/or natural gas pipeline and may include work on customer owned properties.

River – A watercourse that is larger than a perennial stream and flows all year long.

Routine Utility Rights-of-Way Maintenance Activity – Includes but is not limited to vegetation management and repair or replacement of existing utility structures.

Sedimentation Controls – Silt fences, straw bales, compost socks/berms and other barrier devices strategically placed to intercept and treat sediment-laden site runoff.

Sensitive Water - Includes any sediment or nutrient impaired water or a water that is identified by the state, tribe or EPA as Tier 2, 2.5 or Tier 3 for antidegradation purposes.

Siltation Curtain – An impervious barrier erected to prevent silt and sand and/or fines from being washed into a wetland, surface water body or other area of concern.

Surface Water Body or Surface Waters – Those portions of waters which have standing or flowing water at or on the surface of the ground.

Spill Prevention, Control and Countermeasure Plans – Required for site operations that involve the storage of 1,320 gallons or greater of fuel and oils, both in storage containers and stored in equipment. Response actions to spills and releases are specified in these plans.

Swamp Mats – Components of a temporary wood, plastic or other suitable material used as a BMP to cross sensitive areas or provide a stable working surface.

Stormwater Pollution Prevention Plan – A site-specific, written document that, among other things: (1) identifies potential sources of stormwater pollution at a construction site; (2) describes stormwater control measures to reduce or eliminate pollutants in stormwater discharge from a construction site;

and (3) identifies procedures the operator will implement to comply with the terms and conditions of EPA NPDES Construction General Permit (CGP). SWPPPs must be prepared, maintained on-site, and amended as necessary in order to obtain NPDES permit coverage for specific construction site stormwater discharges under the EPA NPDES CGP.

Temporarily Ceased - Is applicable when there are earth disturbance activities such as clearing, grading, and/or excavation that are not complete, but will be idle in one area for a period of up to 14 or more calendar days, and which will resume in the future. The 14 calendar day timeframe begins as soon as you now that construction work on a portion of the Project will be left incomplete and idle. In circumstances where there are unanticipated delays and you do not know at first how long the work stoppage will continue, the requirement to immediately initiate stabilization is triggered as soon as you know with reasonable certainty that work will be stopped for 14 or more additional calendar days.

Tidal Wetlands – A wetland whose vegetation, hydrology or soils are influenced by periodic inundation or tidal waters.

Topsoil – The uppermost part of the soil, ordinarily moved in tillage, or its equivalent in uncultivated soils and ranging in depth from 2 to 10 inches.

Turbidity – The condition in which solid particles suspended in water make the water cloudy or even opaque in extreme cases.

United States Geological Survey topographic map – A map that uses contour lines to represent the three-dimensional features of a landscape on a two-dimensional surface. These maps use a line and symbol representation of natural and artificially created features in an area.

Wetland – An area that is inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal conditions does support, a prevalence of vegetation (more than 50 percent) typically adapted for life in saturated soil conditions (hydric soils). Wetlands include but are not limited to swamps, marshes, bogs, and similar areas.

Work Site – An area where work is performed.

Worker – Company employee, contractor, consultant working on site.

Zone II - Massachusetts - That area of an aquifer which contributes water to a well under the most severe pumping and recharge conditions that can be realistically anticipated (180 days of pumping at safe yield, with no recharge from precipitation). It is bounded by the groundwater divides which result from pumping the well and by the contact of the aquifer with less permeable materials such as till or bedrock. In some cases, streams or lakes may act as recharge boundaries. In all cases, Zone IIs shall extend up gradient to its point of intersection with prevailing hydrogeologic boundaries (a groundwater flow divide, a contact with till or bedrock , or a recharge boundary).

Appendix 2 – Acronyms

ASTM	American Society for Testing and Materials
BMP	Best Management Practices
EFI	Environmental Field Issue
EG	Environmental Guidance
EPA	Environmental Protection Agency
GA/GAA	Rhode Island Groundwater Classifications – see glossary
LGP	Low Ground Pressure
MA	Massachusetts
MA DEP	Massachusetts Department of Environmental Protection
MassDOT	Massachusetts Department of Transportation
NE	New England
NH	New Hampshire
NH DES	New Hampshire Department of Environmental Services
NHESP	Natural Heritage Endangered Species Program
NPDES	National Pollutant Discharge Elimination System
OHM	Oil and/or Hazardous Materials
PSI	Pounds per square inch
RI	Rhode Island
RI DEM	Rhode Island Department of Environmental Management
RI CRMC	Rhode Island Coastal Resources Management Council
RI SESC	Rhode Island soil erosion and sediment control
ROW	Right-of-Way
RTE	Rare, Threatened or Endangered
SPCC	Spill Prevention, Control and Countermeasure
SWPPP	Storm Water Pollution Prevention Plan
TOY	Time-of-Year
USACE	United States Army Corps of Engineers
USGS	United States Geological Survey
VT	Vermont
VT DEC	Vermont Department of Environmental Conservation

Zone II Massachusetts Groundwater Protection district – see glossary

Appendix 3 – EFI template

See EG303NE_Form1 for the EFI template

Appendix 4 – Simplified EFI template

See EG303NE_Form2 for the Simplified EFI template

Appendix 5 – Standard STORMS boilerplate language

See EG303NE_Form3 for examples of standard STORMS boilerplate language

Appendix 6

See EG303NE_Appendix6_Reporting Form published separately

Appendix 7 – BMPs

See EG303NE_Form4 for a list of BMPS

See EG303NE_Form5 for BMP details

APPENDIX 8
CERTIFICATION FORM FOR INVASIVE SPECIES CONTROL

Certain permit conditions, therefore a Condition of Contracts for the Prime Contractor, any Subcontractors, and any equipment or mat vendors for ***National Grid Projects*** shall be required to Certify their equipment[9] {each piece of equipment used on site} as 'clean'[10].

_____ (*name of firm*) hereby Certifies that

_____ (*make, model, and/or type*)

_____ (*equipment ID tag or #)* meets the following

1. before entry on to the job site, has been sufficiently cleaned to remove all accumulated mud, debris, plant fragments, and detritus that could harbor seeds, roots, or plant fragments of so-called invasive plant species; and

2. that the above piece of equipment has neither been off-loaded nor operated in the interval between cleaning and delivery to the jobsite.

3. that equipment deployed in areas of invasive species (as identified in project plans) shall be cleaned prior to redeployment

_____ (*signed*) _____ (*dated*)

_____ (*printed name*) _____ (*title*)

_____ (*Firm*)

The signed original of this form {one for each piece of equipment (or lot[11] of mats)} is to be given to the NG Field Construction Coordinator assigned to the project.

[9] Equipment may include, but is not limited to bulldozers, excavators, backhoes, bucket trucks (tracked or wheeled), pulling equipment, concrete trucks, compressors, drilling equipment, and mats (composite, wood, or other materials).

[10] With regard to invasive species, the definition of clean means free of accumulated mud, debris, plant fragments, and detritus that could harbor seeds, roots, or plant fragments of so-called invasive plant species.

[11] Lot of mats is the number of mats that may be transported by one forwarder/truck at a time.

Record of Change		
Date of Review/Revision:		
Revision	**Date**	**Description**
0	1/23/12	Issued New England Specific EG-303 NE
1	04/22/13	Stone wall dismantling edits.
2	1/23/14	added bmp # 39, edited text on p40 to reference form1 and form2
3	08/29/14	Added section on communication of project specific environmental requirements (2.5), added appendices for EFI, simplified EFI, and STORMS boilerplate language. Added language concerning removal of BMPs (18.1). Minor edits to BMP details, and renumbered appendices. Added swamp mat transition, mat air bridge and silt sack BMP details.
4	2/5/15	Adding additional language about signage and demarcation of rare species populations and historic resources.
5	07/01/2015	Revised construction entrances/exits (5.2) per R170 audit findings.
6	09/28/2015	Added 4.1 (Refreshing of wetland flagging), revised 9.7 (stockpiling on mats), added 18.0 (stabilization deadlines) revised 19.2 (in-situ restoration), and edited BMP details (straw wattle, seeding options), added rock ford detail.
7	10/03/16	Added text to 2.5 for Simplified EFI (documentation of environmental resources present on projects where no permitting required).
8	10/21/2016	Amended Sections 9.1 and 9.4, adding guidance on dust, noise and vibration control requirements.

	BMP #	Measure
Sediment & Erosion Controls	1	Weed free bale barrier
	2	Sediment control fence
	3	Silt fence / weed free barrier
	4	Silt Soxx
	5	Straw Wattle
	6	Erosion Control Blanket - Ditch
	7	Erosion Control Blanket - Slope
	8	Hydroseeding with Tackifier (slope stabilization)
	9	Mulch materials, rates and uses (from NY)
	10	Seeding options - Upland Seed Mixes
	11	Seeding options - Wetland Seed Mix
Crossing Measures	12	Prefabricated mats
	13	Mat bridge
	14	Swamp mat layout (with transition)
	15	Swamp mat layout (with transition and BMPs)
	16	Swamp mat - Air Bridge
	17	Corduroy road
	18	Rock Ford
	19	Temporary construction entrance / exit
	20	Temporary construction culvert
	21	Access way stabilization
	22	Construction signage
Advanced Applications	23	Reinforced silt fence
	24	Sediment filter
	25	Stone check dams
	26	Straw / haybale check dam
	27	Waterbar
	28	Sandbag check dam
	29	Earth dike
	30	Drainage swale and lined ditch
	31	Sedimentation basin
	32	Dewatering basin - Small scale
	33	Dewatering basin - Large scale
	34	Dirtbag
	35	Concrete waste sump
	36	Outpak concrete washout
	37	Barrier fence (construction fence)
	38	ROW gates / fences
	39	Bollard
	40	Dust control
	41	Catch Basin Inlet Protection
	42	Silt Sack
	43	Turbidity Curtain

nationalgrid

ENVIRONMENTAL GUIDANCE

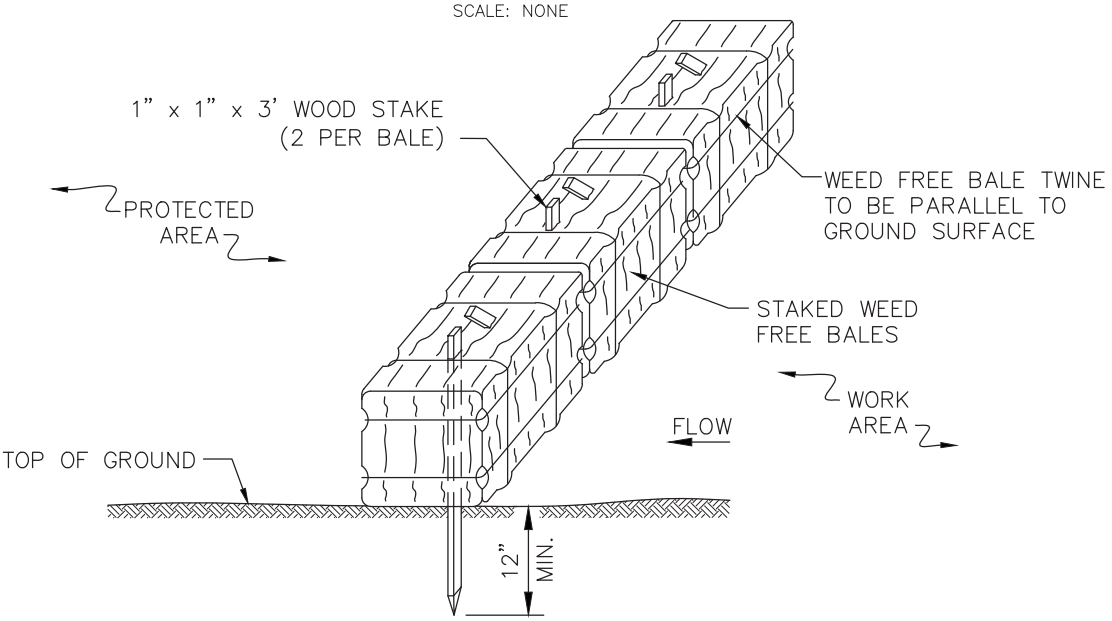
Doc. No.	EG-303NE
Page: 7-1	Rev. No. 3
Date	09/14/15

SUBJECT
Access, Maintenance and Construction
Best Management Practices

Reference
EP No. 3 - Natural Resource
Protection (Chapter 6)

BMP DETAIL

SCALE: NONE



NOTES:

1. THE GROUND SHALL BE PREPARED TO PROVIDE COMPLETE CONTACT WITH THE BALES.

BMP PICTURE

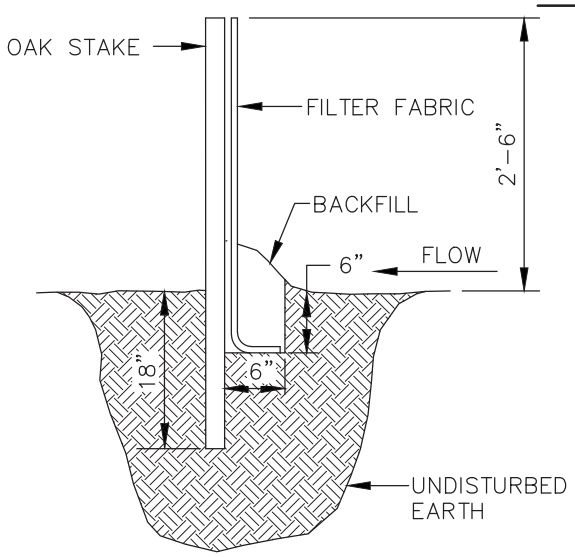
APPROVED BY: VICE PRESIDENT, ENVIRONMENTAL SERVICES
PRINTED COPIES ARE NOT DOCUMENT CONTROLLED. FOR LATEST AUTHORIZED VERSION PLEASE REFER TO THE NATIONAL GRID ENVIRONMENTAL INFONET SITE.

BMP # 1
WEED FREE BALE BARRIER

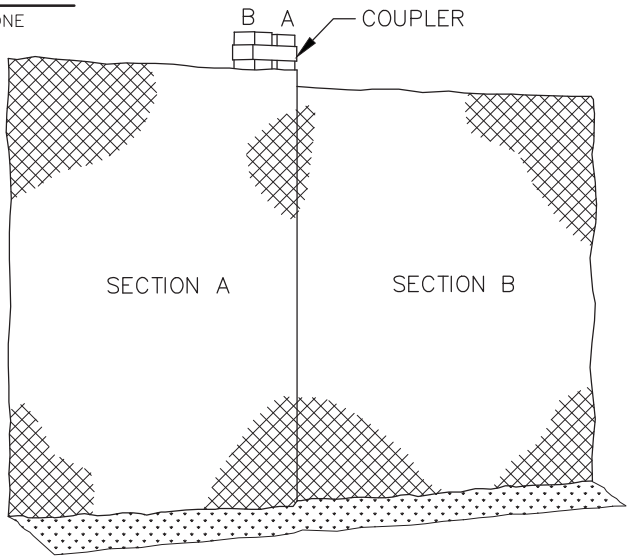
File: BALE_BARRIER.DWG

BMP DETAIL

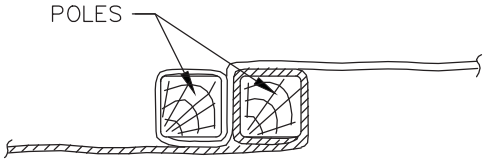
SCALE: NONE



PROFILE



SECTION



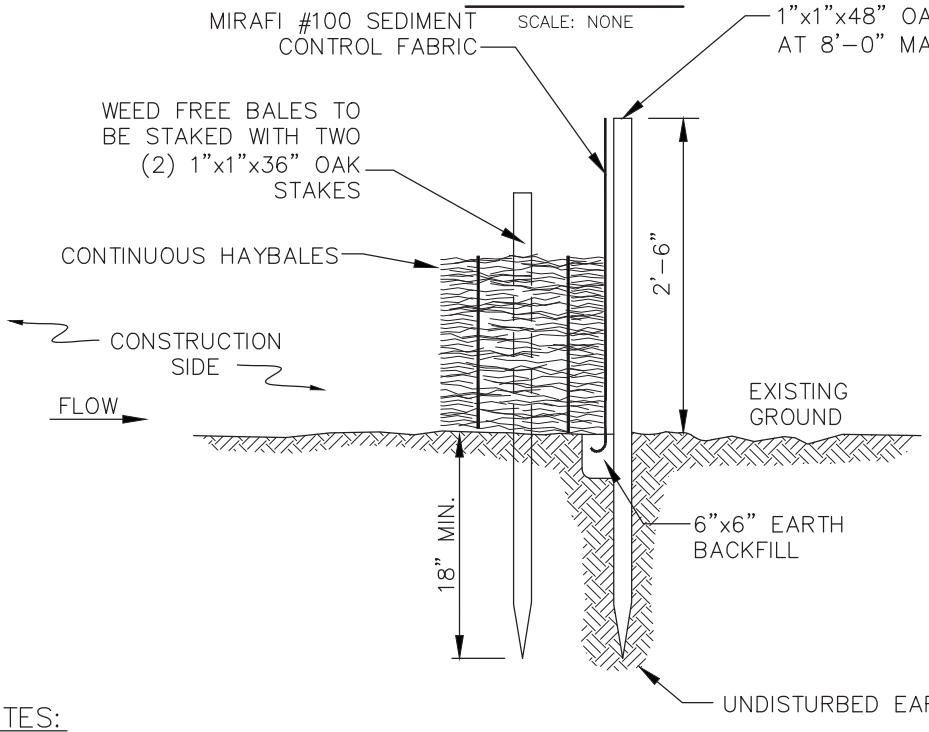
PLAN

BMP PICTURE

BMP # 2
SEDIMENT CONTROL FENCE

File: Sediment_Fence.dwg

BMP DETAIL



NOTES:

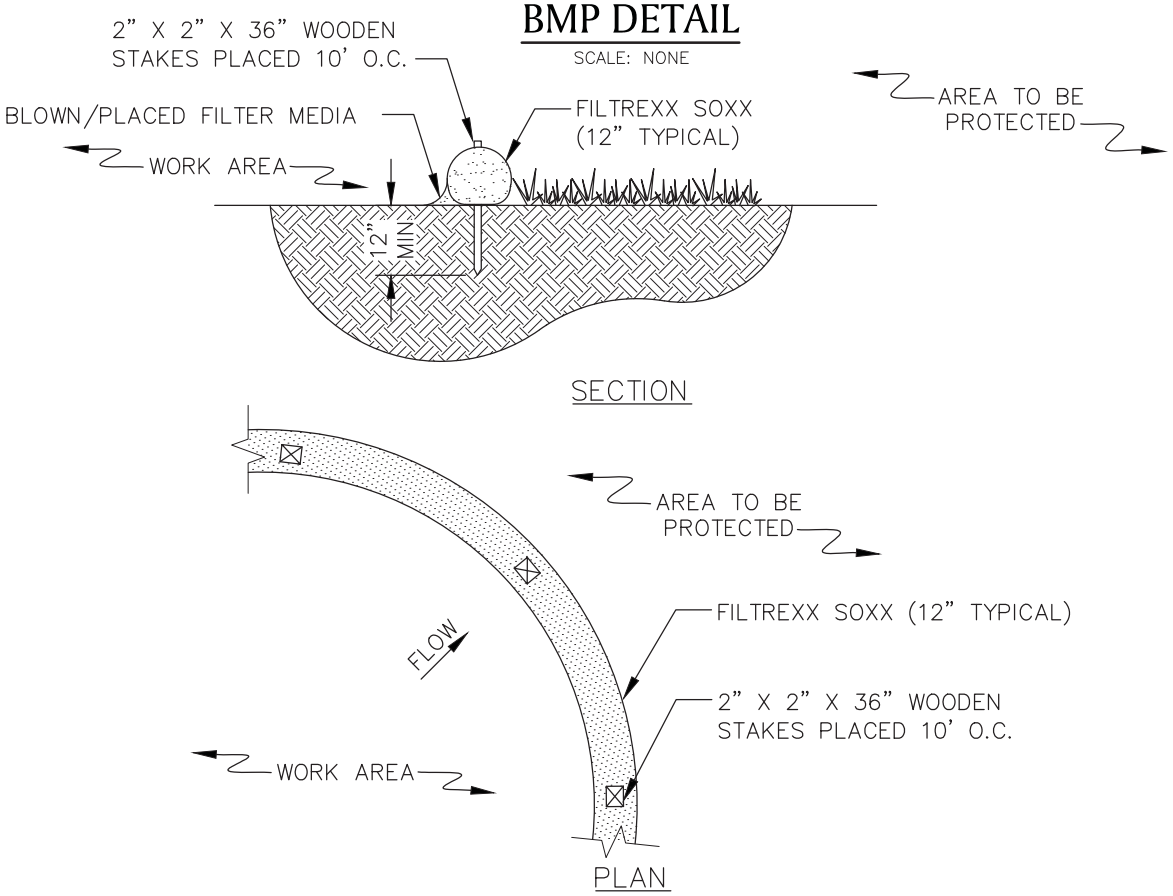
1. BALES SHALL BE PLACED IN A ROW WITH THE ENDS TIGHTLY ABUTTING THE ADJACENT BALES.
2. BALES SHALL BE SECURELY ANCHORED IN PLACE BY TWO (2) 1"X1"X36" OAK STAKES DRIVEN THROUGH THE BALES. THE FIRST STAKE IN EACH BALE SHALL BE ANGLED TOWARD PREVIOUSLY LAID BALE TO FORCE BALES TOGETHER.
3. INSPECTION SHALL BE FREQUENT AND REPAIR OR REPLACEMENT SHALL BE MADE PROMPTLY AS NEEDED.
4. BALES SHALL BE REMOVED AND REPLACED WHEN THEY BECOME FILLED WITH SEDIMENT AND BLOCK OR IMPEDE STORM FLOW OR DRAINAGE.
5. BALES SHALL BE REMOVED WHEN THE EMBANKMENTS STABILIZE.
6. BALES TO BE TWINE BOUND.

BMP PICTURE

BMP # 3
SILT FENCE / WEED FREE BARRIER

BMP DETAIL

SCALE: NONE



NOTES

1. PRODUCT TO BE FILTREXX SILT SOXX OR APPROVED EQUAL BY NATIONAL GRID ENVIRONMENTAL SCIENTIST.
2. ALL MATERIAL TO MEET FILTREXX SPECIFICATIONS.
3. FILTER MEDIA FILL TO MEET APPLICATION REQUIREMENTS.
4. COMPOST MATERIAL TO BE DISPERSED ON SITE, AS DETERMINED BY NATIONAL GRID ENVIRONMENTAL SCIENTIST.

BMP PICTURE

* PICTURE AND DETAIL PROVIDED BY FILTREXX LAND IMPROVEMENT SYSTEMS

APPROVED BY: VICE PRESIDENT, ENVIRONMENTAL SERVICES

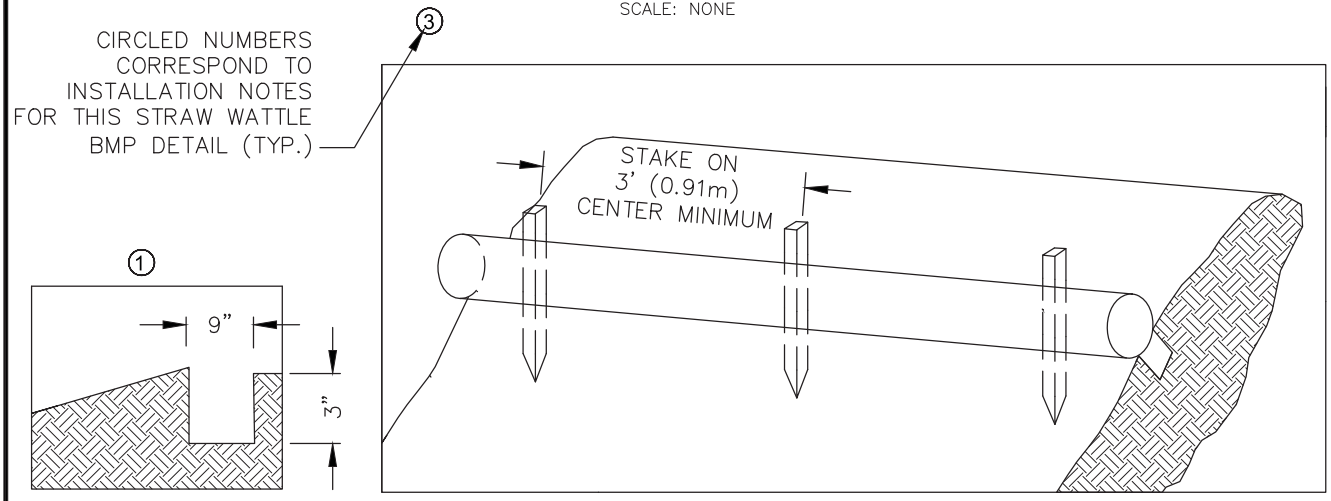
PRINTED COPIES ARE NOT DOCUMENT CONTROLLED. FOR LATEST AUTHORIZED VERSION PLEASE REFER TO THE NATIONAL GRID ENVIRONMENTAL INFONET SITE.

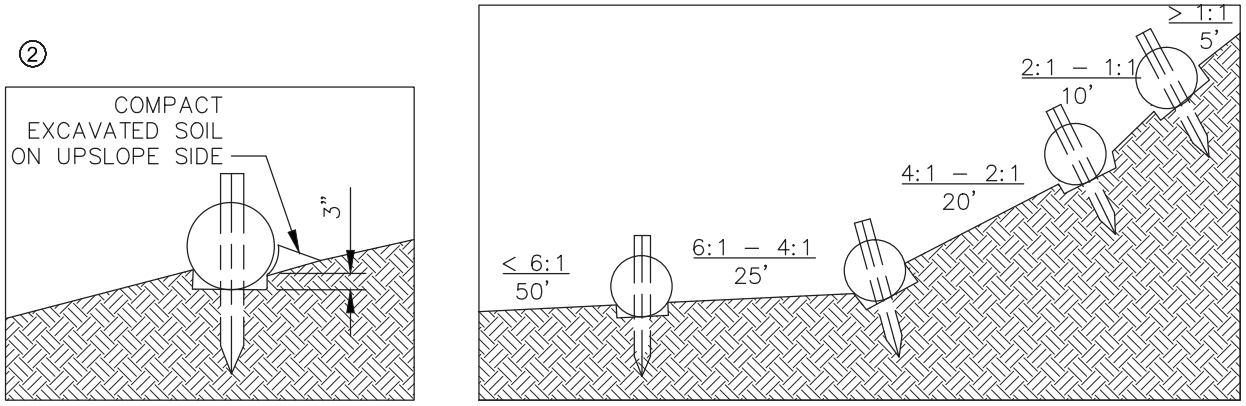
BMP # 4
SILT SOXX *

File: SiltSOXX.dwg

BMP DETAIL

SCALE: NONE





TYPICAL WATTLE SPACING DETAIL

NOTES:

1. PRODUCT TO BE TENSAR NORTH AMERICAN GREEN STRAW WATTLE OR APPROVED EQUAL BY NATIONAL GRID ENVIRONMENTAL SCIENTIST.
2. TYPICAL WATTLE SPACING BASED ON SLOPE GRADIENT. COORDINATE SPACING AND LOCATION WITH NATIONAL GRID ENVIRONMENTAL SCIENTIST.
3. MINIMUM 12" DIAMETER WATTLES SHOULD BE USED FOR HIGHLY DISTURBED AREAS (I.E., HEAVILY USED ACCESS ROAD WITH ADJACENT WETLAND) AND MINIMUM 9–10" WATTLES SHOULD BE USED FOR LESS DISTURBED SOILS.

INSTALLATION NOTES:

1. BEGIN AT THE LOCATION WHERE THE WATTLE IS TO BE INSTALLED BY EXCAVATING A 2–3" DEEP X 9" WIDE TRENCH ALONG THE CONTOUR OF THE SLOPE. EXCAVATED SOIL SHOULD BE PLACED UPSLOPE FROM THE ANCHOR TRENCH.
2. PLACE THE WATTLE IN THE TRENCH SO THAT IT CONTOURS TO THE SOIL SURFACE. COMPACT SOIL FROM THE EXCAVATED TRENCH AGAINST THE WATTLE ON THE UPHILL SIDE. ADJACENT WATTLES SHOULD TIGHTLY ABUT.
3. SECURE THE WATTLE WITH 18–24" STAKES EVERY 3–4' AND WITH A STAKE ON EACH END. STAKES SHOULD BE DRIVEN THROUGH THE MIDDLE OF THE WATTLE LEAVING AT LEAST 2–3" OF STAKE EXTENDING ABOVE THE WATTLE. STAKES SHOULD BE DRIVEN PERPENDICULAR TO THE SLOPE FACE.

* DETAIL AND PICTURE PROVIDED BY TENSAR NORTH AMERICAN GREEN

APPROVED BY: VICE PRESIDENT, ENVIRONMENTAL SERVICES

BMP # 5
STRAW WATTLE * (1 OF 2)

BMP PICTURE

STRAW WATTLE – SHALLOW SLOPE (≤4:1)
(ALTERNATE STAKING)

ALTERNATE STAKING INSTALLATION NOTES:

1. ON SHALLOW SLOPES (≤4:1), STRAW WATTLE MAY BE SECURED WITH 18–24" STAKES DRIVEN AGAINST THE SIDES OF THE WATTLE INSTEAD OF THROUGH. STAKES SHALL ALTERNATE SIDES, AND BE SPACED 3–4' MAX.
2. TWINE SHALL BE TIED FROM STAKE TO STAKE, CRISS–CROSSING THE STRAW WATTLE. TIE TWINE TO STAKES BELOW THE HEIGHT OF THE WATTLE.

File: Straw_Wattle.dwg

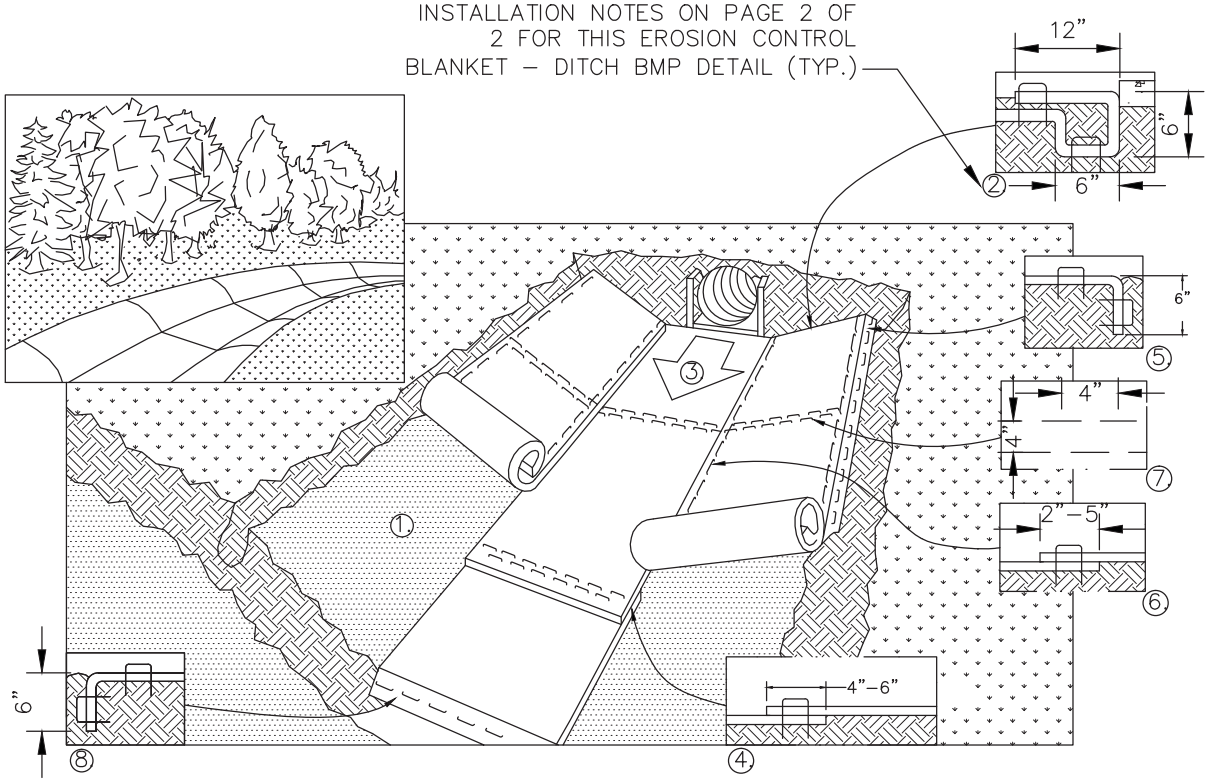
*** DETAIL AND PICTURE PROVIDED BY TENSAR NORTH AMERICAN GREEN**
APPROVED BY: VICE PRESIDENT, ENVIRONMENTAL SERVICES
PRINTED COPIES ARE NOT DOCUMENT CONTROLLED. FOR LATEST AUTHORIZED VERSION PLEASE REFER TO THE NATIONAL GRID ENVIRONMENTAL INFONET SITE.

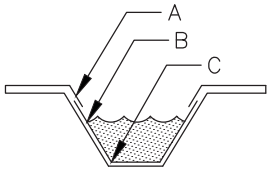
BMP # 5
STRAW WATTLE * (2 OF 2)

BMP DETAIL

SCALE: NONE

CIRCLED NUMBERS CORRESPOND TO INSTALLATION NOTES ON PAGE 2 OF 2 FOR THIS EROSION CONTROL BLANKET – DITCH BMP DETAIL (TYP.)





CRITICAL POINTS
A. OVERLAPS AND SEAMS
B. PROJECTED WATER LINE
C. CHANNEL BOTTOM/SIDE SLOPE VERTICES

NOTES:

1. PRODUCT TO BE NORTH AMERICAN GREEN EROSION CONTROL BLANKET OR APPROVED EQUAL BY NATIONAL GRID ENVIRONMENTAL SCIENTIST.
2. HORIZONTAL STAPLE SPACING SHOULD BE ALTERED IF NECESSARY TO ALLOW STAPLES TO SECURE THE CRITICAL POINTS ALONG THE CHANNEL SURFACE.
3. IN LOOSE SOIL CONDITIONS, THE USE OF STAPLE OR STAKE LENGTHS GREATER THAN 6" (15 CM) MAY BE NECESSARY TO PROPERLY ANCHOR THE ROLLED EROSION CONTROL PRODUCTS (RECP's).

BMP DETAIL

INSTALLATION NOTES:

1. PREPARE SOIL BEFORE INSTALLING ROLLED EROSION CONTROL PRODUCTS (RECP's), INCLUDING ANY NECESSARY APPLICATION OF LIME, FERTILIZER, AND SEED. NOTE: WHEN USING CELL-O-SEED DO NOT SEED PREPARED AREA. CELL-O-SEED MUST BE INSTALLED WITH PAPER SIDE DOWN.
2. BEGIN AT THE TOP OF THE CHANNEL BY ANCHORING THE RECP's IN A 6" (15 CM) DEEP X 6" (15 CM) WIDE TRENCH WITH APPROXIMATELY 12" (30 CM) OF RECP's EXTENDED BEYOND THE UP-SLOPE PORTION OF THE TRENCH. ANCHOR THE RECP's WITH A ROW OF STAPLES/STAKES APPROXIMATELY 12" (30 CM) APART IN THE BOTTOM OF THE TRENCH. BACKFILL AND COMAPCT THE TRENCH AFTER STAPLING. APPLY SEED TO COMPACTED SOIL AND FOLD REMAINING 12" (30 CM) PORTION OF RECP's BACK OVER SEED AND COMPACTED SOIL. SECURE RECP's OVER COMPACTED SOIL WITH A ROW OF STAPLES/STAKES SPACED APPROXIMATELY 12" (30 CM) ACROSS THE WIDTH OF THE RECP's.
3. ROLL CENTER RECP's IN DIRECTION OF WATER FLOW IN BOTTOM OF CHANNEL. RECP's WILL UNROLL WITH APPROPRIATE SIDE AGAINST THE SOIL SURFACE. ALL RECP's MUST BE SECURELY FASTENED TO SOIL SURFACE BY PLACING STAPLES/STAKES IN APPROPRIATE LOCATIONS AS SHOWN IN THE STAPLE PATTERN GUIDE. ™ WHEN USING THE DOT SYSTEM , STAPLES/STAKES SHOULD BE PLACED THROUGH EACH OF THE COLORED DOTS CORRESPONDING TO THE APPROPRIATE STAPLE PATTERN.
4. PLACE CONSECUTIVE RECP's END OVER END (SHINGLE STYLE) WITH A 4" – 6" (10 CM –15 CM) OVERLAP. USE A DOUBLE ROW OF STAPLES STAGGERED 4" (10 CM) APART AND 4" (10 CM) ON CENTER TO SECURE RECP's.
5. FULL LENGTH EDGE OF RECP's AT TOP OF SIDE SLOPES MUST BE ANCHORED WITH A ROW OF STAPLES/STAKES APPROXIMATELY 12" (30 CM) APART IN A 6" (15 CM) DEEP X 6" (15 CM) WIDE TRENCH. BACKFILL AND COMPACT THE TRENCH AFTER STAPLING.
6. ADJACENT RECP's MUST BE OVERLAPPED APPROXIMATELY 2" – 5" (5 CM –12.5 CM) (DEPENDING ON RECP's TYPE) AND STAPLED.
7. IN HIGH FLOW CHANNEL APPLICATIONS, A STAPLE CHECK SLOT IS RECOMMENDED AT 30 TO 40 FOOT (9 M – 12 M) INTERVALS. USE A DOUBLE ROW OF STAPLES STAGGERED 4" (10 CM) APART AND 4" (10 CM) ON CENTER OVER ENTIRE WIDTH OF THE CHANNEL.
8. THE TERMINAL END OF THE RECP's MUST BE ANCHORED WITH A ROW OF STAPLES/STAKES APPROXIMATELY 12" (30 CM) APART IN A 6" (15 CM) DEEP X 6" (15 CM) WIDE TRENCH. BACKFILL AND COMPACT THE TRENCH AFTER STAPLING.

BMP PICTURE

* PICTURE AND DETAIL PROVIDED BY TENSAR NORTH AMERICAN GREEN

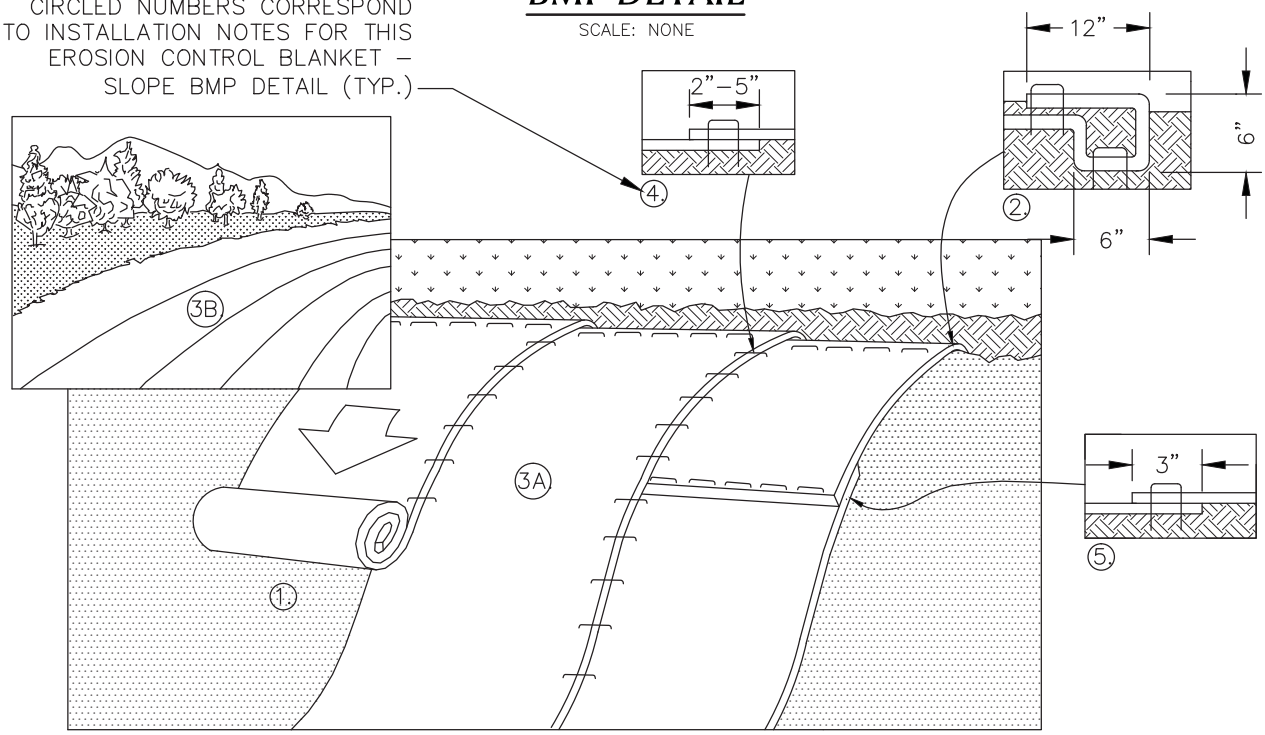
APPROVED BY: VICE PRESIDENT, ENVIRONMENTAL SERVICES

BMP # 6
EROSION CONTROL BLANKET - DITCH * (2 OF 2)

File: Erosion_Blanket_Ditch.dwg

BMP DETAIL

SCALE: NONE



NOTES:

1. PRODUCT TO BE NORTH AMERICAN GREEN EROSION CONTROL BLANKET OR APPROVED EQUAL BY NATIONAL GRID ENVIRONMENTAL SCIENTIST.
2. IN LOOSE SOIL CONDITIONS, THE USE OF STAPLES OR STAKE LENGTHS GREATER THAN 6" (15 CM) MAY BE NECESSARY TO PROPERLY SECURE THE RECP's.

INSTALLATION NOTES:

1. PREPARE SOIL BEFORE INSTALLING ROLLED EROSION CONTROL PRODUCTS (RECP's), INCLUDING ANY NECESSARY APPLICATION OF LIME, FERTILIZER, AND SEED. NOTE: WHEN USING CELL–O–SEED DO NOT SEED PREPARED AREA. CELL–O–SEED MUST BE INSTALLED WITH PAPER SIDE DOWN.
2. BEGIN AT THE TOP OF THE SLOPE BY ANCHORING THE RECP's IN A 6" (15 CM) DEEP X 6" (15 CM) WIDE TRENCH WITH APPROXIMATELY 12" (30 CM) OF RECP's EXTENDED BEYOND THE UP–SLOPE PORTION OF THE TRENCH. ANCHOR THE RECP's WITH A ROW OF STAPLES/STAKES APPROXIMATELY 12" (30 CM) APART IN THE BOTTOM OF THE TRENCH. BACKFILL AND COMPACT THE TRENCH AFTER STAPLING. APPLY SEED TO COMPACTED SOIL AND FOLD REMAINING 12" (30 CM) PORTION OF RECP's BACK OVER SEED AND COMPACTED SOIL. SECURE RECP's OVER COMPACTED SOIL WITH A ROW OF STAPLES/STAKES SPACED APPROXIMATELY 12" (30 CM) APART ACROSS THE WIDTH OF THE RECP's.
3. ROLL THE RECP's (A.) DOWN OR (B.) HORIZONTALLY ACROSS THE SLOPE. RECP's WILL UNROLL WITH APPROPRIATE SIDE AGAINST THE SOIL SURFACE. ALL RECP's MUST BE SECURELY FASTENED TO SOIL SURFACE BY PLACING STAPLES/STAKES ™ IN APPROPRIATE LOCATIONS AS SHOWN IN THE STAPLE PATTERN GUIDE. WHEN USING THE DOT SYSTEM , STAPLES/STAKES SHOULD BE PLACED THROUGH EACH OF THE COLORED DOTS CORRESPONDING TO THE APPROPRIATE STAPLE PATTERN.
4. THE EDGES OF PARALLEL RECP's MUST BE STAPLED WITH APPROXIMATELY 2" – 5" (5 CM – 12.5 CM) OVERLAP DEPENDING ON RECP's TYPE.
5. CONSECUTIVE RECP's SPLICED DOWN THE SLOPE MUST BE PLACED END OVER END (SHINGLE STYLE) WITH AN APPROXIMATE 3" (7.5 CM) OVERLAP. STAPLE THROUGH OVERLAPPED AREA, APPROXIMATELY 12" (30 CM) APART ACROSS ENTIRE RECP's WIDTH.

* PICTURE AND DETAIL PROVIDED BY TENSAR NORTH AMERICAN GREEN

BMP # 7
EROSION CONTROL BLANKET - SLOPE * (1 OF 2)

File: Erosion_Blanket_Slope.dwg

BMP PICTURE

* PICTURE AND DETAIL PROVIDED BY TENSAR NORTH AMERICAN GREEN

BMP # 7
EROSION CONTROL BLANKET - SLOPE * (2 OF 2)

BMP PICTURE

NOTES:

1. COORDINATE MIXTURE TYPE AND APPLICATION AREAS WITH NATIONAL GRID ENVIRONMENTAL SCIENTIST PRIOR TO CONSTRUCTION.
2. A MINIMUM OF 1500 LBS. PER ACRE OF A PAPER/CORN FIBER OR EQUIVALENT WITH NATURAL TACKIFIERS WILL BE USED ON SLOPES LESS THAN 3:1.
3. A BFM (BONDED FIBER MATRIX) WILL BE USED ON SLOPES GREATER THAN 2:1.
4. A FGM (FLEXIBLE GROWTH MATRIX) OR ESM (EXTREME SLOPE MATRIX) WILL BE USED ON SLOPES GREATER THAN 1:1.
5. REFER TO BMP #10 FOR SEED MIXTURE OPTIONS.

* PICTURE PROVIDED BY TENSAR NORTH AMERICAN GREEN
* TACKIFIER INFORMATION PROVIDED BY FILTREXX LAND IMPROVEMENT SYSTEMS AND TENSAR NORTH AMERICAN GREEN

APPROVED BY: VICE PRESIDENT, ENVIRONMENTAL SERVICES
PRINTED COPIES ARE NOT DOCUMENT CONTROLLED. FOR LATEST AUTHORIZED VERSION PLEASE REFER TO THE NATIONAL GRID ENVIRONMENTAL INFONET SITE.

BMP # 8
HYDROSEEDING WITH TACKIFIER
(SLOPE STABILIZATION) *

File: Hydroseeding.dwg

BMP

Definition

Applying coarse plant residue or chips, or other suitable materials, to cover the soil surface.

Purpose

The primary purpose is to provide initial erosion control while a seeding or shrub planting is establishing. Mulch will conserve moisture and modify the surface soil temperature and reduce fluctuation of both. Mulch will prevent soil surface crusting and aid in weed control. Mulch is also used alone for temporary stabilization in non-growing months.

Conditions Where Practice Applies

On soils subject to erosion and on new seedings and shrub plantings. Mulch is useful on soils with low infiltration rates by retarding runoff.

Criteria

Site preparation prior to mulching requires the installation of necessary erosion control or water management practices and drainage systems.

Slope, grade and smooth the site to fit needs of selected mulch products.

Remove all undesirable stones and other debris to meet the needs of the anticipated land use and maintenance required.

Apply mulch after soil amendments and planting is accomplished or simultaneously if hydroseeding is used.

Select appropriate mulch material and application rate or material needs. Determine local availability.

Select appropriate mulch anchoring material.

NOTE: The best combination for grass/legume establishment is straw (cereal grain) mulch applied at 2 ton/ acre (90 lbs./1000sq.ft.) and anchored with wood fiber mulch (hydromulch) at 500 – 750 lbs./acre (11 – 17 lbs./1000 sq. ft.). The wood fiber mulch must be applied through a hydroseeder immediately after mulching.

NOTE:

1. PICTURE DEPICTS STRAW MULCH APPLICATION (FROM MULCH SPREADER) ON STEEP SLOPE WITH AN IMPROVED DRAINAGE SWALE.
2. COORDINATE MULCH MATERIALS AND RATES WITH NATIONAL GRID ENVIRONMENTAL SCIENTIST.

* BMP INFORMATION FROM "NEW YORK STANDARDS AND SPECIFICATIONS FOR EROSION AND SEDIMENT CONTROL (AUGUST, 2005)." INFORMATION OBTAINED VIA WEBSITE: http://www.dec.ny.gov/chemical/29066.html

BMP # 9
MULCH MATERIALS, RATES AND USES (FROM NY) *

File: Mulch_Materials.dwg

UPLAND ROW RESTORATION MIX – GENERAL

Species Composition Options:

- Andropogon gerardii; Niagra Big Bluestem
- Schizachyrium scoparium; Little Bluestem
- Elymus Canadensis; Canada Wild Rye
- Elymus virginicus; Virginia Wildrye
- Lolium multiflorum; Annual Ryegrass
- Sorghastrum nutans; Indiangrass
- Chamaecrista fasciculate; Partridge Pea
- Desmodium canadense; Showy Tick Trefoil
- Helioposis helianthoides; Ox–Eye Sunflower
- Panicum virgatum; Switchgrass
- Rudbeckia hirta; Black Eyed Susan
- Poa palustris; Fowl Bluegrass
- Agrostis perennans; Upland Bentgrass
- Agrostis alba; Redtop
- Festuca rubra; Red Fescue
- Lotus corniculatus; Birds–Foot Trefoil
- Chrysanthemum leucanthem; Ox–Eye Daisy
- Aster novae–angliae; New England Aster

Example Seed Mixes:

1. Native Upland wildlife forage and Cover Meadow Mix – Ernst Conservation Seeds (ERNMX–123)
2. Eastern Ecotype Native Grass Mix– Ernst Conservation Seeds (ERNMX–177)
3. New England Native Warm Season Grass Mix – New England Wetland Plants, Inc.
4. New England Logging Road Mix – New England Wetland Plants, Inc.
5. Northeast Upland Wildflower/Restoration Erosion Mix – Southern Tier Consulting (STCMX–2)

UPLAND ROW RESTORATION MIX – DRY/ROCKY SITES

Species Composition Options:

- Festuca rubra; Red Fescue
- Schizachyrium scoparium; Little Bluestem
- Elymus Canadensis; Canada Wild Rye
- Bouteloua gracillis; Blue Grama
- Lolium multiflorum; Annual Ryegrass
- Lolium perenne; Perennial Ryegrass
- Agrostics scabra; Rough Bentgrass
- Agrostis perennans; Upland Bentgrass
- Sorghastrum nutans; Indiangrass

Example Seed Mixes:

1. New England Erosion Control/ Restoration Mix for Dry Sites – New England Wetland Plants, Inc.
2. Ernst Conservation Seeds and similar companies can create a custom seed mix matching the composition above (with site specific additions if necessary).

WETLAND ROW RESTORATION MIX

Species Composition Options:

- Agrostis stolonifera; Creeping Bentgrass
- Poa trivialis; Rough Bluegrass
- Alopecurus arundinaceus; Creeping Meadow Foxtail
- Lolium multiflorum; Annual Ryegrass
- Festuca rubra; Creeping Red Fescue
- Elymus virginicus; Virginia Wildrye
- Schizachyrium scoparium; Little Bluestem
- Andropogon gerardii; Niagra Big Bluestem
- Carex vulpinoidea; Fox sedge
- Panicum virgatum; Switchgrass
- Agrostis scabra; Rough Bentgrass
- Aster novae–angliae; New England Aster
- Eupatorium perfoliatum; Boneset
- Euthamia graminifolia; Grass Leaved Goldenrod
- Scirpus atrovirens; Green Bulrush
- Verbene hastate; Blue Vervain
- Juncus effusus; Soft Rush
- Scirpus cyperinus; Wool Grass
- Panicum clandestinum; Deertongue

Example Seed Mixes

1. New England Erosion Control/Restoration Mix for Detention Basins and Moist Sites – New England Wetland Plants, Inc.
2. Northeast Wetland Grass Seed Mix – Southern Tier Consulting (STCMX–7)
3. Ernst Conservation Seeds and similar companies can create a custom seed mix matching the composition above (with site specific additions if necessary).

GERNERAL NOTES:

1. Seed mixes described herein are intended to cover a variety of typical new england landscapes. However, site specific seed mixes will need to be evaluated in coastal or mountainous regions.
2. Seed mixes described herein are intended for general ROW restoration. Site specific wetland seed mixes may be required by local, state and/or federal regulators for certain impacts to wetlands.
3. All seed mixes are to be approved by National Grid Environmental Scientist prior to construction and must conform with all project permits.
4. Seedbed preparation and maintenance as well as temporary erosion and sediment controls are crucial to the establishment of newly seeded areas. Coordinate with National Grid Environmental Scientist on seed bed preparation and maintenance as well as temporary erosion and sediment controls prior to construction.

BMP PICTURE

SCALE: NONE

NOTES:

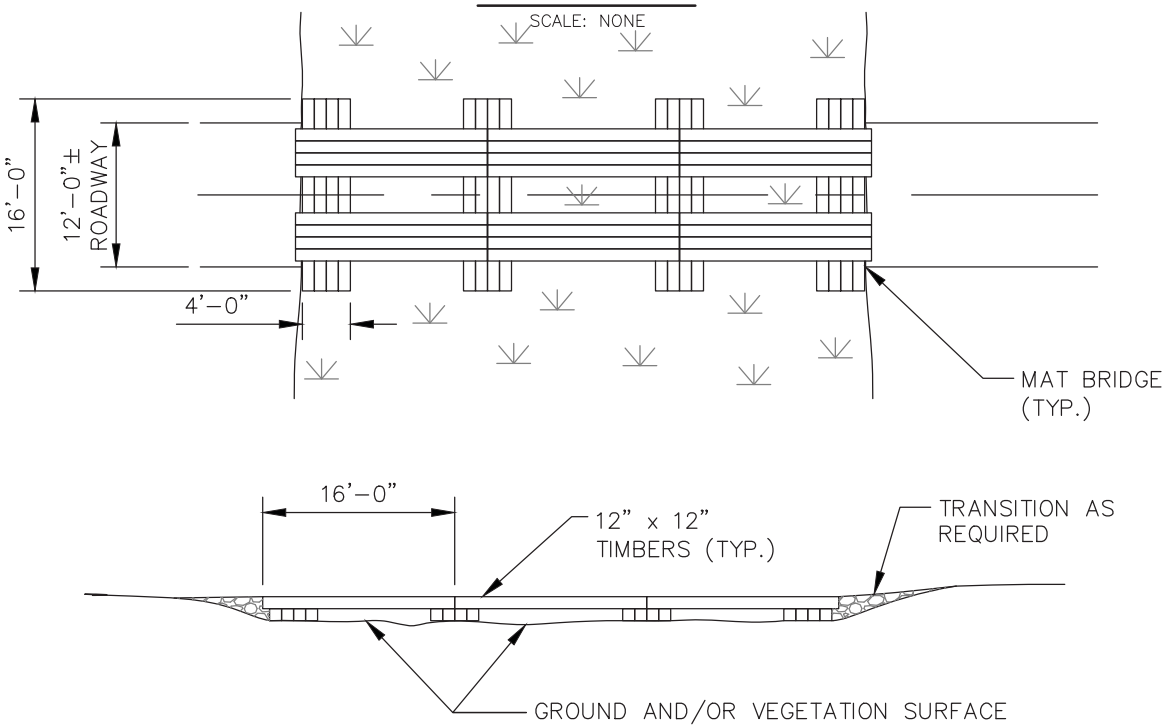
1. PRODUCT TO BE ALTURNAMATS' PREFABRICATED MATS OR APPROVED EQUAL BY NATIONAL GRID ENVIRONMENTAL SCIENTIST.
2. PRODUCT AVAILABLE IN 4X8' UNITS.
3. IF MATS ARE INSTALLED IN A WETLAND AREA, INSTALL EROSION CONTROLS TO CONTAIN MATERIAL UTILIZED IN THE MAT TRANSITIONS.

* PICTURE PROVIDED BY ALTURNAMATS

BMP # 12
PREFABRICATED MATS *

File: Prefab_Mats.dwg

BMP DETAIL



NOTES:

1. IF MATS ARE INSTALLED IN A WETLAND AREA, INSTALL EROSION CONTROLS TO CONTAIN MATERIAL UTILIZED IN THE MAT TRANSITIONS.

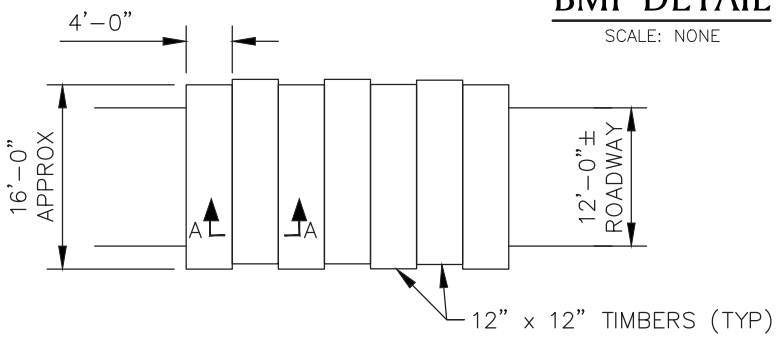
BMP PICTURE

BMP # 13
MAT BRIDGE

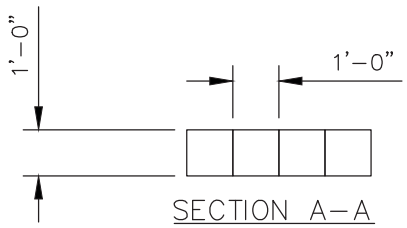
File: Mat_Bridge.dwg

BMP DETAIL

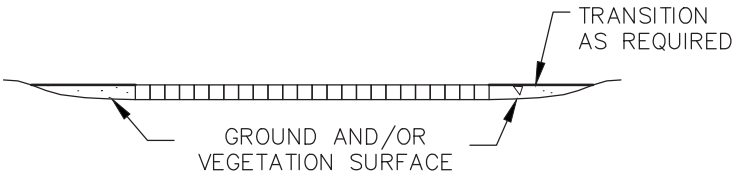
SCALE: NONE



TYPICAL PLAN VIEW



SECTION A–A
TYPICAL MAT SECTION
BOLTED TOGETHER



TYPICAL SECTION VIEW

NOTES:

1. TO BE INSTALLED IF NECESSARY TO PREVENT RUTTING, TO ACCESS STRUCTURES.
2. THIS DETAIL SHOWS TYPICAL DIMENSIONS. SOME CONTRACTOR'S SWAMP MATS ARE DIMENSIONALLY DIFFERENT FROM WHAT IS SHOWN HERE.
3. DEPENDENT ON SITE CONDITIONS, MULTIPLE LAYERS OF SWAMP MATS MAY BE INSTALLED.

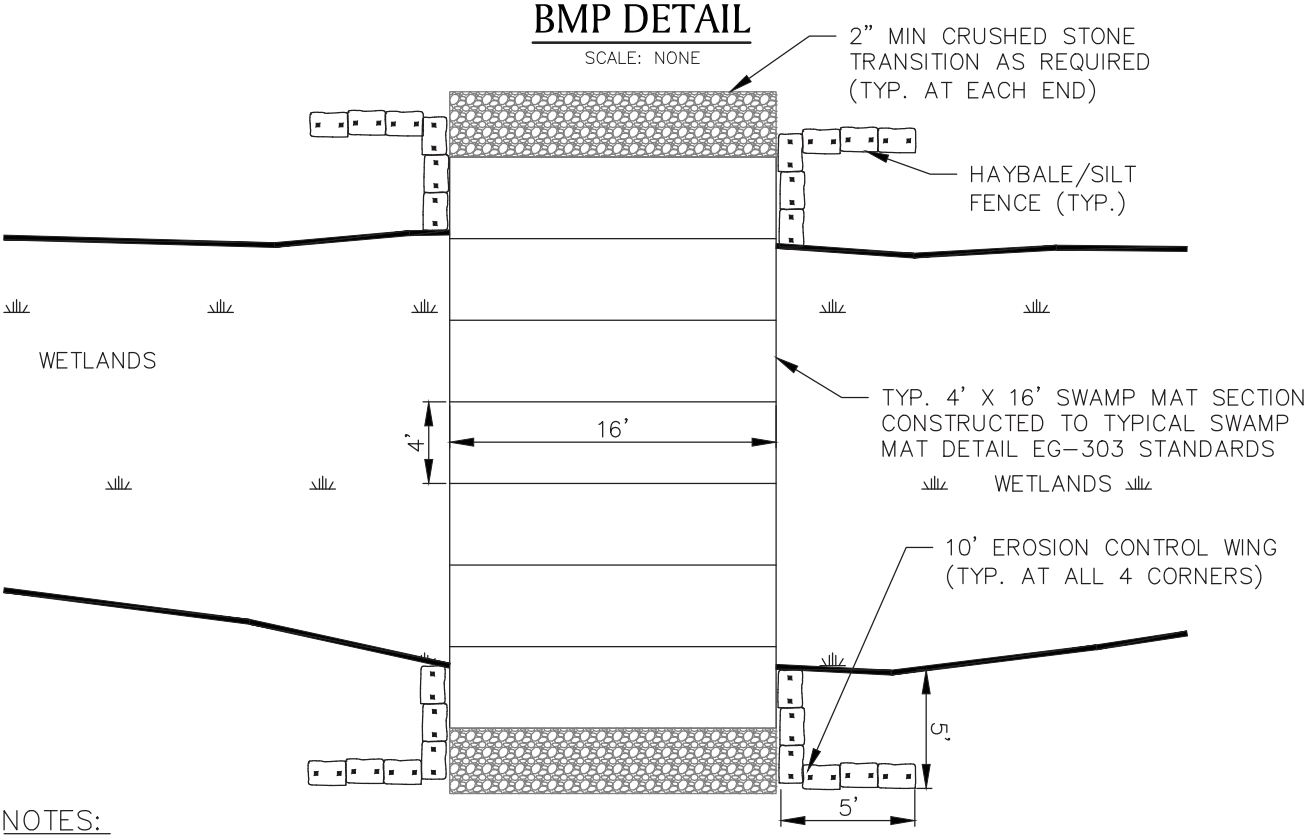
BMP PICTURE

BMP # 14
SWAMP MAT LAYOUT (WITH TRANSITION)

File: Swamp_Mat_Layout.dwg

BMP DETAIL

SCALE: NONE



NOTES:

1. ADD FILTER FABRIC AS NEEDED UNDER STONE TRANSITION RAMPS.
2. ALL MEASUREMENTS AND LOCATIONS ARE APPROXIMATE.

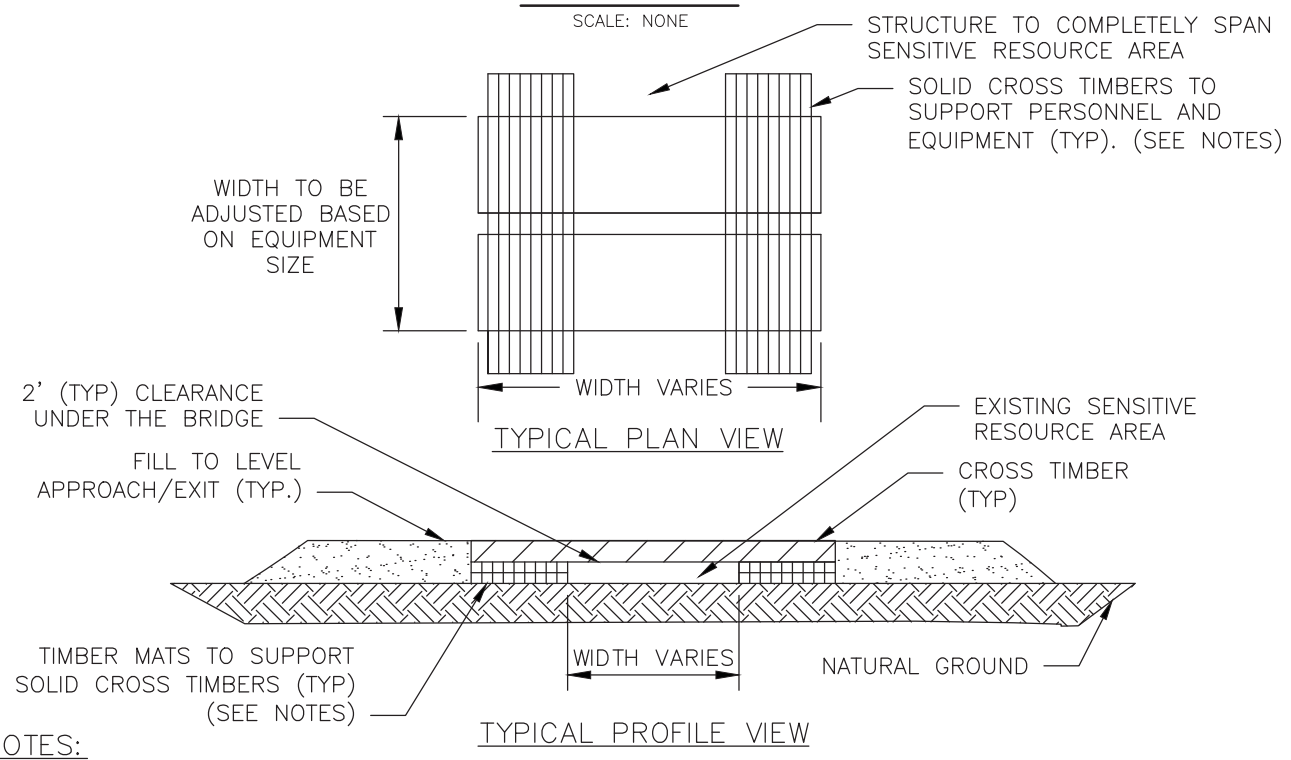
BMP PICTURE

BMP # 15
SWAMP MAT LAYOUT
(WITH TRANSITION AND BMPs)

File: Swamp_Mat_Transition and BMPs.dwg

BMP DETAIL

SCALE: NONE



NOTES:

1. THE DETAIL SHOWN IS CONCEPTUAL. TIMBER MATS AND CROSS TIMBERS SHALL BE SIZED AND SELECTED BASED ON SPAN WIDTH, CROSSING EQUIPMENT AND FIELD CONDITIONS.
2. THE NUMBER OF TIMBER MATS MAY VARY DEPENDING ON THE CLEARANCE HEIGHT.
3. EQUIPMENT AND PERSONNEL LOAD SHALL BE DISTRIBUTED ON ALL TIMBERS.
4. EACH EQUIPMENT OPERATOR AND USER OF THE FIELD BRIDGE SHALL BE FAMILIAR WITH THE DESIGN AND THE MAXIMUM EQUIPMENT AND PERSONNEL LOADS.
5. THIS DETAIL MAY NOT BE APPLICABLE IN ALL FIELD CONDITIONS.
6. INSTALL EROSION CONTROLS ADJACENT TO THE CULVERT ENDS TO PROTECT THE WATERWAY FROM ROADWAY DEBRIS.

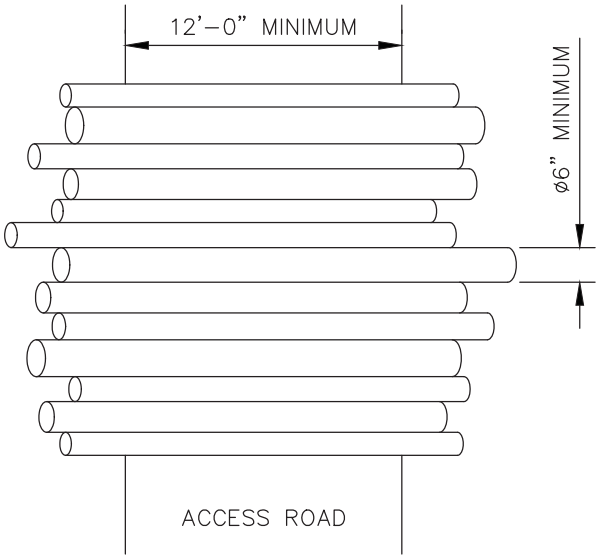
BMP PICTURE

BMP # 16
SWAMP MAT - AIR BRIDGE

File: Swamp_Mat_AIR BRIDGE.dwg

BMP DETAIL

SCALE: NONE



RANDOM LENGTH AND DIAMETER LOGS PLACED ACROSS AN ACCESS ROAD

NOTE:

1. A SIMILAR BRUSH MAT INSTALLATION CONSISTING OF SMALLER DIAMETER STEMS AND LOGS CAN BE USED.
2. CORDUROY ROADS SHALL ONLY BE USED IN EMERGENCIES OR AFTER APPROVAL FROM THE PROJECT ENVIRONMENTAL CONSULTANT OR NATIONAL GRID ENVIRONMENTAL SCIENTIST.

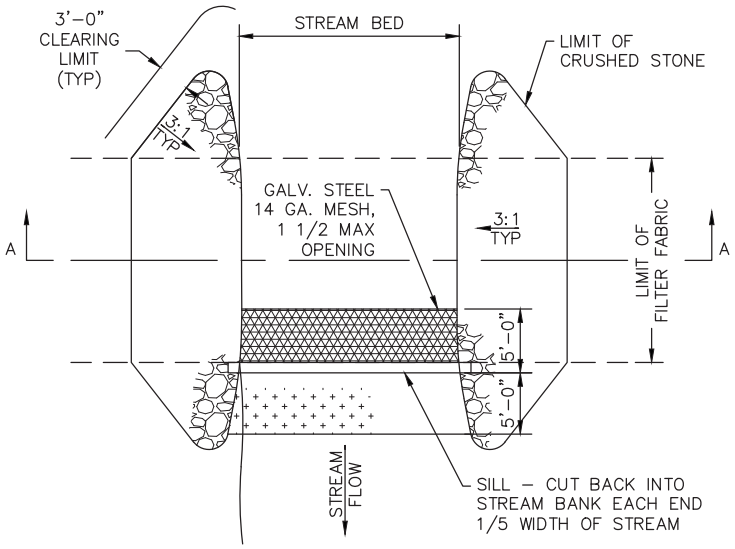
BMP PICTURE

BMP # 17
CORDUROY ROAD

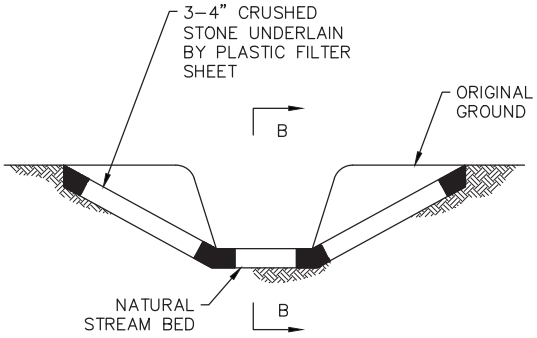
File: Corduroy_Road.dwg

BMP DETAIL

SCALE: NONE



PLAN VIEW



SECTION 'A–A'

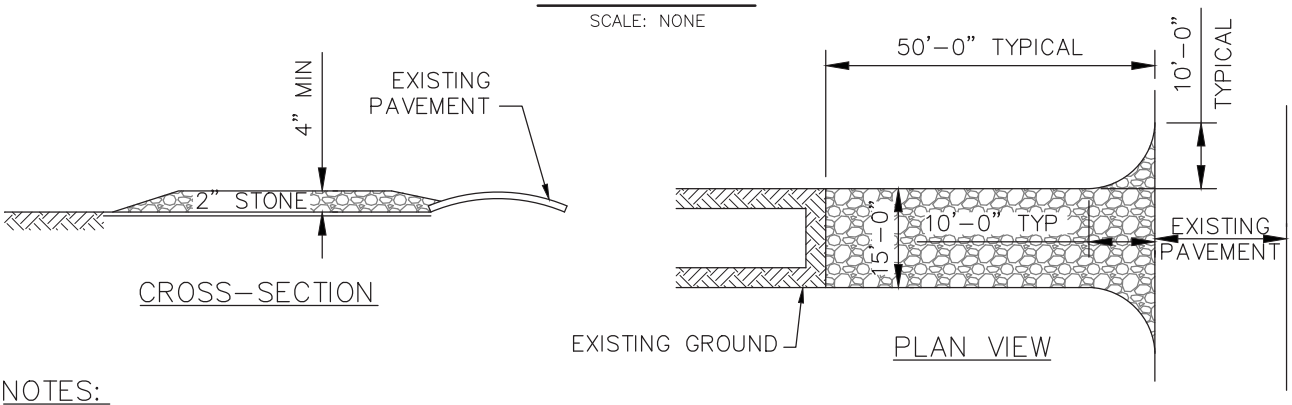
BMP PICTURE

BMP # 18
ROCK FORD

File: Rock_Ford.dwg

BMP DETAIL

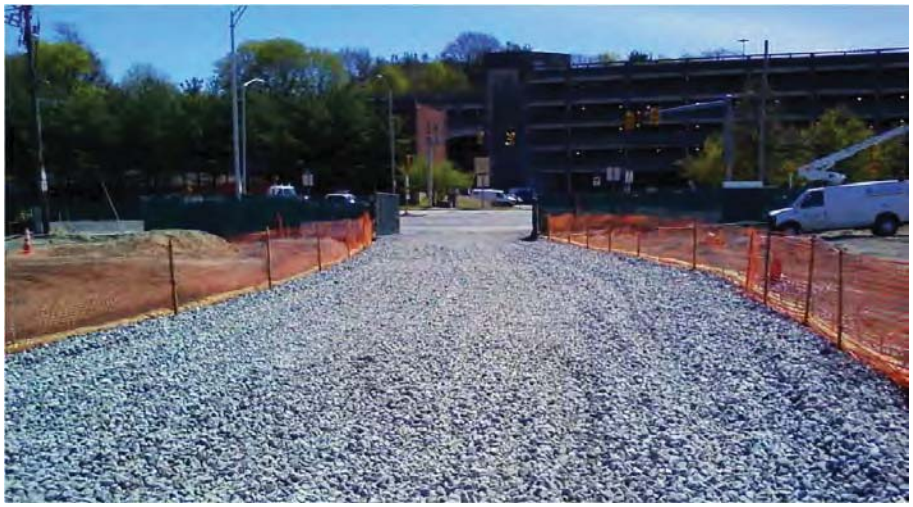
SCALE: NONE



NOTES:

1. STONE SIZE – USE 2" STONE (MINIMUM) TO 6" STONE (MAXIMUM)
2. LENGTH – GREATER THAN OR EQUAL TO 50 FEET
3. THICKNESS – 4"
4. WIDTH – FIFTEEN (15) FOOT TYP., BUT NOT LESS THAN FULL WIDTH AT POINTS WHERE INGRESS OR EGRESS OCCURS.
5. SURFACE WATER – ALL SURFACE WATER FLOWING OR DIVERTED TOWARD CONSTRUCTION ENTRANCES SHALL BE PIPED ACROSS ENTRANCE. IF PIPING IS IMPRACTICAL, MOUNTABLE BERM SHALL BE PERMITTED.
6. MAINTENANCE – THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION WHICH SHALL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHTS–OF–WAY. THIS MAY REQUIRE PERIODIC TOP DRESSING WITH ADDITIONAL STONE AS CONDITIONS DEMAND AND REPAIR OR CLEANOUT OF ANY MEASURES USED TO TRAP SEDIMENT. ALL SEDIMENT SPILLED, DROPPED, WASHED OR TRACKED ONTO PUBLIC RIGHTS–OF–WAY MUST BE REMOVED IMMEDIATELY.
7. PERIODIC INSPECTION AND NEEDED MAINTENANCE SHALL BE PROVIDED.
8. THE CLEAN STONE SHOULD BE INSTALLED OVER A GEOTEXTILE FABRIC. GEOTEXTILE FABRIC MAY BE OMITTED FOR PERMANENT CONSTRUCTION ENTRANCES/EXITS ON A CASE–BY–CASE BASIS WITH THE APPROVAL OF THE NATIONAL GRID ENVIRONMENTAL SCIENTIST.
9. FOLLOWING CONSTRUCTION, THE CONSTRUCTION ENTRANCE/EXIT SHALL BE REMOVED AND THE AREA GRADED, SEEDED, AND MULCHED AS NEEDED. ENTRANCE/EXITS MAY REMAIN DEPENDING UPON FUTURE ACCESS NEEDS AND/OR PROJECT–SPECIFIC APPROVALS BUT REQUIRES APPROVALS FROM THE NATIONAL GRID ENVIRONMENTAL SCIENTIST AND PROPERTY LEGAL.

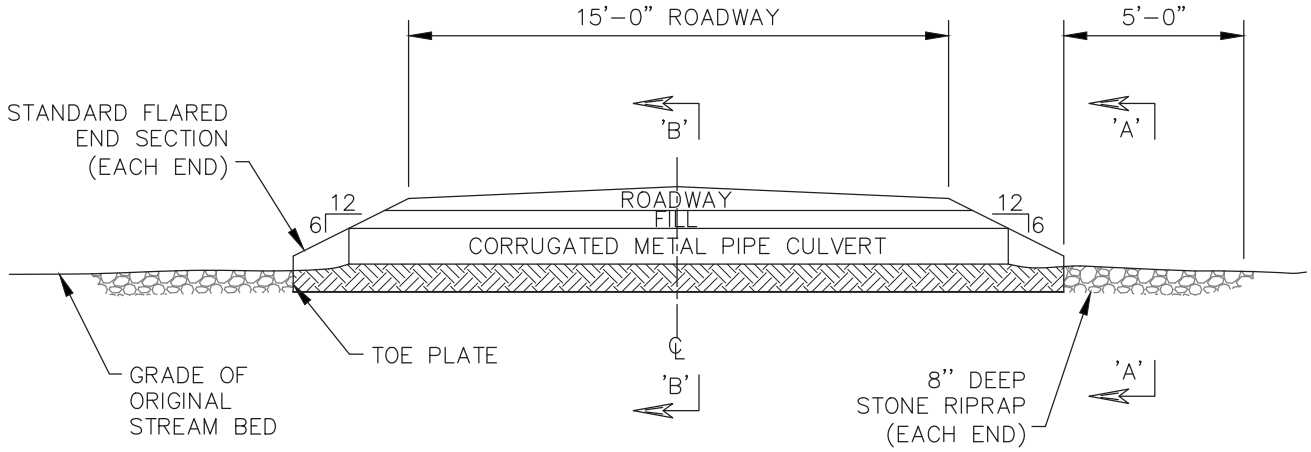
BMP PICTURE



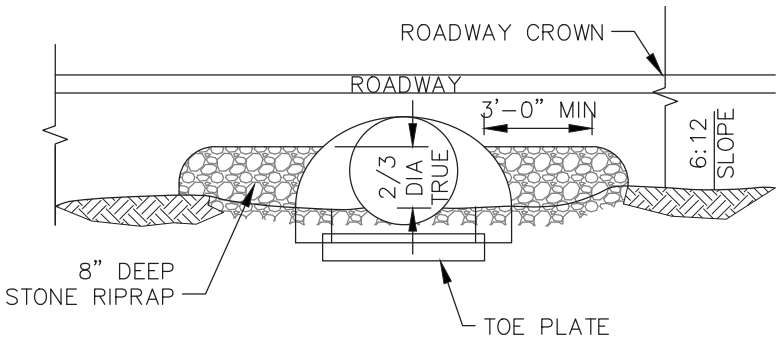
BMP # 19
TEMPORARY CONSTRUCTION ENTRANCE/ EXIT

BMP DETAIL

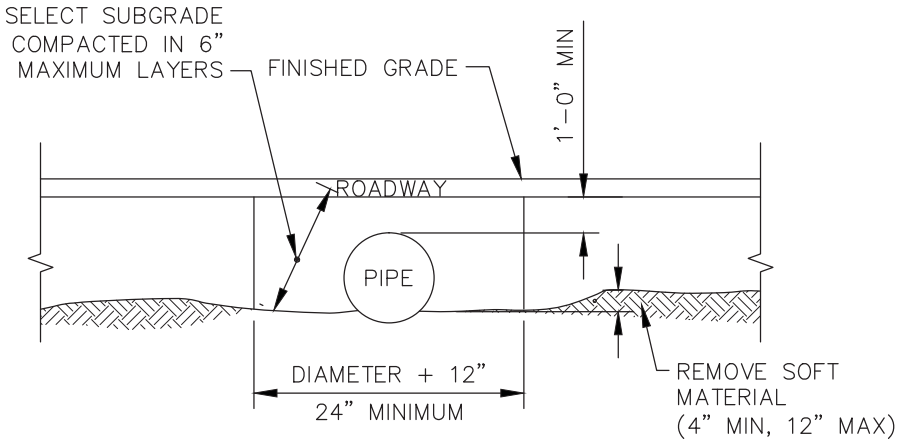
SCALE: NONE



CROSS SECTION



SECTION 'A–A'
(SAME BOTH ENDS)



SECTION 'B–B'

BMP # 19
TEMPORARY CONSTRUCTION CULVERT (1 OF 2)

File: Temp_Constr_Culvert.dwg

BMP DETAIL

SCALE: NONE

NOTES:

1. CULVERT DESIGN AND LAYOUT SHALL BE COORDINATED WITH NATIONAL GRID ENVIRONMENTAL SCIENTIST (NGES).
2. CROWN ROADWAY 1/2 INCH PER FOOT.
3. LAY THE CULVERT STRAIGHT AND AS NEARLY AS POSSIBLE ALONG THE EXISTING STREAM BED AND WITH THE INVERTS AT OR SLIGHTLY BELOW BED ELEVATION.
4. CORRUGATED METAL PIPE IS TO BE GALVANIZED STEEL, OR ALUMINIZED STEEL (TYPE 2), WITH BOLTED CONNECTORS.
5. DIAMETERS SHALL BE AS PER THE PROJECT DRAWINGS AND THE SPECIFICATION. THE PIPE GAGE SHALL BE AS FOLLOWS:

DIAMETER (INCHES)	GAGE
12" – 15"	.004"
18" – 24"	.079"
30" – 36"	.109"

6. INSTALLATION OF CULVERTS LARGER THAN 36 INCH DIAMETER SHALL REQUIRE SPECIAL ENGINEERING DESIGN.
7. SELECT SUBGRADE SHALL BE A GRANULAR MATERIAL AS DESCRIBED IN NYSDOT SPECIFICATION ITEM 203–2.02C, OR AS APPROVED BY A NGES.
8. STONE RIPRAP SHALL BE AS DESCRIBED IN NYSDOT SPECIFICATION ITEM 203–2.02D, WITH 8 INCH MAXIMUM SIZE, OR AS APPROVED BY A NGES. EXCEPT WHERE PROTECTED BY STONE, ALL EMBANKMENT SLOPES ARE TO BE STABILIZED, MULCHED AND SEEDED AS PER PROJECT SPECIFICATIONS.
9. OUTLET SHOULD BE CONFIGURED NOT TO CREATE HYDRAULIC JUMP OR PLUNGE POOL.
10. INSTALL EROSION CONTROLS ADJACENT TO THE CULVERT ENDS TO PROTECT THE WATERWAY FROM ROADWAY DEBRIS.

BMP PICTURE

BMP # 20
TEMPORARY CONSTRUCTION CULVERT (2 OF 2)

File: Temp_Constr_Culvert.dwg

BMP PICTURE

NOTE:

1. PICTURE SHOWS VIEW OF ACCESS WAY STABILIZATION ADJACENT TO A WETLAND.
2. COORDINATE STABILIZATION DESIGN AND PRODUCT WITH NATIONAL GRID ENVIRONMENTAL SCIENTIST.

BMP # 21
ACCESS WAY STABILIZATION

File: Access_Stabilization.dwg

BMP PICTURE


NO ACCESS – WETLAND/STREAM CROSSING MATS REQUIRED

NO ACCESS – A.) PROJECT LIMITS E.G. ROW LIMITS
B.) HISTORICAL/CULTURAL
C.) ENVIRONMENTALLY SENSITIVE E.G. THREATENED & ENDANGERED
D.) OTHER

APPROVED ACCESS

BMP DETAIL

SCALE: NONE

WIRE BACKED SILT FENCE

MUTUAL INDUSTRIES WIRE BACKED SILT FENCE
PART # 1776-14-24
36" X 100'
36" MISF 1776 FABRIC
24" 14GA WIRE MESH
OPENING OF MESH 2" X 4"
FABRIC HOG RINGED EVERY 12"-18" ALONG THE TOP OF THE FENCE

ROLL WEIGHT 40 LBS

32 ROLLS PER PALLET

NOTES:

1. PRODUCT TO BE MUTUAL INDUSTRIES' WIRE BACKED SILT FENCE OR APPROVED EQUAL BY NATIONAL ENVIRONMENTAL SCIENTIST.
2. COORDINATE INSTALLATION METHOD AND LOCATION WITH NATIONAL GRID ENVIRONMENTAL SCIENTIST.

* PICTURE AND DETAIL PROVIDED BY MUTUAL INDUSTRIES

APPROVED BY: VICE PRESIDENT, ENVIRONMENTAL SERVICES

BMP # 23
REINFORCED SILT FENCE *

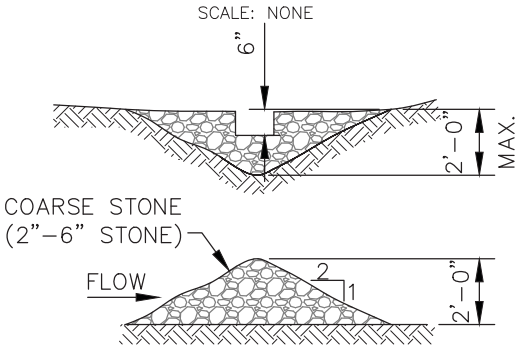
File: Reinforced_Silt_Fence.dwg

BMP PICTURE

NOTE:

1. PICTURE SHOWS SEDIMENT FILTER WITHIN A WETLAND.

BMP DETAIL



STONE CHECK DAM

NOTES:

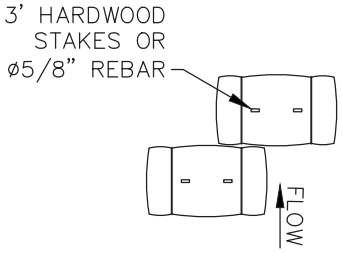
1. USE CHECK DAMS TO SLOW WATER FLOWS AND AS SMALL SEDIMENT TRAPS IN DITCHES ALONG ACCESS ROADS.
2. CLEAN SEDIMENT AND REPLACE DAMS AS NECESSARY.
3. THE CENTER OF THE CHECK DAM MUST BE AT LEAST 6" LOWER THAN THE OUTER EDGES.
4. COORDINATE SPACING WITH NATIONAL GRID ENVIRONMENTAL SCIENTIST.
5. MAX. SPACING: TOE OF THE UPSTREAM DAM IS SAME ELEVATION AS TOP OF DOWNSTREAM DAM.
6. STONE SHALL BE FREE OF FINE PARTICLES TO PREVENT TURBID DISCHARGES.

BMP PICTURE

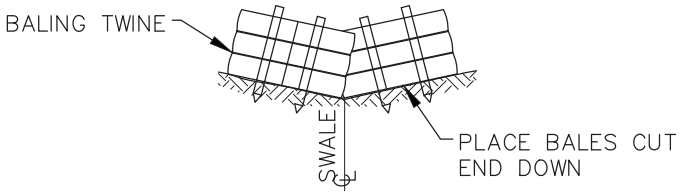
NOTE: A SMALLER STONE SIZE IS SHOWN IN THIS PICTURE.

BMP DETAIL

SCALE: NONE



PLAN VIEW



SECTION VIEW

NOTES:

1. USE CHECK DAMS TO SLOW WATER FLOWS AND AS SMALL SEDIMENT TRAPS IN DITCHES ALONG ACCESS ROADS.
2. CLEAN SEDIMENT AND REPLACE DAMS AS NECESSARY.
3. COORDINATE SPACING WITH NATIONAL GRID ENVIRONMENTAL SCIENTIST.

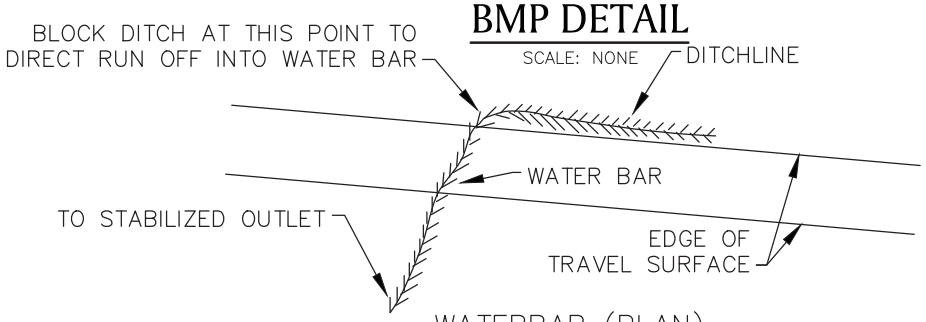
BMP PICTURE

BMP # 26
STRAW / HAYBALE CHECK DAM

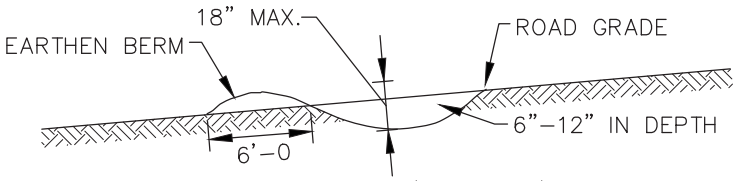
File: Straw_Check_Dam.dwg

BMP DETAIL

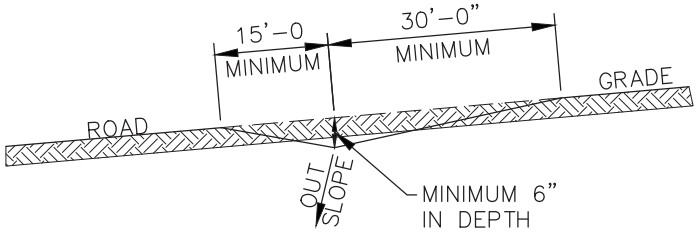
SCALE: NONE



WATERBAR (PLAN)



WATERBAR (SECTION)



DISCHARGE (SECTION)

NOTE:

1. LINE WITH 2"–6" STONE UNDERLAIN BY GEOTEXTILE FILTER FABRIC, KEYED INTO ROAD SURFACE AT LEAST 10 FEET EACH SIDE OF WATERBAR.
2. COORDINATE SPACING WITH NATIONAL GRID ENVIRONMENTAL SCIENTIST.

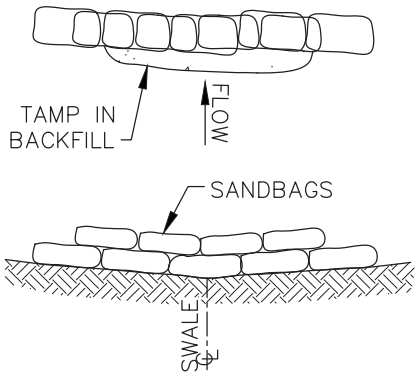
BMP PICTURE

BMP # 27
WATERBAR

File: Waterbar.dwg

BMP DETAIL

SCALE: NONE



SANDBAG
CHECK DAM

NOTES:

1. USE CHECK DAMS TO SLOW WATER FLOWS AND AS SMALL SEDIMENT TRAPS IN DITCHES ALONG ACCESS ROADS.
2. CLEAN SEDIMENT AND REPLACE DAMS AS NECESSARY.
3. COORDINATE SPACING WITH NATIONAL GRID ENVIRONMENTAL SCIENTIST.

BMP PICTURE

NOTE:

1. PICTURE DOES NOT DEPICT "TAMP IN BACKFILL"

BMP # 28
SANDBAG CHECK DAM

File: Sand_Bag_Check.dwg

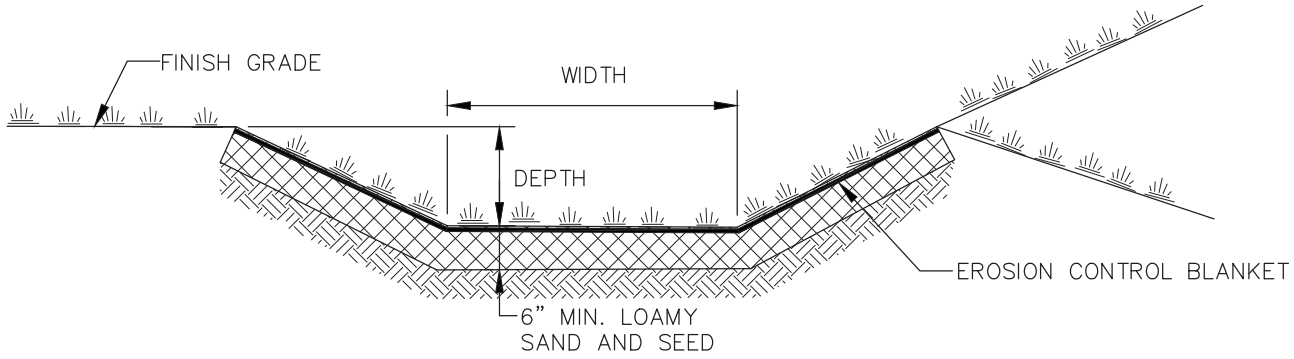
BMP PICTURE

NOTE:

1. EXACT SIZE, LOCATION AND DESIGN IS DEPENDANT ON SITE CONDITIONS, AND LOCAL AND STATE REGULATIONS. COORDINATE THIS BMP WITH NATIONAL GRID ENVIRONMENTAL SCIENTIST PRIOR TO CONSTRUCTION.

BMP DETAIL

SCALE: NONE



NOTES:

1. WIDTH AND DEPTH OF SWALE, AND EROSION CONTROL BLANKET TYPE TO BE COORDINATED WITH NATIONAL GRID ENVIRONMENTAL SCIENTIST.
2. REFER TO BMP # 10 FOR SEED MIXTURE OPTIONS.

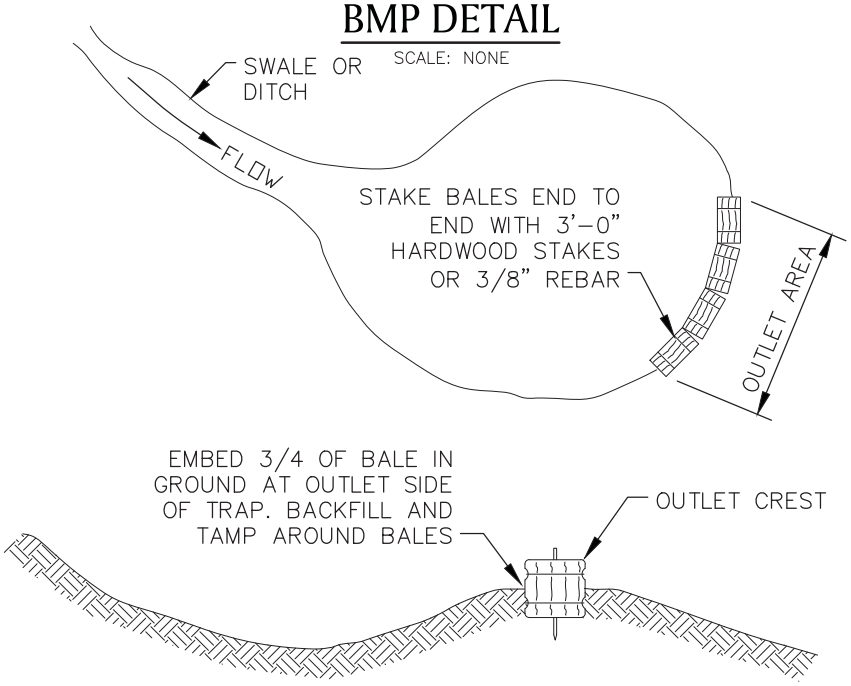
BMP PICTURE

BMP # 30
DRAINAGE SWALE AND
LINED DITCH

File: Lined_Drainage_Swale.dwg

BMP DETAIL

SCALE: NONE



TYPICAL PROFILE

NOTES

1. SIZE, SHAPE AND PROFILE OF SEDIMENT WILL VARY ACCORDING TO ANTICIPATED FLOW VOLUME AND SURROUNDING TERRAIN AND SHALL BE COORDIANTED WITH THE NATIONAL GRID ENVIRONMENTAL SCIENTIST.
2. THE BASIN SHALL BE CUT BELOW THE GROUNDLINE. FILL SHALL NOT BE USED TO HOLD WATER UNLESS ROLLED AND COMPACTED.
3. OUTLET AREA IS TO REMAIN FREE OF EXCAVATION SPOILS.
4. OUTLET CREST ELEVATION SHALL BE LOWER THAN INLET ELEVATION AND AT LEAST 1'–0'' BELOW THE TOP OF THE BASIN.ARMOUR SLOPES >8% IN OUTLET AREA WITH STONE OF APPROPRIATE SIZE TO PREVENT SCOUR.
5. ARMOUR SLOPES >8% IN OUTLET AREA WITH STONE OF APPROPRIATE SIZE TO PREVENT SCOUR.

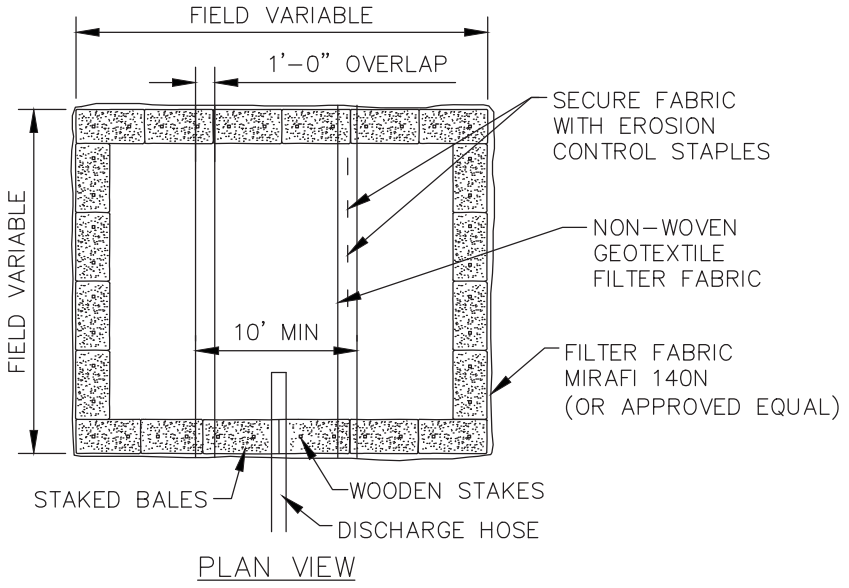
BMP PICTURE

BMP # 31
SEDIMENTATION BASIN

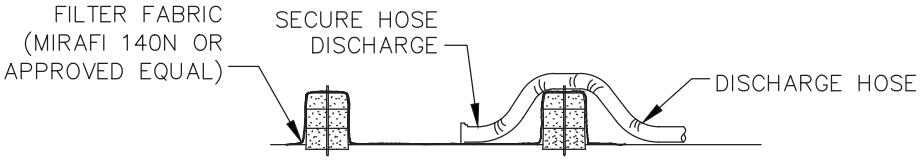
File: Sedimentation_Basin.dwg

BMP DETAIL

SCALE: NONE



PLAN VIEW



CROSS–SECTION

NOTES:

1. NUMBER OF BALES MAY VARY DEPENDING ON SITE CONDITIONS,
2. THE BASIN TO BE SIZED TO PREVENT DISCHARGE WATER FROM OVERTOPPING BASIN.
3. KEEP AS FAR FROM WETLANDS AS PRACTICAL.
4. CLEAN AND REMOVE AS SOON AS DEWATERING IS COMPLETE.

BMP PICTURE

BMP # 32
DEWATERING BASIN (SMALL SCALE)

BMP PICTURE

NOTE:

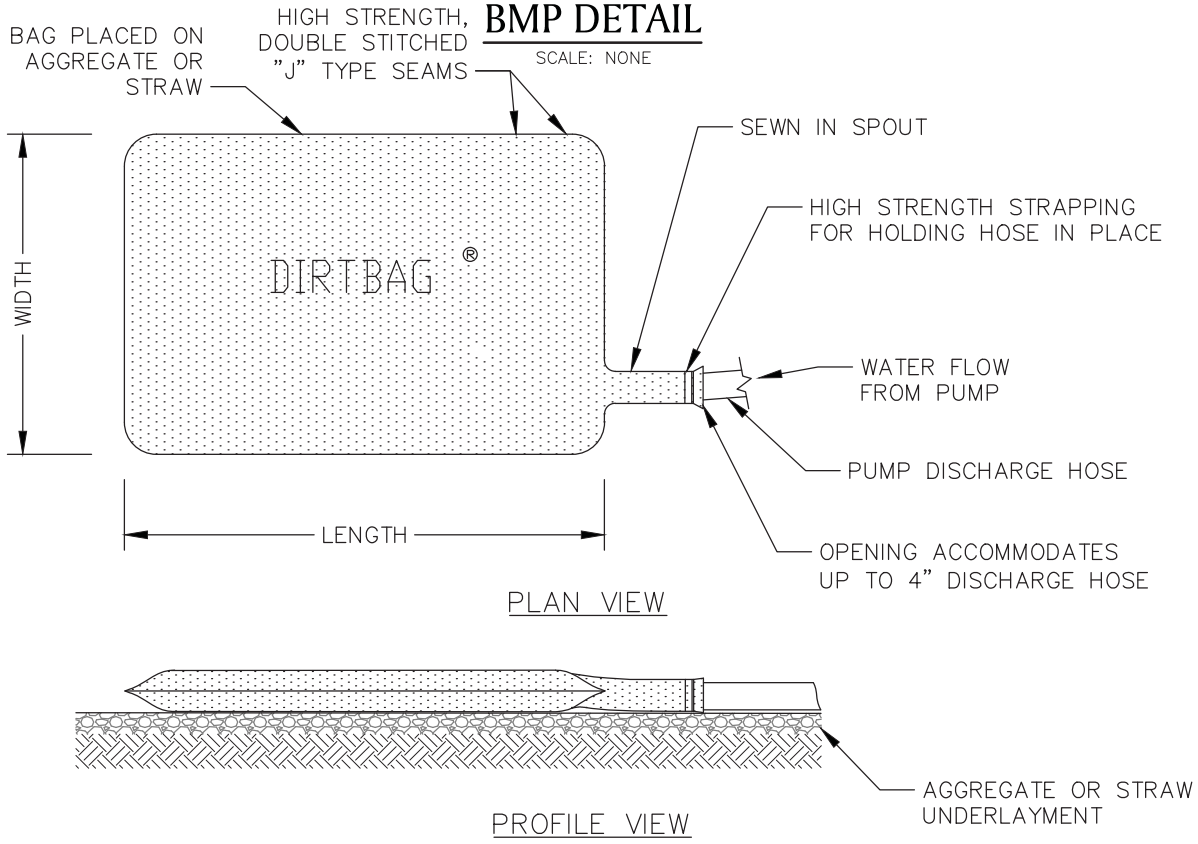
1. EXACT SIZE, LOCATION AND DESIGN IS DEPENDANT ON SITE CONDITIONS, AND LOCAL AND STATE REGULATIONS. COORDINATE THIS BMP WITH NATIONAL GRID ENVIRONMENTAL SCIENTIST PRIOR TO CONSTRUCTION.

BMP # 33
DEWATERING BASIN -
LARGE SCALE

File: Dewat_Bas_Large.dwg

BMP DETAIL

SCALE: NONE



BMP PICTURE

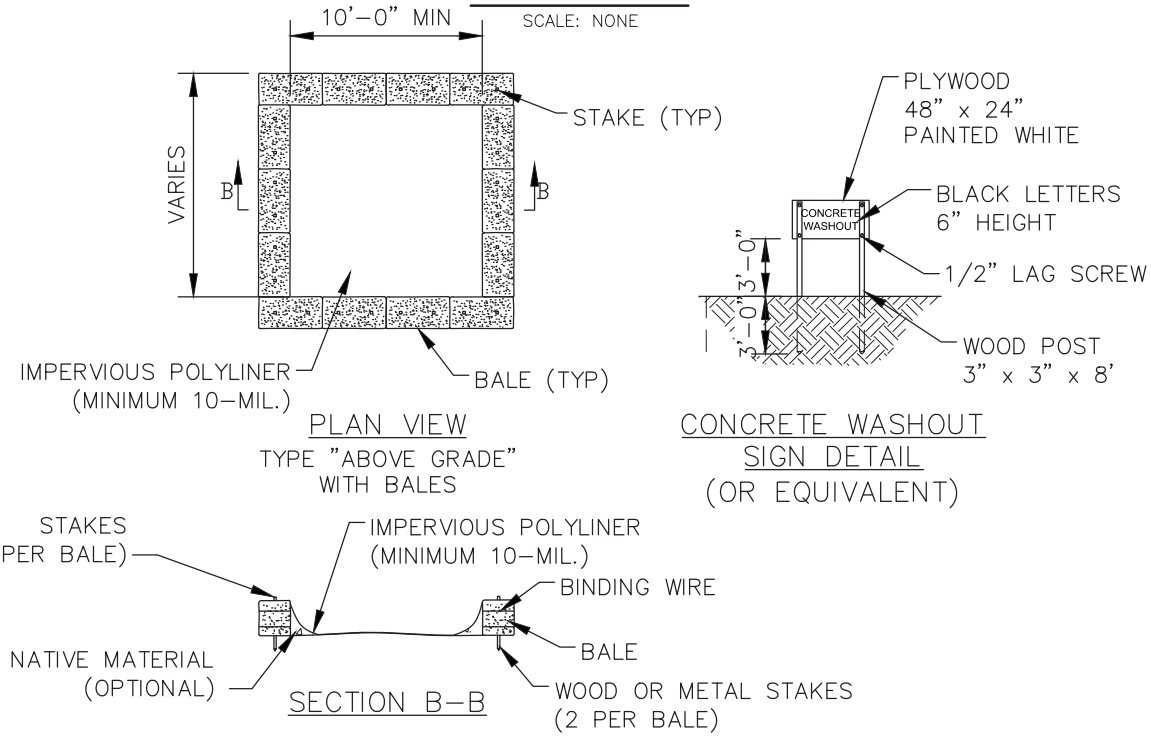
* PICTURE AND DETAIL PROVIDED BY ACF ENVIRONMENTAL

APPROVED BY: VICE PRESIDENT, ENVIRONMENTAL SERVICES

BMP # 34
DIRTBAG *

File: Dirtbag.dwg

BMP DETAIL



NOTES:

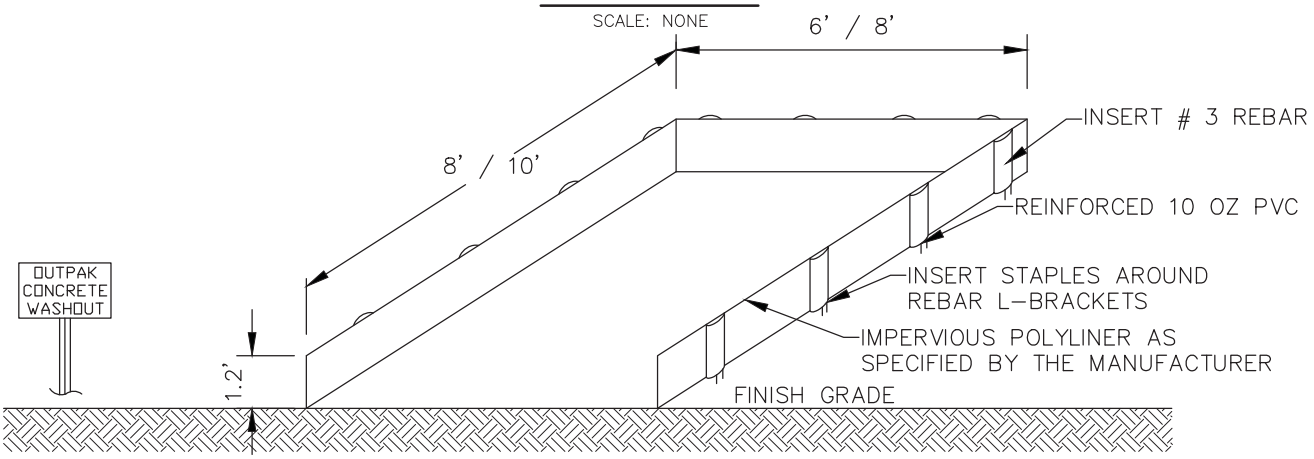
1. NUMBER OF BALES MAY VARY DEPENDING ON SITE CONDITIONS. COORDINATE SIZE AND LOCATION OF CONCRETE WASTE SUMP WITH NATIONAL GRID ENVIRONMENTAL SCIENTIST.
2. KEEP AS FAR FROM DRAINAGE CHANNELS AND WETLAND AREAS AS PRACTICAL.
3. SUMPS TO BE CLEANED AND WASTE CONCRETE REMOVED AND PROPERLY DISPOSED OF UPON COMPLETION OF WORK.
4. SEE ADDITIONAL NOTES ON BMP #35.

BMP PICTURE

BMP # 35
CONCRETE WASTE SUMP

File: Conc_Waste_Sump.dwg

BMP DETAIL



CROSS SECTION

NOTES:

1. PRODUCT TO BE OUTPAK PVC CONCRETE WASHOUT OR APPROVED EQUAL BY NATIONAL GRID ENVIRONMENTAL SCIENTIST.
2. THE CONCRETE WASHOUT AREA SHALL BE INSTALLED PRIOR TO ANY CONCRETE PLACEMENT.
3. SIGNS SHALL BE PLACED AS NECESSARY TO CLEARLY INDICATE THE LOCATION OF THE CONCRETE WASHOUT.
4. THE CONCRETE WASHOUT AREA WILL BE REPLACED AS NECESSARY TO MAINTAIN CAPACITY FOR WASTE CONCRETE AND OTHER LIQUID WASTE.
5. WASHOUT RESIDUE SHALL BE REMOVED FROM THE SITE AND DISPENSED OF AT AN APPROVED WASTE SITE.
6. DO NOT MIX EXCESS AMOUNTS OF FRESH CONCRETE OR CEMENT ON-SITE.
7. DO NOT WASH OUT CONCRETE TRUCKS INTO STORM DRAINS, OPEN DITCHES, STREETS, OR STREAMS.
8. AVOID DUMPING EXCESS CONCRETE IN NON-DESIGNATED DUMPING AREAS.
9. LOCATE WASHOUT AREA AT LEAST 50' FROM STORM DRAIN, OPEN DITCHES, OR WATERBODIES. COORDINATE LOCATION WITH NATIONAL GRID ENVIRONMENTAL SCIENTIST.
10. WASH OUT WASTES INTO THE OUTPAK WASHOUT WHERE THE CONCRETE CAN SET, BE BROKEN UP, AND THEN DISPOSED OF PROPERLY.
11. A SECURE, NON-COLLAPSING, NON-WATER COLLECTING COVER MUST BE PLACED OVER CONCRETE WASHOUT PRIOR TO PREDICTED WET WEATHER TO PREVENT ACCUMULATION AND OVERFLOW OF PRECIPITATION.

BMP PICTURE

* PICTURE AND DETAIL PROVIDED BY OUTPAK WASHOUT

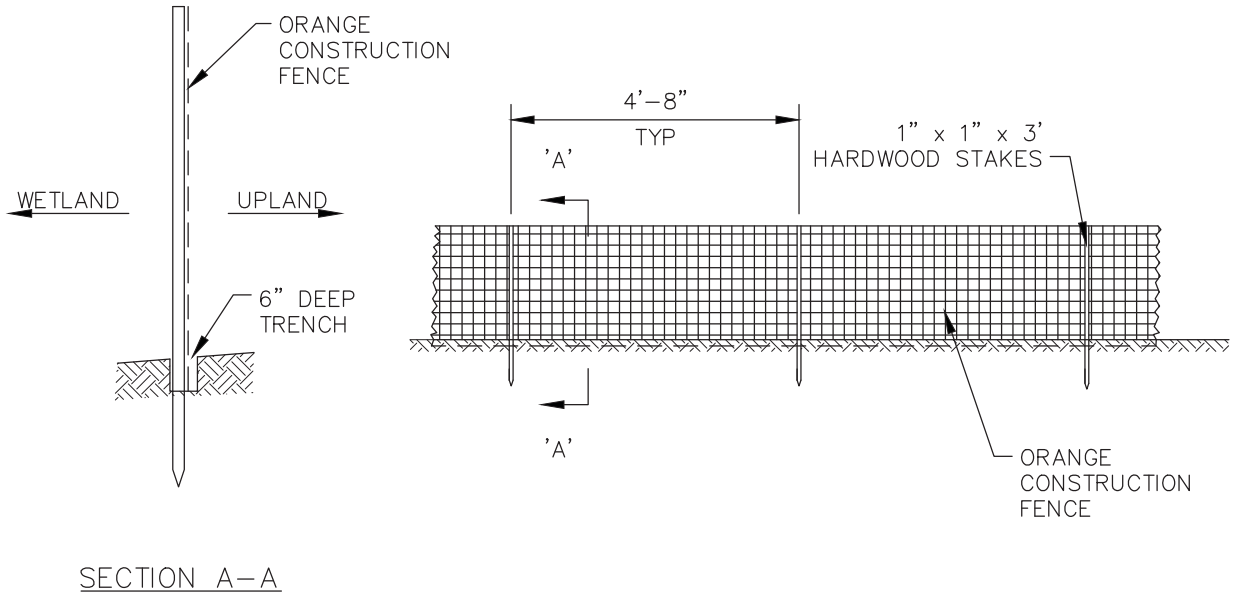
APPROVED BY: VICE PRESIDENT, ENVIRONMENTAL SERVICES

BMP # 36
OUTPAK CONCRETE WASHOUT *

File: Outpak_Washout.dwg

BMP DETAIL

SCALE: NONE



SECTION A-A

BMP PICTURE

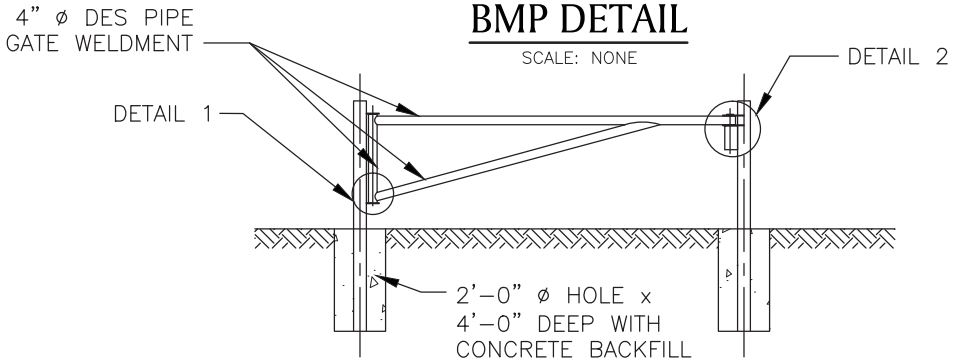
APPROVED BY: VICE PRESIDENT, ENVIRONMENTAL SERVICES
PRINTED COPIES ARE NOT DOCUMENT CONTROLLED. FOR LATEST AUTHORIZED VERSION PLEASE REFER TO THE NATIONAL GRID ENVIRONMENTAL INFONET SITE.

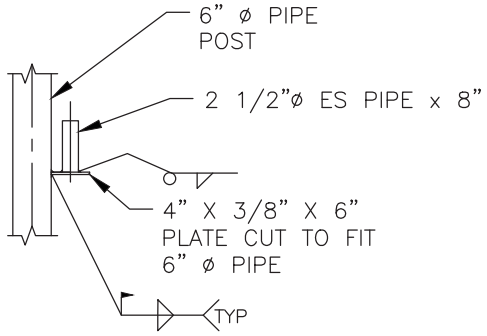
BMP # 37
BARRIER FENCE
(CONSTRUCTION FENCE)

File: Barrier_Fence.dwg

BMP DETAIL

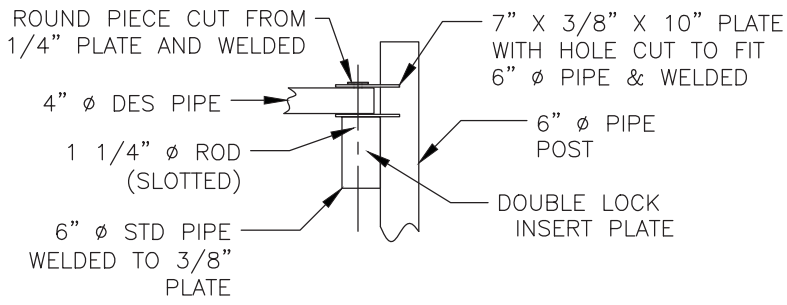
SCALE: NONE





DETAIL 1

SIMILAR DETAIL AT TOP



DETAIL 2

NOTES:

1. ALL GATE STEEL PIPES SHALL BE IN ACCORDANCE WITH ASTM A-501, PLATES SHALL BE ASTM A-36.
2. ALL STEEL PIPES SHALL BE PRIMED WITH ZINC-CHROMATE PRIMER AND FINISHED WITH AN APPROVED OSHA "SAFETY YELLOW" TOP COAT COMPATIBLE WITH THE PRIMER AND FOR EXTERIOR EXPOSURE.
3. REFLECTORS SHALL BE SPACED AT 3 FEET ALONG THE LENGTH OF THE CROSSBAR AND BRACE
4. BACKFILL AT POSTS TO BE COMPACTED.

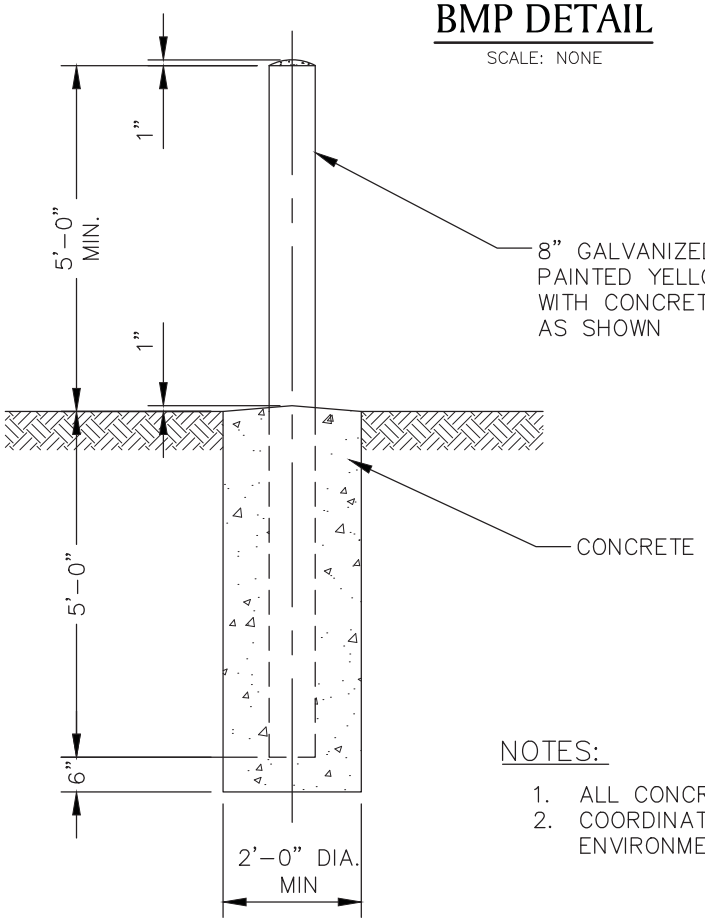
BMP PICTURE

BMP # 38
ROW GATE / FENCE

File: ROW_Gates.dwg

BMP DETAIL

SCALE: NONE



NOTES:

1. ALL CONCRETE TO BE 2500 P.S.I. MINIMUM.
2. COORDINATE LOCATIONS WITH NATIONAL GRID ENVIRONMENTAL SCIENTIST.

BMP PICTURE

BMP # 39
BOLLARD

File: Bollard.dwg

BMP

Definition

The control of dust resulting from land-disturbing activities.

Purpose

To prevent surface and air movement of dust from disturbed soil surfaces that may cause off-site damage, health hazards, and traffic safety problems.

Conditions Where Practice Applies

On construction roads, access points, and other disturbed areas subject to surface dust movement and dust blowing where off-site damage may occur if dust is not controlled.

Design Criteria

Construction operations should be scheduled to minimize the amount of area disturbed at one time. Buffer areas of vegetation should be left where practical. Temporary or permanent stabilization measures shall be installed. No specific design criteria is given; see construction specifications below for common methods of dust control.

Water quality must be considered when materials are selected for dust control. Where there is a potential for the material to wash off to a stream, ingredient information must be provided to the local permitting authority.

Construction Specifications

A. Non-driving Areas – These areas use products and materials applied or placed on soil surfaces to prevent airborne migration of soil particles.

Vegetative Cover – For disturbed areas not subject to traffic, vegetation provides the most practical method of dust control (see Section 3).

Mulch (including gravel mulch) – Mulch offers a fast effective means of controlling dust. This can also include rolled erosion control blankets.

Spray adhesives – These are products generally composed of polymers in a liquid or solid form that are mixed with water to form an emulsion that is sprayed on the soil surface with typical hydroseeding equipment. The mixing ratios and application rates will be in accordance with the manufacturer's recommendations for the specific soils on the site. In no case should the application of these adhesives be made on wet soils or if there is a probability of precipitation within 48 hours of its proposed use. Material Safety Data Sheets will be provided to all applicators and others working with the material.

B. Driving Areas – These areas utilize water, polymer emulsions, and barriers to prevent dust movement from the traffic surface into the air.

Sprinkling – The site may be sprayed with water until the surface is wet. This is especially effective on haul roads and access routes.

Polymer Additives – These polymers are mixed with water and applied to the driving surface by a water truck with a gravity feed drip bar, spray bar or automated distributor truck. The mixing ratios and application rates will be in accordance with the manufacturer's recommendations. Incorporation of the emulsion into the soil will be done to the appropriate depth based on expected traffic. Compaction after incorporation will be by vibratory roller to a minimum of 95%. The prepared surface shall be moist and no application of the polymer will be made if there is a probability of precipitation within 48 hours of its proposed use. Material Safety Data Sheets will be provided to all applicators working with the material.

Barriers – Woven geotextiles can be placed on the driving surface to effectively reduce dust throw and particle migration on haul roads. Stone can also be used for construction roads for effective dust control.

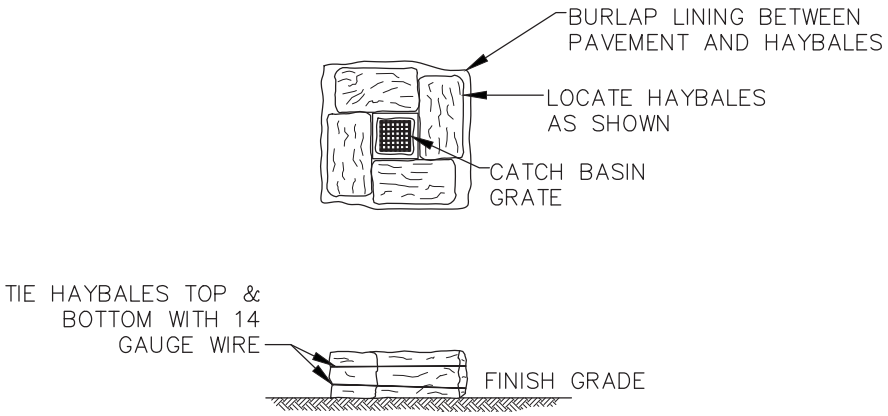
Windbreak – A silt fence or similar barrier can control air currents at intervals equal to ten times the barrier height. Preserve existing wind barrier vegetation as much as practical.

* BMP INFORMATION FROM "NEW YORK STANDARDS AND SPECIFICATIONS FOR EROSION AND SEDIMENT CONTROL (AUGUST, 2005)." INFORMATION OBTAINED VIA WEBSITE: http://www.dec.ny.gov/chemical/29066.html

BMP # 40
DUST CONTROL (FROM NY) *

BMP DETAIL

SCALE: NONE



NOTES:

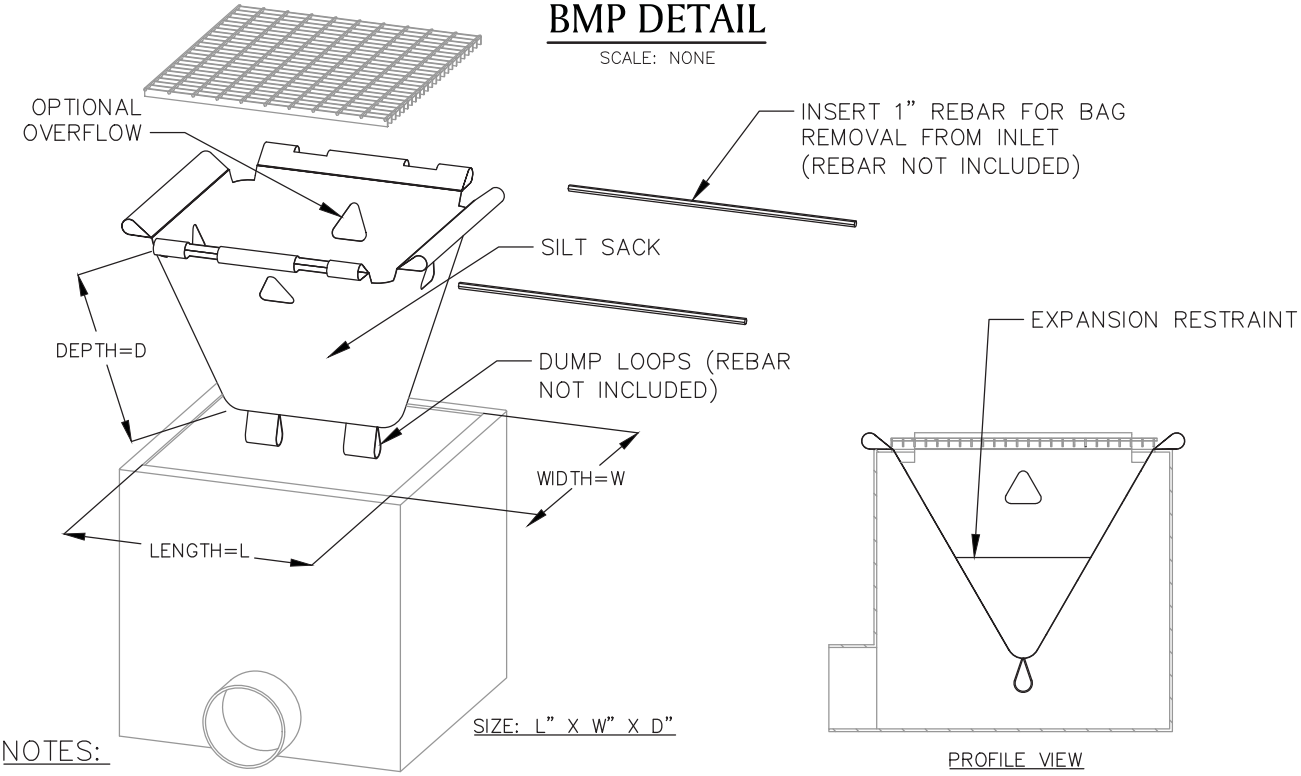
1. SURROUND STREET DRAINAGE STRUCTURE INLET WITH HAY BALES PRIOR TO CONSTRUCTION AND MAINTAIN UNTIL CONSTRUCTION IS COMPLETED. ACCUMULATED SEDIMENTS SHALL BE REMOVED.
2. HAYBALES PLACED ON PAVEMENT SHALL HAVE BURLAP PLACED BETWEEN PAVEMENT AND HAYBALE

BMP PICTURE

BMP # 41
CATCH BASIN INLET PROTECTION

BMP DETAIL

SCALE: NONE



NOTES:

1. PRODUCT TO BE SILT SACK OR APPROVED EQUAL BY NATIONAL GRID ENVIRONMENTAL SCIENTIST.
2. THE USE OF A SILT SACK OPTIONAL OVERFLOW AND OVERALL DIMENSIONS ARE TO BE COORDINATED WITH A NATIONAL GRID ENVIRONMENTAL SCIENTIST.

BMP PICTURE

* DETAIL PROVIDED BY ACF ENVIRONMENTAL

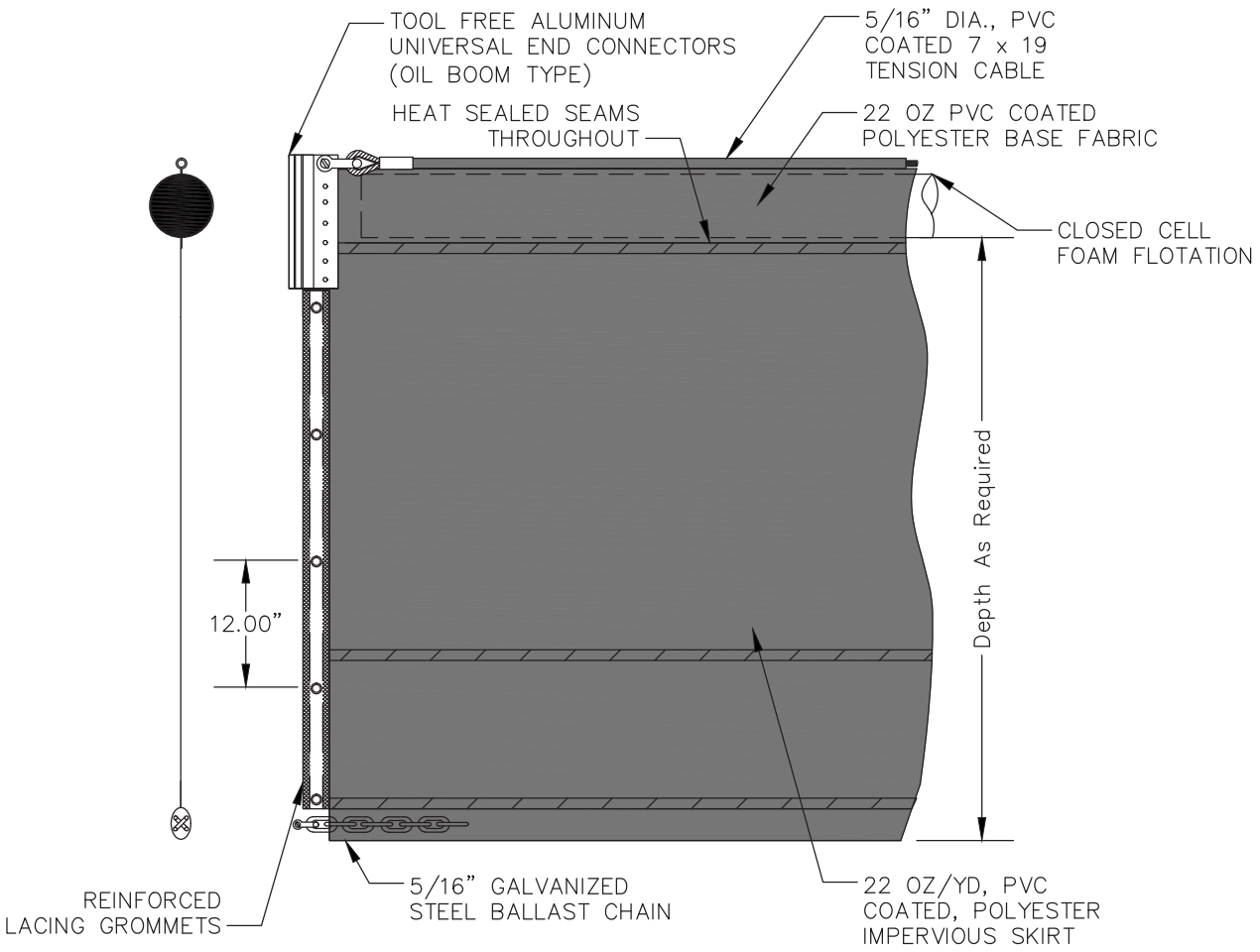
APPROVED BY: VICE PRESIDENT, ENVIRONMENTAL SERVICES

BMP # 42
SILT SACK *

File: SILT SACK.dwg

BMP DETAIL

SCALE: NONE



BMP PICTURE

* DETAIL PROVIDED BY BROCKTON EQUIPMENT / SPILLDAM INC.
APPROVED BY: VICE PRESIDENT, ENVIRONMENTAL SERVICES

BMP # 43
TURBIDITY CURTAIN *

File: Turbidity_Curtain.dwg

Appendix M

Resumes

CRAIG WOOD
Principal Ecologist

Experience
ESS Group, Inc.: 2014 to present

Years of Prior Related Experience: 26

Education
BS, Natural Resource Conservation, University of Connecticut, 1983

MS, Natural Resource Science, University of Rhode Island, 1986

Professional Registrations/Training
Professional Wetland Scientist #800

NH Certified Wetland Scientist #109

RI Certified Coastal Invasives Manager #215

US Forest Service Stream Simulation Methodology for Designing Aquatic Organism passage at Road-Stream crossings

NE Corps of Engineers Regional Supplement to Wetland Delineation Manual Training

Affiliations
Society of Wetland Scientists

Society for Ecological Restoration

New Hampshire Association of Natural Resource Scientists

Association of Massachusetts Wetland Scientists

New England Estuarine Research Society

Narrow River Preservation Association-Board of Directors

Restore America's Estuaries-Conference Organizing Committee

University of Rhode Island Watershed Watch-River Monitor

Qualifications

Mr. Wood has over 27 years of experience and is a recognized expert in the area of freshwater and coastal wetlands. He has conducted and managed ecological investigations, NEPA compliance documentation, as well as other state and local environmental permitting for both public and private sector clients throughout New England.

Representative Project Experience

National Park Service – Herring River Tidal Restoration Plan & Environmental Impact Statement, Cape Cod, MA. Served as lead restoration ecologist for the preparation of an Environmental Impact Statement analyzing the impacts of restoring approximately 1,100 acres of salt marsh located within the Cape Cod National Seashore and the Towns of Wellfleet and Truro, Massachusetts. Restricted tidal flow and marsh subsidence due to 100 years of diking have severely degraded the aquatic/marsh habitat, resulting in a system dominated by freshwater wetland vegetation and upland shrubs, as well as fish kills and shellfish bed closures. Along with NEPA, the project is conducting a coordinated review under the Massachusetts Environmental Policy Act (MEPA) and Development of Regional Impact (DRI) review under the Cape Cod Commission, a regional planning authority.

NOAA Restoration Center – Fresh Meadow Brook Fish Passage Improvement, South Kingstown, RI. Project Manager responsible for baseline investigation, wetland delineation, GPS survey, restoration plans and permitting for improving fish passage in Fresh Meadow Brook. In the spring of 2007, a substantial vertical drop in the stream channel below the recently completed fishway at the outlet to Indian Lake was discovered. To facilitate adult and juvenile anadromous fish passage the project includes development of a base map and longitudinal profile for the project area, summarizing the existing hydrologic and hydraulic information to identify the appropriate flows to use in passage design and the development of preliminary and final plans, details and specifications for construction purposes.

Block Island Land Trust – Vulnerability Assessment and Shoreline Stabilization Alternatives, Spring House Pond, Block Island, RI. Project Manager of a technical investigation of historic and potential future shoreline changes adjacent to Spring House Pond which lies at the crest of an eroding bluff. The Land Trust is concerned with the vulnerability of the coastal pond to beach and bluff erosion. Bluff failure or mass wasting events are influenced by soil conditions (surficial geology), precipitation, groundwater discharge (seeps), and undercutting of the bluff toe caused by wave attack. The investigation evaluate the practicality and effectiveness of potential short- and long-term solutions to allow the Land Trust to make informed decisions on the measures necessary to maintain the scenic qualities, historical significance and habitat values associated with the pond balanced against the risks associated with a large-scale bluff failure.

SunEast Solar Farms - Cranston and Situate, RI. Project Manager for initial resource areas constraint mapping and wetland delineation for two

10.0 MW AC / 12.6 MW DC site layouts along with electrical interconnections. The Scituate Solar site encompasses approximately 129 acres of primarily cleared fields. The Cranston Solar site (Hope Farm) encompasses approximately 70 acres of agricultural lands.

National Grid Mohican - Battenkill 115 kV Transmission Project, Washington and Saratoga Counties, NY. Senior Wetland Scientist responsible for the preparation of a Jurisdictional Determination (JD) Report and Section 404 Permit Application to the US Army Corps of Engineers to support the reconstruction of approximately 15 miles of 115 kV overhead electrical transmission line between the Mohican Substation and Battenkill Substation in the State of New York.

Rhode Island Airport Corporation and Federal Aviation Administration – Environmental Assessment of Block Island Airport Proposed Improvement Projects, Block Island, RI. Under contract with the Rhode Island Airport Corporation and Federal Aviation Administration, performed environmental tasks for an Environmental Assessment (EA) in accordance with NEPA. The EA was performed to evaluate the potential environmental impacts associated with short-term improvements recommended in the Block Island Airport Master Plan. Proposed improvements included runway reconstruction, increased parking for aircraft and autos, and construction of a new terminal building.

NOAA Restoration Center – Marsh Island Restoration Project, Fairhaven, MA. Served as Project Manager to develop restoration plans, permitting and construction documents for the Marsh Island Habitat Restoration Project. Marsh Island is a 22-acre peninsula located at the junction of the Acushnet River and New Bedford Harbor in Fairhaven, Massachusetts. At one time, the majority of the island was a salt marsh. The placement of dredged material in the late 1930's and early 1950's resulted in the filling of the majority of the island. This project will restore as much salt marsh and fish nursery habitat on the island as feasible by removing the dredged material and re-establishing intertidal elevations.

Invenergy – Clear River Energy Center – Burrillville, RI. Senior Wetland Scientist responsible for the wetland and wildlife components of the Rhode Island Energy Facility Siting Board application for the construction and operation of nominal 1,000 MW combined cycle electric generation plant. Wetlands were delineated on the approximately 75-acre site in preparation of an Edge Verification and Application to Alter Freshwater Wetlands to be submitted to RIDEM as well as an Individual Permit to the Army Corps of Engineers.

New England Army Corps of Engineers – South Coast Rail Project, Boston-New Bedford, MA. Working for the U.S. Army Corps of Engineers, served as principal scientist for development of third party EIS intended to advance restoration of passenger rail between the cities of Fall River and New Bedford and downtown Boston. The project, as proposed by The Executive Office of Transportation and the Massachusetts Bay Transportation, is envisioned as a key economic development initiative for the South Coast region and as a means to promote sustainable economic growth. Key environmental issues include indirect impacts on habitat fragmentation, impacts within the Hockamock Swamp ACEC bisected by the former rail corridor, and wetland habitat mitigation strategies. EIS intended to advance the restoration of passenger rail between the cities of Fall River and New Bedford and downtown Boston.

Town of Concord Public Works – Cambridge Turnpike Reconstruction Project, Concord, MA. Environmental Task Manager for the design and permitting of the reconstruction of Cambridge Turnpike which is impacted by extensive flooding at two crossings of the Mill Brook causing the Town to detour traffic. Improvements to the Cambridge Turnpike include redesign and construction of two crossings of the Mill Brook, modifications in roadway profile and geometry, construction of retaining walls, enhancements to pedestrian facilities, as well as management and control of stormwater and floodplain compensatory storage. Flood Insurance Studies (FIS) Maps will be amended to reflect the more up to date flood data. Due to constant high water conditions within this portion of Mill Brook and its associated wetlands and floodplain, the project also involves a watershed-wide identification of flow impediments and a long-term maintenance plan for improvements to drainage and waterways.

JOSHUA M. BURGOYNE
Ecologist

Experience
ESS Group: 2015 to present

Years of Prior Related Experience: 4

Education
BS, Environmental Science and Management, University of Rhode Island

Professional Certifications
New England Onsite Wastewater Treatment Training, U.S. Coast Guard Personal Survival Techniques

Affiliations
Pawtuxet River Authority

Qualifications

Joshua Burgoyne is an Environmental Scientist with background concentration in wetland science. His experience includes wetland delineation/identification, field botany, soil profile analysis, hydrologic/water quality assessment, environmental impact/site assessment, wildlife biology, invasive species mapping, and GIS/remote sensing. Josh has experience with energy generation and transmission projects in New York, Maine, Massachusetts, and Rhode Island.

As a former biologist for the RIDEM OC&I Freshwater Wetlands program, Joshua is particularly familiar with environmental regulations and permitting for freshwater wetlands, stormwater management, air quality, septic systems, and waste management. Josh will assist with on-the-ground collection of vegetation inventory program data.

Representative Project Experience

National Grid – Mohican-Battenkill 115kV Transmission Project – Washington & Saratoga Counties, NY. Prepared State and Federal environmental permit applications, mitigation reports, and served as on-call third-party Environmental Monitor for a 14-mile transmission line rebuild project. Conducted various field work and onsite supervision of construction and restoration activities to ensure use of best management practices and compliance with Department of Public Service regulations.

National Grid – Clay Teall #10/Clay Dewitt #3 Reconductoring Project – Onondaga County, NY. Conducted wetland delineations and prepared documents for a U.S. Army Corps of Engineers Section 404 Jurisdictional Determination and Individual Permit application for a 14-mile electrical transmission line rebuild project to satisfy.

Invenergy, LLC – Clear River Energy Center and Burrillville Interconnection Project – Burrillville, RI. Conducted wetland delineations, other various field work, and prepared permit applications for filings with the RI Energy Facility Siting Board and Rhode Island Dept. of Environmental Management. Project includes construction of a 1,000 MW natural gas fired facility and 7-mile 345 kV transmission line.

Green Line Devco, LLC – Routing Evaluation for Maine Green Line Projects – ME to MA. Performed a preliminary field survey for wetland crossings, invasive species, and general constructability along several potential routes for a submarine/underground electrical transmission project between Plymouth MA and Penobscot County, ME.

Poseidon Transmission LLC – Poseidon Transmission Project Environmental Assessments and Permitting – NY to NJ. Assisted with State environmental permit applications including wetland delineation and impact analysis.

Massachusetts Department of Conservation and Recreation – Marshfield Ponds *Hydrilla* Pioneer Aquatic Plant Management Project – Marshfield, MA. Prepared a Notice of Intent with the Conservation Commission of the Town of Marshfield for the proposed *Hydrilla* control project at Magoun, Oakman, Hatch and Mounce Ponds.

Town of Westford – Nutrient Budget for Comprehensive Lakes Management Plan – Westford, MA. Collected water samples for measurement of total nitrogen and phosphorous, conducted water quality field surveys for pH, dissolved oxygen, turbidity, temperature, and flow velocity at several different ponds and tributaries in support of Comprehensive Lakes Management Plan**.**

Schnitzer Northeast – Stormwater Compliance Services – Attleboro, MA. Collected and submitted stormwater samples from multiple pre-discharge treatment system locations to support NPDES compliance.

Rhode Island Department of Environmental Management – Office of Compliance and Inspection – Providence RI. Senior Natural Resources Specialist responsible for conducting biological field

inspections for Freshwater Wetlands, Water Pollution, and Onsite Wastewater Treatment Systems programs. Delineated and classified wetlands based on vegetative community, presence/absence of hydric soils, and hydrology. Assisted businesses and property owners in achieving and maintaining regulatory compliance. Reviewed permit applications, construction plans, site aerial photo history, draft correspondence, biological site assessments/reports, and detailed site sketches. Served as project manager for wetland restorations, represented the Department at meetings and hearings, and responded to complaints of violations from the public.

Pawtuxet River Authority – Pawtuxet River Watershed Improvements – Pawtuxet, RI. Associate Board Member responsible for writing grant proposals and plans for projects including anadromous fish passages, water quality assessments, boat ramps, and other site improvements within the Pawtuxet River Watershed.

Massachusetts Department of Public Health – Arbovirus Program – Boston, MA. Laboratory/Field Technician responsible for setting and retrieving CDC mosquito traps in wetland habitat throughout Massachusetts. Identified mosquitoes to species level, submitted potential disease vectors to lab for EEE/WNV testing, maintained trapping equipment and state vehicles. Evaluated and chose trap sites based on wetland habitat type and breeding potential.

Mason & Associates – Seasonal Wetland Services Support – Scituate, RI. Wetland Technician responsible for supporting wetland delineations, restorations, invasive species control, and identifying plant species. Used Northeast Regional wetland soil indicators to determine wetland-upland boundaries.

Narragansett Bay Estuary Program – Narragansett, RI. Volunteer Research Intern responsible for conducting analysis of coastal imagery and created maps of macroalgae density in Narragansett. Assisted with EPA-funded stormwater system upgrades, pavement removal and native planting to improve water quality in Roger Williams Park ponds, coordinated outreach and volunteer efforts.

SAFE Project – Oil Palm Plantation Studies – Sabah, Malaysia. Research Assistant responsible for conducting field work and supervising field assistants for three studies on an oil palm plantation. Surveyed and identified amphibians, fish, and macroinvertebrate populations. Measured changes in water quality/primary productivity across a gradient of land-use change.

National Parks Service – Northeast and Mid-Atlantic Regions – Kingston, RI. Biological Technician responsible for uploading and managing data from park archives to the NPS Data Portal for widespread access. Collected field data for salt-marsh monitoring project, monitored sea level rise on salt marshes. Used acoustic data loggers to monitor frog populations in vernal pools, isolated calls using software.

JASON R. RINGLER, PWS, CWB®
Project Manager

Experience
ESS Group: 2016 to present

Years of Prior Related Experience: 19

Education
BS, Wildlife Biology and Management, University of Rhode Island, 1998

Professional Certifications
Certified Wildlife Biologist, The Wildlife Society

Federal Aviation Administration Qualified Airport Wildlife Biologist

Professional Wetland Scientist #1953, Society of Wetland Scientists

Rhode Island Certified Arborist #261, Rhode Island Department of Environmental Management

Rhode Island Coastal Invasive Manager #25, Rhode Island Coastal Resource Management Council

Technical Service Provider #10-6520, Natural Resources Conservation Service

OSHA 30-hour Construction Safety & Health Training

OSHA Compliance & Workplace Safety Training

RCRA Waste Management Regulation Training

Wildlife & Oil Spill Response Training

Qualifications

Jason Ringler is a Senior Scientist with more than 19 years of experience in wildlife assessments, environmental compliance monitoring, and wetland and terrestrial ecology. Mr. Ringler is a Certified Wildlife Biologist, Professional Wetland Scientist, licensed arborist, and an invasive species manager. Mr. Ringler has supported and managed a wide range of projects for federal, state, and private sector clients many of which has been associated with energy projects. His experience includes power plants, and transmission line impact assessments, utility siting and permitting, ecological surveys, wetland delineation and permitting and regulatory agency coordination.

Representative Project Experience

Green Line Devco, LLC – Routing Evaluations for Maine Green Line Project – ME to MA. Senior Scientist responsible for preparing preliminary land base routing analysis, scheduling of multi-state field crews, and environmental due diligence for the proposed 340-mile transmission line, which involves both upland and submarine project segments. Supervised the development of environmental due diligence mapping along the upland route alternatives in Maine and Massachusetts to identify wetland and stream features, threatened and endangered species habitat, invasive species, and vernal pools in an effort select a preferred route alternative.

Poseidon Transmission, LLC – Environmental Assessments and Permitting Support – NY to NJ. Senior Scientist who coordinated field crews and supervised the delineation of tidal and freshwater wetlands in accordance with US Army Corps of Engineers guidelines along a proposed electrical cable route in Middlesex and Monmouth Counties, New Jersey. Coordinated with NJDEP with issuance of a Letter of Interpretation (LOI). Assisted with the development of a DLUR application to NJDEP for the New Jersey portion of the cable route.

National Grid – Mohican-Battenkill 115kV Transmission Project – Washington & Saratoga Counties, NY. Senior scientist responsible for directing the layout of wetland plantings in 7.5-acre mitigation site for a portion of the project. Planting included endemic herbaceous, shrub and tree species. Several invasive species were noted which resulted in the development of a subsequent invasive species management plan.

Appalachian Power Company – 138-kV Wythe Area Improvements Project – Wythe County, VA. Senior environmental scientist responsible for developing a desktop habitat assessment methodology for the 17.6-mile-long proposed project route specifically for the state threatened loggerhead shrike (*Lanius ludovicianus*). The habitat assessment was reviewed and approved by Virginia Department of Game and Inland Fisheries, and Mr. Ringler validated the results of the desktop habitat assessment in the field and search for loggerhead shrikes during the 2014 breeding season. The purpose of the habitat assessment was to locate the proposed 100-foot right-of-way in a manner that avoids and/or

minimizes impacts to suitable habitat of the loggerhead shrike and to identify areas where ground clearing and tree removal activities cannot occur between April 1 to July 31 of any given year.

FirstEnergy – Bruce Mansfield-Glenwillow 345-kV Transmission Line Project – OH to PA. Senior Environmental Scientist who provided routing and permitting services for FirstEnergy's proposed Bruce Mansfield- Glenwillow 345-kV Transmission Line Project. The project will run more than 100 miles from FirstEnergy's Bruce Mansfield Plant in Beaver County, Pennsylvania, to a new substation in Cuyahoga County, Ohio. As a wetland delineator, Mr. Ringler performed the routine delineation method described in the USACE 1987 Wetland Delineation Manual and the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region (Version 2.0) that consisted of a pedestrian site reconnaissance, including identifying the vegetation communities, soils identification, a geomorphologic assessment of hydrology, and notation of disturbance. During field surveys, the physical boundaries of observed wetlands and other WOUS were recorded using sub-meter accurate Trimble Global Positioning System units. The GPS data were then reviewed, geo-corrected using GPS Pathfinder Office software (version 4.20), and edited for errors. The Ohio Environmental Protection Agency (Ohio EPA) Ohio Rapid Assessment Method for Wetlands v. 5.0 (ORAM) and the qualitative habitat evaluation index (QHEI) were used to determine the relative ecological quality and level of disturbance of a particular wetland and to provide a rapid determination of habitat features assessing physical characteristics of streams most desirable by fish and, to a lesser extent, macroinvertebrates and smaller microinvertebrates, respectively. The Ohio EPA Primary Headwater Habitat Evaluation Index, a rapid field assessment method for physical habitat was used to appraise the biological potential of most Primary Headwater Habitat.

Environmental and Social Impact Assessment for the Lekki Port and Harbor Facilities – Lagos, Nigeria. Senior environmental scientist responsible for a conducting a biological assessment of flora and fauna which included local avian, mammalian, and threatened and endangered marine turtles to update the environmental and social impact assessment for a proposed port near Lagos, Nigeria. Mr. Ringler assisted in revising several environmental sections of the environmental and social impact assessment per the guidance of the African Development Bank Group and the International Finance Corporation. Upon completion, the Port at Lekki will feature a 1,500-meter-long main breakwater; a 6-kilometer-long, 14.5-meter-deep approach channel; a 1,500-meter-long quay wall; and cargo-handling equipment, enabling the facility to accommodate container vessels of up to 4,000 twenty-foot equivalent units and liquid bulk vessels of up to 45,000 deadweight tons.

Massachusetts Division of Ecological Restoration (MassDER) – Mill Pond Restoration Project: Site Survey, Base Mapping and Vegetation Assessment – Truro, MA. Project Manager responsible for coordinating a topographic survey of the restoration area, resource area delineation, the establishment of vegetation benchmarks in the salt marsh as well as a vegetation assessment of the restoration area. Wetlands were delineated based on the presence of three parameters: hydrophytic vegetation, wetland hydrology, and hydric soils, as outlined in the U.S. Army Corps of Engineers (USACE) Corps of Engineers 1987 Wetland Delineation Manual, the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region (Version 2), and the Massachusetts Wetlands Protection Act. The classification of wetlands and uplands were based on field observations and the Classification of Wetlands and Deepwater Habitats of the United States Cowardin et al. and Classification of the Natural Communities of Massachusetts.

ALEXANDER PATTERSON, AWB
Lead Ecologist

Experience
ESS Group: 2011 to present

Years of Prior Related Experience: 5

Education
BS, Wildlife & Conservation Biology, Summa cum Laude, University of Rhode Island, 2009

Professional Registrations and Affiliations
Associate Wildlife Biologist Certification, The Wildlife Society, 2014

Member of The Wildlife Society, 2014

Massachusetts Association of Conservation Commissions, Wetland Delineation Workshops, 2013

OSHA 40-hour HAZWOPER Training (first issued 4/19/2012, annual refresher and supervisor training 4/9/2013)

SafeGulf Marine Safety Training (issued 8/20/12)

Rhode Island Dept. of Environmental Management Boater Safety Education Course (issued 7/25/11)

Qualifications

Alex Patterson has conducted ecological field studies throughout the eastern United States and abroad. His work on projects has included wildlife surveys, surface water monitoring, wetland delineation, aquatic and terrestrial plant mapping, sediment mapping and sampling, waterbody bathymetry surveys, wildlife habitat evaluations, invasive species mapping and management, benthic invertebrate sampling, stream assessments, stormwater compliance monitoring, groundwater sampling and monitoring, and spatial analysis of data using GIS. He has prepared and filed numerous environmental permitting documents, from large regional energy developments to local resource improvement projects in New York, New Jersey, Massachusetts and Rhode Island. Alex regularly reviews projects with respect to their potential impacts on wetland and wildlife resources, both through field work and desktop data analysis. On this project, he will serve as a field supervisor, and will be responsible the field data collection effort and provide quality control/quality assurance for all field generated data.

Representative Project Experience

Green Line Devco – Routing Evaluations for Maine Green Line Project – ME to MA. Prepared preliminary routing analysis and environmental due diligence for the proposed 340-mile transmission line, which involves both upland and submarine project segments. Environmental due diligence involved characterizing the existing environmental conditions – primarily wetland and stream features – along the upland route alternatives in Maine and Massachusetts, including identifying potential environmental constraints.

Poseidon Transmission LLC – Poseidon Transmission Project Environmental Assessments and Permitting – NY to NJ. Delineated tidal and freshwater wetlands in accordance with US Army Corps of Engineers guidelines along a proposed electrical cable route on Long Island, New York and in Middlesex and Monmouth Counties, New Jersey. Prepared a Letter of Interpretation (LOI) to the NJDEP and an Environmental Impact Statement (EIS) to the Town of South Brunswick for the proposed New Jersey Converter Station parcel. Prepared a DLUR application to NJDEP for the New Jersey portion of the cable route.

National Grid – Mohican-Battenkill 115kV Transmission Project – Washington & Saratoga Counties, NY. Prepared a Jurisdictional Determination (JD) Report and Section 404/10 Individual Permit Application to the US Army Corps of Engineers to support the reconstruction of approximately 15 miles of 115 kV overhead electrical transmission line between the Mohican Substation and Battenkill Substation in the State of New York. Work involved examining the wetland resources areas within the Project Right-of-Way, determining whether and how the proposed Project may affect wetland resources, report writing, GIS mapping, and coordinating with regulators. Conducted survey for state-listed bird species along the project ROW as required by the project's permit.

National Grid – Clay Teall #10/Clay Dewitt #3 Reconductoring Project – Onandaga County, NY. Delineated wetland and stream resources along the 14-mile project right-of-way in support of the project's Article VII application, Jurisdictional Determination (JD), and other required permit filings. Preparation the Wetlands & Water Resources section of the project's Article VII application pursuant to the New York Public Service Law. Prepared and filed the JD and permit application with the USACE Buffalo District.

National Grid – GlobalFoundries Surveys and Permitting Support – Malta, NY. Conducted surveys for invasive plant species along a four-mile proposed gas pipeline route in upstate New York. Created maps in ArcGIS in accordance with ACOE requirements that displayed the location and abundance of invasive plants along the proposed route. Used ArcGIS to conduct analysis of wetlands along the proposed project route and created wetlands figures to ACOE specifications.

Confidential Client – Wetland Delineation – Northern RI. Delineated wetland and stream resource areas at a 200+ acre site to provide baseline data for evaluating the feasibility of the proposed project. Prepared GIS maps which displayed the extent of wetland and waterbodies at the site. Prepared Request to Verify Wetland Edges to RIDEM and prepared wetlands, wildlife, vegetation, and surface water resources sections of Rhode Island Energy Facilities Siting Board application.

EmKey, LLC – Northern Independence Pipeline Article VII – Madison, Chenango, & Broome Counties, NY. Prepared the Wetland & Water Resources and the Vegetation, Wildlife, & Rare Species sections of the Article VII application to the New York Public Service Commission for the proposed 75-mile gas pipeline in upstate New York.

Red Oak Pipeline Lateral – Environmental Permitting – Sayreville, NJ. Performed delineation of wetland resource areas along a 0.75-mile proposed gas pipeline route in accordance with ACOE guidelines. Oversaw the preparation and filing of state and local environmental permit applications to support construction of a 0.75-mile gas pipeline route in Sayreville, NJ. Permits required included New Jersey DEP Land Use Regulation permit (LURP), Construction Activities Stormwater General permit, Hydrostatic Test permit, and Middlesex County Utilities Authority (MCUA) Temporary Discharge Authorization permit.

New England Interstate Transmission Co., LLC – Montreal, Maine, and Atlantic Rail Transmission Corridor Feasibility Study. Reviewed existing information regarding an abandoned railroad right-of-way in Maine proposed for use as a transmission corridor as part of a development feasibility assessment. Created a summary of sensitive environmental and cultural resources along the right-of-way. Collected and compiled a variety of relevant GIS data layers and associated metadata from electronic sources and in coordination with state officials.

West Point Partners, LLC – Wildlife, Vegetation, and Rare Species Desktop Study – Hudson River, NY. Researched and complied data regarding wildlife and plants, including federally and state listed threatened and endangered species that could potentially occur along the proposed route of a 75-mile electrical transmission line in the Hudson River. Documented the existing conditions of wildlife and plant communities in the region, identified potential project impacts to the environment, and developed possible mitigation measures to reduce or eliminate these impacts. Generated reports for federally and state listed species, as well as GIS figures displaying the spatial distribution of known habitats of listed species along the proposed project route.

JAMIE DURAND

ENVIRONMENTAL PROJECT MANAGER

YEARS OF EXPERIENCE

26

EDUCATION

- B.S., Natural Resources Science, Concentration in Wildlife Biology, University of Rhode Island, 1988
- M.S., Coursework Soil Science, University of Massachusetts
- M.S., Coursework Soil Science, University of New Hampshire

SPECIAL TRAINING

> U.S. Army Corps of Engineers Wetlands Delineator Certification Program Training

CERTIFICATION

> Professional Wetland Scientist #891
> New Hampshire Certified Wetland Scientist #174

AFFILIATIONS

> New England Regional Soil Science Certificate
> Associate Certified Wildlife Biologist
> Registered Professional Soil Scientist - Society of Soil Scientists of Southern New England

EXPERIENCE SUMMARY

Mr. Durand is a project manager and environmental scientist with extensive experience in the energy and facilities fields. Mr. Durand is experienced with natural resource field surveys, environmental impact assessments and environmental permitting and licensing. He brings experience in routing evaluations, environmental feasibility studies and fatal flaw analyses to the industry. He is responsible for managing complex, multidisciplinary and multi-state projects, conducting constructability reviews, managing field studies, writing environmental reports, preparing permit applications at the federal, state, and local levels, and representing clients at agency meetings and hearings. Mr. Durand brings knowledge of the permitting and licensing requirements for electrical transmission lines, natural gas pipelines (FERC 7(c) filings), and facilities ancillary to these energy projects. He has completed projects sited onshore and offshore, including impact assessments on freshwater and coastal/ marine resources. His scientific expertise encompasses wetland ecology, soil science, and wildlife biology. He has experience with development projects in New England and the Northeast.

National Grid, Confidential Program, Multiple States

Environmental Project Manager coordinating the evaluation of approximately 70 miles of 16 separate electric transmission lines and 13 substation improvement projects to address system reliability needs identified by the Independent System Operator of New England. Preparation of environmental siting, licensing and permitting assessments for individual project components to determine environmental constraints, permitting requirements and potential fatal flaws. Performing environmental due diligence and routing analysis for potential overhead and underground transmission solutions, in consultation with engineering, real estate, stakeholder relations and legal project team members. Managing biological field programs, data collection and the development of environmental constraints mapping. Established environmental and engineering criteria for evaluation and comparative analysis of candidate solutions.

The Narragansett Electric Company d/b/a National Grid, sea2shore: The Renewable Link, Rhode Island

Environmental Project Manager assisting The Narragansett Electric Company (TNEC) to secure all remaining environmental permits, approvals and pre-construction commitments for the installation of approximately 20 miles of 34.5 kV bi-directional submarine transmission cable from mainland Rhode Island in the town of Narragansett to the town of New Shoreham (Block Island), approximately 1 mile of underground cable on Block Island and approximately 5 miles of underground cable in Narragansett. Responsible for the preparation of environmental bid documents; permit preparation and agency consultation for supplemental marine surveys; consultation with federal, state, and local regulatory agencies; and

coordination with project fishery liaison. Preparation of pre-construction filings and reports with the Bureau of Ocean Energy Management (BOEM), National Marine Fisheries Service (NMFS), U.S. Army Corps of Engineers, Rhode Island Coastal Resources Management Council, and the Rhode Island Department of Environmental Management. Assisting TNEC with Environmental Compliance Monitoring during marine cable-lay installation, an onshore HDD, a land-sea HDD, and terrestrial installation of the cable, including coordination with the contractors, project fishery liaison, protected species observers, third party environmental compliance monitor, and regulatory agencies.

The Narragansett Electric Company d/b/a National Grid Sherman Road Switching Station Rebuild Project, Rhode Island

Environmental Project Manager for the reconstruction and expansion of a 115/345 kV switching station, as a component to The Narragansett Electric Company's Interstate Reliability Project. Managed environmental field surveys, alternatives analysis, development of wetland mitigation program, storm water management design, and erosion and sediment control plan. Secured federal, state and local licenses and permits including approvals from the U.S. Army Corps of Engineers, Rhode Island Energy Facility Siting Board, Rhode Island Department of Environmental Management, and town of Burrillville Zoning and Planning Boards. Coordinated with McPhee and McPhee's subcontractors to provide environmental compliance monitoring during construction, including implementation of the Project Environmental Field Issue (environmental compliance plan).

The Narragansett Electric Company, New England Power Company, and the Connecticut Light & Power Company - Interstate Reliability Project - NEEWS Project, Rhode Island, Massachusetts and Connecticut

Environmental Project Manager responsible for managing the environmental field surveys, natural resource data collection and permitting for the installation of approximately 75 miles new 345 kV transmission line, reconstruction of 9 miles of existing 345 kV transmission line and reconstruction of two switching stations. This project was permitted jointly by three companies as a tri-state project. Responsibilities included federal (USACOE Section 404/10 permit), state (RIDEM Section 401, Freshwater Wetlands and RIPDES permits) and local soil and erosion control permitting, and preparing the environmental report (including evaluating underground alternatives) for filings with the Rhode Island Energy Facility Siting Board, Massachusetts Energy Facilities Siting Board and Connecticut Siting Council. Mr. Durand served as an expert witness for environmental-related issues during the RI EFSB and MA EFSB public hearings. Mr. Durand was responsible for coordinating constructability field reviews, coordinating the other utilities including three interstate pipeline companies, developing compensatory wetland mitigation plans, stakeholder outreach and assisting National Grid with Section 106 consultations. Managing the Environmental Compliance Monitoring for The Narragansett Electric Company construction.

Connecticut Light & Power Company and Western Massachusetts Electric Company, NEEWS Project - Greater Springfield Reliability Project, Connecticut Interstate Reliability Project, Connecticut and Massachusetts

Project Manager responsible for managing the environmental field surveys, natural resource data collection and permitting for the installation of new 345 kV transmission lines, including expansion of existing substations and rebuilds of existing 115 kV transmission lines. Responsibilities included federal, state and local permitting, and filings with the Connecticut Siting Council and the Massachusetts Energy Facilities Siting Board.

National Grid – The Narragansett Electric Company, T7 115 kV Transmission Line Reconductoring Project, Rhode Island

Project Manager responsible for managing the environmental field surveys, natural resource data collection and permitting for the reconstruction and upgrade of an existing 115 kV transmission line. Responsibilities included federal, state and local permitting, and filings with the Rhode Island Energy Facility Siting Board.

The Connecticut Light & Power Company, Oxford 115 kV Substation Project, Connecticut

Project Manager responsible for managing the siting and permitting of a new 115 /13.8 kV electric power substation. Conducted field surveys, performed alternative site evaluation, rare species assessment, prepared environmental permit applications and documentation in support of Municipal Location Approvals, Municipal Consultation Filing, Connecticut Siting Council Filing, and U.S. Army Corps of Engineers Category 2 Programmatic General Permit Screening.

Tennessee Gas Pipeline Company, Northampton Expansion Project, Massachusetts

Project Manager for the preparation of FERC 7c Resource Reports, and federal and state environmental permitting for the newly proposed 2,000 horsepower electric motor-driven centrifugal compressor station (a.k.a. Southwick Compressor Station 260A), including an emergency generator; and a new mainline valve and pipeline interconnection with the existing Northampton Lateral.

Algonquin Gas Transmission, Ramapo Expansion Project, New York, New Jersey, and Connecticut

Project Manager responsible for managing a multi-scope and multi-state natural gas pipeline project in the States of Connecticut, New York and New Jersey. Project activities included the replacement and upgrade of 5.0 miles of pipeline, construction of a new meter station, modifications to three compressor stations, and construction of the new compressor station. Managed the FERC 7c filing and all Federal, state, county and local environmental permit applications, including consultations with the NYSDEC regarding wetlands & watercourses, threatened and endangered species, and project impacts and mitigation.

ALISON MILLIMAN
ENVIRONMENTAL SPECIALIST

YEARS OF EXPERIENCE
12

EDUCATION
- M.S., Natural Resources Science, University of Rhode Island, 2007
- B.S., Summa Cum Laude, Wildlife and Conservation Biology, University of Rhode Island, 2005

MILITARY SERVICE

SPECIAL TRAINING
> OSHA 40-Hour HAZWOPER

CERTIFICATION
> Certified Professional in Erosion and Sediment Control (CPESC #6825, Connecticut)

HARDWARE/SOFTWARE
> Jump-In SAS
> GPS Pathfinder
> Dreamweaver
> ArcGIS

EQUIPMENT

PUBLICATIONS
> Addy, K.A., L. Green, E. Herron, and A.J. Milliman. In press. "Nitrogen and Water Quality," Natural Resources Facts, Fact Sheet No. 050307. Cooperative Extension, University of Rhode Island.

EXPERIENCE SUMMARY

Ms. Milliman is an environmental scientist with experience conducting natural resource investigations and managing associated environmental permitting tasks. She is experienced in environmental inspection duties to verify permit compliance for electrical transmission line corridors. She is experienced with permitting and regulatory issues across all levels of government including, but not limited to, MA and RI wetlands permits, RI Energy Facility Siting Board Environmental Reports, EPA NPDES NOI and SWPPPs, U.S. Army Corps 401 Water Quality Certifications, and Section 404 permits. She is also a Certified Professional in Erosion and Sediment Control with capability producing and signing Storm Water Pollution Prevention Plans (SWPPP) for electric transmission projects. Field work experience includes threatened and endangered species surveys, invasive plant surveys, wetland delineation surveys, cultural resource surveys, and breeding bird surveys.

National Grid, New England East-West Solution (NEEWS) 115/345 kV Projects, Massachusetts and Rhode Island

Environmental Specialist responsible for providing oversight of environmental monitoring during construction activities, and preparing and submitting construction updates and reports to the Rhode Island Department of Environmental Management, U.S. Army Corps of Engineers, and Local Town Offices. POWER is providing program management and owner's engineering services for a $700M program to construct new EHV transmission facilities and upgrades in Massachusetts and Rhode Island. Projects include over 50 miles of new 345 kV transmission lines, reconductoring of existing 345 kV lines, rebuilds of existing 115 kV lines, new 115 kV taps to multiple substations, expansions and modifications to two existing 345/115 kV substations, and upgrades to several 115 kV and 345 kV line terminations.

The Narragansett Electric Company d/b/a National Grid, sea2shore: The Renewable Link Project, Rhode Island

Environmental Specialist responsible for preparing the Rhode Island Pollution Discharge Elimination System (RIPDES) NOI and Soil Erosion and Sediment Control Plan (SESC Plan) for the Mainland Cable portions of the Project, and providing environmental monitoring during construction activities. The Project is approximately 20 miles of 34.5kV bidirectional submarine transmission cable from mainland Rhode Island in the town of Narragansett to the town of New Shoreham (Block Island).

Western Massachusetts Electric Company, Connecticut Light & Power Company and National Grid, The Narragansett Electric Company, NEEWS Project (Greater Springfield Reliability Project; Connecticut Interstate Reliability Project; and Rhode Island Interstate Reliability Project.), Connecticut, Rhode Island and Massachusetts

Project Scientist involved in field investigations for wetland delineations, U.S. Army Corps of Engineers wetland forms, vernal pool surveys, invasive and threatened and endangered species surveys (including use of radio telemetry), and environmental monitoring. Developed permitting documents for the RI Energy Facility Siting Board Environmental Report, the RIPDES SWPPP and NOI, and the Conceptual Wetlands Mitigation Plan and Highway Methodology Wetland Function and Values forms for the U.S. Army Corps 404 Application. The Project involves a set of improvements to the electric transmission system in Connecticut, Rhode Island, and Massachusetts that will enable continuation of safe, reliable, and economic transmission service to these states, and in particular, will increase the regional transmission system's ability to meet growing demand for power and comply with federal and regional reliability standards and criteria. The Project consists of approximately 75 miles of a new 345 kV transmission line to improve the transmission system's capacity to move power into Connecticut from Massachusetts and Rhode Island, and also includes modifications to existing systems in Connecticut and Rhode Island, and modifications to the existing Substations in Connecticut, Rhode Island and Massachusetts.

National Grid – New England Power Company, T7 115 kV Transmission Line Reconductoring Project, Rhode Island and Massachusetts

Project Scientist responsible for preparation of MA State Freshwater Wetlands Protection Act Notices of Intents, U.S. Army Corps Individual Permit for General Use of Swamp Mats, and RIPDES and MA NPDES SWPPP. Field efforts included conducting environmental compliance inspections, and threatened and endangered species monitoring and contractor training. The project involved installing new, larger conductors along its existing line for a distance of approximately 17 miles in length through the towns of Somerset, Swansea, Rehoboth and Seekonk, Massachusetts and Pawtucket, Rhode Island.

National Grid – The Narragansett Electric Company, Q143/R144 Clearance Improvement Project, Rhode Island

Project Scientist responsible for preparation of the U.S Army Corps 404 Permit, and conducted environmental compliance inspections. The purpose of the project was to replace damaged structures as well as structures that do not meet the clearance requirements of the 2007 National Electric Safety Code (NESC) along approximately 4 miles of transmission line ROW.

National Grid – The Narragansett Electric Company, Mansfield Tap Project, Massachusetts

Project Scientist responsible for preparation of the MA State Freshwater Wetlands Notice of Intent and co-ordination with MA Natural Heritage and

Endangered Species Program (NHESP) to obtain rare and endangered species clearances. Conducted environmental compliance inspections, and threatened and endangered species monitoring and contractor training. The project involved refurbishing tap lines to feed a municipal power substation.

National Grid – New England Power Company, 303/3520 Guy Strain Replacement Project, Massachusetts

Project Scientist responsible for preparation of the U.S. Army Corps Individual Permit for General Use of Swamp Mats, environmental compliance inspections, and field surveys for wetland delineation, construction access routes and swamp mat requirements. The scope of the project involved the replacement of the insulators and crossarms on 26 of the structures on transmission lines.

National Grid – New England Power Company, B154S/C154S Structure No. 17 to South Danvers Substation Project, Massachusetts

Project Scientist responsible for the preparation of the U.S. Army Corps Individual Permit for General Use of Swamp Mats, Construction Guidance document (Environmental Field Issue), and environmental compliance inspections. The purpose of the project was to refurbish the structures from Structure No. 17 to South Danvers Substation No. 42 on both lines, as applicable, and to install a new shield wire atop each circuit.

Northeast Utilities, 1990 Transmission Line Project, Connecticut

Project Scientist involved in the preparation of the CT Siting Council Development & Management Plan, rare and endangered species monitoring, and environmental compliance inspections. This 21-mile project involved the replacement of aging transmission line structures in southeastern Connecticut.

Warwick Sewer Authority, Phosphorus Removal/Upgrade/ Flood Control and Mitigation Project, Rhode Island

Project Scientist responsible for field investigations for wetlands delineation, U.S. Army Corps wetland forms, and development of the Soil Erosion and Sediment Control Plan for the RI Preliminary Determination Application and U.S. Army Corps 404 permit. The purpose of the project is to upgrade the existing levee and facilities at a waste-water treatment facility located within the floodplain of the Pawtuxet River in Warwick, Rhode Island.

TransCanada and Exxon-Mobil, Alaska Pipeline Project, Alaska

Project Scientist involved in conducting pedestrian field survey field investigations for cultural resources along a proposed natural gas pipeline ROW. The project is designed to connect Alaska's North Slope natural gas resources to new markets.

Chad Jacobs, PE

Chad is HDR's northeast region oil and gas lead and has been involved in FERC linear projects and oil and gas treatment projects. He has served as project manager and owner's engineer on civil, environmental and construction service related projects. He is experienced with site/civil design including heavy industrial process and environmental work and is competent in hydraulics, hydrology and environmental related subjects.

EDUCATION
Bachelor of Science, Civil Engineering, Georgia Institute of Technology, 2001

REGISTRATIONS
Professional Engineer, FL, LA, OH, PA, TX, WV

ISI Envision Sustainability Professional, Pennsylvania, United States

Certification
Technical Toolboxes Horizontal Directional Drill classroom certification, 2015

RELEVANT EXPERIENCE

UGI Utilities, Inc., Horizontal Directional Drill Projects, PA
HDR has permitted and designed over 20 horizontal direction drill (HDD) projects for UGI. The scope of work for these projects include alignment selection, geotechnical investigation, environmental field surveys, permitting, HDD design including bore hole stability calculations and preparation of construction bid documents. These projects cover both plastic and steel pipe design under waterways, wetlands or roads. Self-preforming the geotechnical investigation and reporting work has allowed HDR to streamline the design process and turn around a fully designed project within a week after the bore log is finalized.
Role: QC Lead

UGI Utilities, Inc., Cleona Reinforcement Project UGI Utilities, Inc., Lebanon County, PA
HDR completed planning, permitting and design of a 3-mile high/medium pressure pipeline system. In addition to the linear footage of pipe, the project included two tie-ins, three directional drills and one regulator station. We self-performed all activities including field biological and geotechnical survey. The project remained on schedule and budget as it headed into construction. We also provided construction as-built survey services and utilized our web based asset management and data tracking tool, TecHub to view real time progress of the construction process.
Role: Engineering Design

UGI Utilities, Inc., International Waxes Pipeline Project, Smethport, PA
The purpose of this project is focused on reinforcing the pipeline distribution system to serve new demand, improve system reliability, and to reinforce localized low pressure areas. This project will meet these goals through installation of approximately 8 miles of new 12-inch diameter high pressure steel gas main which will provide additional pressure to an industrial facility in Smethport, Pennsylvania. The project was divided into two phases, Constructability/Feasibility Analysis and Permitting/Detailed Design.
Role: QA/QC; Route Selection

Spectra Energy, Nexus Gas Transmission Line, MI, OH
Nexus Gas Transmission (NEXUS) proposes to construct a 255-mile interstate natural gas transmission pipeline. HDR is tasked with providing FERC compliance oversight on engineering documents prepared for the FERC 7C filing, environmental inspection services, evaluation of erosion and sediment control

compliance, coordination with the construction contractor to determine appropriate resolution for non-compliances, and documenting non-compliances, and post-construction and restoration monitoring.
Role: Project Manager

NiSource, Tri-County Bare Steel Replacement Project, PA
HDR was selected to provide environmental support services for the Columbia Gas Pipeline replacement project in southwestern Pennsylvania. The project includes approximately 34 miles of Line 1570 pipeline and associated aboveground and appurtenant facilities in three replacement segments. HDR is currently supporting Columbia through the FERC Pre-filing Process.
Role: Senior Technical Lead

Antero Resources, National Gas Pipeline Environmental Surveying and Permitting, WV
HDR completed environmental and cultural surveying for a planned pipeline project in the Marcellus region and deliver an Environmental Clearance Report to determine the extent of environmental and cultural impact, the type of permits required to move forward with pipeline development, and hold informal negotiations with the USACE and environmental regulatory authorities.
Role: Project Manager

Confidential Client, Design-Build, Oil & Gas Exploration And Production Waste Processing Atascosa Facility
HDR provided integrated design-build services for multiple oil/water processing and separation facilities in various locations throughout the southern, southwestern, and Rocky Mountain regions of the United States. These facilities receive and treat liquid and solid oilfield Exploration and Production (E&P) wastes.
Role: Project Manager

Hydro Recovery, LP, Produced Water Reclamation Facility, PA
HDR performed a treatability analysis and developed a basis of design for a new 15,000 BPD produced water reclamation facility. The facility will receive produced water and drilling muds, treat the water in preparation for returning back into the well field for hydro fracturing purposes, dewater/dispose of the drilling muds, and have available long-term storage of treated produced water. HDR completed the mass balance, process flow diagram and general arrangement for the facility.
Role: Project Manager

Nuverra Environmental Solutions, Haynesville Pipeline Design, LA
Preliminary engineering services included review of the current water/wastewater facilities; hydraulic modeling; wastewater characterization; cost evaluation; pipeline material chemical compatibility and pressure rating; treatment processes evaluation; and monitoring and controlling systems evaluation. HDR Constructors then provided design-build services for 24 miles of pipe; two oil/water separation systems and booster pump stations; pipeline under the Sabine River; and a control system.

Alex Deuson, PE

Alex is a project engineer capable of executing and overseeing the execution of projects from concept to construction; grading, drainage, erosion and sedimentation control, and water quality design; local, state, and federal permitting; and client and outside discipline coordination. He has worked on natural gas pipeline gathering, transmission, and utility projects in a project engineer capacity executing the preparation of permitting documents, bid documents, and construction packages. Alex is experienced performing NPDES and aquatic resource crossing permits in Pennsylvania, HOP permitting at the local and state level and railroad permitting. Alex is proficient in hydrologic and hydraulic modeling.

EDUCATION

Master of Science, Civil Engineering, Hydrology & Water Resources, University of California, Irvine, 2011

Bachelor of Science in Civil Engineering, Cum Laude, University of Pittsburgh, 2009

REGISTRATIONS

Professional Engineer, PA

RELEVANT EXPERIENCE

HDR Engineering, Project Engineer

- Civil and environmental engineer for industrial site development and utility projects.
- Designed grading, drainage, erosion and sediment control, utility, and layout plans for proposed natural gas fired power plants, wastewater treatment plants, existing coal fired power plants, and natural gas distribution appurtenant facilities.
- Prepared pipeline alignment and permitting plans for approximately 60 miles of proposed natural gas transmission and distribution pipelines (over 30 projects).
- Designed 15+ Horizontal Directional Drills including bore profile, stress calculations, borehole stability, and pullback loads.
- Permitted approximately 10 sites under PAG-02, PAI-02, and ESCGP-2.

Civil & Environmental Consultants, Assistant Project Manager

- Assistant PM to Principal in Charge, Civil/Site Design practice area, oil and gas group.
- Prepared scopes and budgets for oil and gas development projects including pipelines, well pads, compressor facilities, gas processing plants, and impoundments.
- Primarily acted as permitting and civil engineer to oil and gas clients and Assistant PM for integrated services including civil engineering, ecological, geotechnical, cultural resources, survey, and environmental.
- Prepared ESCGP-2 and Centralized Impoundment permit applications, plans, reports, and calculations in support of gas development activities in Pennsylvania. Prepared Land Development plans and packages for submission to municipalities, as applicable, in support of such development.
- Prepared E&S permit packages in support of gas development activities in West Virginia.
- Responsible for full project lifecycle permitting and civil services from conceptual grading and drainage plans, to final site design and PCSM (and/or Site Restoration) and E&S plans, calculations, and reports, to roadway permitting and Notice of Termination filing.

Albert A Webb Associates, Associate Engineer

- Drainage engineer for public and private development in Riverside, San Bernardino, Orange, and Los Angeles Counties.
- Lead design engineer for high-conflict multi-jurisdictional agency storm drain and channel projects including federal, military, rail, county, city, DOT, state and federal regulatory agencies.
- Lead engineer of Civil3D implementation committee, “software mentor” of Civil3D 2012-2014.
- Developed company-wide workflow for client compliance with state-wide Construction General Permit requirements (SWPPP/E&S).
- Daily client contact and coordination with utilities, stakeholders, regulators, special districts, and approval agencies.
- Prepared numerous WQMPs and implemented HCOC mitigation measures for a variety of commercial, industrial, residential, and transportation projects.

Riverside County Flood Control and Water Conservation District, Assistant Engineer

- Scoped, scheduled, designed, produced Plans Specifications and Estimate (PS&E), and provided construction support to numerous infrastructure projects such as:
    - 7+ miles of storm drain and channel, ranging in size from 18” to 108” and larger RCB.
    - Numerous basin projects with storage ranging from 1-500 ac-ft
    - Access road, levee, channel, and dam design and grading
    - Special structures design for rehabilitation projects.
- Hydrologically modeled and calibrated numerous climatically diverse basins ranging in size from 10 to over 5,000 acres.
- Helped develop District-wide configuration workflow for HEC-RAS hydraulic models, greatly increasing efficiency throughout the organization.
- Pioneered expedient hydrologic parameter aggregation system using available resources, yielding no hard cost to the District and greatly reducing model computational effort.
- Produced innovative design solutions to complex constrained systems, especially as related to projects seeking FIRM revision.
- Hosted in-house master class on basin routing/design for all staff levels.
- Experience with EPA CWA water quality and hydromodification mandates as related to watershed planning and operation.

Appendix N

Water Supply Plan

WATER SUPPLY PLAN

Clear River Energy Center
Burrillville, Rhode Island

PREPARED FOR:
Invenergy Thermal Development LLC
One South Wacker Drive, Suite 1900
Chicago, Illinois 60606

FOR SUBMITTAL TO:
State of Rhode Island Energy Facility Siting Board
Public Utilities Commission
89 Jefferson Boulevard
Warwick, Rhode Island 02888

PREPARED BY:
ESS Group, Inc.
10 Hemingway Drive, 2nd Floor
East Providence, Rhode Island 02915

ESS Project No. I108

January 11, 2017

TABLE OF CONTENTS

Tables

Figures

Appendices

1.0 INTRODUCTION

Since the filing of the Energy Facility Siting Board (EFSB) Application on October 28, 2015 and consideration of the many concerns expressed by the Community over use of local water supplies and possible use of water from a previously-contaminated Pascoag Utility District (PUD) groundwater well for process water for the Clear River Energy Center (CREC or Facility), an alternative water supply plan has been developed. This document provides details on the proposed source of process water for the facility and the proposed methodologies for the management of both the process wastewater and sanitary wastewater that will be generated by the Facility.

Although the proposed changes and alternatives increase the overall operating cost of the Facility, this Water Plan is based on viable alternatives that minimize water consumption for process use and avoids the construction of both a water supply pipeline and a wastewater sewer line for the process wastewater, both of which had previously been proposed.

In a joint letter submitted by the Town of Burrillville, dated October 5, 2016, CREC agreed to provide certain details to meaningfully evaluate any Water Plan proposed for the Facility. The details provided in the following sections address all of the information requested by the Town of Burrillville in its letter, as identified below;

1. The source of process water (from a municipality or water system, with details), **[Section 2.0]**;
2. The identity of the municipality or water system, **[Section 2.0]**;
3. Quantity of water available on a daily basis in gallons per day, **[Section 2.3.2]**;
4. Quality of water from a chemical standpoint, **[Section 2.0]**;
5. Routing or transport of water from the source to the proposed facility **[Section 2.0]**;
6. Expected treatment of water at source and/or at the facility for use at the facility **[Section 2.2.1]**;
7. If water treatment of water at source and/or at the facility for use at the facility **[Section 2.2.1]**;
8. If water treatment is required, conceptual process and instrumentation diagram, expected size and location of building to be used for treatment, and the proposed treatment operator, **[All water treatment will be performed within the Facility on the site; Appendix A]**;
9. Identification of a redundant/contingent process water source, **[Section 2.0]** and;
10. The proposed location of the discharge of water from the plant and the expected volume and chemical content of the water at discharge **[Section 3.0 and Section 3.1.1]**.

2.0 WATER SUPPLY

Water for use at the Facility will be supplied from the Town of Johnston, Rhode Island under a long term water supply agreement and delivered to the Facility via public roads by trucks owned and/or leased by the Facility. Back-up or contingent water will be supplied by private trucking supplier(s) who draw their water from the CREC source and/or other potable water sources. Since the Facility will own and/or lease its own water supply trucks, other municipal or private water suppliers could operate as redundant/contingent process water transportation capability should water from the Town of Johnston water supply system be unavailable to the Facility. CREC has also secured commitments from a private trucking company, Benn Water & Heavy Transport Corp., to supply water to the Facility. *See* **Appendix G**.

The Town of Johnston purchases its municipal water from the Providence Water supply system which has its own water reservoirs and water treatment facility.

The long term agreement with the Town of Johnston has been signed, with approval from the Johnston Town Council on January 10, 2017 to meet the needs of the Facility. *See* **Appendix F**. Since trucking of the water will be the method of transport for all alternative water suppliers, these alternative suppliers become the back-up or contingent water suppliers to the Facility.

Whether water is supplied by truck from the Town of Johnston or private water suppliers, the overall result will be that only water of drinking water quality will be used at the Facility to meet its process water requirements. No local water supplies, other than a small on-site drinking water well to support the need for on-site potable water, will be utilized by the Facility. As previously explained to the EFSB, CREC initially proposed using a local source for water supply (Pascoag Utility District [PUD's] contaminated Well #3A). Notwithstanding a signed letter of intent (LOI) with PUD, PUD elected to terminate the LOI. Also, the other local water supplier, Harrisville Fire District, voted not to supply water to CREC. As indicated in the Status Report filed with the EFSB on December 12, 2016, Invenergy Thermal Development LLC (Invenergy) identified the City of Woonsocket as a potential source to supply water to the Facility via a pipeline or trucking. In order to pursue alternative or contingent sources, Invenergy approached the Town of Johnston during the end of December 2016.

The Town of Johnston municipal water system obtains its water supply from Providence Water and is considered a consecutive water system. A consecutive water system is defined by the Rhode Island Department of Health (RIDOH) as "a public water system that receives some or all of its finished water from one or more wholesale systems. Delivery may be through a direct connection or through the distribution system of one or more consecutive systems". As such, the capacity of the Town of Johnston water system to be able to support the water demands of the CREC facility is provided by the capacity of the Providence Water system.

The principal water source for Providence Water is the Scituate Reservoir and its five tributary reservoirs, collectively referred to as the Scituate Reservoir Complex. The Scituate Reservoir Complex has a total storage capacity of 41.3 billion gallons and a net storage capacity of 39.8 billion gallons. The Providence Water treatment plant (Phillip J. Holton Water Purification Plant) processes 100% of the surface water supply from the Scituate Reservoir Complex and has a capacity of 144 MGD. This plant is the largest treatment facility in New England.

Figure 2.1 provides a map of the proposed route of the water delivery trucks from the Town of Johnston to the Facility. The water delivery trucks will use state roads, to the extent feasible, to make deliveries to the Facility. Costs associated with the installation of a water truck filling station at a point on the Town of Johnston water supply system and any other necessary appurtenances will be covered entirely by the Facility.

The Facility will continue to work with the Town of Johnston to obtain all necessary permits and/or local approvals, subject to EFSB oversight, as applicable, for installation of the water truck filling station on the municipal water supply system of the Town of Johnston.

2.1 Water Supply Pipeline Alternative

As an alternative to trucking water to the Facility, a water pipeline to deliver water to the Facility was considered. To be viable a water pipeline would need to be constructed to the closest municipal water supply of a size that could meet the needs of the Facility and that of the municipal water supply customers into the future. A water pipeline was initially considered to deliver water to the Facility from the City of Woonsocket.

Suppling water to the Facility, from the City of Woonsocket, would require a dedicated water supply pipeline that would extend from a connection point in the City's low pressure zone, approximately 1.75 miles to the west of the Mount St. Charles storage tank, via a new 12-inch transmission main to the

Facility site a distance of approximately 14 miles and requiring numerous bridge and/or wetland crossings.

Figure 2.2 provides a map of the alternative water pipeline route that was considered for this dedicated water supply pipeline to the Facility. This dedicated water pipeline would have been installed in existing State roads.

After full consideration of this alternative water supply option for the Facility, this alternative was determined to be not desirable as a result of the overall cost of the water pipeline, its long term maintenance costs, concerns over securing the necessary approvals for installing the pipeline in State roads, concerns regarding construction and concerns over the numerous bridge or alternative wetland crossings that would have been required to complete the route of the water pipeline to the Facility. When considering these facts and comparing the alternative of the CREC water use redesign option to reduce water demand, the redesign option utilizing truck delivery was selected. As a result, the water plan for the Facility will rely on trucking water from the Town of Johnston's water system with contingent/redundant supply from private water suppliers, if needed.

2.2 Water Use

A modern energy efficient gas fired combined cycle electric generating facility is not the classical power plant of the past. The overall efficiency of the generation processes has significantly increased over recent years, and as a result, the amount of fuel used, air emissions produced, water used and wastewater produced have been significantly reduced, compared to older generation technologies.

Modern combined cycle electric generating facilities in New England are primarily fueled by natural gas, and at times in the cold winters when natural gas supplies are under severe stress, some electric generation plants are required by the electric grid operator (ISO-NE) to fire distillate oil to conserve the natural gas supplies for home heating and commercial use. Water use by combined cycle electric generating facilities increases when distillate oil is fired, as water is used in the combustion process to control the temperature of the combustion flame significantly reducing emissions that otherwise would have occurred. Conditions that lead to a need to fire distillate oil are typically infrequent and short in duration in New England and although daily water use increases during distillate oil firing it does not significantly impact overall annual water consumption of the Facility.

In a combined cycle power plant, the majority of the electricity (approximately two-thirds) is generated by a gas fired combustion turbine, which is tied to an electrical generator. Waste exhaust heat from the combustion turbine is recovered and used to generate steam in a "Heat Recovery Steam Generator" (HRSG) that uses the waste heat to generate high pressure steam used to spin a more conventional steam turbine which is also tied to an electrical generator. In some combined cycle generation facilities such as the proposed Facility, the steam turbine and the gas turbines share the same shaft saving space in the overall plant configuration. The term "combined cycle" is derived from the two types of turbines involved (gas and steam turbines).

After passing through the steam turbine the exhaust steam, now devoid of its useful energy, must be condensed back into water in a steam condenser and the condensed water is then reused in the cycle and pumped back to the HRSG. To condense the steam, the Facility features a dry cooling system, which is similar to the cooling provided by a typical automobile radiator, which cools by the use of ambient air supplied by fans.

The use of a dry cooling system by the proposed Facility reduces the amount of water and wastewater generation by more than 90% from that which would have otherwise been required if a more conventional wet cooling tower had been selected. Most power plants in New England use wet cooling and as a result consume considerably more water per megawatt (MW) of electricity generated. Although dry cooling costs more, Invenergy has selected the dry cooling system for this site to minimize water use.

The use of a dry cooling system also considerably reduces the amount of wastewater that will be generated by the Facility, eliminating cooling tower blowdown that would have been required to control the cooling water chemistry if a more conventional wet cooling tower system had been proposed.

2.2.1 Additional Water Recycling / Water Use Reduction

To support the alternative of supplying the Facility by truck delivery of water, the Facility's process water systems, on-site water treatment system, and wastewater collection system have been re-designed to further minimize water use and to decrease the amount of trucking required to supply water to the Facility.

The water demand for CREC was originally designed based on the supply of water from the PUD Well #3A. As part of that use, water demand from the well was maintained at a relatively high level so as to have a high flow through the well such that it would help the well remediation process. Once use of Well #3A was no longer possible CREC began to evaluate alternatives which included reducing water use and wastewater generation by the inclusion of various water recycling features, tightening standards for steam evaporative losses from the steam cycle, reduction in the frequency of use of evaporative cooling in the summer for cooling the air inlet to the combustion turbines and by substitution of a trailer mounted demineralization system to replace the previously considered reverse osmosis (RO) and electrodeionization (EDI) systems. These features will significantly reduce overall water use and wastewater generation by the Facility albeit with a higher operating cost to the Facility.

The Facility plans to limit winter distillate oil firing to that which can be supported by drawing down the Facility's on-site water storage tanks and to re-fill these tanks only on an extended trucking schedule. Further discussion of this is included in **Section 2.4**. Although the proposed Facility has already committed to incorporate a dry cooling system, which will significantly reduce water use and wastewater generation by 90% from that which other combined cycle electric generating facilities in New England use, the re-designed Facility will incorporate further water reduction features that will support the option of supplying the Facility by truck delivery of water and eliminate use and concerns over local water supplies.

The amount of water used by the Facility will vary with the level of generation output and will vary seasonally to meet the needs of specific processes within the Facility. For the re-designed Facility, the major water uses will be; high purity demineralized water for steam cycle makeup (required throughout the year) to replace losses from the steam system, water evaporated from the evaporative cooling system during warm periods to provide incremental output and efficiency and high purity water for injection into the combustion turbine combustors to control emissions (only needed when firing distillate oil which will typically occur only if needed in the dead of winter). It is important to note that water injected into the combustion turbines to control air emissions, when required to fire oil, is a consumptive water use; the water is evaporated into the combustion turbine exhaust and does not result in an associated wastewater flow.

Other than the three specific water uses identified above, the balance of water use within the Facility for normal operations is for miscellaneous low volume plant services such as general housekeeping, floor/equipment drains and at times, for general maintenance of the Facility.

A separate potable drinking water system will be used to separate these uses from the process water uses, and the Facility will include an on-site sanitary wastewater collection and treatment system consisting of a septic tank and associated leaching field. Sanitary wastewater will be collected in a separate sewer drain system and will not be commingled with process wastewaters.

The following provides a description of the specific changes that have been made to the Facility's water and wastewater systems from that which were originally included in the EFSB Application. Refer to **Appendix A** for schematics of the revised Facility water and wastewater treatment systems.

a) Cycle Makeup Water Treatment System Change

The most significant water reduction has been achieved by replacing the RO/EDI system with a trailer mounted demineralization system which eliminates water losses from the RO/EDI system used to control RO system chemistry and prevent chemical scaling within the RO membranes.

The raw water supplied to the Facility contains dissolved ions such as sodium (Na^+), calcium (Ca++), and chloride (Cl^-). Positively charged ions are called cations and negatively charged ions are called anions. The original concept for treating the makeup water was the use of a RO system which operates by separating the cations/anions in the incoming raw water and concentrating these ions in a reject stream. The reject stream is about 25 percent of the incoming raw water flow rate but contains 95-98% of the dissolved cations/anions from the incoming water stream. An RO/EDI system sized to process 100 gpm of water would generate a 25 gpm reject stream. The reject stream from the RO/EDI system is typically discharged from the plant as wastewater.

The new proposed water treatment system would use mobile demineralizer trailers to treat the makeup water. Each mobile demineralizer trailer would house a pre-assembled cation vessel, an anion vessel and a mixed bed polishing vessel that are each filled with distinct ion-exchange resins to remove cations and anions from the water. Once the trailer is set in place, the operator hooks the raw water line to the trailer inlet water connection. As the incoming water flows through these vessels, the cations are exchanged for H^+ ions and the anions are exchanged for OH^- ions. These ions then combine to form neutral water.

Once the ion-exchange capacity of a resin bed is exhausted, the mobile trailer is shipped off-site for regeneration. Unlike the RO system, mobile demineralizer trailers do not generate a wastewater stream. For each gallon of incoming water treated, one gallon of demineralized water is produced.

Mobile demineralizer trailers were initially not considered for CREC because the cost to rent these is higher than the cost of a permanently installed RO/EDI system.

There are numerous suppliers of mobile demineralizer trailer systems in the United States. One potential supplier of these systems is General Electric (GE). The GE trailers would likely be dispatched from the GE East Hartford Service Center in Connecticut. The throughput of each trailer depends on the concentration of dissolved ions in the raw water that is processed. If, for example the total dissolved ion concentration in the raw water was 135 mg/L, each demineralizer trailer could generate about 1,200,000 gallons of demineralized water prior to needing to be sent off-site for chemical regeneration. Based on the annual average cycle makeup water demand, this is equivalent to approximately one trailer needing to be regenerated per month. To provide operational flexibility and avoid trailer demurrage charges, a higher volume of water may be processed through the demineralizer trailers than required for plant operation and the excess water stored in the demineralized water storage tank. Each demineralizer trailer is able to make approximately 400 gallons per minute of demineralized water from the municipal water supplied to the Facility.

Trailer mounted demineralization systems also provide an advantage to operators of electric generation facilities in that the trailer demineralizer suppliers have a high level of expertise in the operation and production of demineralized water and can provide remote monitoring of demineralized water production using remote sensing technologies built into the demineralization trailer units.

Trailer mounted demineralization systems are chemically regenerated off-site at the supplier's regeneration facility and thus, eliminate the need for on-site storage of chemicals that would have been required if the ion exchange treatment systems had to be regenerated on-site. Although the trailer mounted demineralization systems operate at an overall higher operating cost, they are effective in reducing on-site water use and do not generate wastewaters on-site.

Appendix B provides a brochure that supplies further details on trailer mounted demineralization systems. The trailer mounted demineralization systems will be monitored remotely by both the suppliers of these trailers who are trained in the operation and maintenance of these systems and the Facility. There is no specific operator's license required for operation of the trailer mounted demineralization systems such as is required for operators in municipal drinking water treatment facilities.

Reverse osmosis treatment systems that had been considered previously, although they operate at high chemical efficiency and provide an overall lower operating cost for the production of demineralized water, are not necessarily water efficient, as a portion of the water to be treated must be wasted as an RO reject stream in order to control the chemistry within the RO membranes and to avoid the formation of chemical scales that would destroy the membranes potentially requiring full membrane replacement. The RO reject stream in electric generating facility's that use wet cooling systems can be recycled to the wet cooling tower and thus, in these type of facilities do not result in a wastewater stream requiring discharge.

b) HRSG Blowdown Recovery

HRSG blowdown is water intentionally removed from the HRSG steam drums to control the concentration of impurities during evaporation of water. The impurities in the steam must be controlled to low levels to reduce erosion and fouling of the HRSG and steam turbine components and to minimize operating and maintenance costs to maintain high reliability. Common steam impurities include sodium, chloride, silica and iron.

HRSG blowdown is still high quality water that is lower in mineral content than the municipal water supplied to the Facility and can be recycled after filtration to remove suspended solids (low levels of boiler system corrosion products). The re-designed water treatment systems will employ a filter to remove suspended solids from the HRSG blowdown and because the total dissolved salts in the blowdown are considerably lower than the municipal water treated by the on-site demineralizer trailers can be recycled to the Facility's Service/Fire Water tank after cooling as shown by the revised water balances provided in **Appendix C**.

In a typical plant configuration, the HRSG blowdown is routed to blowdown tanks that are vented to the atmosphere. The hot, pressurized blowdown stream flashes in the blowdown tank and some of the fluid is lost as vapor through the vent. The remaining condensed fluid is hot and therefore quenched with service water to 140° F before it is discharged from the facility as wastewater.

In order to conserve water, a means of recovering the flashed steam from the blowdown tank vents will be incorporated into the design. This may include installation of a heat exchanger on the blowdown tank vent line to condense most of the flashed steam, or possibly a cascading blowdown scheme between the high pressure and intermediate pressure steam systems can be used to allow recovery of heat and lowering of the blowdown system pressure. During detailed design of the plant, the final design of recovering the flashed steam will be evaluated and incorporated into the CREC system. A heat exchanger will also be installed on the blowdown tank liquid drain line to cool the collected condensate to less than 140°F. The cooled HRSG blowdown condensate will be filtered to remove any suspended

solids (corrosion products from the boiler cycle) before routing the filtered water to the facility service water (SW) tank for reuse in the plant.

High temperature resistant cartridge filters are typically utilized for this type of application. The cartridge filter provides inline iron filtration. When the differential pressure across the cartridge filter reaches a predetermined set point, new elements will be installed and the used elements disposed as solid waste. During detailed design of the plant, the best option for filtering the condensate will be identified for incorporation into the system.

c) Evaporative Cooler Operating Changes

To increase combustion turbine efficiency, an evaporative cooler vaporizes water in the turbine inlet air stream, thereby cooling the air and increasing its density (mass flow). As water evaporates, the dissolved species are concentrated in the water circulated through the coolers. To prevent scaling, a portion of the circulating water is removed as evaporative cooler blowdown and fresh water added to the cooler system. Makeup to the evaporative cooler consists of a blend of demineralized water and service water.

In order to conserve water, a higher proportion of demineralized water will be utilized in the cooler makeup water to increase cycles of concentration and reduce blowdown. With a 50/50 blend of service water and demineralized water, the cycles of concentration has been increased from five to seven reducing the overall water use and wastewater required for evaporator system blowdown.

With the revised operational changes, the evaporative cooler makeup flow will be up to approximately 4,600 gallons per hour (total both units) when the evaporative coolers are used. Note that the amount of water used by the evaporative coolers is dependent on ambient temperatures and relative humidity and as a result the evaporative cooler makeup will often be well below the 4,600 gallons per hour estimate.

d) Facility Wastewater Recovery and Recycle

The last water recycling feature is a wastewater treatment system that will treat wastewater from various miscellaneous service water uses such as floor and equipment drains by employing an oil/water separator for bulk oil removal and a filtration system intended to remove suspended solids and any oil that could escape the upstream oil/water separator. Floor and equipment drains are essentially potable water that has been drained from various pieces of equipment or been used to wash down the operating floor of the facility. Good housekeeping practices can eliminate this wastewater flow since there is little real need to wash the operating floors as opposed to alternative dry sweeping methods. Although the expected wastewater flows associated with the miscellaneous service water uses are expected to be low, they can be recovered with diligence to the removal of any oil that might be present.

Wastewater from the floor and equipment drains will be collected in a wastewater collection tank. The tank serves to collect large volumes of water generated in batch operations such as area wash-downs and in the summer when evaporative coolers may be in operation. With the water conservation design changes described above, the only wastewater streams during normal operation would be wastewater that is discharged from the oil/water separator(s) that will need further treatment before it can be recycled. This wastewater stream is basically plant service water but with a higher concentration of oil/grease and suspended solids.

The wastewater will therefore be treated to remove suspended solids and oil/grease. The treated water will be clean water which will be recycled back to the plant Service/Fire Water

Storage tank for reuse. For this type of application, the suspended solids are typically removed by filtration using cartridge filters. During plant transient conditions, such as start-up, when large volumes of wastewater may be generated, an alternate filtration technology such as a pre-coat filtration system may be used. Therefore, the final technology will be selected during detailed design after reviewing the expected transient wastewater flows relative to available filtering technologies. As discussed above, use of cartridge filters does not generate a wastewater stream. A pre-coat filter can be configured to provide a dry waste product suitable for landfill. Any wastewater stream that might be generated by the filtration system will be collected in a wastewater disposal tank or sump and hauled off-site for disposal at a POTW or other facility licensed to receive and treat these wastewaters.

The filtered wastewater may still contain low amounts of oil/grease. The oil/grease can be removed by several types of filter pre-coats such as activated carbon, solka floc (essentially ground paper pulp), or ground walnut shells. As an alternative, special types of oil removing cartridge filters whose elements are designed with high affinity for oil can be used. Again, the equipment selection will be finalized during detailed design of the plant.

Additional technical brochures for various water and wastewater treatment technologies discussed in this section are included in **Appendix D**.

2.2.2 Water Sources

Given the high efficiency of the Facility when compared to older generating facilities in New England, the Facility is expected to operate at full output throughout the majority of the year. Facilities that operate at full load throughout the year are described as having a high capacity factor. The water supply to the Facility must be from a reliable source that can meet the water quality and quantity requirements.

The following provides an analysis of the capacity of the primary water supply source, the Town of Johnston water system (supplied by the Providence Water system), to meet the requirements of the Facility. A review of any other identified water supplier will be performed, as necessary.

The Town of Johnston water supply system is supplied solely by the Providence Water system which is supplied from the Scituate Reservoir and its five tributary reservoirs, all of which combine to make up the Scituate Reservoir Complex. Under the re-designed Facility, process water will be provided by the Town of Johnston water system (supplied by Providence Water) via trucks.

The source of potable water for the Facility during its operation will be from an on-site potable well to be permitted principally through the Rhode Island Department of Health (RIDOH). It is currently expected that the well will be completed in bedrock and that the needs of the facility can be supplied by a single well with a yield less than 10,000 gpd. Based on the anticipated number of employees at the facility (approximately 25 employees), it is estimated that the average daily demand for the facility will be less than 1,000 gpd.

2.3 Source Capacity

This section provides more detail on the water demand for the Facility during each season and the capability of the Town of Johnston which indirectly is the Providence Water municipal water system to meet the water demands of the Facility.

2.3.1 Facility Water Demand

The proposed Facility has been configured as a nominal 850-1,000 MW, energy efficient, dual-fuel combined cycle power plant that will utilize dry cooling to conserve water use. The Facility's daily water demand will vary depending on plant load, ambient air temperature and the fuel used in firing the Facility. Although the Facility will utilize natural gas as its primary fuel, during the winter season if

natural gas supplies coming into New England are in short supply or constrained, the gas turbines can be fired by ultra-low sulfur distillate (ULSD), as requested by Independent System Operator New England (ISO-NE). The Facility's water demand while firing ULSD increases from that used while firing natural gas and only for the period of time that the ULSD fuel is required.

The re-designed Facility's daily water demand with both combustion turbines firing natural gas under full-load normal conditions will be approximately 15,840 gallons per day (gpd),a full-load summer condition (approximately 3 months of year) will be approximately 18,720 gpd. During the summer months, in order to operate the Facility under optimal conditions to maximize electricity generation, it may be desired at times to operate the evaporative coolers; although this mode of operation is optional, the frequency of operation can be controlled to only that required to maximize electricity generation from the Facility as the on-site water supply tanks may permit. According to the revised water balances, presented in **Appendix C**, operation of the evaporative coolers would require up to approximately 4,600 gallons per hour of operation. The water for operation of the evaporative coolers would be a mix of demineralized water and/or the service water drawn from their respective water storage tanks and water provided by delivery via trucks.

During the infrequent periods when the Facility is requested to fire one of the gas turbines on oil, the additional daily water demand for the re-designed Facility will be approximately 724,320 gpd for each day of oil firing which will be met by on site storage. Although the total water use of the Facility increases when firing ULSD oil, the total number of days that the Facility will be required to fire oil will typically be determined by the grid operator (ISO-NE) based on the severity of winter conditions when there is a need to conserve natural gas for heating needs of the region. The additional water to support oil-firing conditions would be obtained by drawing down the on-site demineralized water storage tank and/or the service water tank. The on-site water tanks will be refilled after a winter oil firing event by trucked water supplied from the municipal water supplier. The rate of filling of the on-site tanks to replenish water used during winter oil firing will depend on the number of water trucks making delivery to the Facility. **Section 2.4** provides a table showing the number of daily truck deliveries required meeting the normal process water makeup requirements of the Facility and the incremental number of trucks required to refill the on-site water storage tanks to replenish water consumed as a result of winter oil firing.

Appendix C includes four revised water balances developed for the revised water use plans for the Facility. The water balances cover the full range of operating conditions for the Facility expected throughout a typical year. These water balances have been modified to reflect the water use by the Facility when using the Town of Johnston water supply via the trucking option and using all of the water recycling features discussed above. Each of these water balances reflects the Facility operating under a full load condition (maximum output) so the water flows are the maximum expected for each operating case.

- Water balance WMB-01 (Sheet 1 of 4) depicts water flows for the average annual operating condition (average annual air temperature not average annual flow).
- Water balance WMB-01 (Sheet 2 of 4) depicts ambient summer conditions (typically three months of the year) when firing natural gas and with the option of using evaporative coolers for cooling the inlet air to the combustion turbines. As previously noted, operation of the evaporative coolers requires additional water usage estimated at up to 4,600 gallons per hour of operation. This mode is used when high ambient temperatures warrant.
- Water balance WMB-01 (Sheet 3 of 4) depicts water flows for the ambient winter operating condition when firing natural gas.

- Water balance WMB-01 (Sheet 4 of 4) depicts a winter condition if the Facility were requested by the electric grid operator ISO-NE to fire distillate oil on one combustion turbine. As previously noted, oil firing of one of the combustion turbines requires additional water usage estimated at 724,320 gpd.

These four water balances identify all of the major operational water uses and associated wastewater sources throughout the year with each flow reported in gallons per minute when the Facility is operated on water obtained via trucks from the Town of Johnston municipal water system.

Table 2.1 then identifies the daily water use, daily wastewater generated, and daily consumptive or evaporative losses by the Facility at its maximum generation output for each of these four operating conditions.

Table 2.1
Daily Water Use, Wastewater Generated and Evaporative Losses

Operating Season and Fuel	Water Use	Wastewater Generated	Consumptive Evaporative Loss
Average Ambient *Firing Natural Gas*	15,840 gpd	1,440 gpd	14,400 gpd
Summer* *Firing Natural Gas* *Potential for Evaporative Cooling*	18,720 gpd	1,440 gpd	17,280 gpd
Winter Ambient *Firing Natural Gas*	15,840 gpd	1,440 gpd	14,400 gpd
Winter** *Firing Natural Gas* *Potential for Oil Firing*	15,840 gpd	1,440 gpd	14,400 gpd

NOTES:
gpd – gallons per day
*Evaporative cooling Summer water demand – 4,600 gallons per hour additional if/when used
**Additional water demand – Oil Firing – 724,320 gpd will be provided by drawing down on-site storage tanks and re-filling these tanks by truck deliveries to the Facility

Gas Versus Distillate Oil Firing

The natural gas supply to New England is delivered via pipeline from outside of the region. Historically, expansion of the natural gas supply into the region was not pursued because natural gas was more expensive than distillate oil. With the major expansion in natural gas supply in the U.S., there has been a significant reduction in the price of natural gas, and as a result, many major gas pipeline companies are pursuing projects to expand their delivery capacity into the region. As a result, once these natural gas pipeline expansions are complete, the pressures on the regional natural gas distribution system that historically have forced the use of distillate oil firing will be lessened.

To put the above in perspective, over the last five years with the current limited pipeline capacity into the region, there has been an average of only five days per year when gas fired electric generation were asked to switch to distillate oil. Five days per year means, if the Facility had existed for the last five years, the Facility would have fired natural gas 98.6% of the time. Not all of the electric generating facilities in New England have the capability of firing oil; and most, if not all are limited by the amount of on-site oil and/or water stored on site.

Projecting forward with the natural gas pipeline expansions underway and the growth of renewables throughout New England, whose output is not tied to the natural gas supply, the total annual days of oil firing should lessen with the increasing supplies of natural gas and renewables helping to reduce winter shortage of this critical fuel to the region. The Facility will limit winter distillate oil firing to that

which can be supported by drawing down the Facility's on-site water storage tanks and to re-fill these tanks only on an extended trucking schedule to reduce traffic impacts on the community.

2.3.2 Ability of Source to Meet Facility Demand

The following section discusses the capability of the Town of Johnston water system (supplied by Providence Water) to meet the Facility's projected water demand. A filling station will be established within the Town of Johnston that would allow trucking of water to the Facility.

The Town of Johnston municipal water system obtains its water supply from Providence Water and is considered a consecutive water system. As such, the capacity of the Town of Johnston water system to be able to support the water demands of the CREC facility is dependent on the capacity of the Providence Water system.

The principal water source for Providence Water is the Scituate Reservoir Complex. The safe yield of the Scituate Reservoir Complex (Scituate Reservoir and associated tributary reservoirs) has been determined to be 92 MGD, and taking into consideration the requirement to release 9 MGD downstream, to the Pawtuxet River, results in a net Safe Yield of 83 MGD, as detailed in the 2010 Water Supply System Management Plan (WSSMP; Pare 2010).

Table 2.2 below provides actual and projected water demands (residential, commercial, industrial and governmental uses) for the Providence municipal water system as provided in the 2010 WSSMP (Pare, 2010).

Table 2.2
Average and Maximum Day Demands

Water Supplier	2007 (Actual)		2015 (Projected)		2030 (Projected)	
	ADD (MGD)	MDD (MGD)	ADD (MGD)	MDD (MGD)	ADD (MGD)	MDD (MGD)
Providence Water (Method 1)	68.14	113.5	71.3	119	76	126.9
Providence Water (Method 2)			68.7	114.7	71	118.6

NOTES: ADD – average day demand; MDD – maximum day demand
Method 1 – uses wholesaler based projections
Method 2 – PWSB Population Based Projections

In the 2010 WSSMP, Providence Water states that the safe yield (83 MGD) provides the Providence Water Supply Board (PWSB) with ample supply for the current and projected future average daily water demand. The WSSMP also states that the maximum day demand is available through reserve system storage (storage reservoirs) and short-term drafting of the reservoir complex.

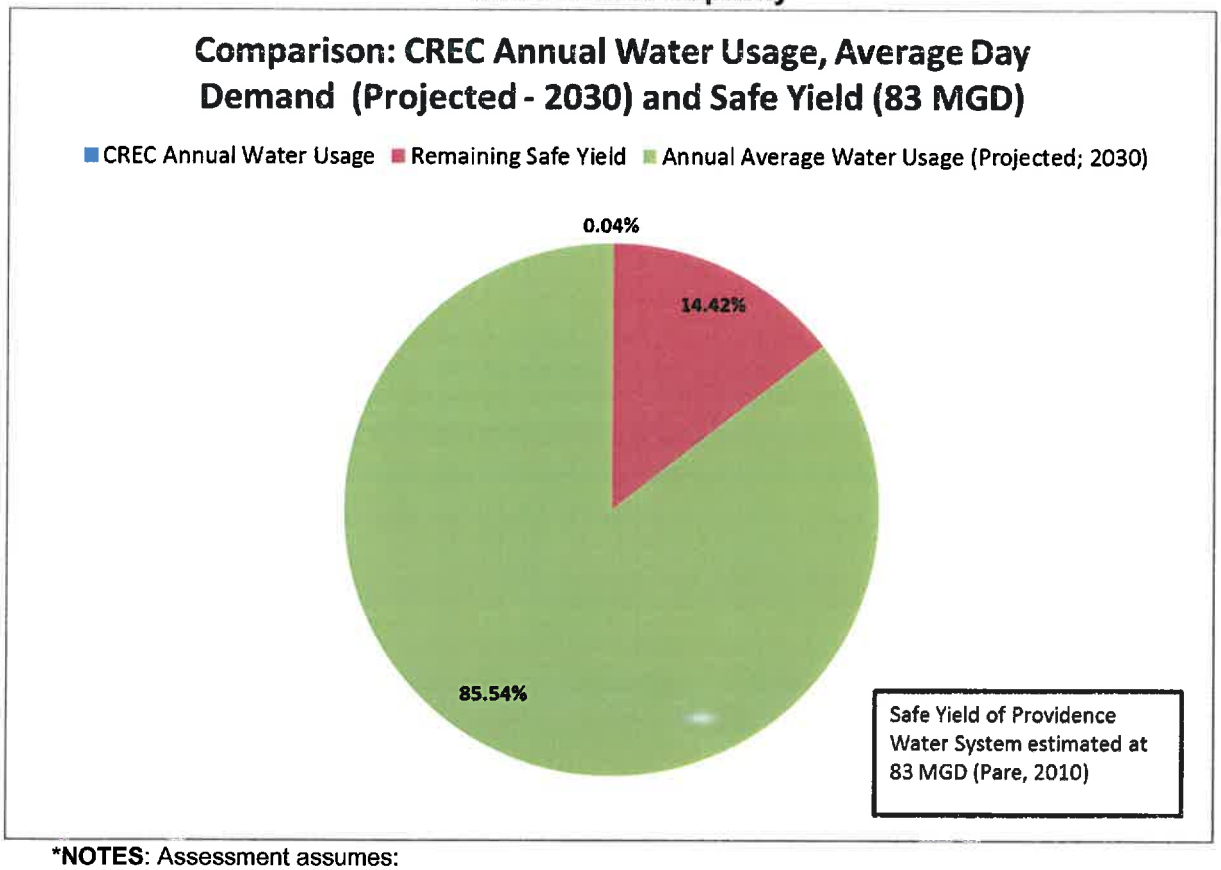
Table 2.3 presents the population projections for the cities and towns that receive some or all of their municipal water from the Providence Water system, an important factor in the future planning for water use by the community (Rhode Island Statewide Planning Program, 2013). Also included are the population growth projections for the entire state of Rhode Island. Based on these projections, it would be anticipated that the water demand for residential uses would be expected to remain consistent or experience a slight increase within the next 25 years.

Table 2.3
Population Projections

City/Town	Count	Projections		
	2010	2020	2030	2040
Barrington	16,310	15,933	15,914	15,569
Bristol	22,954	23,009	23,638	23,770
Coventry	35,014	36,108	38,037	39,172
Cranston	80,387	80,270	82,133	82,270
E. Greenwich	13,146	13,459	14,048	14,342
E. Providence	47,037	44,188	42,602	40,195
Johnston	28,769	29,035	29,996	30,327
Lincoln	21,105	21,857	23,038	23,750
No. Providence	32,078	31,403	31,475	30,895
Providence	178,042	180,583	187,547	190,601
Smithfield	21,430	22,023	23,136	23,766
Warren	10,611	10,015	9,640	9,083
Warwick	82,672	79,243	77,751	74,701
West Greenwich	6,135	7,140	8,287	9,234
West Warwick	29,191	28,502	28,496	27,902
Totals	**624,881**	**622,768**	**635,738**	**635,577**
% Change	**- -**	**-0.34%**	**1.74%**	**1.71%**
RI Population	**1,052,567**	**1,049,177**	**1,070,677**	**1,070,104**
% Change	**- -**	**-0.32%**	**1.72%**	**1.67%**

Source: RI Population Projections (Rhode Island Statewide Planning Program, April 2013)

Figure 2.3
Water Source Capacity*



***NOTES**: Assessment assumes:

- 8 hours per day of evaporative cooling for 90 days per year
- 3 days of oil firing per year

The above graph (**Figure 2.3**) provides a conservative comparison of the total annual water usage of the Facility (shown in blue) compared to the net Safe Yield of the Providence Water System (83 MGD) and the projected average day demand (ADD) for 2030 (71 MGD) using the Method 2 projections as detailed in **Table 2.2**. The Method 2 projections (which assume approximately 4.2 % growth in ADD through 2030) were utilized in this evaluation since they are more comparable to the projected population growth within the Providence Water service area (approximately 1.7% growth in population through 2030) and still allow for additional growth in other water uses (e.g., commercial, industrial, governmental). The above clearly shows that the annual amount of water required for the Facility is a small fraction of the available capacity of the Providence Water supply system and will not impact their ability to supply water to their current or future customers.

Based on this evaluation, it is clear that the existing capacity of the Providence Water system, based on the net safe yield of 83 MGD, is more than sufficient to meet the water demands of CREC, as well as the current and projected water needs of the communities that it supplies on an annual basis.

2.4 Water Supply Trucking

The option of trucking water to the Facility and disposing of wastewater generated by the Facility is a viable solution to meet the operational requirements of the Facility in the absence of use of local water

supplies. This approach requires an increase in the number of truck deliveries to the Facility to support this option of supplying water to the Facility and for disposal of wastewater from the Facility.

Table 2.4 and **Table 2.5** below are provided to identify the number of potential water truck trips (deliveries) required per day based on the expected operation of the Facility. Two tables have been provided to separate the expected daily number of truck deliveries required to provide water for process makeup to the Facility during typical operations from those trucks needed to re-fill the on-site water storage tanks that may have been drawdown as a result of winter distillate oil firing.

Table 2.4
Typical Gas-Fired Operating Scenarios

Operating Condition	Water Usage (gpd)	# of Truck Trips Per Day
Annual Average Ambient Condition	15,840	2.0
Summer Ambient Condition	18,720	2.3

Evaporative Cooling is optional and is used primarily in the Summer and because New England Summers have high variability in temperature and humidity, evaporative cooling is not necessary for all days and seldom is used at night because nighttime humidity levels reduce the effectiveness of evaporative cooling.

Table 2.5
Additional Trucks Trips - Re-Fill Water Tanks After Oil Firing

Condition	# of Additional Water Truck Trips Per Day
3-Days Oil Firing; 1 month Refill	9.1
3-Days Oil Firing; 2 month Refill	4.5

NOTES: assumes 724,320 gpd for each oil firing day

Table 2.4 identifies the range in truck deliveries required assuming each truck holds approximately 8,000 gallons per truck for the various typical operating scenarios. The range in the number of truck deliveries for normal operations is typically from 2 to 3 trucks per day. On those exceptional days when evaporative cooling might be needed, CREC will utilize on-site storage and replenish the on-site storage over time.

Table 2.5 shows a range of water truck delivery periods when replenishment is required for the on-site storage tanks. Winter oil firing may not be required in all years. Whether these additional truck deliveries are required is outside of the control of the Facility. **Table 2.5** demonstrates that the total truck deliveries can be reduced by stretching out the number of days allowed to re-fill the on-site water storage tanks.

The revised traffic analysis is included as **Appendix E**.

3.0 WASTEWATER

As a result of the reduction in the overall water use by the Facility, the amount of wastewater that will be generated by the Facility will also be significantly reduced, allowing use of trucking wastewater from the Facility as the method of wastewater disposal.

Discharge of wastewater from the Facility will be by trucking wastewater to POTWs or other privately-owned facilities in the area licensed to receive and treat industrial wastewater. Any wastewater considered for receipt by any POTW or privately owned facility licensed to treat industrial wastewater

must meet the overall quality and compositional requirements to be accepted by those facilities for treatment and discharge under their operating permits.

The projected wastewater composition for wastewater generated by the Facility has been developed in **Table 3.1,** based on the water quality of the Town of Johnston municipal drinking water supply. Although drinking water quality varies between municipal water suppliers in Rhode Island, the overall composition of these municipal water supplies are of high quality and have similar overall chemical composition. As a result, although **Table 3.1** has been developed for the Town of Johnston municipal water supply, **Table 3.1** is representative of the Facility wastewater composition that will be generated by use of any municipal water supply in Rhode Island.

3.1 Wastewater

The majority of wastewater generated by the re-designed Facility's water and wastewater collection/treatment system will be from the steam generator (HRSG) blowdown, the reduced use of evaporative cooler blowdown (summer only if/when used) and miscellaneous plant services water uses and sanitary wastewater from the operating staff.

Sanitary wastewater will be collected within a separate sanitary sewer system and will be treated in an on-site wastewater disposal facility employing a septic tank and on-site leaching field. Miscellaneous service water uses generate industrial wastewater within the Facility such as customary house cleaning required for any industrial complex, are low volume wastewater that can be recovered in part by an on-site wastewater treatment system consisting of a filtration system to remove suspended solids and any residual oil not removed by the on-site oil/water separator. The filtration system will be selected in the final design and will either be a cartridge or pre-coat type filtration system selected based on effectiveness for oil and suspended solids removal and operating costs.

The blowdown from the HRSG will also be recycled through a filtration system that will be either a cartridge or pre-coat type filtration used to filter the HRSG blowdown and allow this demineralized water to be recycled back to the Service/Fire Water Storage tank. HRSG blowdown is high quality water of low overall salt content and is reusable once filtered to remove any suspended solids (boiler system corrosion products) and can be recycled to the Service Water/Fire Water Tank for treatment by the on-site trailer mounted demineralizer system.

Table 2.1 provides the expected seasonal daily wastewater flows from the re-designed Facility that will need to be discharged by trucking this wastewater to a POTW or privately-owned treatment works or facility. Any wastewaters to be disposed of off-site will need to be characterized to ensure these wastewaters are properly disposed of by those facilities licensed to receive and treat this wastewater or otherwise utilize these wastewaters.

The Facility's daily industrial wastewater discharge flow while firing either natural gas or distillate oil is expected to be approximately 1,440 gpd. This wastewater flows is representative of the vast majority of operating hours for the Facility.

3.2 Wastewater Discharge Limits

On November 19, 1982, under 40 CFR 423, the U.S. Environmental Protection Agency (USEPA) developed and promulgated effluent limits applicable to the Steam Electric Power Generating Point Source Category. The Categorical Effluent Standards issued in 1982 were described as applicable to "discharges resulting from the operation of a generating unit by an establishment primarily engaged in the generation of electricity for distribution and sale, which results primarily from a process utilizing fossil-type fuel (coal, oil, or gas) or nuclear fuel in conjunction with a thermal cycle employing the steam water system as the thermodynamic medium."

The USEPA, on June 7, 2013, proposed revisions to the regulation issued in 1982 aimed at strengthening the controls from certain steam electric power plants by revising these technology-based effluent limitation guidelines and standards for the steam electric generating point source category. The USEPA finalized this revision to 40 CFR Part 423 on September 30, 2015.

The revised Categorical Effluent Standards are applicable to a wide range of technologies used in the electric generating sector from coal, oil and nuclear facilities of all sizes and configurations. These Categorical Effluent Standards also apply to modern gas fired combined cycle generating facilities because combined cycle generating facilities employ as part of the overall facility design "a thermal cycle employing the steam water system."

In developing the Categorical Effluent Standards, the USEPA had to consider a wide range of generating technologies employing many different materials of construction of the steam water systems. Conventional steam boiler cycles built in the 1950s, 1960s and 1970s are still in operation in many areas of the country, and as such, the wastewaters from these facilities reflect the materials of construction that included significant use of copper alloys both in the boiler systems and often in the steam condensers of these facilities. As a result, significant focus was placed on effluents from these facilities for a range of heavy metals, especially copper, and the USEPA has included a specific limit on copper in the discharges from steam electric generating facilities.

Many of the USEPA proposed Categorical Effluent Standards are also focused on coal-based power plants and coal gasification technologies that have the wide range of wastewaters associated with coal ash and coal based power plant emission control systems, which are not applicable to gas fired combined cycle power plants.

In developing the revised regulations, the USEPA specifically focused on the Categorical Effluent Standards applicable to new Steam Electric Power Generating facilities discharging to POTWs.

In developing the new standards, the USEPA defined Low Volume Waste Sources as "wastewater from all sources including but not limited to ion exchange water treatment systems, water treatment evaporator blowdown, laboratory and sampling streams, boiler blowdown, floor drains, cooling tower basin cleaning wastes and recirculating house services water systems. Sanitary and air conditioning wastes and carbon capture wastewaters are not included."

As a result, wastewaters generated by most modern combined cycle generating facilities fit the definition of Low Volume Wastewaters under the revised USEPA Steam Electric Point Source Category.

CREC has reviewed the recently revised categorical pretreatment standards. The attached **Table 3.1** provides information on the composition of the Town of Johnston (Providence Water) water supply and provides a projection of the industrial wastewater composition from the Project. **Table 3.1** does not include a projection of the wastewater compositions for sanitary wastewaters as these will be managed separately from the industrial wastewater and disposed of in an on-site septic tank and leaching field which is commonly employed for these wastes. **Table 3.1** also identifies the recently promulgated effluent pretreatment discharge standards for those facilities discharging to a POTW. USEPA reviewed wastewaters generated by combined cycle electric generating facilities and required pre-treatment standards for those facilities discharging their wastewaters to POTW facilities. This review found that these wastewaters are compatible for discharge to POTWs, found that these waters could benefit by the removal of suspended solids provided by the settling processes of the POTWs and found only one metal of concern prevalent in some electric generating facilities employing wet cooling systems using copper alloys in their cooling system. Since the Facility does not employ a wet cooling system, there will be no copper in the discharge from any wet cooling system.

As shown on **Table 3.1**, the wastewater discharged from the Facility will meet the Categorical Pretreatment Standards applicable to discharges to POTWs without any additional treatment. Some

POTWs and private wastewater treatment facilities may have site specific discharge limits that will be uniquely applicable to those facilities based on their discharge permits. Table 3.1 identifies these as discharge specific limits (DSLs) to identify these as separate of the Categorical Pretreatment Standards. Other than sanitary wastewaters generated by the Facility's operating staff, no wastewater generated at the Facility will be disposed of on the Facility's site.

All discharges from the Facility are projected to meet all applicable Categorical Pretreatment Standards and any additional standards that might be imposed by the POTW's receiving this wastewater. Upon commencing operation, all wastewaters generated at the Facility will be thoroughly sampled and characterized to confirm that the composition of any wastewater generated by the Facility meets with the plans for its disposal.

Table 3.1
Projected Wastewater Quality

Parameters[1]	Units	Johnston Supply to CREC	Projected CREC Wastewater Quality	Categorical Pretreatment Standards Applicable to Discharges to POTWs[2]
Specific Conductivity	µS/cm	173	58	Not Regulated
TDS	mg/L as CaCO3	94	32	Not Regulated
pH	S.U.	10.2	6-9	6.0 – 9.0
Calcium	mg/L	15.0	4.9	Not Regulated
Magnesium	mg/L	0.7	0.23	Not Regulated
Potassium	mg/L	1.0	0.31	Not Regulated
Sodium	mg/L	12.0	4.1	Not Regulated
Total Alkalinity	mg/L as CaCO3	16.5	5.4	Not Regulated
Bicarbonate (HCO3)	mg/L	NA	16	Not Regulated
Hardness	mg/L as CaCO3	42.0	14	Not Regulated
Chloride	mg/L	20.5	6.9	Not Regulated
Fluoride	mg/L	0.70	0.7	Not Regulated
Nitrate (N)	mg/L	<0.10	0.1	Not Regulated
Sulfate (SO4)	mg/L	23.5	7.7	Not Regulated
Total Silica (SiO2)	mg/L	3.9	1.9	Not Regulated
Dissolved Silica (SiO2)	mg/L	3.9	1.3	Not Regulated
Total Suspended Solids	mg/L	ND	66.7	DSL
Total Organic Carbon (TOC)	mg/L	1.8	4.3	DSL
Oil/Grease	mg/L	NA	10	DSL
Ammonia - N (NH4)	mg/L	<0.02	2.0	≤ 30
Nitrite (N)	mg/L	0.0002	0.00	DSL
Ortho Phosphate (PO4)	mg/L	<0.10	0.1	DSL
Residual Chlorine	mg/L	0.44	0.0	DSL
Biochemical Oxygen Demand	mg/L	NA	0.15	≤ 300
Total Aluminum	mg/L	<0.01	0.0	DSL
Total Antimony	mg/L	<0.001	0.0	DSL
Total Arsenic	mg/L	<0.004	0.0	ND
Total Barium	mg/L	0.01	0.0	DSL
Total Beryllium	mg/L	<0.001	0.0	DSL
Total Cadmium	mg/L	<0.001	0.0	DSL
Total Chromium	mg/L	<0.001	0.0	DSL
Total Copper	mg/L	0.03	0.0	1.0
Total Manganese	mg/L	<0.01	0.0	DSL
Total Iron	mg/L	0.05	0.69	DSL
Total Lead	mg/L	0.02	0.0	ND
Total Mercury	mg/L	<0.0002	0.0	DSL
Total Nickel	mg/L	<0.001	0.0	DSL
Total Selenium	mg/L	<0.005	0.0	DSL
Total Silver	mg/L	<0.001	0.0	DSL
Total Thallium	mg/L	<0.001	0.0	DSL
Temperature	F	173	58	≤ 150
NOTES: DSL – Each POTW may have site specific discharge limits required by their respective discharge permits				

3.3 Wastewater Trucking

The truck trips required to manage the process wastewater have been developed based on the following assumptions:

- process wastewater generated at the Facility will be approximately 1,440 gpd; and
- capacity of the trucks used to remove this wastewater from the Facility for treatment and disposal is 3,200 gallons per truck

Based on these assumptions, approximately 3 truck trips per week will be necessary for the management of the process wastewater. The actual frequency of these truck trips will be dependent on the volume of the process wastewater holding tank.

The revised traffic analysis is included as **Appendix E**.

4.0 REVISED TRAFFIC ANALYSIS

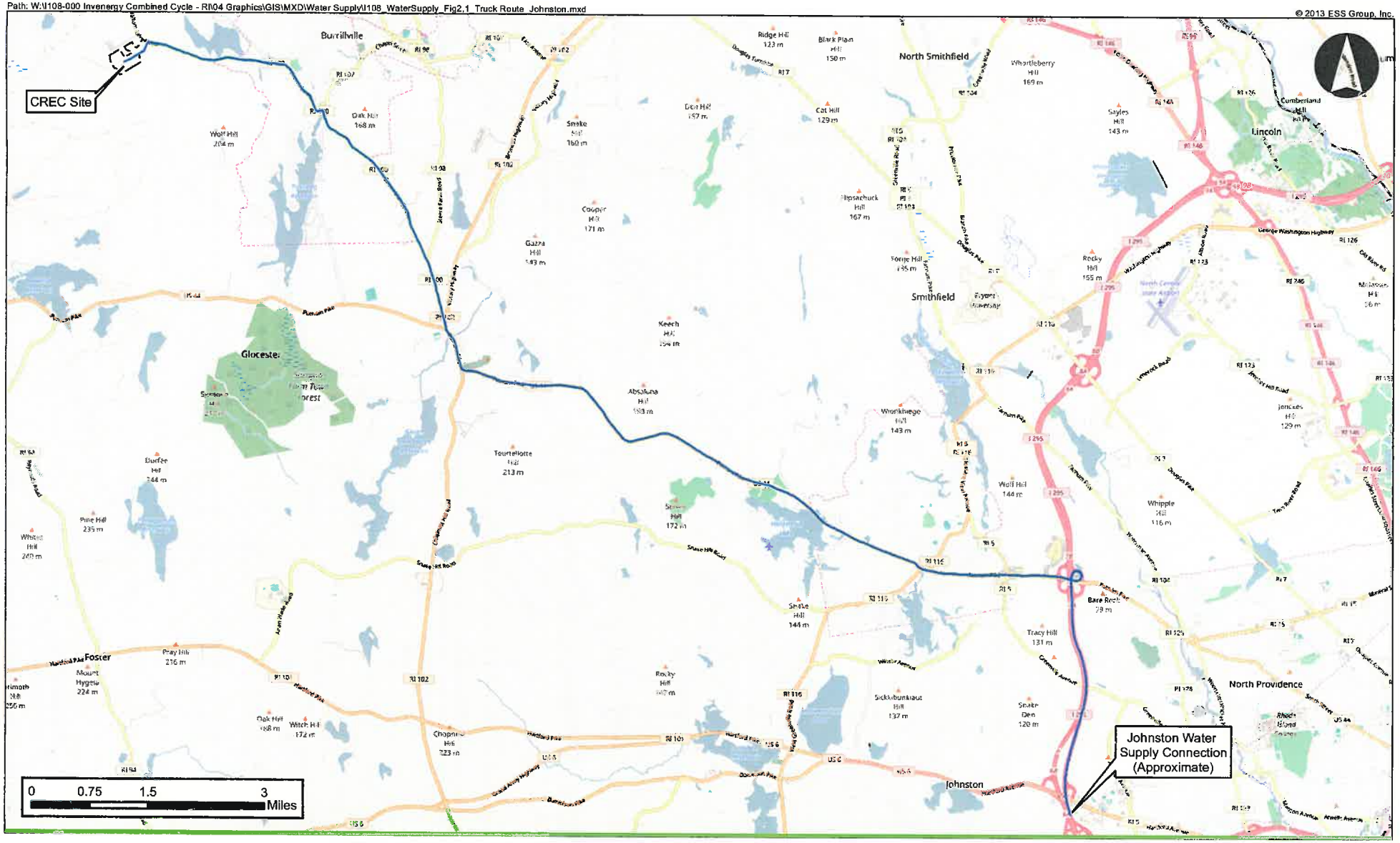
McMahon Associates (McMahon) prepared a traffic analysis to reflect the current water supply option for CREC. *See* **Appendix E**. This analysis is a supplement to the original Traffic Impact Study (TIS) for CREC dated May 2016.

McMahon concluded the following:

- Conclusions of the TIS in terms of peak hour traffic operations remain valid;
- Proposed truck routes are able to accommodate the proposed increase in truck traffic as a result of the proposed CREC facility operations; and
- Truck routes would not experience significant additional deterioration due to the transport of water to the site.

Figures

Date: 1/9/2017
Path: W:\I108-000 Invenergy Combined Cycle - RI\04 Graphics\GIS\MXD\Water Supply\I108_WaterSupply_Fig2.1_Truck Route_Johnston.mxd



Clear River Energy Center
Burrillville, Rhode Island

1 inch = 9,000 feet

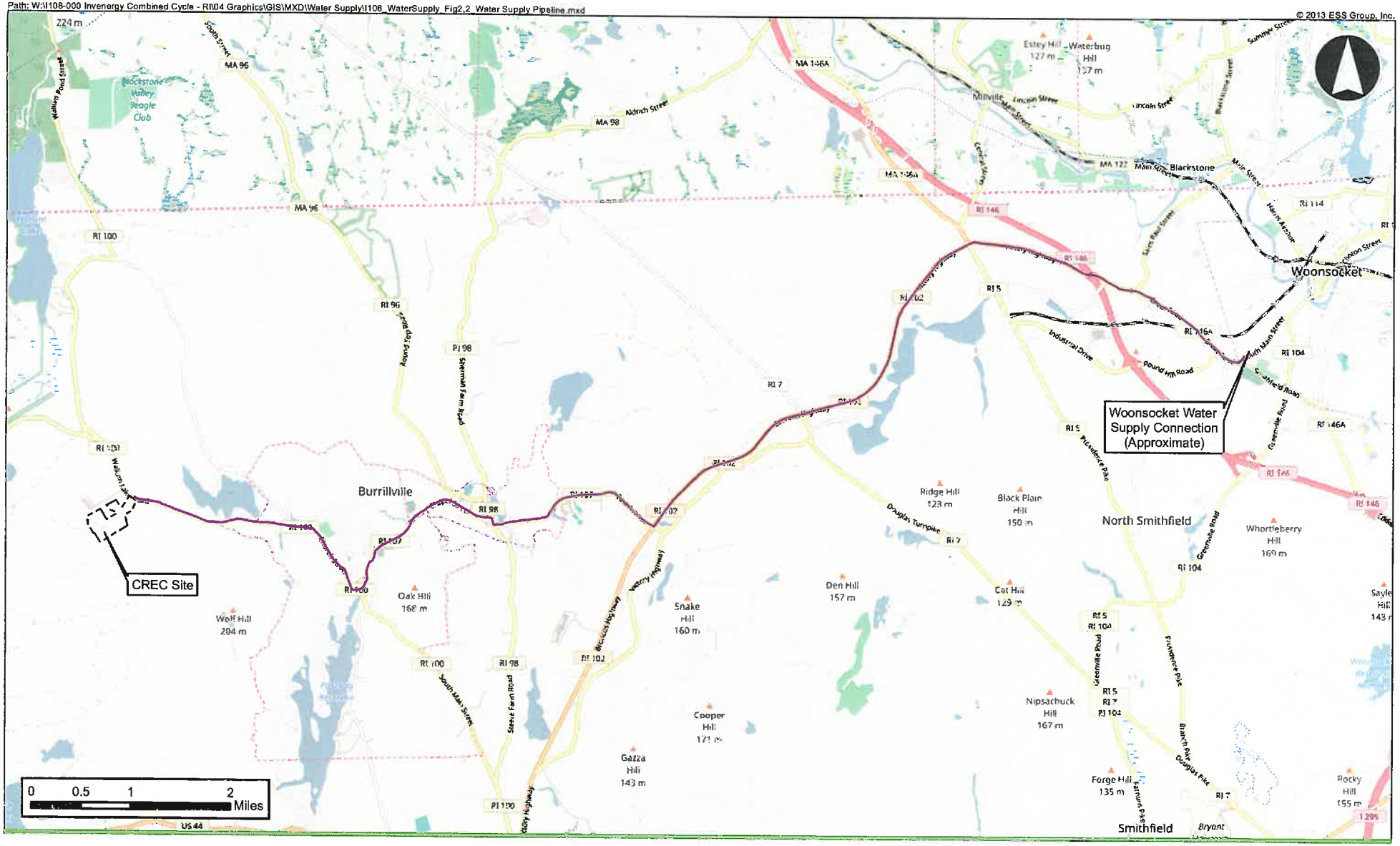
Source: 1) Invenergy, Site Location, 2016
2) ESS, Pipeline/Trucking Routes, 2017

ess group
environmental consulting & engineering services

Water Supply Truck Route

Figure 2.1

Date: 1/9/2017
Path: W:\1108-000 Invenergy Combined Cycle - RI04 Graphics\GIS\MXD\Water Supply\1108_WaterSupply_Fig2.2_Water Supply Pipeline.mxd



Clear River Energy Center
Burrillville, Rhode Island

1 inch = 7,000 feet

Source: 1) Invenergy, Site Location, 2016
2) ESS, Pipeline/Trucking Routes, 2017

ess group
environmental consulting & engineering services

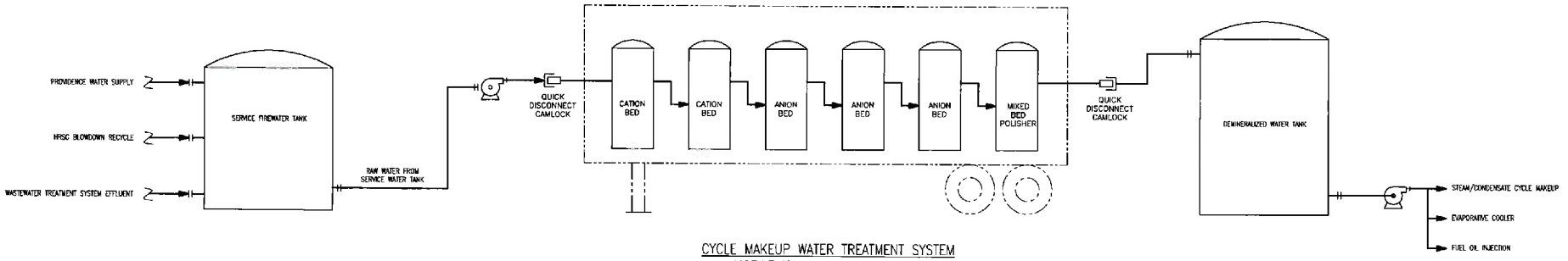
Alternative Water Supply Pipeline

Figure 2.2

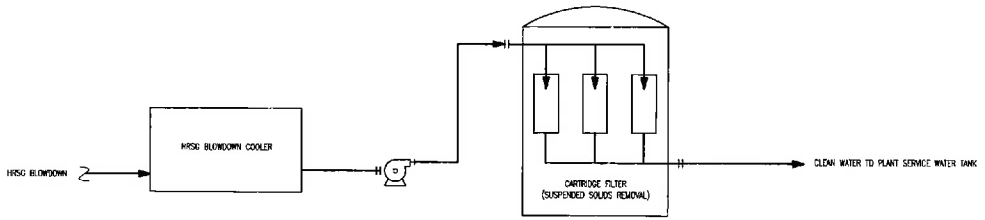
Appendix A

CREC Water and Wastewater Treatment Systems

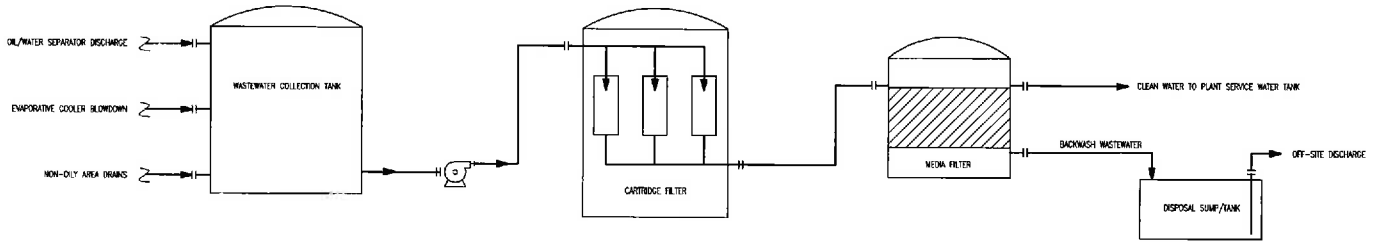
NOTES:
1. CONDENSATE POLISHERS ARE NOT SHOWN ON THIS DRAWING.



CYCLE MAKEUP WATER TREATMENT SYSTEM
MOBILE ION-EXCHANGE TRAILER



HRSG BLOWDOWN FILTRATION SYSTEM



WASTEWATER TREATMENT SYSTEM

ISSUE	DATE	DESCRIPTION	DWN	ENGR	CHK	APPV
A	06 JAN 17	FOR INFORMATION	PVJ	ASH	XXX	XXX

HDR Engineering, Inc.

PRELIMINARY NOT FOR CONSTRUCTION OR RECORDING

INVENERGY, LLC
CLEAR RIVER ENERGY CENTER

CLEAR RIVER ENERGY CENTER
WATER AND WASTEWATER TREATMENT SYSTEMS

FILENAME	M1203-0WT-238926.dwg	SHEET
SCALE	NONE	238926-0WT-M1203

Appendix B

Mobile Demineralizer Trailers System Brochures

MobileFlow*

Description and Use

GE offers the world's largest fleet of mobile water treatment systems, providing demineralization, filtration, softening, and deoxygenation treatment, quickly and efficiently – available for either emergency, supplemental, or extended term service.

All aspects of treatment, from system analysis and design through installation, maintenance, upgrades and emergency response are available. Included are immediate system backup, complete analytical laboratory, application and engineering consultants, qualified Field Service Representatives (FSR's), regional service centers, and a 24-hour dispatch and control center.

Each MobileFlow* system contains six rubber-lined ASME code steel tanks of uniform size, with a patented piping system to allow operation in series or parallel. The system can be operated by FSR's, your plant personnel or remotely monitored. Automatic shutdown features protect from power failure, excess pressure and off-specification water. Regional service centers perform regeneration quality control checks on every unit. Demineralization treatment is available in as little as two hours plus transit time. Other special applications may require additional time.

Typical Applications

Demineralization

Premium 10% cross-linked cation resins and porous Type I strong base anion resins are standard in custom loading of the MobileFlow system.

Regeneration of ion exchange resins at service centers provides the highest conversions for economical production of ultra pure water. A proprietary rinse is used on the selected resins to prevent any residual QC test water from remaining in the trailer when it is delivered to the user. Off-site resin regeneration gives the customer the use of a true zero discharge system.

Formalized resin purchase specifications include specific test procedures and quality limits to ensure that the products are free of manufacturing impurities, and can meet the most stringent specifications.

Filtration

GE stands alone in filtration capability, having pioneered in-line coagulation for the mobile water treatment industry. The MobileFlow system takes advantage of a proprietary dual media filter that is treated with a biocide, acid, and hot water after each use to protect against cross-contamination from various surface water sources.

We guarantee the effluent quality for influents up to 50 NTU and the system can also treat water up to 100 NTU. Treatment flow rates are dependent upon the influent turbidity values. Typically, flow rates up to 600 GPM per trailer are possible with influent values of less than 10 NTU.

Deoxygenation

Our patented DEOX* process provides a water quality of less than 1 ppb dissolved oxygen, with 0.5 ppb typically measured. Clients in the pulp and paper, petrochemical, refinery, and utility industries have benefited by our capability to

Find a contact near you by visiting www.ge.com/water and clicking on "Contact Us".

deoxygenate water from virtually any source, including municipal, well, raw surface water, condensate, and demineralized water. This service is readily available on an emergency basis, and is also typically utilized during by-pass of the client's deaerator for inspections and repairs.

Softening

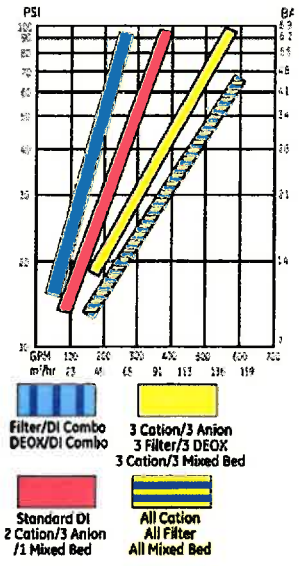
The MobileFlow system provides softening at high flow rates, routinely producing water at 600 GPM, and can be reconfigured to produce 1,000 GPM per trailer. Mobile and quickly available, this application can be provided with either exchange service off-site regeneration) or on-site regeneration. A MobileFlow unit has a softening capacity in excess of 15 million grains.

Condensate Polishing

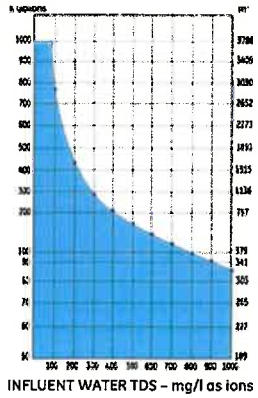
Utilizing a cation/mixed bed configuration, condensate can be polished to remove crud loading and trace ionic contaminants during unit start-ups or for longer-term requirements. The 10% cross-linked cation resin is strong enough to withstand aggressive temperatures and crud loads of the condensate while keeping the mixed bed resins clean for final ionic contaminant removal without interference.

General Properties

MobileFlow Pressure Drop at 60°F (16°C)



Demineralizer Capacity



The MobileFlow system incorporates an exclusive piping system linking six rubber-lined ASME code pressure vessels. The international version (shown here) has three axles and the U.S. version has two.

Dimensions and weights	
Overall length with tractor	60'-0"
Trailer length	43'-0"
Trailer height	13'-6"
Trailer width	8'-0"
Gross trailer operating weight	90,000 lbs.
Electrical	
Electrical power requirements	110V, 20 amps
Specifications	
Inlet/outlet connections	2.5" NST, male fire hose, 3 inlet, 3 outlet Also available: 4" 150 psi flange or 4" NST male fire hose, 1 inlet, 1 outlet
Pressure vessels	6 per trailer, ASME code, 100 psi (7 bar) W.P., rubber lined
Resin capacity	Over 5 million grains (Demineralization)
Outlet resin trap	8" with suitable mesh element
Suitable media	Ion exchange resins, synthetic adsorbents, activated carbon, granular filter media, etc.
Instrumentation	• Two conductivity meters, one with strip chart recorder and alarm or telog recorder, with alarm • High/Low temperature alarms • Complete pressure instrumentation • Rate of flow indicator • Totalizing flow meter
Controls	• Adjustable pressure reducing valve on inlet • Isolation valves on all pressure vessels • Automatic shutdown system • External audible alarms
Heating	Propane fueled, thermostat controlled system for freeze protection to -20°F

Further Information

For more about the Emergency and other services please call number below:

US toll free 800 446 8004 or 757-855 9000

EVOQUA
WATER TECHNOLOGIES

MOBILE DEMINERALIZERS SYSTEMS

MOBILE DI FOR MAXIMUM VERSATILITY

For over thirty years, Evoqua Water Technologies has met the short-term and emergency treated water needs of its customers using Mobile Demineralizer (DI) trailers. These trailers are the treatment of choice for zero-discharge applications and seasonal treated water needs. A reliable and extensive service network, an ever-expanding trailer fleet, and strategically located regeneration facilities allow Evoqua Water Technologies to serve its large North American customer base quickly and effectively.

Mobile DI services allow customers to meet their treated water needs without on-site waste generation, hazardous chemical handling or capital investment. Evoqua uses the following trailers to match customers' exact capacity and flow needs with the right solution:

- MT 5500 - This versatile DI trailer is normally configured with six vessels: two cations, three anions, and one mixed bed. Each vessel holds up to 100 ft^3 of resin for a nominal capacity of five million grains. Depending upon configuration, flow rates range from 100-400 gpm.
- MT 5000 - A six-vessel trailer with a nominal five million grain capacity. This two-train trailer offers 300 gpm per train (600 gpm total).
- MT 4500 - A four-vessel trailer, includes a weak-base anion vessel. With flows of 200 gpm and capacities of up to four million grains on certain feedwaters, this trailer is ideally suited for water with high free mineral acidity.
- MT 3000 - A three-vessel trailer with a nominal three million grain capacity and flow rates to 200 gpm.

Typical Uses:

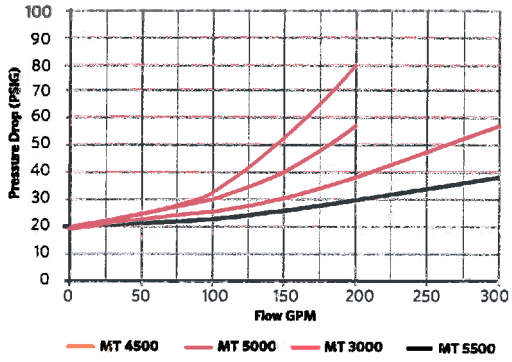
- Capacity expansions
- Zero discharge applications
- Pilot plant water needs
- Interim use until a permanent system is installed
- Process water quality changes
- Existing demineralization system environmental salt discharge problems
- Scheduled shutdowns
- Seasonal water needs
- Emergency water needs

A TRAILER FOR EVERY NEED

Series	MT 3000	MT 4500	MT 5000	MT 5500
	Effective for lower flow rate and low TDS water applications (especially for power industry)	Effective in low alkalinity/high FMA (free mineral acidity) applications	Highest flow rate per trailer in the industry, completely automatic two-train system	Versatility with 6x100 ft³ vessels, the 5500 can be configured to provide highest capacity or most effective flow rate
Nominal exchange capacity (kgr)*	3,000	4,500	5,000	5,000
Vessels	3 tanks/trailer	4 tanks/trailer	6 tanks/trailer	6 tanks/trailer
Vessel composition	Carbon steel	Carbon steel	Carbon steel	Carbon steel
Vessel lining	Vulcanized rubber	Vulcanized rubber	Vulcanized rubber	Vulcanized rubber
ASME	Yes	Yes	Yes	Yes
Flow rate (gpm) min./max.	50/200	50/200	50/600	50/400
Inlet pressure (psig) min./max.	45/100	50/100	40/100	40/100
Inlet/outlet hose connections	2.5" Minimum	2.5" Minimum	2.5" Minimum	2.5"–4" Minimum
Weight (lbs.) shipping/operating	35,000/42,000	47,000/62,000	60,000/84,500	58,000/84,500
Dimensions – Length x Width x Height	32' x 8' x 13.5'	32' x 8' x 13.5'	43' x 8' x 13.5"	48' x 8.5' x 13.5'
Trailer electrical requirements	115 V, single phase, 60 hz, 10 amps			
Heater electrical requirements	(2) 115 V, single phase, 60 hz, 30 amps			
Instrumentation	Flow indicator and totalizer on main header; pressure gauges and sample ports; conductivity meters on primary and polish outlet ports			
Feedwater requirements	Turbidity < 3 NTU — Free chlorine < 0.25 ppm			
Typical water service quality	Conductivity: 1.0 - 0.1 µS-cm and silica leakage < 20 ppb			

*Based on a 1 µS-cm end point

PRESSURE DROP VERSUS FLOW



*These pressure drops are from the inlet of the trailer to the outlet connection. The MT 5000 has two trains @ 300 gpm each.

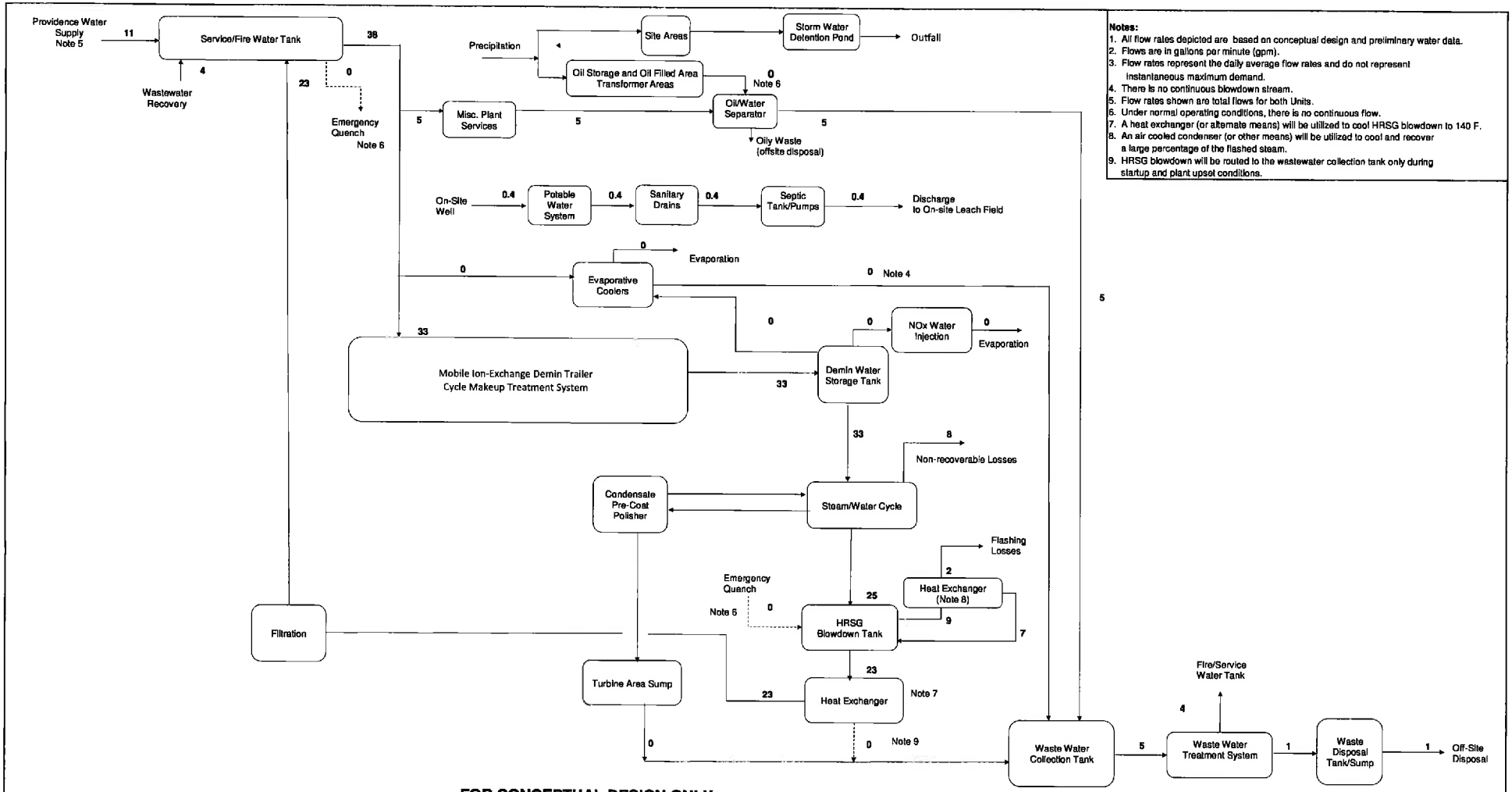
EVOQUA WATER TECHNOLOGIES

4800 North Point Parkway, Suite 250, Alpharetta, GA 30022

+1 (800) 435-3223 (toll-free) **+1 (978) 614-7233** (toll) www.evoqua.com

Appendix C

Revised Facility Water Balances



Notes:

1. All flow rates depicted are based on conceptual design and preliminary water data.
2. Flows are in gallons per minute (gpm).
3. Flow rates represent the daily average flow rates and do not represent instantaneous maximum demand.
4. There is no continuous blowdown stream.
5. Flow rates shown are total flows for both Units.
6. Under normal operating conditions, there is no continuous flow.
7. A heat exchanger (or alternate means) will be utilized to cool HRSG blowdown to 140 F.
8. An air cooled condenser (or other means) will be utilized to cool and recover a large percentage of the flashed steam.
9. HRSG blowdown will be routed to the wastewater collection tank only during startup and plant upset conditions.

FOR CONCEPTUAL DESIGN ONLY

Conceptual Design Basis	01/11/2017	
Demin Water Makeup Demand	1.0% of IP+HP Steam Flow	GE HB Case 7 (Issued 3/31/2016)
Potable Water Demand	20 personnel, 50 gal per day, 3 shifts	
Ambient Conditions	51.8°F / 74%RH	
Fuel Oil Injection	None	

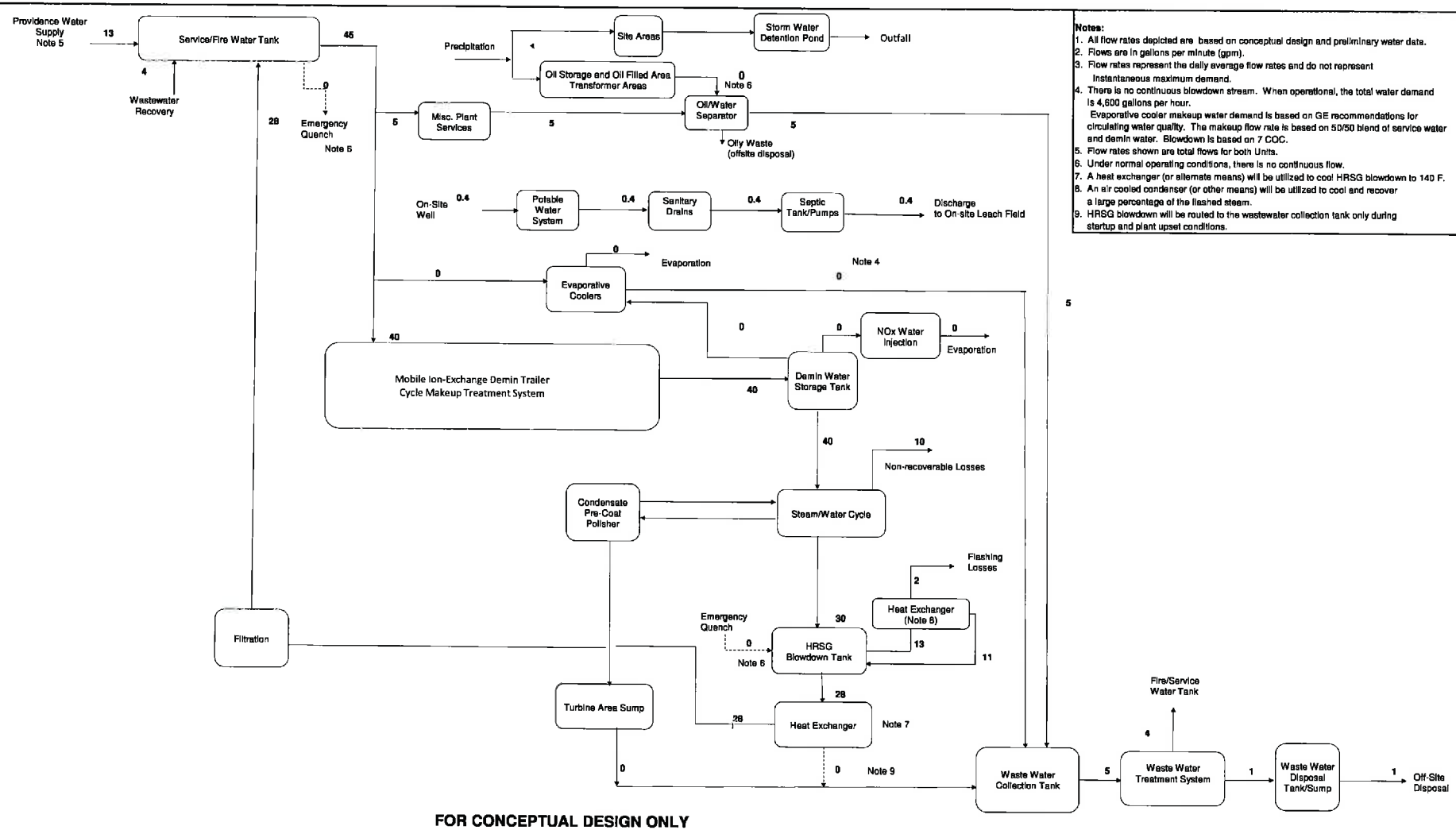
Invenergy

RHODE ISLAND
Two 1 x 1 COMBINED CYCLE
NATURAL GAS FIRED WATER MASS BALANCE
Two 1 X 1 GE 7HA.02 - Dry Cooling
Average Ambient Conditions - Full Load

Project: 238926

Drawing: WMB-01 SHEET 1-4

Rev: N3



Notes:

1. All flow rates depicted are based on conceptual design and preliminary water data.
2. Flows are in gallons per minute (gpm).
3. Flow rates represent the daily average flow rates and do not represent instantaneous maximum demand.
4. There is no continuous blowdown stream. When operational, the total water demand is 4,600 gallons per hour.
   Evaporative cooler makeup water demand is based on GE recommendations for circulating water quality. The makeup flow rate is based on 50/50 blend of service water and demin water. Blowdown is based on 7 COC.
5. Flow rates shown are total flows for both Units.
6. Under normal operating conditions, there is no continuous flow.
7. A heat exchanger (or alternate means) will be utilized to cool HRSG blowdown to 140 F.
8. An air cooled condenser (or other means) will be utilized to cool and recover a large percentage of the flashed steam.
9. HRSG blowdown will be routed to the wastewater collection tank only during startup and plant upset conditions.

FOR CONCEPTUAL DESIGN ONLY

Conceptual Design Basis	01/11/2017	
Demin Water Makeup Demand	1.0% of IP+HP Steam Flow	GE HB Case 3 (Issued 3/31/2016)
Potable Water Demand	20 personnel, 50 gal per day, 3 shifts	
Ambient Conditions	90°F / 45%RH / Fired / Evap Cooler ON	
Fuel Oil Injection	None	

Invenergy

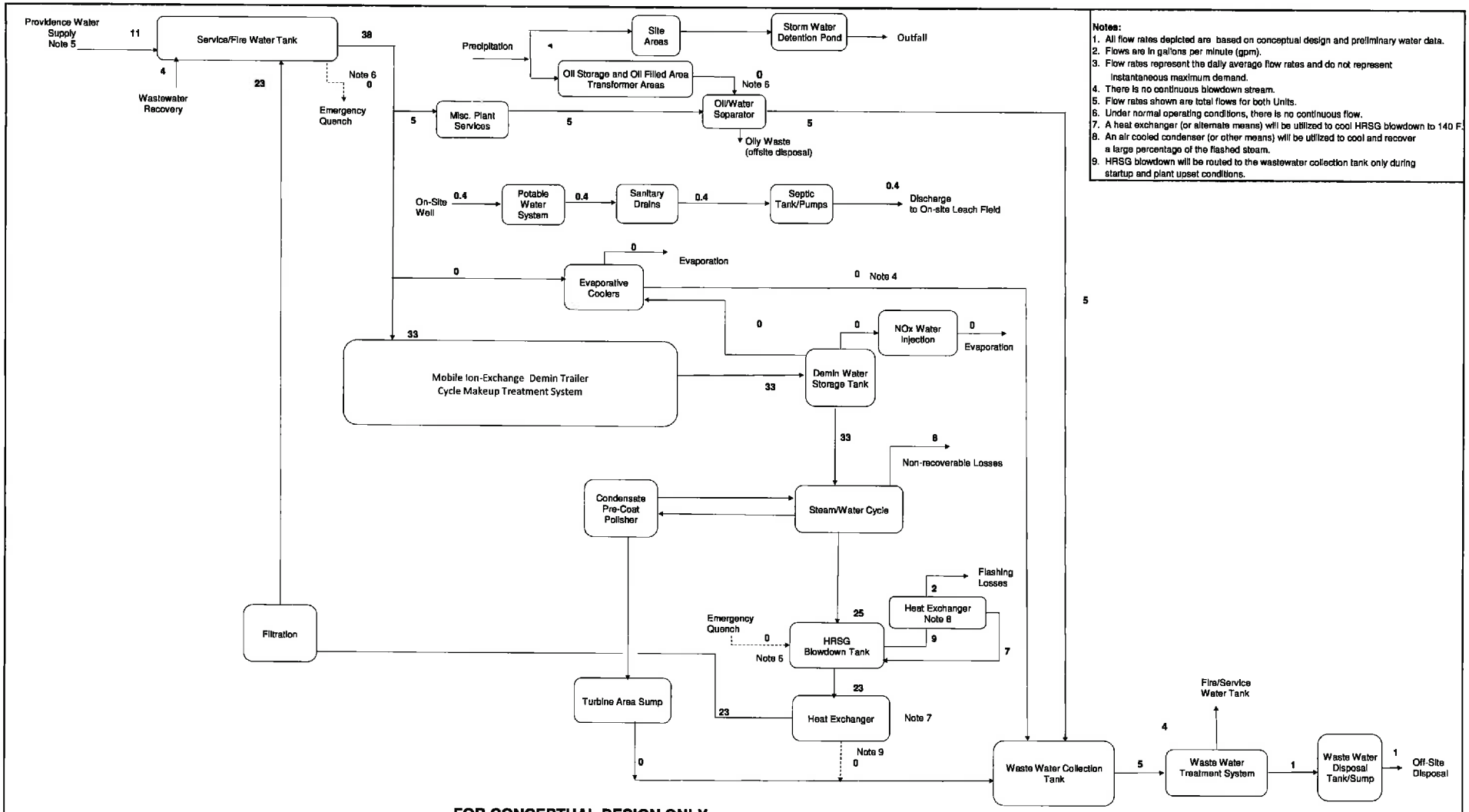
RHODE ISLAND
Two 1 x 1 COMBINED CYCLE

NATURAL GAS FIRED WATER MASS BALANCE
Two 1 X 1 GE 7HA.02 - Dry Cooling
Summer Ambient Conditions - Full Load

Project: 238926

Drawing: **WMB-01 SHEET 2-4**

Rev: **N3**



Notes:

1. All flow rates depicted are based on conceptual design and preliminary water data.
2. Flows are in gallons per minute (gpm).
3. Flow rates represent the daily average flow rates and do not represent instantaneous maximum demand.
4. There is no continuous blowdown stream.
5. Flow rates shown are total flows for both Units.
6. Under normal operating conditions, there is no continuous flow.
7. A heat exchanger (or alternate means) will be utilized to cool HRSG blowdown to 140 F.
8. An air cooled condenser (or other means) will be utilized to cool and recover a large percentage of the flashed steam.
9. HRSG blowdown will be routed to the wastewater collection tank only during startup and plant upset conditions.

FOR CONCEPTUAL DESIGN ONLY

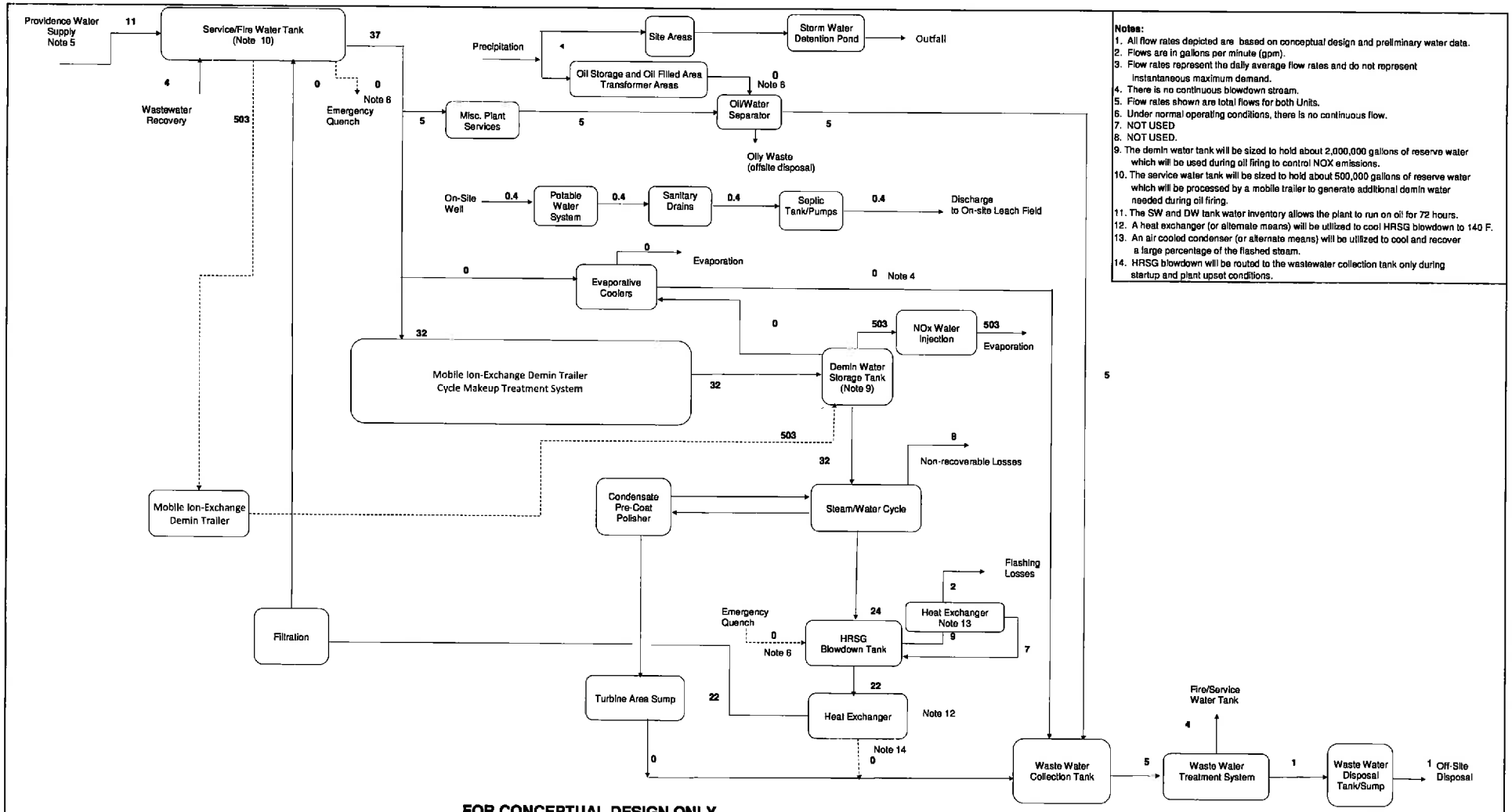
Conceptual Design Basis	01/11/2017	
Demin Water Makeup Demand	1.0% of IP+HP Steam Flow	GE HS Case 10 (Issued 3/31/2016)
Potable Water Demand	20 personnel, 50 gal per day, 3 shifts	
Ambient Conditions	20°F / 60%RH	
Fuel Oil Injection	None	

Invenergy

RHODE ISLAND
Two 1 x 1 COMBINED CYCLE

NATURAL GAS FIRED WATER MASS BALANCE
Two 1 X 1 GE 7HA.02 - Dry Cooling
Winter Ambient Conditions - Full Load

Project	Drawing
238926	WMB-01 SHEET 3-4
	Rev N3



Notes:

1. All flow rates depicted are based on conceptual design and preliminary water data.
2. Flows are in gallons per minute (gpm).
3. Flow rates represent the daily average flow rates and do not represent instantaneous maximum demand.
4. There is no continuous blowdown stream.
5. Flow rates shown are total flows for both Units.
6. Under normal operating conditions, there is no continuous flow.
7. NOT USED
8. NOT USED.
9. The demin water tank will be sized to hold about 2,000,000 gallons of reserve water which will be used during oil firing to control NOX emissions.
10. The service water tank will be sized to hold about 500,000 gallons of reserve water which will be processed by a mobile trailer to generate additional demin water needed during oil firing.
11. The SW and DW tank water inventory allows the plant to run on oil for 72 hours.
12. A heat exchanger (or alternate means) will be utilized to cool HRSG blowdown to 140 F.
13. An air cooled condenser (or alternate means) will be utilized to cool and recover a large percentage of the flashed steam.
14. HRSG blowdown will be routed to the wastewater collection tank only during startup and plant upset conditions.

FOR CONCEPTUAL DESIGN ONLY

Conceptual Design Basis	01/11/2017	
Demin Water Makeup Demand	1.0% of fP+HP Steam Flow	GE HB Case 18 (Issued 3/31/2015)
Potable Water Demand	20 personnel, 50 gal per day, 3 shifts	
Ambient Conditions	20°F / 60%RH	
Fuel Oil Injection	Operational	

Invenergy

RHODE ISLAND
Two 1 x 1 COMBINED CYCLE

OIL (1 UNIT ONLY) FIRED WATER MASS BALANCE
Two 1 X 1 GE 7HA.02 - Dry Cooling
Winter Ambient Conditions - Full Load

Project: 238926

Drawing: WMB-01 SHEET 4-4

Rev: N3

Appendix D

Water and Wastewater Treatment Technology Brochures

Powdex® Condensate Filter Demineralizer

GRAVER WATER SYSTEMS




Graver's patented Powdex® condensate polishing system is a precoat filter demineralizer which provides both suspended solids removal and ion exchange capability in a single unit. The process utilizes powdered ion exchange resin in combination with fiber materials to form a precoat on specially designed filter septa. This Powdex® precoat provides excellent filtration performance and rapid ion exchange kinetics that can be optimized to meet changes or upsets in cycle chemistry. The Powdex system is chemical-free, uses ion exchange resin for a single use and subequently disposed off without the temperature constraints of typical deep bed polishers. The result is the perfect system to ensure fast starts and long term steam cycle operation by meeting the effluent quality needed to satisfy the high demands of today's utility and industrial applications.

Advantages of Condensate Polishing

- Elimination and control of harmful impurities, both dissolved and insoluble resulting in increased thermal efficiency, turbine protection from deposits and increased overall plant efficiency
- Quicker startups decrease the time necessary for the plant to achieve full generating capacity
- Extension of the boiler lifetime due to exposure to "cleaner" water
- Backup protection in the case of suspended solids or dissolved contamination from a condenser tube leak or rupture
- Decrease/elimination of blow-down resulting in decreased makeup water requirements and increased thermal efficiency
- Reduced maintenance on the turbine/boiler system from both a labor and cleaning chemical usage
- Reduced or elimination of blowdown during normal operation

Typical Applications:

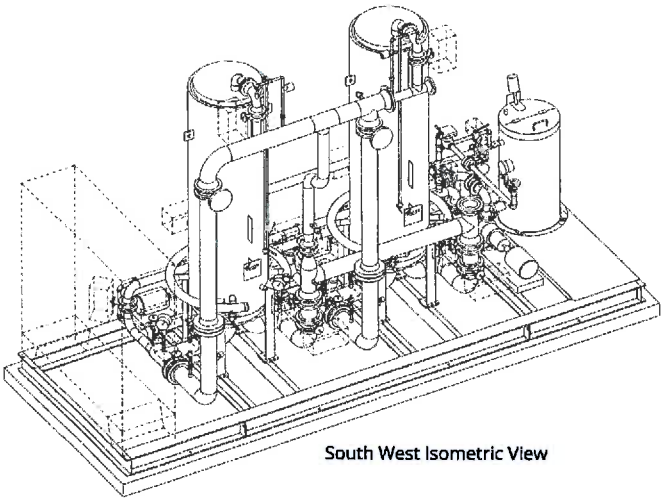
- Used in power (nuclear and fossil): Condensate treatment, heat recovering steam generators, and combined cycle plants especially with air cooled condensers
- Used in petrochemical and chemical steam generation: Condensate treatment for industrial boilers

Powdex Features

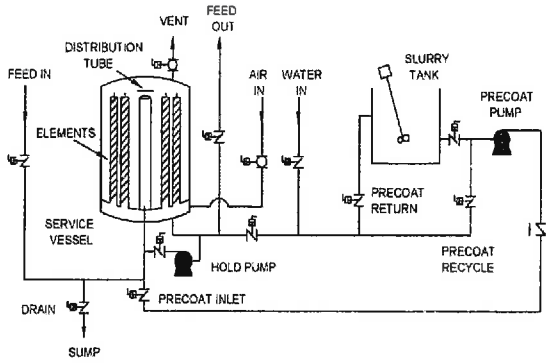
- Superior suspended solids and corrosion by-product removal
- Filtration and ion exchange in a single unit
- Elimination of chemical handling
- Reduced generation of wastewater
- Lower overall system cost (capital + operating)
- Smaller equipment footprint compared to deep bed + Filtration
- Low ΔP (Pressure drop)
- Protection of steam loop assets such as Boiler, Turbine, Condenser, etc

Powdex® Condensate Filter Demineralizer

GRAVER WATER SYSTEMS



South West Isometric View



Powdex Service Vessel			Nominal Pipe Size			Utilities				Dimensions - Ft.		Shipping Weights - lbs			Operating Weights - lbs		
Model No. Notes (1)	Nom. Diam. In.	Max Flow GPM	In/ Outlet Size in.	Vent Size In.	Drain Outlet In. -3	B/W Water GPM -5	Waste Vol. Gal.	B/W Air Makeup SCFM -6	Total Air SCF	Filter Module (ea) LxWxClear -7	Precoat Module LxWxClear	Filter Module Each	Precoat Module	Air Surge Tank	Filter Module Ea.	Precoat Module	Air Surge Tank
GP-24-0238-X-C-3	24	428	4	2	3	27	600	43	34	19'-0"x7'-3"x16'-7"	Included	20,000	Incl.	1,500	26,000	Incl.	1,500
GP-30-0378-X-C-3	30	660	6	2.5	3	42	1000	66	527	20'-0"x7'-3"x17'-0"	Included	21,000	Incl.	2,000	34,500	Incl.	2,000
GP-36-0546-X-C-3	36	951	8	2.5	4	59	1300	95	761	21'-0"x7'-6"x17'-6"	Included	22,000	Incl.	2,500	40,000	Incl.	2,500
GP-42-0882-X-C-3	42	1536	8	3	6	96	2000	154	1229	13'-0"x 9'-0"x17'- 9"	Included	18,000	Incl.	3,000	35,000	Incl.	3,000
GP-48-1176-X-C-3	48	2048	10	3	6	128	2700	205	1638	13'-6"x 9'-0"x18'- 0"	Included	19,000	Incl.	4,000	40,000	Incl.	4,000
GP-54-1582-X-C-3	54	2755	10	4	6	172	3500	275	2204	14'-0"x 9'-0"x18'- 3"	Included	20,000	Incl.	5,000	45,000	Incl.	5,000
GP-60-2002-X-C-3	60	3486	12	4	8	218	4500	349	2789	8'-9"x 7'-6"x18'- 5"	7'- 6"x 7'-0"x13'- 1"	22,000	6,000	6,000	40,000	8,500	6,000
GP-66-2436-X-C-3	66	4242	12	4	8	265	5500	424	3394	11'-0"x 9'-9"x18'- 8"	10'- 0"x 9'-0"x13'- 1"	24,000	11,000	7,500	38,000	19,000	7,500
GP-72-2940-X-C-3	72	5120	12	6	10	320	6600	512	4096	11'-6"x10'-0"x18'-10"	10'- 6"x 9'-0"x13'- 1"	27,000	11,200	9,500	45,000	20,000	9,500
GP-78-3444-X-C-3	78	5998	14	6	10	375	7800	600	4798	12'-0"x11'-5"x19'- 7"	11'- 0"x 9'-6"x13'- 1"	30,500	11,500	10,000	53,000	21,500	10,000
GP-84-4032-X-C-3	84	7022	16	8	10	439	8900	704	5616	14'-0"x12'-6"x20'-0"	13'-6"x11'-6"x13'-1"	50,000	17,000	12,500	87,000	33,000	12,500

Notes:

(1) For X digit substitute N=nylon, P=polypropylene, M=316SS; for C digit substitute design pressure in psig.

(2) Average design flow rate is typically 75% of maximum but can be restricted to 50% for high loading rates.

(3) Drain pipe size represents discharge pipe size to customers open gravity drain.

(4) One hold pump per Powdex vessel.

(5) Backwash water required at 25 psi. Rates based on air surge type backwash for 238 ft2 units and larger.

(6) Air surge makeup rate based on one minute recovery time. Divide by recovery time to obtain required rate at 80 psi.

(7) Overhead clearance includes provision for element replacement.

Contact Us

Graver Water Systems, LLC
675 Central Avenue I Suite 3
New Providence, NJ 07974

T: 908 516 1400
F: 908 516 1401
E: info@graver.com

PENTAIR

CREC - HRSG Blowdown Filter

PENTEK POLYDEPTH SERIES
POLYPROPYLENE CARTRIDGES

MULTIPLE MICRON RATINGS FOR A WIDE VARIETY OF APPLICATIONS

Pentair Pentek§ Polydepth§ Filtration Cartridges are constructed of thermally bonded polypropylene microfibers to ensure high efficiency. The filter incorporates a rigid polypropylene center core for increased collapse strength and durability. This thermal bonded micro-fiber construction has minimal fiber release, consistent flow rate and superior filtration performance. It also is not brittle or prone to breakage problems like resin-bonded cartridges.

Unique micro-grooves provide added surface area. The Polydepth Cartridge will not impart taste, odor or color to the liquid being filtered, which makes it ideal for food and beverage applications. The recommended temperature limit of 40-175°F (4.4-79.4°C) allows it to be used in many hot water applications. Additionally, the polypropylene construction provides superior chemical resistance and is not prone to bacterial attack.

Available in different lengths from 9.75" up to 40". Unlike competitive cartridges, the longer lengths are not manufactured by gluing shorter cartridges together. They are continuous cartridges that cannot separate during use and do not sacrifice filtering surface area.

FEATURES/BENEFITS

Thermally bonded polypropylene micro-fiber construction for higher filtration efficiency

Consistent flow rate and superior filtration performance

Will not impart taste, odor or color to water being filtered

Ideal for a wide variety of industrial filtration

Nominal 1, 5, 10, 25, 50 micron rating

Lengths: 10", 20", 30", 40"

SPECIFICATIONS

Filter Media – Polypropylene

Temperature Rating – 40-175°F (4.4-79.4°C)

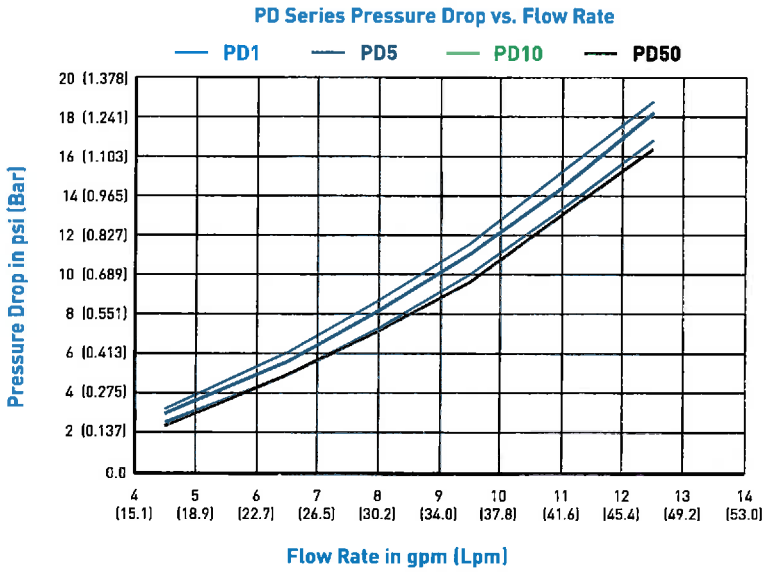
NSF COMPONENT

PD-1-934, PD-5-934, PD-10-934, PD-25-934, PD-50-934, PD-1-20, PD-5-20, PD-10-20, PD-25-20 and PD-50-20 are Tested and Certified by NSF International to NSF/ANSI Standard 42 for material requirements only.

SPECIFICATIONS AND PERFORMANCE

MODEL #	PART #	MAXIMUM DIMENSIONS	RATING* (NOMINAL)	INITIAL ΔP (PSI) @ FLOW RATE (GPM)
PD-1-934	155748-43	2.32" x 9.88" (59 mm x 251 mm)	1 micron	<2 psi @ 2 gpm (<0.14 bar @ 7.6 Lpm)
PD-5-934	155749-43	2.32" x 9.88" (59 mm x 251 mm)	5 micron	<2 psi @ 2 gpm (<0.14 bar @ 7.6 Lpm)
PD-10-934	155750-43	2.32" x 9.88" (59 mm x 251 mm)	10 micron	<2 psi @ 2 gpm (<0.14 bar @ 7.6 Lpm)
PD-25-934	155751-43	2.32" x 9.88" (59 mm x 251 mm)	25 micron	<2 psi @ 2 gpm (<0.14 bar @ 7.6 Lpm)
PD-50-934	155752-43	2.32" x 9.88" (59 mm x 251 mm)	50 micron	<2 psi @ 2 gpm (<0.14 bar @ 7.6 Lpm)
PD-1-20	155755-43	2.32" x 20" (59 mm x 508 mm)	1 micron	<2 psi @ 5 gpm (<0.14 bar @ 19 Lpm)
PD-5-20	155756-43	2.32" x 20" (59 mm x 508 mm)	5 micron	<2 psi @ 5 gpm (<0.14 bar @ 19 Lpm)
PD-10-20	155757-43	2.32" x 20" (59 mm x 508 mm)	10 micron	<2 psi @ 5 gpm (<0.14 bar @ 19 Lpm)
PD-25-20	155758-43	2.32" x 20" (59 mm x 508 mm)	25 micron	<2 psi @ 5 gpm (<0.14 bar @ 19 Lpm)
PD-50-20	155759-43	2.32" x 20" (59 mm x 508 mm)	50 micron	<2 psi @ 5 gpm (<0.14 bar @ 19 Lpm)
PD-1-30	155762-43	2.32" x 30" (59 mm x 762 mm)	1 micron	<2 psi @ 7 gpm (<0.14 bar @ 26.5 Lpm)
PD-5-30	155763-43	2.32" x 30" (59 mm x 762 mm)	5 micron	<2 psi @ 7 gpm (<0.14 bar @ 26.5 Lpm)
PD-10-30	155764-43	2.32" x 30" (59 mm x 762 mm)	10 micron	<2 psi @ 7 gpm (<0.14 bar @ 26.5 Lpm)
PD-25-30	155765-43	2.32" x 30" (59 mm x 762 mm)	25 micron	<2 psi @ 7 gpm (<0.14 bar @ 26.5 Lpm)
PD-1-40	155769-43	2.32" x 40" (59 mm x 1016 mm)	1 micron	<2 psi @ 9 gpm (<0.14 bar @ 34 Lpm)
PD-5-40	155770-43	2.32" x 40" (59 mm x 1016 mm)	5 micron	<2 psi @ 9 gpm (<0.14 bar @ 34 Lpm)
PD-25-40	155772-43	2.32" x 40" (59 mm x 1016 mm)	25 micron	<2 psi @ 9 gpm (<0.14 bar @ 34 Lpm)

*Not Performance Tested or Certified by NSF



Data shown reflects the performance of 10" cartridges. 20", 30" and 40" cartridge pressure drops can be estimated by dividing the psi above by 2, 3 and 4 respectively at the same flow rate.

PENTAIR

WATER QUALITY SYSTEMS
5730 NORTH GLEN PARK ROAD, MILWAUKEE, WI 53209
P: 262.238.4400 | F: 262.238.4404
WATERPURIFICATION.PENTAIR.COM
CUSTOMER CARE: 800.279.9404 | tech-support@pentair.com

310094 REV D SE16

740 EMERALD SERIES

FTC
FOREFRONT OF FILTRATION TECHNOLOGY

CREC Wastewater Oil/Grease Filter

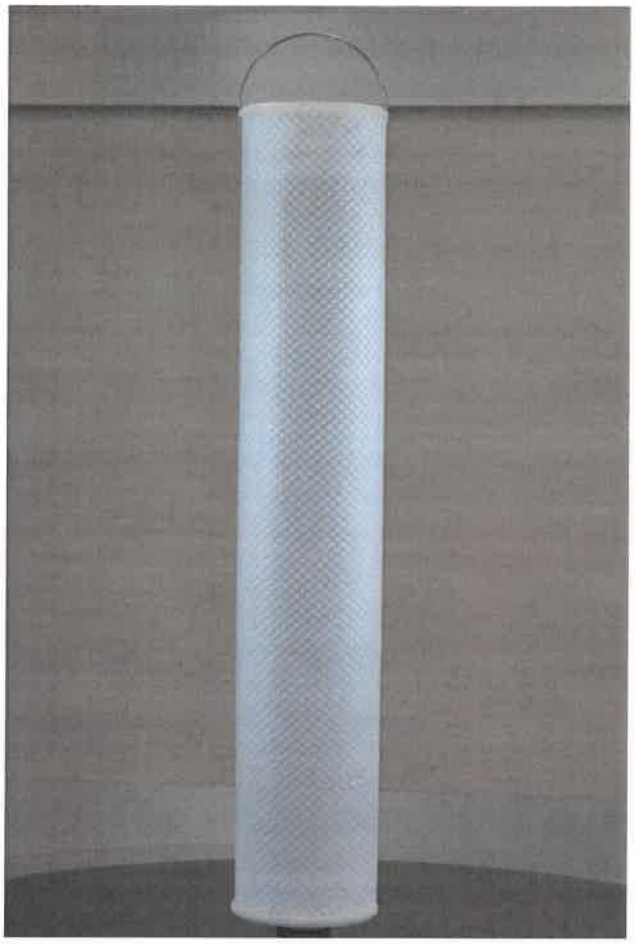
ES740-002-05-15

COST EFFECTIVE FILTRATION

FTC introduces its new 740 Emerald Series "Oil Guzzler" cartridge for eliminating oil from water.

The media in this unique cartridge combines the effects of adsorption and absorption to enhance its oil removal efficiency. The components of construction for this particular cartridge are polypropylene and a non-toxic, non-hazardous, non-corrosive, environmentally friendly petroleum bonding agent.

One 740 "OIL GUZZLER" is designed to hold greater than six liters of oil before reaching the maximum differential pressure of 35 PSI. The rapid differential pressure increase mechanism provides a positive indication of cartridge change-out time prior to any oil bypass.



MATERIALS OF CONSTRUCTION

Filter Media:	Proprietary Polymer
Center Core:	Polypropylene
Netting:	Polypropylene
End Caps:	Polypropylene

OPERATING SPECIFICATIONS

Maximum Operating Conditions:
185°F (85°C) Continuous Operating Temp

Recommended Flow Rate for Optimal Oil Loading: 15 GPM Per 40" of filter length

Maximum Recommended Differential Pressure: 35 PSID

Filter Oil Capacity: 6.6 Liters

PH Specifications: Neutral: 6.5 to 7

Toxicity: Product is non-toxic, non-hazardous, non-corrosive and can be incinerated

Surfactants: Surfactants will disperse the oil into solution requiring a longer resonance time for the adsorbtion/absorbtion.

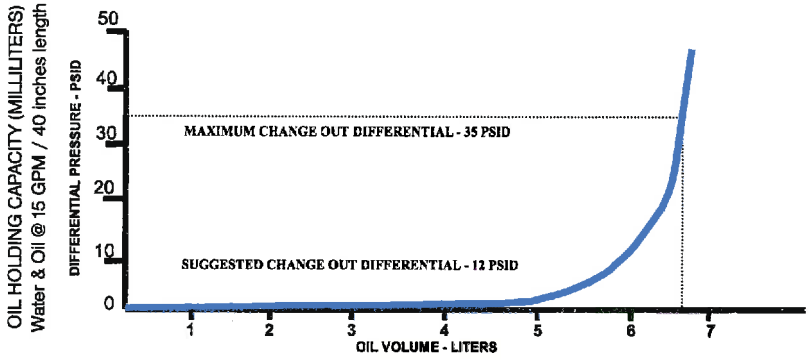
CONTAMINANTS REMOVED

1, 1, 2-Trichloroethane
1, 1-Dichloroethane
1, 1-Dichloroethylene
1, 2, 3-Trichloropropane
1, 2-Dichloroethane
1, 2-Dichloropropane
Acetone
Benzene
BHC'S
Benzo Compounds
Carbon Tetrachloride
Chlorine
DBCP
Diedrin
Diesel Fuel
Endrin
Ethers
Flourens (some)
Gasoline
Halogenated Hydrocarbons
Lindane
Methylene Chloride
Napthalenes
Nitro Compounds
PCB's
Petroleum Oils
Phenol Compounds
Phthalotes
Pyrens
Tetrachloroethylene
THM'S
Toluene Compounds
Toxaphene
Trichloroethylene (TCE)
Xylenes

SEPARATION EFFICIENCY

OIL HOLDING CAPACITY

DATA FOR 740 "OIL GUZZLER" @ 40 INCHES LENGTH
OIL CHALLENGE OF 400 PPM WITH LESS THAN 5 PPM OIL EFFLUENT



WARNING

Propylene and Ethylene Glycols will coat the Bonding Agent Polymer causing premature blinding and failure of the media.

CARTRIDGE CODING

ES	—	74	9	—	H	40	6
EMERALD SERIES		SERIES NUMBER 74 - 740 Style (6.25" OD)	9 - Polyester outer wrap		MEDIA H - Hydrocarbon Removal Polymer	LENGTH 35 - 35" 40 - 40"	O-RING SIZE 6 - 226 o-ring

Notice: The information presented here is based on tests and data which FTC believes to be reliable, but their accuracy or completeness is not guaranteed. FTC MAKES NO WARRANTIES, EXPRESS OR IMPLIED, BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OR MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. The determination of whether the FTC product is fit for a particular purpose or application is the responsibility of the user.

PENTAIR

CREC - Wastewater TSS Removal

PENTEK WP-BB SERIES
POLYPROPYLENE STRING-WOUND CARTRIDGES

DESIGNED FOR A VARIETY OF APPLICATIONS REQUIRING SEDIMENT REDUCTION

Pentair‡ Pentek‡ WP-BB Series Cartridges are manufactured in 10" and 20" lengths and in 4.5" diameters from a durable polypropylene string that is wound around a rigid polypropylene core. The WP-BB Cartridges are an economical solution to reduce fine sediment including rust, sand and scale particles.

The material in the WP-BB Cartridges is a fibrous polypropylene media wound in a precise pattern around a polypropylene core, providing greater surface area to maintain high flow rates. The WP-BB Cartridges are manufactured using an anti-static agent during the winding process to reduce the electrical charges produced during the winding process.

These string-wound cartridges are capable of withstanding temperatures up to 165°F (73.9°C), and will accommodate flow rates between 10 and 65 GPM with minimal pressure drop.

WP-BB Series Cartridges are suitable for a wide range of sediment applications including municipal and well water, and are chemical resistant so they can be used with many industrial fluids.

Note: The anti-static agent used in the WP-BB Cartridges may cause some foaming during start up of a new cartridge. If foaming is an application issue, we recommend using the WPX-BB Series.

FEATURES/BENEFITS

String-wound design reduces fine sediment from a variety of fluids

Economically priced

Lengths: 10", 20"

Also available in 0.5*, 1, 5, 10 & 25 micron ratings

*Not intended for the removal of microbial pests including viruses, bacteria and cysts.

SPECIFICATIONS

Filter Media – fibrous polypropylene fiber cord

Temperature Rating – 40-165°F (4.4-73.9°C)

SPECIFICATIONS AND PERFORMANCE

MODEL #	PART #	MAXIMUM DIMENSIONS	RATING (NOMINAL)*	INITIAL ΔP (PSI) @ FLOW RATE (GPM)*
WP.5BB97P	355212-43	4.5" x 9.88" (114 mm x 251 mm)	0.5 micron	<5 psi @ 10 gpm (<0.3 bar @ 38 Lpm)
WP1BB97P	355213-43	4.5" x 9.88" (114 mm x 251 mm)	1 micron	<4 psi @ 15 gpm (<0.3 bar @ 57 Lpm)
WP5BB97P	355214-43	4.5" x 9.88" (114 mm x 251 mm)	5 micron	<3 psi @ 20 gpm (<0.2 bar @ 76 Lpm)
WP10BB97P	355215-43	4.5" x 9.88" (114 mm x 251 mm)	10 micron	<1 psi @ 20 gpm (<0.1 bar @ 76 Lpm)
WP25BB97P	355216-43	4.5" x 9.88" (114 mm x 251 mm)	25 micron	<1 psi @ 20 gpm (<0.1 bar @ 76 Lpm)
WP1BB20P	355222-43	4.5" x 20" (114 mm x 508 mm)	1 micron	<6 psi @ 30 gpm (<0.4 bar @ 114 Lpm)
WP5BB20P	355223-43	4.5" x 20" (114 mm x 508 mm)	5 micron	<6 psi @ 40 gpm (<0.4 bar @ 151 Lpm)
WP25BB20P	355225-43	4.5" x 20" (114 mm x 508 mm)	25 micron	<5 psi @ 40 pm (<0.3 bar @ 151 Lpm)

*Based on manufacturer's internal testing.
WARNING: Do not use with microbiologically unsafe or of unknown quality water without adequate disinfection before or after the system.

PENTAIR

WATER QUALITY SYSTEMS
5730 NORTH GLEN PARK ROAD, MILWAUKEE, WI 53209
P: 262.238.4400 | F: 262.238.4404
WATERPURIFICATION.PENTAIR.COM
CUSTOMER CARE: 800.279.9404 | tech-support@pentair.com

247662 REV B MY15

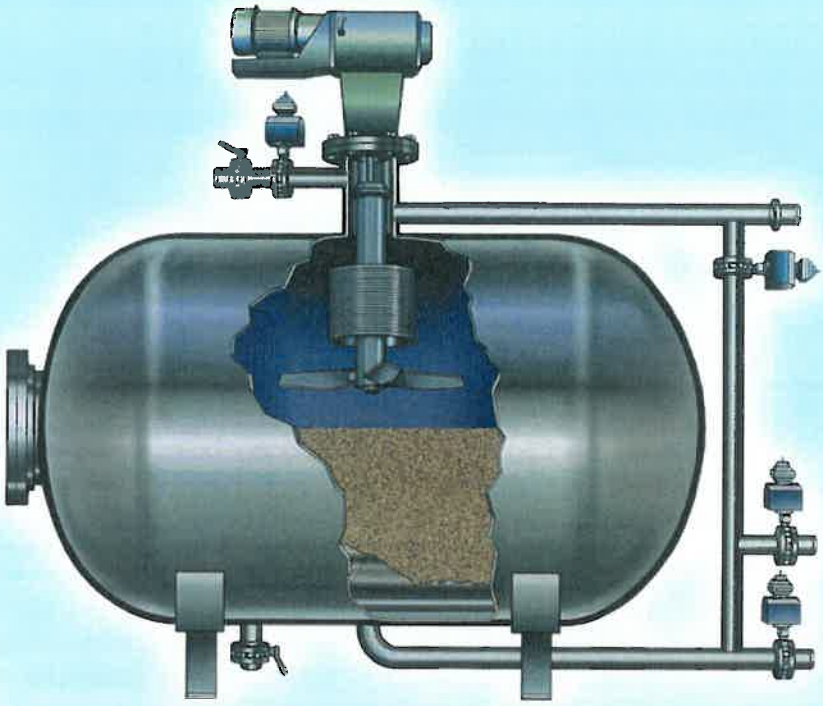
FILTRA SYSTEMS™

FILTRATION SYSTEMS TECHNOLOGY

HYDROMATION DEEP BED FILTER

95% To 99% Removal Of Suspended Solids
90% To 99% Removal Of Suspended Oils
Flow Rates To 12,000 GPM (410,000 Bpd) Per Unit
Filter Media Scrubbing During Backwash Cycle
Permanent Crushed Black Walnut Shell Media

*patented design



High throughput filtration of oily process water & industrial wastewater.

Filter out suspended solids and hydrocarbons.

Hydromation Deep Bed filtration systems give you double the throughput efficiency of conventional deep-bed sand or graded mixed-media filters. Under normal operating conditions, they remove 95 to 99% of suspended solids, 90 to 99% of insoluble hydrocarbons, without the use of chemicals.

In the oil field, Hydromation Deep Bed filters are used to remove suspended solids and hydrocarbons from produced water, surface water, sea water, rivers, lakes and well water. In metal working, power generating, municipal, chemical and petrochemical applications, they treat and remove suspended solids, oily residues, ash and metallic hydroxides from industrial liquids.

Media scrubbing cycle prevents filter bed fouling.

Unique to Hydromation Deep Bed filters is a patented media scrubbing cycle that fully reconditions the filter media during each backwash cycle. This scrubbing cycle is initiated automatically whenever the filter bed becomes dirt laden. A change in pressure differential across the filter bed, or an automatic preset time signal, activates backwashing.

The current design incorporates the high intensity of a mixer to vigorously agitate the media bed during the scrubbing cycle. The mixer is combined with the separating efficiency of a rotating backwash scrubber screen to produce the optimum separating of the scrubbed media from the backwash concentrate.

Energy Efficient.

The mixer provides a savings of over 85% in energy consumption for the backwash cycle. It also allows high efficiency scrubbing to be done inside the filter, reducing the requirements for external valves, piping and inefficient recirculation pumps, and providing additional savings in capital equipment costs. In addition, this design allows almost continuous dirty influent feed to the filter.

High efficiency minimizes maintenance and downtime.

The Hydromation Deep Bed filter system design ensures maximum throughput efficiency and low operating costs. Here's why...

- System flux rates are high; up to 25 gpm/ft² of filter bed surface area.
- Only process water is used for backwash make-up, eliminating the expense of a separate clean water source.
- Backwash discharge volume is only 0.5% of throughput, compared to three to ten times that amount for conventional filters, reducing clean water storage and backwash disposal costs.
- Media cleaning involves less than 1% of cycle time, compared to four to six times that amount for conventional filters.
- Permanent filter media is reconditioned during each backwash cycle.
- No chemicals, polymers, surfactants or air sparging are required for backwash. This simplifies operation and reduces your operating costs.

Horizontal and vertical models for flexibility.

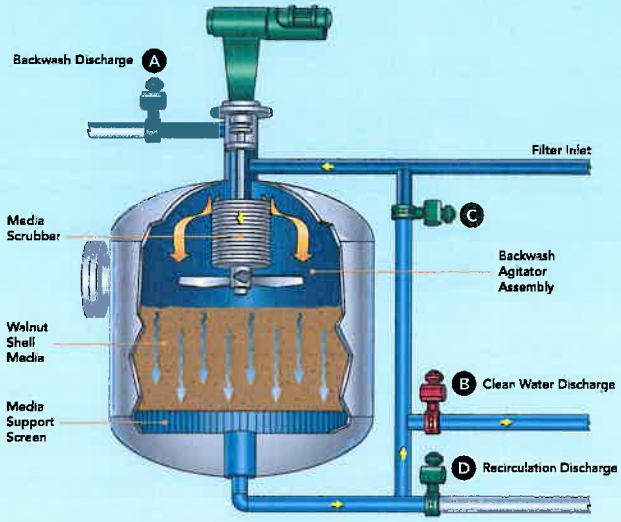
Filtra Systems builds eleven standard vertical and nine horizontal Hydromation Deep Bed models. Vertical models provide a flow rate range from 70 gpm to 2800 gpm per unit, while horizontal models provide flow rates from 1,200 gpm to 12000 gpm per unit, each depending on the application. Units are preassembled at the factory and shipped to the site skid mounted, ready for installation.

Engineered and supported to meet your needs.

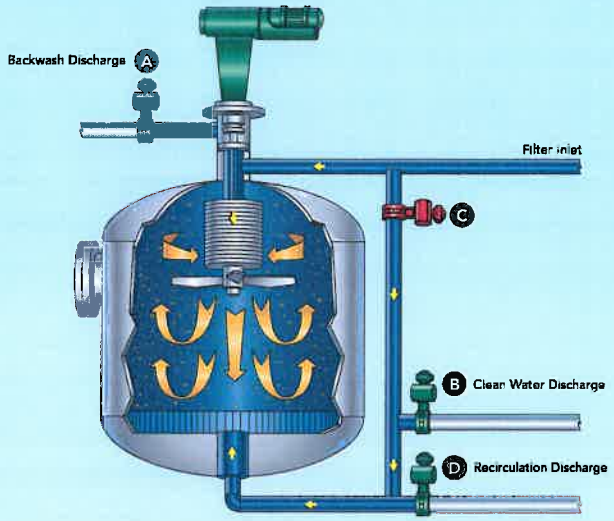
Hydromation Deep Bed filters provide proven operations with pressure, vacuum or gravity flow to meet your specific on-site requirements. Engineered and built-to-spec units are also available. Filtra Systems Company provides engineering, lab analysis, installation and service support, worldwide.

HOW Hydromation® Deep Bed Filter WORKS

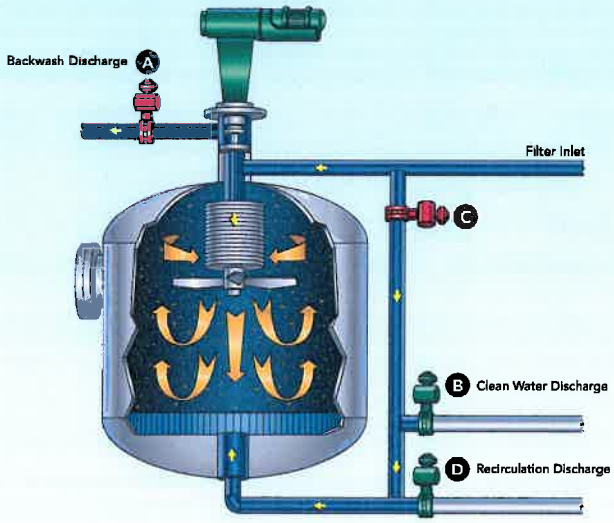
1. Filtration Cycle



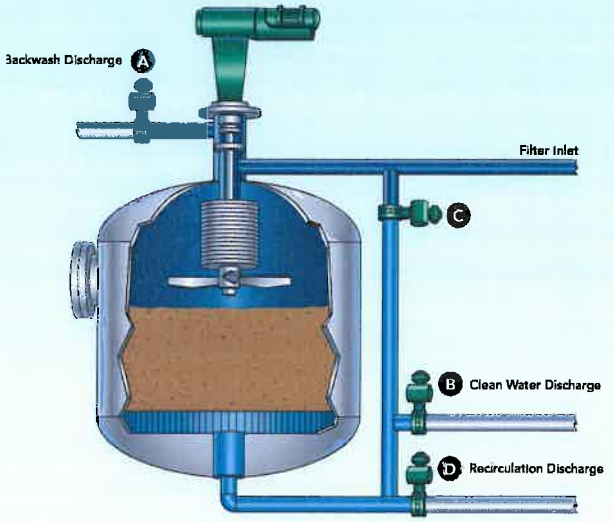
2. Agitation Cycle



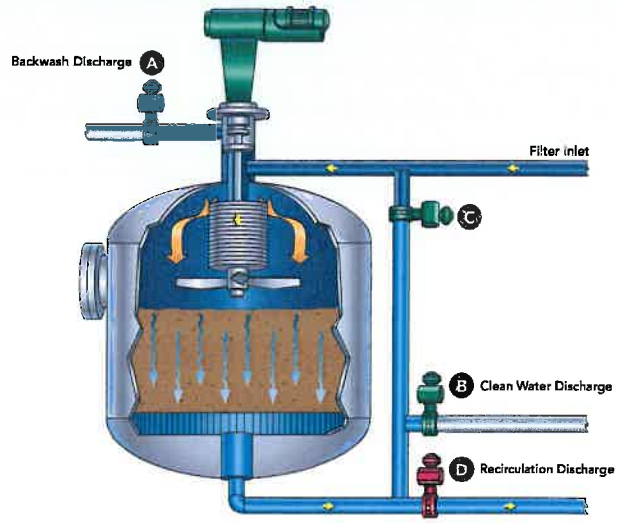
3. Backwash Cycle



4. Delay Cycle



5. Recirculation Cycle



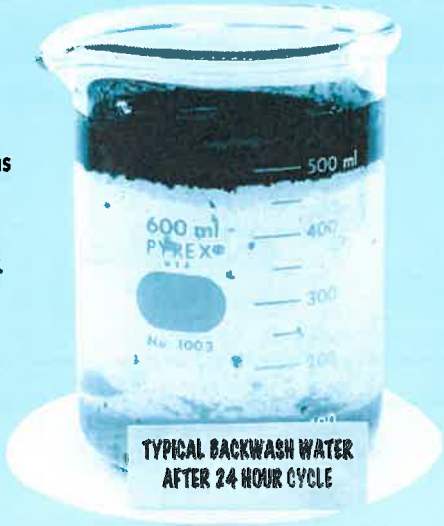
Filter Sequence of Operation and Valve Position

● indicates valve is open: all other valves are closed.

CYCLE	A	B	C	D	TIME
Filtration		●			"x" Hrs.
Agitation			●		30 Sec.
Backwash	●		●		8 Min.
Delay					15 Sec.
Recirculation				●	3 Min.

Clean Water
Dirty Water
Backwash Water (concentrated)
Walnut Shells

The suspended hydrocarbons in this beaker illustrate how efficient the filter is at separating oil from water.

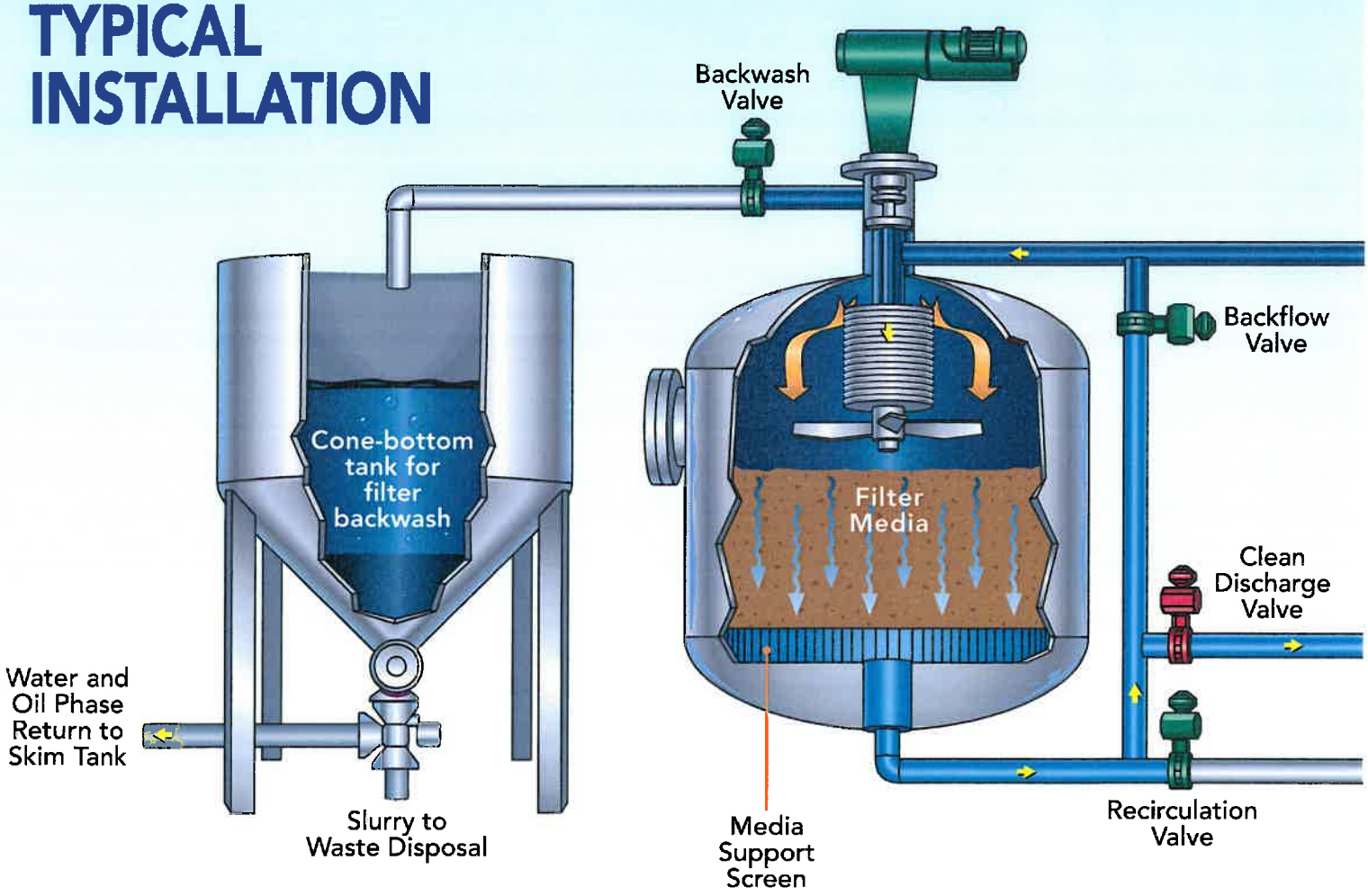


Continuous filtration systems for cleaning oily process water and industrial waste water.

Walnut shell filter media technology was developed and introduced by Hydromation more than three decades ago.
Only a Hydromation Deep Bed Filter will give you the confidence of assured clear effluent, maintenance-free operation and production efficiency payback-year after year.

To determine the appropriate filter size, flux rate and system design requirements, Filtra-Systems provides laboratory analysis and on-site pilot filter test services.

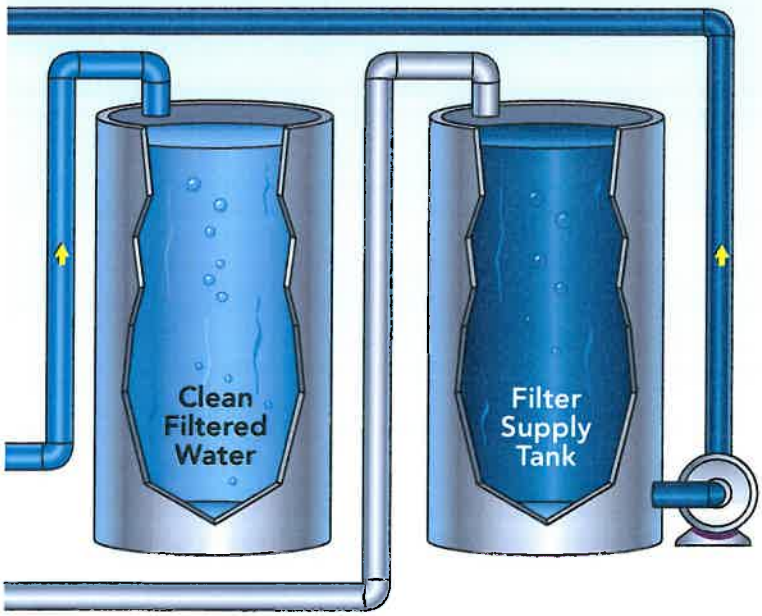
TYPICAL INSTALLATION



The Hydromation Deep Bed filter utilizes the kinetic model of a Continuously Stirred Tank Reactor (CSTR) to efficiently and completely remove contaminant's during every media regeneration cycle.

The above photo shows backwash water samples taken over the 8-minute backwash interval (0, 2, 4, 6, 8 min samples). The backwash water at the end of the 8-minute cycle is as clean as the inlet process water, illustrating the regeneration cycle is complete. 100% recovery in less than 10 minutes, due to the vigorous agitation and maximized efficiency.

Maximizing backwash (regeneration) efficiently allows the unit to have the smallest required backwash volume, shortest offline cycle time, eliminates channeling or short cycling, and guarantees that the media bed is completely cleaned, cycle after cycle.



TYPICAL INSTALLATIONS

A steel producer uses the filter to remove oil from their continuous caster water. The filter operates at 625 gpm.

A Canadian oil company process oily water in a SAGD, steam generation application. The unit operates at 3,500 gpm

CUSTOMERS

Aera Energy
Army Corps of Eng.
BP Chemicals
Chevron
Compania Minera Collahuasi
Conco Phillips
Dayton Power & Light
Detroit Edison
Devon Energy
EnCana
Hawaiian Electric
Husky Oil
Imperial Oil
Inland Steel
International Paper
Kuwait Oil Company
Occidental Petroleum
PDVSA
SunCor
Weirton Steel

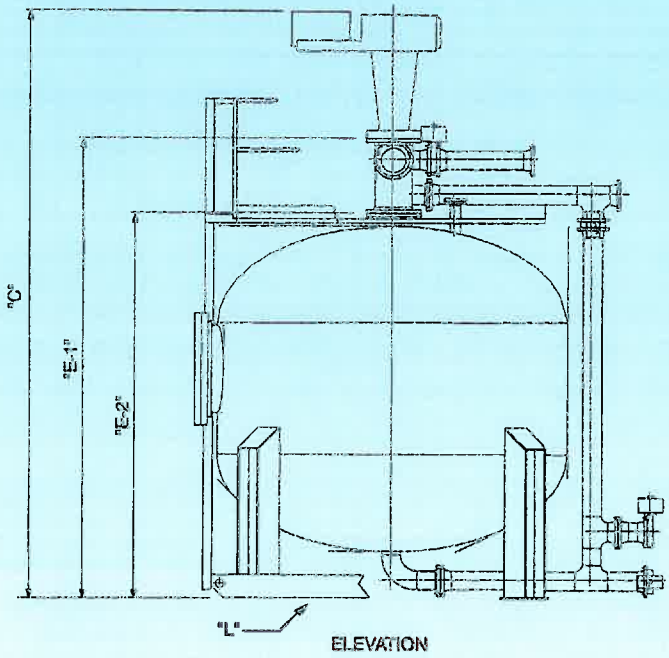
PREVIOUS APPLICATIONS

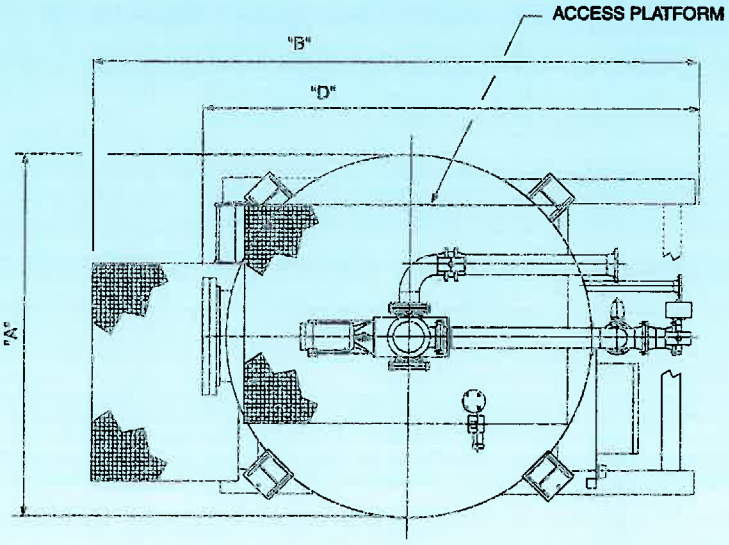
Cooling tower water
Continuous caster water (steel/aluminum)
Steel mill process water
Power plant process/waste water
Refinery process water
Oil field produced water
Oil field injection water
Groundwater Remediation
Chemical Plant Waste Water
Stream Assisted Gravity Drainage Feed Water

A Government Agency use the filter to remove Creosote Oils, PCPs, and NAPL,s from Groundwater. The unit operates at 400 gpm.

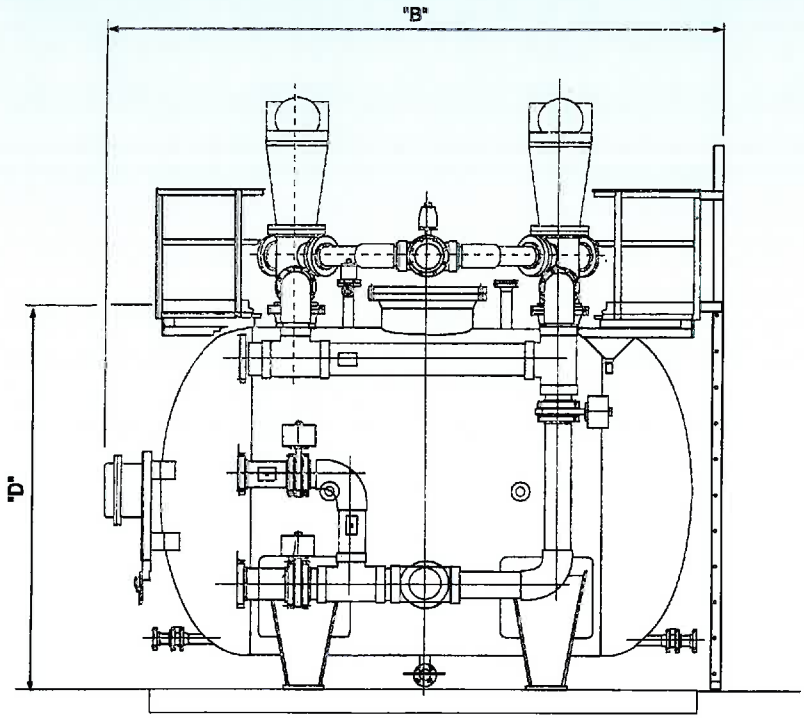
SPECIFICATIONS

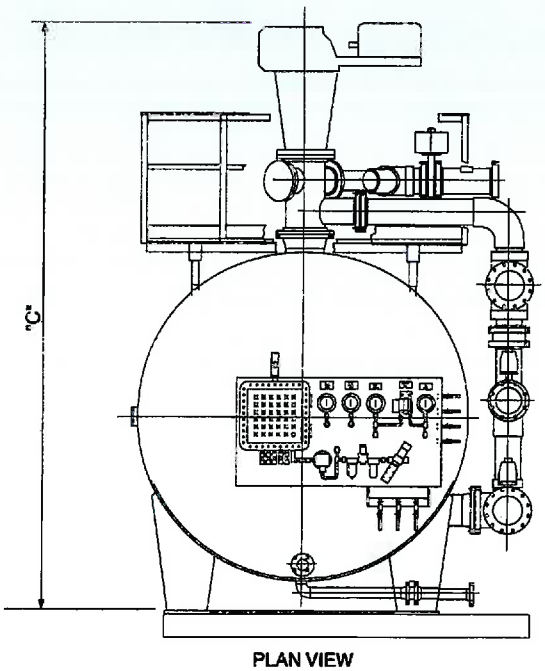
Vertical Filters





Horizontal Filters





APPROXIMATE DIMENSIONS AND WEIGHTS - VERTICAL FILTERS

Filter Model	Installed "A" Width	Installed "B" Length	Installed "C" Height	Shipping "D" Length	Shipping "E-1" Height	Shipping "E-2" Height	"L" Optional Skid	Weight (lbs.) Shipping	Weight (lbs.) Operating
FDB-7P	3'-6"	8'-6"	11'-3"	5'-6"	7'-7"		4'	2,350	6,800
FDB-12P	4'-6"	9'-6"	12'-6"	6'-6"	8'-8"		4'	3,095	9,450
FDB-19P	5'-3"	11'-9"	13'-1"	8'-6"	9'-5"		4'	5,600	20,490
FDB-28P	6'-1"	12'-6"	13'-6"	9'-6"	9'-10"		6'	7,580	31,560
FDB-39P	7'-1"	13'-0"	14'-0"	10'-0"	10'-3"		6'	9,695	42,390
FDB-50P	8'-1"	14'-3"	14'-11"	11'-3"	11'-2"		8'	10,020	47,550
FDB-64P	9'-1"	15'-6"	15'-10"	12'-6"	12'-1"		8'	11,510	58,425
FDB-78P	10'-2"	16'-6"	17'-0"	13'-6"		*11'-2"	8'	13,200	69,500
FDB-95P	11'-2"	17'-6"	18'-1"	14'-6"		*11'-10"	8'	19,490	82,525
FDB-113P	12'-2"	18'-6"	18'-7"	15'-6"		*12'-5"	8'	25,775	95,550
FDB-133P	13'-4"	18'-8"	18'-9"	15'-8"		*12'-5"	8"	60,000	140,000

*** Vessel may be shipped in the horizontal position**
Larger units available upon request — consult factory for quotation

APPROXIMATE DIMENSIONS AND WEIGHTS - HORIZONTAL FILTERS

Filter Model	"A" Width	"B" Length	"C" Height	"D" Shipping Height	"L" Optional Skid	Weight (Lbs) Shipping	Weight (Lbs) Operating
FDB-122P	11'-1"	16'-11"	16'-6"	12'-9"	8'	38,500	101,655
FDB-162P	11'-1"	21'-5"	16'-6"	12'-9"	8'	45,000	125,000
FDB-170P	11'-2"	22'-2"	16'-6"	12'-9"	8'	97,000	168,000
FDB-243P	11'-3"	30'-5"	16'-6"	12'-9"	8'	65,500	181,190
FDB-324P	11'-4"	39'-5"	16'-6"	12'-9"	8'	85,950	237,500
FDB-340P	11'-5"	40'-0"	16'-6"	12'-9"	8'	162,000	360,000
FDB-405P	11'-5"	48'-5"	16'-6"	12'-9"	8'	106,500	293,575
FDB-486P	11'-6"	57'-5"	16'-6"	12'-9"	8'	126,850	349,800
FDB-510P	11'-6"	42'-8"	21'-2"	13'-5"	8'	230,000	552,000

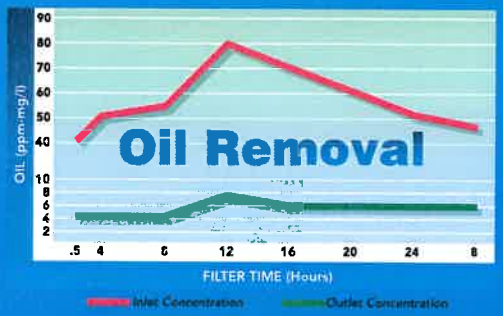
PERFORMANCE

Seawater Filtration Test Performance

FLUX RATE gpm/ft²	% Particle Removal Efficiency Particle Size in Microns				
	16.0-20.0	8.0-10.0	4.0-5.0	2.0-2.5	1.0-1.25
15	100.0	100.0	99.6	99.3	98.5
20	100.0	100.0	98.8	98.3	97.5
25	100.0	97.9	97.7	97.4	96.3

Location: North Sea – Bergen, Norway
Influent: Chlorinated Seawater, 0.5 – 1.5 ppm
Suspended Solids 1.0 mg/l, Turbidity: 0.18 NTU
Water Temp: 50°F

Typical Efficiency Curves



SITE SPECIFIC INSTALLATIONS

OIL AND GAS INDUSTRIES

- A California Oil producer filters 35,000 gpm of produced water for enhanced oil recovery steam flood.
- In Canada, an oil company processes over 16,000 gpm of water for use in Steam Assisted Gravity Drainage (SAGD) applications.
- Oil producers filter produced water from deep well aquifers. Once purified the water is then injected for flood enhanced oil recovery. The units operate at 10,000 gpm.

INDUSTRIAL PROCESS WATER

- A power company process filters the water in fly ash ponds, prior to river discharge. The units operate at 4,000 gpm.
- In steel production plants, filters are used to remove the oil from a continuous casting operation. These units operate at 6,500 gpm.
- A chemical manufacture filters a variety of process water streams, prior to deep well injection for disposal. The unit operates at 750 gpm.

ENVIRONMENTAL PROJECTS

- In Colorado, our filters are being used for groundwater remediation work. The groundwater was contaminated by fuel oils leaking from a boilerat a former paper mill. The unit operates at300 gpm. Once cleanup is completed, the water rights will be issued to the state for agriculture use.
- A metal producer utilizes a filter to recover PCBs from non-contact caster water. The filter processes 8,000 gpm and discharges into a fish bearing stream.
- A US EPA Superfund Site processes 70 gpm of groundwater containing PCPs and DNAPLs. The filter discharges into a fish bearing water system. Once the cleanup is completed, the land will be converted into a city park.

FILTRA SYSTEMS™
FILTRATION SYSTEMS TECHNOLOGY

For More Information, Please Call or Contact Us At:
23900 Haggerty Road
Farmington Hills, MI 48335 • USA
Phone: (248) 427-9090 • Fax: (248) 427-9892
e-mail: sales@FiltraSystems.com
www.FiltraSystems.com

PRECOAT FILTRATION

Business Unit I

SOLID WEAVE GKD TECHNOLOGY

Filtration- and Separation

The terms *precoating filtration system* or *precoat filter* are used as collective terms for various different filter constructions. In most cases, however, the combination of process and apparatus is meant by these terms. These terms which are mostly used arbitrarily, often lead to misunderstandings and ought therefore be replaced by the following definition.

Precoat filtration systems are technical separation process steps which in the simpliest case comprises a filter, a feeding pump and the corresponding connecting lines including the feedback of the product. Precoat basin, dosage pumps and instrumentation equipment are supplementing the basis equipment depending on the process.

Construction and operation of precoat filtration systems are depend primarily on the kind of product which has to be filtered and secondarily on the method the process is based upon.

Precoat filtration is a special filtration process in which the filter media is flushed on a base, e.g. a woven wire cloth, prior to the actual filtration operation.

The heart of a precoat filtration system is therefore any kind of filter which is according to its construction suitable for the precoat filtration. In other words: only by the method and not by the type of construction a filter can be defined as precoat filter. Therefore, beside the classic construction types such as candle or vertical leaf filters very often layer filters, filter presses and vacuum drum filters are used in precoat filtration systems.

Application:

Precoat filtration systems were mainly desingned for the filtration of medium to difficult filtrable suspensions. They are particularly suitable for the discontinuous filtration of large batches and/or for continuous processes. The easy adaptability to semiautomatic or fully automatic operation processes is an important factor. A series of typical seperating tasks in various industrial areas is listed below:

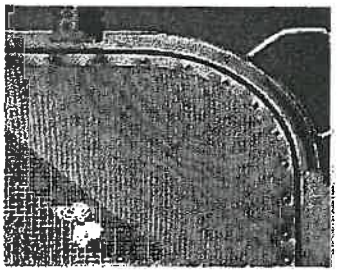
Examples for applications:

- filtration of liquid sugar and molasses by meant of activated carbon
- processing and purification of circulating systems for rolling oil, hone oil, grinding agents and coolants
- separation of bleaching earth in the edible oil refining
- purification of electrolyte solutions in the galvanic industry
- seperation of catalysts in hydrogenation units
- seperation of catalysts in the process for hardening of fats
- purification of beer and wine
- purification of herbicides and insecticides
- removing oil from condensates and processing

Filter types:

The following types of filters are used in precoat systems:

- vertical leaf filter (Niagara filter)
- horizontal (centrifugal) pressure leaf filter
- candle filter
- filter press
- layer filter
- rotating drum filter



Pre-coating:

The process of precoating or pre-flushing is done by means of a suspension which is pumped round via the filter. This suspension consists of the actual precoat material and a suitable carrier liquid. Typical products for the precoating are siliceous earth, perlites and cellulose as well as mixtures of the before mentioned or solids contained in the liquid which is to be filtered such as bleaching earth, activated carbon, catalysts a.s.o.. Besides special liquids suitable for the corresponding product in many cases already filtered product is used as carriers liquid. In the simpliest case the unfiltered product is the carrier liquid and contains the precoat material, e. g. in the filtratration of carrier catalyzers from hardened edible oils.

Security or final filters:

In the typical types of filters for precoat filtration systems in which metal or plastic woven wire cloths are used as basis for the pre-coating, the pores are wider than the particles of the used precoat material. i.e. only by building a bridgeformations of the precoat particles a fine filtration coat can be formed. These processes are the reasons for the excellent cleaning characteristics of such filter elements. Their good suitability for semi-automatic and fully automatically operating processes resides in this feature. The disadavantage of this principle is clearly the lability of the pre-coat, i. e. ist sensitivity to operational disruptions or product variations.

That means that in applications in which the product is not allowed to have more than a certain content of particles, a „security or final filter system" is required. Layer filters or candle filters are representing the majority of the security filters which are often also referred to as polishing filter or police filter. By the use of pre-manufactured filter layers as support for the pre-coating materials the additional security filter can be omitted as these filters are representing precoated filter and security system in one.

For this branch of filtration technology our Business Unit I offers optimized wire mesh media for most different filtration devices and applications. Above all within the field of the precoat filtration a wide range programme of high tensile PZ and KPZ wire cloths is available. The most attention is paid to the field of filter media for centrifugal filters and Niagara filters for the chemical industry and the food industry (filtration of beer).

Optimized in terms of their usage the woven wire cloths can be manufactured as discs or ready cut to the size required. According to the requirement the wire cloth can also be supplied in ultrasonic cleaned form.

In addition to the supply of filter media we offer as well customer specific solutions in the field of ready-made filter cartridges/cylinders or special constructions. In the field of application in this area we are using - if possible - an existing standard production programme on filter candle basis.

Due to the large market share typical GKD filter wire cloths are available at short notice in ready-made form.

Pz - Microdur Cloth

article no..	type	meshes per inch (25,4 mm)	thickness of cloth in mm	filter opening model in µm	filter opening absolute in µm	water permeability in l /(cm² x min) Δp = 200 mbar	air-** permeability in l /(m²xs) Δp = 2 mbar
19370140	PZ 14	615 x 132	0,20	14	17 - 20	3,2	650
19370170	PZ 17	615 x 128	0,21	17	22 - 25	6	590
19370270	PZ 25 S	615 x 102	0,24	25	40 - 48	5,9	980
19370410	PZ 40	287 x 71	0,35	40	50 - 55	6,2	1260
19370510	PZ 50	171 x 51	0,57	50	64 - 72	7,1	1500
19370610	PZ 60	171 x 46	0,57	60	82 - 94	8,1	1920
19370810	PZ 80 S	128 x 36	0,77	80	98 - 106	7,1	2260
19371000	PZ 100 L	171 x 33	0,60	100	96 - 111	9,3	3500
19371501	PZ 150 S	107 x 20	1,03	150	200 - 215	9,1	3800
19371570	PZ 200 S	63 x 18	1,34	200	210 - 225	11,3	3750
14375600	KPZ 55	325 x 39	0,73	55	64 - 70	7,3	2200
19342001	KPZ 75	400 x 120	0,25	75	72 - 78	13,6	3920

Plain Dutch Weave

article no.	type	meshes per inch (25,4 mm)	thickness of cloth in mm	filter opening model in µm	filter opening absolute in µm	water-permeability in l /(cm² x min) Δp = 200 mbar	air-** permeability in l / (m²xs) Δp = 2 mbar
13372305	GT	50 x 250	0,31	40	55-61	10,00	2670
13371400	GT	30 x 150	0,49	65	100-110	9,60	3480
13370705	GT	24 x 110	0,74	85	117-125	8,40	2960
13370170	GT	12 x 64	1,22		280-300	11,50	4350

Twilled Dutch Weave

article no.	type	meshes per inch (25,4 mm)	thickness of cloth in mm	filter opening model in µm	filter opening absolute in µm	water permeability in l /(cm² x min) Δp = 200 mbar	air-** permeability in l / (m²xs) Δp = 2 mbar
14372701	KT	80 x 700	0,25	25	35 - 38	6,20	700
14371700	KT	32 x 360	0,55	80	95 - 105	5,50	1300

Support Cloth

article no.	meshes per inch (25,4 mm)	meshes per cm²	aperture in mm	wire diameter in mm	wire diameter in inch (25,4 mm)	* weight in kg / m²	open area in %
10378760	4,5	3	4,20	1,40	0,035	4,46	56
10378821	4	2	4,75	1,60	0,0630	5,16	56

Intermediate Cloth

	per inch (25,4 mm)	per cm²	in mm	in mm	in inch (25,4 mm)	in kg / m²	in %
10375530	20	59	1,00	0,30	0,0076	0,87	59
10377926	8	10	2,48	0,70	0,0178	1,95	60
10377950	8	11	2,50	0,50	0,0200	1,06	69

* the density factor calculated with is 7.85 kg/dm³ for steel

** measured values of the air permeability per DIN 53887 - B, deviation ± 10 %

Each woven wire cloth is also available in different stainless grades.

Appendix E

McMahon Traffic Analysis

McMAHON ASSOCIATES, INC.
14 Breakneck Road, Suite 201
Lincoln, RI 02865
p 401-648-7200

PRINCIPALS
Joseph W. McMahon, P.E.
Joseph J. DeSantis, P.E., PTOE
John S. DePalma
William T. Steffens
Casey A. Moore, P.E.
Gary R. McNaughton, P.E., PTOE

ASSOCIATES
John J. Mitchell, P.E.
Christopher J. Williams, P.E.
R. Trent Ebersole, P.E.
Matthew M. Kozsuch, P.E.
Maureen Chlebek, P.E., PTOE
Dean A. Carr, P.E.

January 10, 2017

John Niland, P.E.
Director Business Development
Invenergy LLC
One South Wacker Drive, Suite 1800
Chicago, IL 60606

RE: **Traffic Analysis for Water Source Option**
Clear River Energy Center - Burrillville, Rhode Island

McMahon Associates has prepared a traffic analysis to reflect the current water supply option for the proposed Clear River Energy Center (CREC) in Burrillville, Rhode Island. This memorandum is intended as a supplement to the original Traffic Impact Study (TIS) for the Clear River Energy Center dated May of 2016 and provides details on the traffic operations adjacent to the proposed site as well as the condition of the roadway along the truck route to the proposed site, relative to the water supply source.

Water Connection Analysis

The revised analysis follows a decision by the Pascoag Utility District and the Harrisville Fire District to not grant the facility access to the their water resources. Instead, water will be delivered to CREC by truck from Johnston, Rhode Island. The capacity of each water truck is approximately 8,000 gallons, resulting in an average of 2 trucks accessing the site per day during typical operations. The water demand reductions were in part created by the use of trailer mounted mobile treatment to demineralize the water through mobile demineralization trailers. Each trailer has a capacity of approximately 1,200,000 gallons before the trailer needs to be replaced. The trailer will therefore need to be replaced once every twenty five days during typical operating conditions. Additionally, the reduced water demand is also creating the potential of waste water disposal by truck, as the disposal volume is also substantially less. The expected wastewater discharge from the site is approximately 1,440 GPD. The trucks carrying wastewater have a capacity of 3,200 gallons, resulting in one truck accessing the facility every two days to transport wastewater.

Ammonia Trucks

As previously discussed in the TIS dated May 2016, there are also aqueous ammonia trucks that access the site. The TIS describes a bi-monthly occurrence of ammonia trucks assessing the site and therefore,

these trucks were not previously included in traffic projections. The frequency has since been revised to approximately once every other day. While the traffic impacts are still minimal, these vehicles have been included in traffic projections for the proposed facility.

Oil Fired Events

In extreme winter weather conditions, the CREC's ability to run on natural gas may be inhibited, and therefore, the facility may need to run on oil for a short duration, as described in the TIS. In such a case, the facility will require oil and additional water to run. The CREC is proposed to have an onsite tank with capacity for 2,250,000 gallons of water for such an event. Similarly, the site is also proposed to have an oil tank with capacity for 2,000,000 gallons. The capacity of these two tanks can service an oil fired event lasting up to three days without additional resources.

After an oil fired event, the tanks will need to be replenished. Previously in the TIS, the oil trucks were planned to be replenished over a short duration, resulting in an estimate 3 to 4 trucks per hour or approximately 32 oil trucks per day. In an effort to reduce the traffic impacts of the truck deliveries following an oil fired event, the duration of time to refill the onsite tanks has been extended. Approximately 11 trucks per day will access the CREC facility to replenish the water tanks and approximately 7 trucks per day will access the facility to replenish the oil tanks as well as an additional demineralization trailer for a total of 19 trucks. The time required to replenish the tanks depends on the duration of the oil fired event. Typically, these events do not have a duration that would totally deplete the on-site tanks. In a worse-case scenario where the tanks were depleted, the oil and water truck deliveries required to replenish the on-site supple would occur over a longer period which is not expected to exceed one month. This results in approximately 19 trucks per day in order to replenish the tanks after the occurrence of an oil fired event, and this number excludes the 3 trucks per day that would be needed for typical operations. It should be noted that based on the on-site storage volumes of water truck deliveries can be suspended for a significant length of time during severe winter storms and resume once the roadways are cleared.

Therefore, after the occurrence of an oil fired event, there will be approximately 22 trucks per day expected to access the site, (11 water replenish, 7 oil, 2 ammonia/waste water discharge/demin trailers, and 2 typical water supply).

Peak Hour Truck Traffic

The majority of truck traffic transporting materials to the CREC facility will do so outside of peak hours; however, to be conservative, it was assumed that approximately 25% of these truck trips will occur during the weekday morning peak hour and weekday afternoon peak hours. Throughout the course of the year under normal operating procedures, this amounts to one truck in each of the peak hours (one truck entering and one truck exiting), resulting in two peak hour truck trips, as shown in Table 1.

Table 1: Normal Site Truck Trip Generation

	Weekday Daily			Weekday AM Peak Hour			Weekday PM Peak Hour		
Description	In	Out	Total	In	Out	Total	In	Out	Total
Normal Weather Operations[1]	3	3	6	1	1	2	1	1	2

(1) Based on normal weather water truck generation

During the oil fired operations and in the days following the oil fired events during which the on-site water and oil tanks are being replenished, an additional three trucks are expected to access the site during each peak hour, or six truck trips (three trucks trips entering, three truck trips exiting). As part of the truck analysis presented in the TIS, it was previously assumed that the oil fired event alone would require four vehicles per hour to replenish the onsite tanks. Since duration of time to replenish these tanks has been extended, the number of daily and hourly trips associated with an oil fired event has been reduced. Therefore, despite the increase in the daily number of trucks due to the water deliveries, there is an overall reduction in peak hour truck trips from four trucks to three trucks (two trucks resulting from the oil fired event and one truck for typical water operations). A comparison of the expected daily and peak hour truck trip generation is shown in Table 2 below.

Table 2: Oil Fired Event Truck Trip Generation

	Weekday Daily			Weekday AM Peak Hour			Weekday PM Peak Hour		
Description	In	Out	Total	In	Out	Total	In	Out	Total
Oil Fired Event (Tank Replenishment) [1]	19	19	38	2	2	4	2	2	4
Ambient Weather Operations[2]	3	3	6	1	1	2	1	1	2
Total Oil Fired Event Operations	22	22	44	3	3	6	3	3	6

(1) Based on oil fired event tank replenishment

(2) Based on ambient weather water truck generation

In terms of traffic operations during peak periods, the number of truck trips has been reduced by two truck trips (one truck entering, one truck exiting) during the weekday morning and weekday afternoon, in comparison to the analysis presented in the original traffic report. The change in projected traffic volume has little impact on the traffic operations for study area roadways and intersections analyzed. The revised traffic projections result in very minor decreases in delay and no change in level-of service (LOS) at the study area intersections, as compared to the delay and LOS originally reported. All movements at the intersection of Pascoag Main Street at South Main Street are

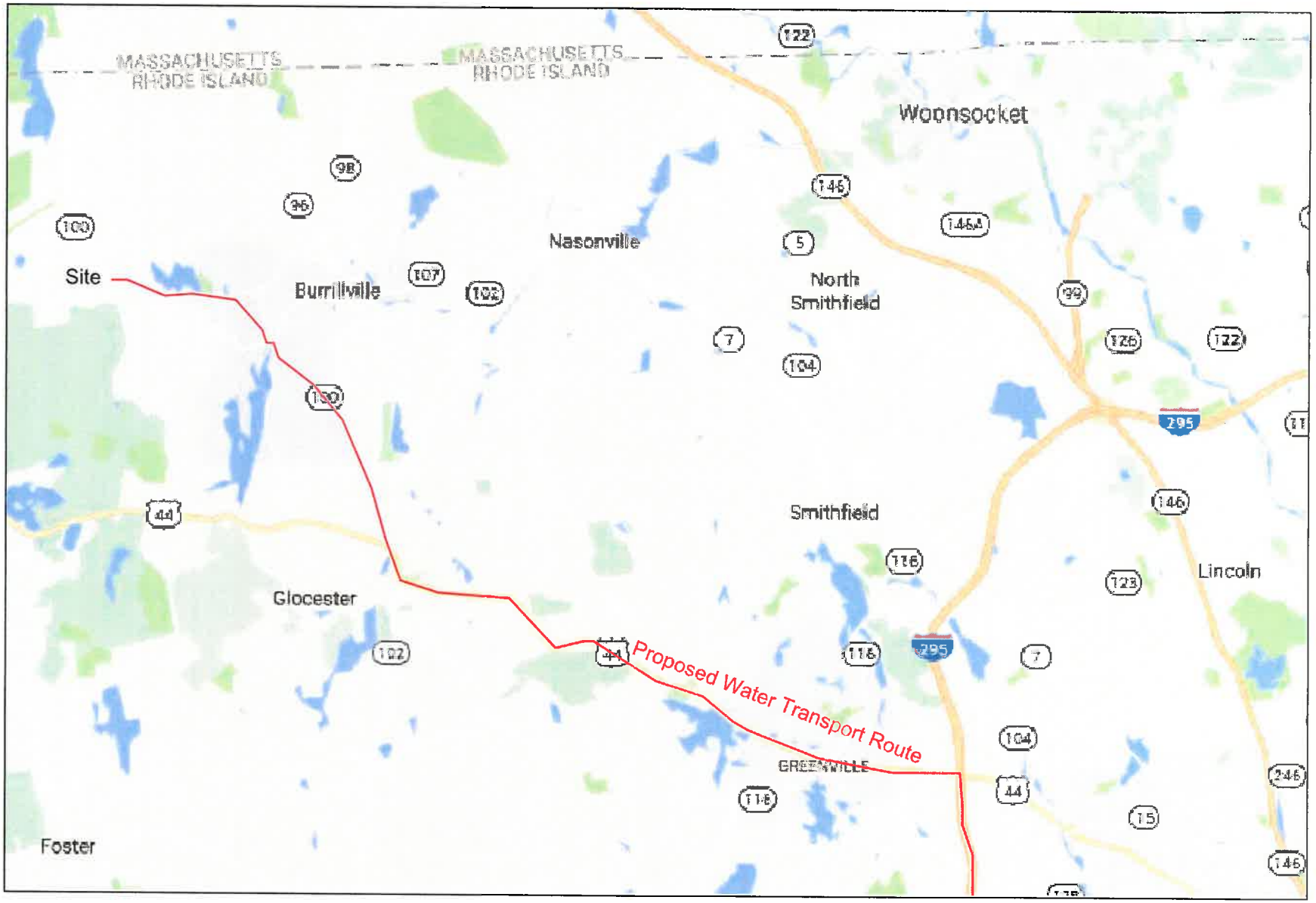
still expected to operate at LOS C or better during the weekday morning peak hour and LOS E or better during the weekday afternoon peak hour. All movements at the intersection of Pascoag Main Street at Church Street are expected to continue to operate at LOS C or better during the weekday morning peak hour and LOS D during the weekday afternoon peak hour. The critical exiting movement at the proposed site driveway is still expected to operate at LOS A during both the weekday morning and weekday afternoon peak hours. All movements within the study area intersections are expected to operate under capacity and at acceptable levels-of service.

Roadway Impacts

Potential roadway impacts resulting from delivery of water from Johnston were evaluated and are discussed below.

Water trucks accessing the proposed facility from Johnston would utilize I-295 north to US Route 44 west in Smithfield, to Route 100 north in Glocester. This is the same route that was evaluated in a previous study as the primary truck route to the site for construction vehicles. As these are all high-level, State maintained highways, the previous study found this route to be suitable for the additional expected construction truck traffic. Based on this, the route would continue to be suitable for the additional expected truck traffic necessary to operate the facility.

Based on the projected volume of additional trucks noted above, and assuming all water trucks are within legal weight limits, the truck water delivery option from Johnston will not produce significant additional burden on the State Highways along the route(s) proposed as noted above.



McMAHON
TRANSPORTATION ENGINEERS & PLANNERS

CREC Water Transport Routes
Burrillville, RI

Conclusion

The following conclusions have been drawn based on the analysis provided:

- Two alternatives were considered to transport water to the CREC facility. The preferred alternative is to transport water by truck to the site.
- Transporting water to the facility by truck would result in approximately three (for average ambient condition) additional trucks per day accessing the site.
- Revisions were made to the ammonia delivery schedule since the TIS was published in May 2016. An ammonia truck will deliver to the site once every other day.
- Revisions were also made to the oil fired event delivery schedule. After an oil fired event, trucks will deliver oil and water to the facility to replenish the on-site tanks at a rate of 19 trucks per day.
- The estimated peak hourly traffic during the peak time of the facility is approximately three trucks or six truck trips (three trucks entering, three trucks exiting) during both the weekday morning and weekday afternoon peak hours, which is less than what was originally analyzed as part of the May 2016 TIS. Therefore, the conclusions of the TIS in terms of peak hour traffic operations remain valid.
- The proposed truck route to the facility would be I-295 north/US 44 west/Route 100 north which was evaluated in a previous study.
- The proposed truck route is able to accommodate the increase in truck traffic as a result of the proposed CREC facility operations. This route would not experience significant additional deterioration due to the transport of water to the site.

Very truly yours,

Maureen Chlebek

Maureen Chlebek, P.E., PTOE
General Manager - Rhode Island

Appendix F

Agreement Between Clear River Energy LLC And the Town of Johnston

WATER SUPPLY AND ECONOMIC DEVELOPMENT AGREEMENT

THIS WATER SUPPLY AND ECONOMIC DEVELOPMENT AGREEMENT (this "**Agreement**") is entered into as of January 6, 2017 (the "Effective Date"), by and between the Town of Johnston, a municipal corporation organized under the laws of the State of Rhode Island ("**Johnston**" or "**the Town**"), and Clear River Energy LLC, a limited liability company organized under the laws of the State of Delaware ("**CREC**"). Johnston and CREC may each be referred to herein individually as a "Party", and collectively as "Parties".

RECITALS

WHEREAS, Johnston is a municipal corporation located in Providence County, Rhode Island, and the owner and operator of a water system which currently provides municipal water services to residents of Johnston, Rhode Island, (the "**Water System**");

WHEREAS, CREC is the developer of a nominal one thousand (1,000) MW modern, energy efficient, dual-fuel combined cycle, thermal energy generation facility (the "**Project**"), which subject to licensure by the Rhode Island Energy Facility Siting Board, will be constructed and operated on certain real property located in Burrillville, Rhode Island;

WHEREAS, in connection with the operation of the Project, CREC requires a reliable source of water in sufficient quantities to meet the Project's demand;

WHEREAS, CREC has designed the Project such that its water demand has been reduced to the point where water can be delivered to the Project by truck;

WHEREAS, if Johnston becomes the primary water supply to the Project, it is desirable for CREC to develop a dedicated facility in Johnston to take delivery of water (the "Water Transport Facility");

WHEREAS, the development of a Water Transport Facility creates a unique economic development opportunity in Johnston;

WHEREAS, Johnston has the available water supply capacity and has agreed to supply the Project with a reliable source of water in sufficient quantities to meet the Project's demand on the terms and conditions set forth herein;

WHEREAS, CREC and Mayor Joseph Polisena have negotiated terms for the benefit of the Project and the Town of Johnston in terms of economic development;

WHEREAS, the Project requires redundancy in water supply; and

WHEREAS, Johnston desires to be the primary water supplier or is willing to serve as the secondary source of water supply for the Project.

NOW THEREFORE, in consideration of the mutual covenants contained herein and other good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, the Parties hereby agree as follows:

1. **Recitals**. The foregoing recitals are hereby incorporated herein by this reference.

2. **Water Supply**.

(a) Flow Rate. During the Term (defined below), CREC will purchase from Johnston and Johnston shall supply to CREC potable, treated water meeting all applicable state and federal purity standards ("**Potable Water**") for use by and in connection with the Project. Johnston shall supply the Project's daily Water Demand (defined below). With both combustion turbines operating on natural gas at full-load average ambient conditions, the daily water demand for the Project will be supplied by trucks that are filled at a location located within the Town limits. The following approximate number of trucks required to satisfy the water usage rates are based upon the assumption that the trucks have a maximum capacity of 7,200 gallons.

(i) Average Operating Conditions. CREC estimates water usage rates during the summer season of approximately 13 GPM, or 18,720 GPD. In turn, CREC estimates that up to 3 truck deliveries per day will be required to satisfy expected water use needs of the Project. However, up to five (5) trucks a day may be necessary for certain operational occurrences and weather related impacts. This is the Average Demand Flow Rate.

(ii) Replenishing On-Site Storage. Once an oil event happens CREC would need to replenish the water tanks which would require an additional 10 to 11 water trucks per day over that required in subsection (i), above, for approximately 30 days. This is the Maximum Demand Flow Rate.

(b) Point of Delivery. Johnston shall deliver all Potable Water pursuant to this Agreement through a mutually designated point of delivery ("**Point of Delivery**") at the Water Transport Facility, or if Johnston is a secondary supply, a designated hydrant of point of delivery, which shall be equipped with a Water Meter (defined below) and backflow preventer. CREC shall take title to the Potable Water at the Point of Delivery.

(c) Quantity/Quality. Johnston shall immediately notify CREC of any condition in the Water System of which it learns may affect the quality or quantity of water supplied to CREC by Johnston.

3. **Water Supply Terms.**

(a) Water Supply Rates.

(i) *Rate.* As full consideration for Johnston's supply of Potable Water to the Project up to the Maximum Demand Flow Rate, CREC shall pay to Johnston the rate otherwise applicable to all customers located with the Town's service area per one hundred (100) standard cubic feet of Potable Water supplied to the Project. The Town shall not establish a rate applicable solely to CREC.

(ii) *Invoices.* Within thirty (30) days following the end of the quarter of the calendar year in which the commercial operations date of the Project occurs, Johnston shall send an invoice to CREC detailing CREC's usage as shown on the applicable water meter ("Water Meter"), any usage during the invoiced period by Additional Users (in order to determine any O&M Fee Adjustment or Water Supply Payment Adjustment, if any), and the amount due from CREC for its usage pursuant to this Agreement (an "**Invoice**"). CREC and Johnston agree that quarterly payment for the first three quarters of the calendar year will be based on actual usage and that the quarterly payment for the fourth quarter of the calendar year will be based on the greater of actual usage or the dollar amount required to meet the minimum annual payment. Johnston shall thereafter send an Invoice to CREC within thirty (30) days following each successive quarter during the Term.

(iii) *Audit.* Johnston shall maintain records documenting all relevant costs and usage by CREC and any Additional Users, and Johnston shall make the same available to CREC for viewing and copying upon reasonable notice. CREC shall have the right, within thirty (30) days following receipt of any Invoice, to dispute any item shown on such Invoice (including, without limitation, the payment due and usage) by giving written notice to Johnston of such dispute. Following CREC's delivery of any such dispute notice, the Parties shall work in good faith to determine whether the relevant Invoice contains incorrect information or whether the Water Meter has transmitted incorrect information.

(b) Capacity Reserve for Johnston to Serve the Secondary Source of Water Supply.

(i) *Secondary Supply Delivery.* If Johnston is the secondary source of water supply, the Town will identify a hydrant(s) or point of delivery within Johnston that is serviced by Johnston Water where trucks owned or contracted by CREC could be filled on an as needed basis subject to the above water supply rates. "Secondary Source of Water Supply" is defined to mean that CREC has a Water Supply and Economic Development Agreement within the City of Woonsocket as the "Primary Water Supplier".

(ii) *Capacity Reserve Payment.* If Johnston is the Secondary Source of Water Supply, CREC will pay to the Town of Johnston Two Hundred Thousand and 00/100 ($200,000.00) Dollars per year for capacity reserve for Johnston to act as the Secondary Source of Water Supply for the Project. Said annual payment will commence upon commercial operations of the Project and shall extend for a ten (10) year term with CREC having two, five (5) year options to extend. In addition, CREC shall pay the Town for any water consumed from the Town as the Secondary Source of Water Supply at the rates set forth in Section 3(a)

4. **Economic Development Terms (Johnston Serving as a Primary Water Supplier to the Project).**

(a) Development and Location of Water Transport Facility. CREC will purchase a parcel of real estate within Johnston that is served by Johnston water. CREC will either construct a new Water Transport Facility or recondition an existing building, should there be a suitable building on the selected site. CREC will work with appropriate staff from Johnston to identify a suitable parcel. CREC also reserves the flexibility to lease and develop a suitable parcel. Notwithstanding, CREC and Johnston shall enter into a payment in lieu of taxes agreement (the "PILOT Agreement") applicable to the Water Transport Facility including all associated trucks, equipment and other real and tangible property for a term of twenty (20) years. The payments under the PILOT Agreement shall be in lieu of any and all taxes, assessments, levies, and/or tariffs that may be in existence or may be enacted relative to the Water Transport Facility, the associated trucks, equipment and all related real and tangible property. The payments in lieu of such taxes by CREC to the Town of Johnston shall be Two Hundred Thousand and 00/100 ($200,000.00) Dollars per year for the twenty (20) year term of the PILOT Agreement.

(b) Direct Payment to Johnston General Fund for Taxpayer Relief. During the term of this Agreement, CREC shall pay to the Johnston General Fund for taxpayer relief the sum of Five Hundred Thousand and 00/100 ($500,000.00) Dollars per year with a three (3%) percent escalation every year. Said payments will commence upon commercial operation of the Project.

(c) Contribution. For the first five (5) years of this Agreement, CREC will make a contribution to Johnston of Two Hundred Thousand and 00/100 ($200,000.00) per year that will be utilized for

youth programs at the Administration's discretion. Said contributions will commence upon commercial operation of the Project.

(d) Termination of Economic Development Payments. The economic development payments as set forth in subparagraphs (a)-(c), above, shall continue during the term of this Agreement, so long as the Project remains licensed by the Rhode Island Energy Facility Siting Board, the Water Transport Facility continues to operate and be supplied water in the amounts set forth herein, and there has been no material breach of this Agreement. If during the term of this Agreement, such an event occurs, payments shall cease.

(e) Secondary Source of Water Supply. The Town, if it becomes the Secondary Source of Water Supply, shall not be entitled to the payments defined in this Section, notwithstanding any other provisions in this Agreement.

5. **Term**. This Agreement shall be for an initial term ("Initial Term") commencing on the Effective Date and continuing until the twentieth (20th) anniversary of the date after the Project begins commercial operations (the "**Term**"). CREC has the exclusive option of extending the Agreement for successive five (5) year period. CREC can terminate the Agreement after the Initial Term for any reason by providing written notice to the Town.

6. **Termination**.

(a) Notice. CREC shall have the right to terminate this Agreement for Cause effective upon written notice from CREC to Johnston. Following CREC's termination of this Agreement, neither Party shall have any obligation to the other Party under this Agreement. As used herein, "**Cause**" means CREC's decision (in its sole discretion) to either (i) discontinue the development of the Project prior to the commencement of construction of the Project as a result of CREC's inability to secure the necessary permits, licenses or regulatory approvals for the Project or obtain financing for the Project; (ii) suspension or termination of the Project's licensure; or (iii) CREC's decision to terminate commercial Project operations; or (iv) in the event that the Town is in breach of this Agreement.

7. **Representations and Warranties**.

(a) CREC's Representations and Warranties. CREC hereby represents, warrants and covenants to Johnston that:

(i) CREC has the unrestricted right and authority to execute this Agreement. Each person signing this Agreement on behalf of CREC is authorized to do so. Upon execution by all Parties hereto, this Agreement shall constitute a valid and binding agreement enforceable against CREC in accordance with its terms.

(ii) CREC has the ability to adjust its daily Water Demand through the use of on-site storage tanks and other operational adjustments between the Standard Demand Flow Rate and the Increased Demand Flow Rate when operating on natural gas. CREC also has the ability to adjust its daily demand for truck deliveries for any of the Demand Flow Rates by relying on such on-site tanks.

(b) Johnston's Representations and Warranties. Johnston hereby represents, warrants and covenants to CREC that:

(i) Johnston is the sole owner of the Water System and has been explicitly authorized to enter into this Agreement pursuant to an approved resolution of the Johnston Town Council attached hereto as Exhibit A (the "**WSA Approval**").

(ii) Johnston has the unrestricted right and authority to supply the Water Demand to CREC.

(iii) Johnston has the unrestricted right and authority to execute this Agreement. Each person signing this Agreement on behalf of Johnston is authorized to do so. Upon execution by all Parties hereto, and upon approvals as may be required by Johnston as a regulated water supplier, this Agreement shall constitute a valid and binding agreement enforceable against Johnston in accordance with its terms.

(iv) No litigation is pending, and, to the best of Johnston's knowledge, no actions, claims or other legal or administrative proceedings are pending, threatened or anticipated with respect to, or which could affect, the Water System or the ability to deliver the Water Demand. If Johnston learns that any such litigation, action, claim or proceeding is threatened or has been instituted, Johnston shall promptly deliver notice thereof to CREC and provide CREC with periodic updates of the status of said litigation, action, claim or proceeding that is ongoing.

8. **Assignment**.

(a) Collateral Assignments. CREC shall have the absolute right in its sole and exclusive discretion, without obtaining the consent of Johnston, to finance, mortgage, encumber, hypothecate, pledge or transfer to one or more Mortgagees (defined below) any and all of the rights granted hereunder, and/or any or all rights and interests of CREC in and to the Project.

(b) Non-Collateral Assignments. CREC shall have the right, without the prior consent of Johnston, to sell, convey, assign or transfer any or all of its rights hereunder provided such transfer is related to the Project. CREC shall be relieved of all of its obligations arising under this Agreement from and after the effective date of such transfer, provided such rights and obligations have been assumed by such transferee.

(c) Acquisition of Interest. The acquisition of all interests, or any portion of interest, in CREC by another person shall not require the consent of Johnston or constitute a breach of any provision of this Agreement and Johnston shall recognize the person as CREC's proper successor.

(d) Assignment by the Town. The Town may assign this Agreement and the obligations hereunder to an entity that has acquired or leased the Town's water system so long as said entity enters into an agreement in a form acceptable to CREC, acceptance shall not unreasonably be withheld, acknowledging the obligations to supply water under the terms hereof. Notwithstanding, if the Town becomes the Primary Water Supplier to the Project, then the payments under Section 4, hereof, shall continue to be made to the Town for the term of this Agreement, despite such assignment, so long as the new operator of the Town's water system is in compliance of the terms and conditions of this Agreement.

9. **Mortgagee Protection**. In the event that any document memorializing a security interest in this Agreement or in any part of the Project (a "**Mortgage**"), is entered into by CREC, then any person who is the mortgagee, grantee or beneficiary of a Mortgage (a "**Mortgagee**") shall, for so long as its Mortgage is in existence and until the lien thereof has been extinguished, be entitled to the protections set forth in this Section 9. CREC shall send written notice to Johnston of the name and address of any such Mortgagee;

provided that failure of CREC to give notice of any such Mortgagee shall not constitute a default under this Agreement and shall not invalidate such Mortgage.

(a) Notice of Default; Opportunity to Cure. As a precondition to exercising any rights or remedies as a result of any default of CREC, Johnston shall give a Notice of Default (defined below) to each Mortgagee of which it has notice, concurrently with delivery of such notice to CREC. In the event Johnston gives a Notice of Default, the following provisions shall apply:

(i) The Mortgagee shall have the same period after receipt of the Notice of Default to remedy the default, or cause the same to be remedied, as is given to CREC, plus, in each instance, the following additional time periods: (i) thirty (30) days in the event of any monetary default; and (ii) sixty (60) days in the event of any non-monetary default. The Mortgagee shall have the absolute right to substitute itself for CREC and perform the duties of CREC hereunder for purposes of curing such default. Johnston expressly consents to such substitution, agrees to accept such performance. Johnston shall not take any action to terminate this Agreement in law or equity prior to the expiration of the cure periods available to a Mortgagee as set forth above.

(ii) Neither the bankruptcy nor the insolvency of CREC shall be grounds for terminating this Agreement as long as all material obligations of CREC under the terms of this Agreement are performed by the Mortgagee in accordance with the terms hereunder.

(b) New Agreement to Mortgagee. If this Agreement terminates because of CREC's default or if this Agreement is rejected or disaffirmed pursuant to bankruptcy law or other law affecting creditors' rights, Johnston shall, upon written request from any Mortgagee within ninety (90) days after such event, enter into a new water supply agreement on the following terms and conditions:

(i) The terms of the new agreement shall commence on the date of termination, rejection or disaffirmance and shall continue for the remainder of the Term and subject to the same terms and conditions set forth in this Agreement.

(ii) The new agreement shall be executed within thirty (30) days after receipt by Johnston of written notice of the Mortgagee's election to enter a new agreement, provided said Mortgagee: (i) pays to Johnston all monetary charges payable by CREC under the terms of this Agreement up to the date of execution of the new agreement, as if this Agreement had not been terminated, rejected or disaffirmed; (ii) performs all other obligations of CREC under the terms of this Agreement, to the extent performance is then due and susceptible of being cured and performed by the Mortgagee; and (iii) agrees in writing to perform, or cause to be performed, all non-monetary obligations which have not been performed by CREC and would have accrued under this Agreement up to the date of commencement of the new agreement, except those obligations which constitute non-curable defaults.

(iii) At the option of the Mortgagee, the new agreement may be executed by a designee of such Mortgagee without the Mortgagee assuming the burdens and obligations of CREC thereunder.

(iv) The provisions of this Section 8 shall survive the termination, rejection or disaffirmance of this Agreement and shall continue in full force and effect thereafter to the same extent as if this Section 9 were a separate and independent contract made by Johnston, CREC and such Mortgagee, and, from the effective date of such termination, rejection or disaffirmation of this Agreement to the date of execution and delivery of such new agreement, such Mortgagee may use and enjoy the Potable Water without hindrance by Johnston or any person claiming by, through or

under Johnston, provided that all of the conditions for a new agreement as set forth herein are complied with.

(c) Mortgagee's Consent to Amendment, Termination or Surrender. Notwithstanding any provision of this Agreement to the contrary, the Parties agree that so long as there exists an unpaid Mortgage, this Agreement shall not be modified or amended and Johnston shall not accept a cancellation, termination or release of this Agreement from CREC prior to expiration of the Term without the prior written consent of the Mortgagee. This provision is for the express benefit of and shall be enforceable by such Mortgagee.

(d) No Waiver. No payment made to Johnston by a Mortgagee shall constitute an agreement that such payment was, in fact, due under the terms of this Agreement, and a Mortgagee, having made any payment to Johnston pursuant to Johnston's wrongful, improper or mistaken notice or demand, shall be entitled to the return of any such payment.

(e) Estoppel Certificates, Etc. Johnston shall execute such estoppel certificates (certifying as to such matters as CREC may reasonably request, including without limitation that no default by CREC then exists under this Agreement, if such be the case) and/or consents to assignment (whether or not such consent is actually required) as CREC, any transferee of CREC or Mortgagee may reasonably request from time to time. The failure of Johnston to deliver any estoppel certificate within fifteen (15) days after CREC's written request therefor shall be conclusive evidence that (i) this Agreement is in full force and effect and has not been modified; (ii) any amounts payable by CREC to Johnston have been paid through the date of such written request; (iii) there are no uncured defaults by CREC; and (iv) the other certifications requested by CREC in its estoppel, are in fact, true and correct.

10. **Default/Remedies.**

(a) Default. If a Party defaults in or otherwise fails to perform an obligation under this Agreement, the non-defaulting Party shall not have the right to exercise any remedies hereunder if the default is cured by the defaulting Party within sixty (60) days of receiving written notice of such default specifying in detail the default and the requested remedy (a "**Notice of Default**"); provided, that if the nature of the default requires, in the exercise of commercially reasonable diligence, more than sixty (60) days to cure, the non-defaulting Party shall not have the right to exercise any remedies hereunder as long as the defaulting Party commences performance of the cure within sixty (60) days of receipt of Notice of Default and thereafter completes such cure with commercially reasonable diligence. Further, if the Parties have a good faith dispute as to whether a payment is due hereunder, the alleged defaulting Party may deposit the amount in controversy (not including claimed consequential, special, exemplary or punitive damages) into escrow with any reputable third party escrowee, or may interplead the same, which amount shall remain undistributed and shall not accrue interest penalties, and no default shall be deemed to have occurred, until final decision by a court of competent jurisdiction or upon agreement by the Parties. No such deposit shall constitute a waiver of the defaulting Party's right to institute legal action for recovery of such amounts.

(b) Remedies. Except as qualified by Section 9 regarding Mortgagee Protections, should a default remain uncured beyond the applicable cure periods, the non-defaulting Party shall have the right to exercise any and all remedies available to it at law or in equity, all of which remedies shall be cumulative, including the right to enforce this Agreement by injunction, specific performance or other equitable relief.

11. **Indemnities.** Each Party (the "**Indemnifying Party**") shall defend, indemnify, and hold harmless the other Party (the "**Indemnified Party**"), including its agents, servants, employees, affiliates,

contractors, licensees, invitees, and/or elected officials, from and against all liability, damage, loss, costs, (including reasonable attorneys' fees) claim, demands, and actions of any nature whatsoever for any personal injury, death, physical damage or fines which arise out of or are connected with, or claimed to arise out of or be connected with, the Indemnifying Party's violation of any applicable water use regulations, hazardous materials regulations, or regulations promulgated by RIDEM and/or RIDOH.

12. **Notice**. All notices or other communications required or permitted by this Agreement, including payments to Johnston, shall be in writing and shall be deemed given when personally delivered to Johnston or CREC, the same day if sent via facsimile with confirmation, or the next business day if sent via overnight delivery or five (5) days after deposit in the United States mail, first class, postage prepaid, certified, addressed as follows:

If to Johnston:	If to CREC:
1385 Hartford Ave Johnston RI 02919 Fax: 401-553-8835 Attn: Mayor	c/o Invenergy LLC One S. Wacker Drive, Suite 1800 Chicago, Illinois 60606 Fax: 312-224-1444 Attn: General Counsel

Either Party may change its address for purposes of this paragraph by giving written notice of such change to the other Parties in the manner provided in this paragraph

13. **Notice of Primary or Secondary Supplier Status**. CREC shall provide Johnston with written notice on or before January 15, 2017 as to whether Johnston will serve as a primary or secondary supplier. If Johnston is a secondary supplier, the payments under Section 4 above, would not be applicable.

14. **Miscellaneous.**

(a) Emergency. Either party may terminate or suspend its obligations under this Agreement by reasonable advance written notice to the other in order to protect the public health and safety of its agents, servants, employees, affiliates, contractors, licensees, invitees and inhabitants pursuant to a written declaration of a health or safety emergency by either Party. Both Parties shall forthwith thereafter jointly address any such issues so as to promptly remedy the same and effectuate the intention and purposes of this Agreement.

(b) Force Majeure. If performance of this Agreement or of any obligation hereunder is prevented or substantially restricted or interfered with by reason of an event of Force Majeure (defined below), the affected Party, upon giving notice to the other Party, shall be excused from such performance to the extent of and for the duration of such prevention, restriction or interference, and the time to so perform herein shall be extended for such period of time. The affected Party shall use its reasonable efforts to avoid or remove such causes of nonperformance and shall continue performance hereunder whenever such causes are removed. As used herein, Force Majeure" means fire, earthquake, flood, or other casualty, condemnation or accident; strikes or labor disputes; war, civil strife or other violence; any law, order, proclamation, regulation, ordinance, action, demand or requirement of any government agency or utility; or any other act or condition beyond the reasonable control of a Party hereto.

(c) Successors/Assigns. This Agreement shall inure to the benefit of and be binding upon CREC and Johnston and, to the extent provided in any assignment or other transfer permitted hereunder, any

transferee, and their respective heirs, transferees, successors and assigns, and all persons claiming under them.

(d) Entire Agreement/Amendments. This Agreement, together with all exhibits attached hereto, constitutes the entire agreement between Johnston and CREC respecting its subject matter, and supersedes any and all oral or written agreements. All of the provisions of any exhibit hereto shall be treated as if such provisions were set forth in the body of this Agreement and shall represent binding obligations of each of the Parties as part of this Agreement. Any agreement, understanding or representation respecting the Property, or any other matter referenced herein not expressly set forth in this Agreement or a previous writing signed by both Parties is null and void. No purported modifications or amendments, including without limitation any oral agreement (even if supported by new consideration), course of conduct or absence of a response to a unilateral communication, shall be binding on either Party unless in a writing signed by both Parties. Provided that no material default in the performance of CREC's obligations under this Agreement shall have occurred and remain uncured, Johnston shall cooperate with CREC in amending this Agreement from time to time to include any provision that may be reasonably requested by CREC for the purpose of implementing the provisions contained in this Agreement or for the purpose of preserving the security interest of any transferee of CREC or Mortgagee.

(e) Legal Matters. This Agreement shall be governed by and interpreted in accordance with the laws of the State of Rhode Island. If the Parties are unable to resolve amicably any dispute arising out of or in connection with this Agreement, they agree that such dispute shall be resolved in the state courts located in the Providence County, Rhode Island. The Parties agree that any rule of construction to the effect that ambiguities are to be resolved in favor of either Party shall not be employed in the interpretation of this Agreement and is hereby waived. The prevailing Party in any action or proceeding for the enforcement, protection or establishment of any right or remedy under this Agreement shall be entitled to recover its reasonable attorneys' fees and costs in connection with such action or proceeding from the non-prevailing Party.

(f) Partial Invalidity. Should any provision of this Agreement be held, in a final and unappealable decision by a court of competent jurisdiction, to be either invalid, void or unenforceable, the remaining provisions hereof shall remain in full force and effect, unimpaired by the holding.

(g) Counterparts. This Agreement may be executed in counterparts, each of which shall be deemed an original and all of which when taken together shall constitute one and the same document.

(h) Partnership. Nothing contained in this Agreement shall be construed to create an association, joint venture, trust or partnership, covenant, obligation or liability on or with regard to any one or more Parties in this Agreement.

(i) Contingencies to Agreement. This Agreement is expressly subject to and conditioned upon the Project securing final licensure from the Rhode Island Energy Facility Siting Board with all applicable appeals periods having expired, said licensure remaining in full force and effect during the Term hereof, and the Project coming to financial closure on Project finance on terms deemed acceptable to CREC in CREC's sole discretion. If said contingencies are not satisfied, the obligations of CREC and/or CREC hereunder do not come into force and effect.

[signatures on following page]

IN WITNESS WHEREOF, CREC and Johnston, acting through their duly authorized representatives, have executed this Agreement with the intent that it be effective as of the Effective Date, and certify that they have read, understand and agree to the terms and conditions of this Agreement.

JOHNSTON:

TOWN OF JOHNSTON

By: _____
Name: Joseph M. Polisena
Title: Mayor

By: _____
Name: William J. Conley Jr. Esq.
Title: Solicitor, as Authorized by the Town Council for the Town of Johnston having ratified this Agreement on January 10, 2017. Said resolution ratifying the Agreement as attached hereto as Exhibit A.

CREC:

CLEAR RIVER ENERGY LLC,
a Delaware limited liability company

By: _____
Name: James J. Shield
Title: Vice President

EXHIBIT A

WSA Approval

[see attached]

Town of Johnston

RESOLUTION OF THE TOWN COUNCIL

No. 2017-5

In Favor: 5 Opposed: 0

1/10/2017
Council President Date

Be it resolved that:

Whereas, *The Town is desirous of entering into an agreement for the sale of water; and;*

Now, therefore, be it resolved that we, the members of the Johnston Town Council hereby ratify and authorize Mayor Joseph M. Polisena to enter into the attached Water Supply and Economic Development Agreement between the Town of Johnston and Clear River Energy, LLC for the purchase of water from the Town of Johnston.

Resolution 2017-5 shall become effective immediately upon the date of its passage.

Robert V. Russo, Councilman
District-4

Robert J. Civetti, Councilman
District-5

Richard J. DelFino III, Councilman
District-1

Anthony A. Verardo, Councilman
District-2

David J. Santilli, Councilman
District-3

Attest
Vincent P. Baccari, Jr., Town Clerk

A TRUE COPY ATTEST JAN 11 2016
Vincent P. Baccari Jr.
Town Clerk

Official Document

Appendix G

Memorandum of Agreement Between Clear River Energy LLC and Benn Water & Heavy Transport Corp.

VIA E-MAIL

January 6, 2017

Benn Water & Heavy Transport, Corp.
c/o Charles Soloveitzik, Esq.
Two Elm Street
Westerly, RI 02891

Re: ***Clear River Energy Center located in Burrillville, Rhode Island (the "Project")***
Memorandum of Agreement to Enter Into Water Supply and/or Transport Agreement

Dear Attorney Soloveitzik:

This Memorandum of Agreement to enter into a Water Supply and/or Water Transport Agreement (this "**MOA**") expresses the intent of Clear River Energy LLC, a Delaware limited liability company ("**CREC**"), and Benn Water & Heavy Transport, Corp. ("**Benn Water**") to have Benn Water supply and/or transport water necessary for operation of the proposed Clear River Energy Center (the "Project") to be located in Burrillville, Rhode Island (collectively, the "**Transaction**"). CREC and Benn Water are sometimes referred to in this MOA as a "**Party**" or collectively as the "**Parties**".

The Project will require a secure source(s) of potable process water for its use in generating electric power. The Parties, therefore, have agreed to pursue the Transaction, the basic terms of which are as follows:

1. **Water Supply**. Subject to a Water Supply and/or Water Transport Agreement, Benn Water has the right to supply water up to the quantities described below.

2. **Water Transport**. In the event, CREC secures alternate services of water supply, Benn Water would transport and/or supplement CREC's transport of water from a supply "Point of Delivery" to the Project as requested.

3. **Water Usage**. CREC estimates that the water usage rates required for the Project will vary somewhat throughout the year. The following approximate number of trucks required to satisfy the water usage rates are based upon the assumption that the trucks have a maximum capacity of 7,200 gallons.

    a. Normal Operations. CREC estimates water usage rates during the year of approximately 13 GPM, or 18,720 GPD. In turn, CREC estimates that up to 3 truck deliveries per day will be required to satisfy the water use needs of the Project.

    b. Replenishing On-Site Storage. CREC may need to replenish the on-site water storage tanks which would require up to an additional 10 to 11 water trucks per day for a total of about 13 trucks per day for approximately 30 days.

4. **Due Diligence**. CREC, at its sole cost and expense, will retain a consultant to work with Benn Water to conduct all necessary due diligence with regard to Benn Water's source water, water chemistry, adequate volumes, and Benn Water's ability to deliver required volumes both in the summer and winter seasons. Due diligence will be completed within twenty (20) days and to

CREC's sole satisfaction. CREC agrees to reimburse Benn Water for all reasonable professional costs incurred with regard to the due diligence conducted in finalizing the Water Supply Agreement by and between the Parties.

5. **Water Supply and/or Water Transport Agreement**. In the event Due Diligence is completed to CREC's sole satisfaction, the Parties will negotiate in good faith and enter into a long-term water supply and/or transport agreement (the "Water Supply and/or Transport Agreement") governing said supply and/or transport, which shall include, at minimum, the terms outlined herein.

6. **Payment Terms**. The terms of payment and transport capacity reserve with regard to the proposed Water Supply and/or Transport Agreement are confidential and are therefore, set forth in **Schedule 1** attached hereto and incorporated herein.

7. **Delivery Off-Peak**. Benn Water agrees to provide deliveries of water to the Project site off-traffic peak and beyond regular business hours of operation, as required by CREC.

8. **Water Delivery**. Benn will provide specifications for insulated, stainless steel tanks with internal valves for winter season delivery.

9. **Other Commercial Terms**. The Parties agree to negotiate other standard commercial terms in good faith.

10. **Confidentiality/Public Announcement.**

    a. The Parties each agree to keep confidential the existence, status, or terms and conditions of this MOA, including, without limitation, any compensation or lack of compensation hereunder (collectively, the "Confidential Information"), and not to disclose or otherwise convey any portion of the Confidential Information to any person other than the disclosing Party's attorneys, employees, family members, affiliates, potential third party power purchasers, potential financing parties, agents or representatives and other personal advisors who need to know such information for the purpose of assisting the disclosing Party in connection with this MOA or pursuant to lawful process, subpoena or court order; provided the disclosing Party in making such disclosure advises the party receiving the information of the confidentiality of the information and obtains the agreement of said party not to disclose the information. It is further understood and agreed by the Parties that money damages may not be a sufficient remedy for any breach of this Section 10 and that the non-disclosing Party shall be entitled to seek specific performance and injunctive or other equitable relief as a remedy for any such breach without the necessity of posting bond. Such remedies shall not be deemed to be the exclusive remedy for breaches of this Section 10, but shall be in addition to all other remedies that may be available at law or equity.

    b. The Parties shall consult with each other on the desirability, timing and substance of any press release or public announcement, publicity statement or other public disclosure relating to this Transaction or the fact that negotiations between us are being held. Each Party agrees not to make any such public disclosures without the prior written consent of the other Party as to the content and timing of such disclosure; *provided, however,* that either Party may make such disclosures as are required to comply with applicable law.

the Effective Date, and certify that they have read, understand and agree to the terms and conditions of this Memorandum of Agreement.

BENN WATER:

Benn Water & Heavy Transport, Corp.
a Rhode Island corporation.

By: Jeffrey K Benn
Name: JEFFREY K BENN
Title: PRESIDENT
Date: 1-9-16

CREC:

Clear River Energy LLC.
a Delaware limited liability company

By: Bryan Schueler
Name: Bryan Schueler
Title: Vice President
Date: _____

Appendix O

Burrillville Interconnection Project Alternatives Analysis

5.0 PROJECT ALTERNATIVES

5.1 Introduction

This section describes the alternatives to the Project that were considered to address the need to interconnect the proposed CREC to the existing electric transmission system. The need for this Project is driven exclusively by the proposed interconnection of the CREC to the New England electric system. As a result, the alternatives are limited by the need for a direct connection to Sherman Road Switching Station, as identified by the ISO-NE.

Selecting a preferred design option involves evaluating a suite of feasible project alternatives, which includes screening of each project component, analyzing the alternative routes and configurations, general ranking of alternatives and identification of initial recommendations in the selection of a preferred solution. TNEC's overriding goal has been to select the alternative that best meets the Project need, with a minimum impact on the environment, at the lowest possible cost.

Section 5.2 describes the no-action alternative. Section 5.3 describes the electrical alternatives. Section 5.4 and Section 5.5 describe an alternative overhead route and the overhead alternatives using the existing ROW, respectively. Section 5.6 describes several underground transmission alternatives.

5.2 No-Action Alternative

This alternative was dismissed as it would not address the need to interconnect the proposed CREC to the existing electric transmission system.

5.3 Electrical Alternatives

5.3.1 Connection to Existing Transmission Lines

ISO-NE analyzed connecting CREC directly to the existing 341 Line or the existing 347 Line or both. These options were rejected by ISO-NE as they all presented unacceptable reliability issues and power transfer limitations. Ultimately, ISO-NE determined that a new 345 kV transmission line to the Sherman Road Switching Station would be the required solution for connecting CREC to the transmission system.

5.3.2 115 kV Alternative

TNEC evaluated installing one new overhead 115 kV transmission line from the CREC to the Sherman Road Switching Station as an alternative to the Project. This alternative would use a similar H-Frame structure and monopole structure configuration proposed as for the Project.

The Sherman Road Switching Station is a 345 kV facility, therefore this alternative would require adding a 115/345 kV transformer, which would take up additional space within the fenced in area and add to the cost of the Project. The use of the additional space is problematic because it limits TNEC's ability to fully utilize the station in the future due to site constraints associated with neighboring wetlands and high pressure gas pipelines located near the station. Additionally, this alternative would

have similar environmental and other impacts on the ROW as the proposed Project. For these reasons TNEC rejected this alternative.

5.4 Overhead Route Alternatives

TNEC considered two overhead routing alternatives for the 3052 Line. These alternatives involve paralleling existing utility corridors.

5.4.1 Construct Overhead Transmission Line in Project ROW (Proposed Option)

As discussed in greater detail in Section 4.0 of this ER, the Project involves (i) the construction of a new 6.8-mile 345 kV transmission line in the existing TNEC ROW and the new CREC ROW; and (ii) improvements to the existing Sherman Road Switching Station. This alternative was found to be superior to others considered for a variety of reasons discussed in this section. Consequently, it has been advanced as the proposed alternative.

5.4.2 Overhead Transmission Line Adjacent to Algonquin Gas Transmission Pipeline ROW

TNEC also evaluated the use of an existing Algonquin Gas Transmission (AGT) pipeline ROW which runs from southwest to northeast as shown on Figure 5-1. TNEC considered constructing an overhead 345 kV transmission line adjacent to AGT ROW from the CREC to the Sherman Road Switching Station, utilizing H-Frame construction as an alternative to the Project. This alternative would require the same improvements to the Sherman Road Switching Station as the proposed alternative.

This routing alternative would parallel an existing ROW corridor and has the advantage of not having to relocate the existing 341 and 347 Lines to accommodate the new line. However, the AGT ROW is not currently wide enough to accommodate the 3052 Line and it is unlikely AGT would permit the construction of an overhead transmission line within its gas pipeline ROW. This option would require creating and clearing of forested wetlands and upland forest for a new approximately 150-foot-wide ROW and building new access roads along the AGT ROW that are located away from the existing high pressure gas pipelines. Thus, this alternative would require obtaining additional easement rights along the entire length of the AGT ROW. This land acquisition would add significantly to Project costs, would result in increased impacts to the natural and social environments from creating a new 6+ mile corridor, and would delay the Project schedule. In addition, installing electric and natural gas facilities within the same corridor can introduce constraints to both operations in regard to safe access, work space requirements and future replacement and/or expansion of facilities within the shared corridor.

After consideration of this alternative, TNEC determined that locating an overhead transmission line within or adjacent to the AGT ROW would result in additional costs and delays associated with the need to acquire additional land; increased environmental and other impacts; and operational and safety constraints from the collocation of a transmission line near a high pressure gas line. TNEC therefore concluded that use of the TNEC and CREC ROWs was its proposed alternative.

5.5 Overhead Configuration Alternatives

The Applicant considered three alternative configurations (combinations of transmission line structure types) for constructing the Project within the existing TNEC ROW:

- Install 3052 Line in the Project ROW utilizing a combination of H-frame and monopole construction (the proposed Project).
- Install 3052 Line in the Project ROW utilizing monopole construction.
- Install 3052 Line in the TNEC ROW utilizing double-circuit monopole construction.

TNEC assessed the impacts of each of these configurations on Project cost, reliability, visibility of the structures, wetlands, and the level of disturbance caused by construction. The following sections describe the advantages and disadvantages of each alternative.

5.5.1 Construction Using Combination of H-Frame Structures and Monopoles (the Proposed Project)

As proposed, the Project will use steel H-frame structures for the 3052 Line and monopole structures for the shifted 341 Line. This option was chosen as it is the most cost-effective and reliable overhead solution. Monopoles and H-frame structures are relatively comparable in terms of their allowable span lengths, and as such, both designs would utilize approximately the same number of structures along the transmission line route. Monopoles and H-frame structures are comparable in terms of their structural reliability and their electrical reliability and performance. The narrower configuration of the monopole permits the 341 Line to be shifted north in Segment 2 without having to rebuild the 347 Line which was recently constructed as part of IRP. By using the monopoles for only 1.6 miles, the Applicant is able to minimize the visual impact of the taller structures as well as to minimize the impact of the larger reinforced concrete caisson foundations required for each monopole.

5.5.2 Construction Using Monopole Structures

TNEC evaluated using monopole structures both for the entire length of the 3052 Line and for the shifted 347 Line. The structures in Segments 1 and 3 would be approximately 110 feet tall, approximately 22 feet taller than the proposed H-frame structures. The typical steel H-frame structure includes two poles that are each approximately 5.5 feet in diameter whereas the steel monopole structure has a single pole that is approximately 10 feet in diameter. Each monopole structure would require a reinforced concrete caisson foundation, which would result in greater areas of excavation and fill for the structure installations. In addition, the monopole structures would be more expensive than the proposed configuration.

Ultimately, this option was rejected because of the increased environmental impact from the larger footprint of the reinforced concrete caisson foundations, the visual impact from the taller structures, the additional cost of the structures, and because the 3052 Line could be built using H-frame structures in Segments 1 and 3.

5.5.3 Construction Using Double-Circuit Monopole Structures

As an alternative to constructing the Project using H-frame structures, TNEC also evaluated the use of double-circuit structures to carry the 3052 Line and the existing 347 Line. To achieve this

configuration, the 3052 Line and the existing 347 Line would be constructed on a common single-shaft steel structure and the existing parallel 347 Line would be removed from its present location. TNEC determined that the double-circuit structure alternative had the following advantages and disadvantages relative to the proposed H-frame structure:

Advantages:

- The natural and social environmental impacts of the single circuit monopole configuration would be generally similar to those of the double-circuit monopole configuration.
- Use of a double-circuit structure could reduce tree removal requirements by approximately 10 to 15 feet in width, in portions of the ROW.
- Double-circuit structures and H-frame structures would be relatively comparable in terms of their allowable span lengths, and as such, both designs would utilize approximately the same number of structures along the transmission line route.
- Double-circuit structures and single-circuit H-frame structures would be comparable in terms of their structural reliability.

Disadvantages:

- Double-circuit structures would be inferior to single-circuit H-frame structures in terms of their electrical reliability and performance. Common mode failure of double-circuit structures could result in the loss of both lines. Double-circuit structures would increase the risk of a lightning strike or single transmission line fault causing both transmission lines to be interrupted simultaneously.
- Double-circuit monopoles would be larger in diameter to accommodate the weight of two circuits, and would not resemble the existing H-frame structures on the TNEC ROW.
- Typically, double-circuit structures would be approximately 135 feet in height (approximately 45 to 50 feet taller than the proposed single-circuit H-frame structures), and as such would be more visible.
- Each double-circuit structure would require a reinforced concrete caisson foundation, as opposed to the H-frame structures which would only require concrete foundations at points of line angle and dead-end locations. The additional foundations required for the double-circuit alternative would significantly increase the excavation, rock removal and soil disturbance required for installation, and would increase the potential for impacts (access roads, construction pads, support work pads) to environmental resources.
- The larger and heavier steel structures required for a double-circuit transmission line, together with the need to get concrete trucks safely along the access spur roads to each foundation location may increase the level of access road improvements required for the Project, and the impacts associated with those improvements.
- The use of double-circuit structures would increase the installed cost of the Project.
- Constructing a double-circuit transmission line would unnecessarily remove, retire and replace existing transmission line segments which are functioning adequately. This incremental cost would be borne by ratepayers and not Invenergy.
- If the 3052 Line and the existing 347 Line shared double-circuit structures (towers), the simultaneous loss of these lines would be treated as a double-circuit tower (DCT) contingency in transmission planning studies; this would lower official interface transfer capabilities.

After considering the relative advantages and disadvantages of utilizing double-circuit structures, TNEC concluded that utilizing single-circuit H-frame and monopole structures as proposed for the Project offered more advantages, provided greater reliability, created fewer impacts, and was a more cost-effective solution.

5.6 Underground Transmission Alternatives

TNEC developed and analyzed underground alternatives to compare with the proposed overhead transmission line configuration for the Project. Underground transmission lines typically have much higher installation costs than overhead transmission lines. Underground transmission cables, particularly long underground cables, have very different electrical characteristics than overhead transmission lines. This can lead to operational and power flow issues, and can require additional system reinforcements to address these issues. Construction techniques for underground transmission lines create different environmental impacts than overhead transmission line construction. Reliability issues associated with underground transmission lines are different than those associated with overhead transmission lines. In developing the underground alternative, TNEC addressed these differences between overhead and underground transmission lines. The following sections describe the underground alternatives considered and their advantages and disadvantages.

5.6.1 Underground Transmission Routes

TNEC considered the following three underground routes:

- Project ROW from the CREC to the Sherman Road Switching Station.
- AGT ROW from the CREC to the Sherman Road Switching Station.
- Public roadways from CREC to the Sherman Road Switching Station.

5.6.1.1 Project ROW

The advantages of installing an underground transmission line along the Project ROW include use of the existing TNEC utility corridor, fewer traffic impacts during construction than if a roadway route were used, and a somewhat shorter route in this particular case. These factors might lead to somewhat lower costs and lower traffic disruptions/ impacts than a public roadway underground route.

However, the TNEC ROW is ill-suited for an underground transmission line for a number of reasons. The ROW traverses multiple wetlands and wetland buffer zones, and crosses multiple waterbodies, including Dry Arm Brook (twice), Clear River, Mowry Brook (twice), Round Top Brook, Chockalog River, and several smaller streams. With overhead construction, it is frequently possible to span wetlands and other sensitive resource areas. This has been demonstrated on the TNEC ROW with the existing transmission lines, and is proposed for the new overhead transmission line. By contrast, with underground construction, it is necessary to either trench the entire route, or to use trenchless techniques such as horizontal directional drilling or pipe jacking. Trenchless installation techniques create additional design, construction, and economic issues, and have their own associated environmental issues. Underground transmission construction techniques have the potential to cause an increase in short and long term impacts to wetlands and other sensitive resources along the overhead ROW.

A substantial permanent access road would need to be constructed along the ROW for purposes of construction and maintenance of an underground transmission line, causing permanent impacts to the ROW, and potentially affecting wetlands, stream crossings, rare species habitat, and other sensitive resources.

In addition, there is significant visible rock along portions of the ROW, which would make constructing an underground transmission line difficult and costly.

Finally, TNEC does not own the majority of the overhead ROW in fee, but rather holds easements. These easements generally do not include the right to install underground lines. Acquisition of the underground rights from numerous parties would significantly increase the timeframe and cost of this routing alternative as well. These constraints and considerations led TNEC to dismiss the TNEC ROW as a potential route for an underground transmission line.

5.6.1.2 Existing Algonquin Gas Pipeline ROW

Similar to the TNEC ROW, the AGT ROW is ill-suited for an underground electric transmission line. The AGT ROW crosses multiple wetlands, wetland buffer zones, and water bodies. A substantial permanent access road would be required for construction and maintenance of an underground line, potentially causing permanent impacts to wetlands, rare species and other sensitive resources, as discussed in Section 5.7.1.1.

TNEC would need to acquire additional property rights from AGT or individual property owners along the corridor for this alternative. Obtaining new property rights would significantly increase the timeframe and cost of this routing alternative. The AGT ROW is 75 feet wide and has two existing natural gas transmission lines within the ROW. In some areas, the ROW may not be wide enough to accommodate an underground electric transmission line, which would trigger the need for acquisition of additional property rights. These constraints and considerations led TNEC to dismiss the existing AGT ROW as a potential route for an underground transmission line.

5.6.1.3 Existing Public Roadways

There are several advantages to installing an underground transmission line beneath the public roadway network, as compared to using the utility corridors. These relative advantages could include:

- Reduced impacts on the natural environment. By using the established roadway network, most construction would not directly impact wetlands or environmentally sensitive areas. Some construction could fall in areas where the roadway is within wetland buffer zones. In these cases, suitable environmental controls and BMPs would be employed to control sedimentation.
- There would likely be less rock removal with a roadway network route, since original road construction would have graded and removed a portion of the rock along the route. Roadway geometry generally is more suitable for underground transmission installation, since there would not be severe grade changes to contend with.
- Access for construction and ongoing maintenance is generally simpler within the roadway network.

- In general, rights for installation of underground facilities within the roadway network are obtained via a permit from a limited number of agencies (municipal Departments of Public Works, RIDOT, etc.).

There are some potential disadvantages to using the roadway network for an underground transmission line:

- During installation of the conduit and manhole system, there would be construction related impacts on vehicular traffic. There would also be some traffic impacts during cable installation and splicing, but these would be confined to manhole locations.
- The roadway network is relatively sparse in this portion of the state, and does not directly parallel the TNEC ROW. As a result, the roadway route is somewhat longer than the overhead ROW route.

5.6.1.4 Selection of Roadway Network as Preferred Underground Route

Overall, TNEC concluded that the roadway network presented fewer environmental and property acquisition issues, and had significant operational benefits as compared to installing an underground transmission line within an existing cross-country utility corridor. For these reasons, TNEC developed a "representative" roadway route between the CREC and the Sherman Road Switching Station using the existing public roadway network. The underground roadway route would start at the CREC and be installed in the proposed CREC access road to Wallum Lake Road (Route 100). The underground route would proceed southeast on Wallum Lake Road, east onto Laurel Hill Road, south onto Grove Street, northeast onto Centennial Street, east along Hill Road to its intersection with Sherman Farm Road (Route 98), and then proceed north along Sherman Farm Road to the Sherman Road Switching Station. The length of the underground roadway route is approximately 7.2 miles long. The representative roadway route is shown in Figure 5-1. This route was selected as a reasonably direct interconnection between the two endpoints and is not the result of exhaustive routing analysis. Other roadway routes would be approximately the same length, and would be expected to have similar construction and operational issues, and similar costs. The public roadway underground alternative was developed in further detail for comparison to the Project.

5.6.2 Underground Cable Design and Construction

A solid dielectric cross-linked polyethylene (XLPE) cable system was selected to develop a conceptual design and cost estimate for the public roadway underground alternative. An XLPE cable system would be expected to have high reliability, lower cable charging, and lower maintenance requirements compared to other available transmission cable technologies at 345 kV (such as high pressure fluid filled pipe type cable).

The overhead transmission capacity of the bundled 1,590 kcmil ACSR proposed for the Project is approximately 3,000 amps (A), or 1,790 Megavolt Ampere (MVA). The overhead conductor size selected somewhat exceeds the immediate rating need, but overhead conductors are also selected based on sag requirements, conductor strength requirements under ice and wind loadings, and other factors. The immediate ampacity need for the interconnection to CREC is approximately 2,000 amps.

For underground construction, the cable system would consist of a single-circuit, initially consisting of two sets of 5,000 kcmil enamel coated copper 345 kV XLPE insulated cables per phase. This would satisfy the 2,000 amp need for the CREC project. These cables would be installed in a ductline

and manhole system that would have spare capacity for additional cables for maintenance or replacement purposes.

Preliminary cable ampacity calculations were performed for the alternative underground cable system. Ampacity calculations were executed using CYME International's Cable Ampacity Program 7.1 Revision 1 to model the cable system based on the following design criteria:

TABLE 5-1 CABLE SYSTEM DESIGN CRITERIA

Nominal Voltage	345 kV
Conductor	5,000 kcmil Copper (coated)
Cable System	Extruded Dielectric Cross Linked Polyethylene
Maximum Normal Operating Temperature	90 degrees Celsius (°C)
Installation Depth (top of duct bank):	
Minimum Depth	3 feet
Maximum Depth	8 feet
Earth Ambient Temperature	25°C (Assumed)
Native Soil Thermal Resistivity	90°C - centimeters per watt (cm/W) (Assumed)
Duct Bank Thermal Resistivity	60°C - cm/W
Load Factor	100%
Steady-State Ampacity Rating	2,000 A

Note: The final circuit rating would depend on detailed engineering and final configuration of the underground transmission line.

For the portions of the underground cable route within roadways, the duct bank for the cables would be installed using open-cut trench design. Open trenching involves cutting and removing the pavement, excavating a trench, installing the conduit system, and backfilling the trench. Precast manholes would be installed at pre-determined locations, typically every 2,000 to 2,500 feet along the route. For a 345 kV system, manhole dimensions would be approximately 30 feet long by 7 feet wide by 8 feet high. PVC conduit is assembled and placed in the trench to form a duct bank. Typically a 20-foot-wide construction working area is utilized on streets for a single trench.

The approximately 6.2-feet wide by 2.6-feet tall concrete encased duct bank would consist of nine 8-inch Schedule 40 PVC conduits for the 345 kV Power Cables, three 2-inch PVC conduits for Ground Continuity Conductors, and two 4-inch conduits for communication cables. There would be a minimum of 36 inches of cover from grade to the top of the duct bank, resulting in a 6.2 foot wide by 5.6 foot deep trench. The final duct bank size and layout may vary somewhat from this and would be determined during detailed design. Factors to be considered during detailed design include electrical requirements, heat dissipation, minimal burial depths, existing facility/utility locations and cable installation requirements.

The underground transmission line would also require the following:

- Three large manholes (one manhole per cable set), each approximately 30 feet long by 7 feet wide by 8 feet high at every splice location;
- The installation of multiple cable terminal positions at the switching stations to accommodate the cables. This would require significant area at the switching stations to connect the cable terminations; and,

- Installation of three Shunt Reactors at the terminal switching station due to significant MVARs generated by the cable system. This would require additional land at the switching station.

The underground alternative would also take several additional years to design, license and build.

5.6.3 Underground Alternative Cost

TNEC prepared a conceptual cost estimate for the existing roadway underground alternative. A breakdown of the costs is shown below in Table 5-2.

TABLE 5-2 ESTIMATED UNDERGROUND CONSTRUCTION COST

COMPONENTS	ESTIMATE
Underground Transmission Cable Costs	$148,000,000
Incremental Switching Station Modifications, Transition Stations and Shunt Reactors	$30,000,000
Switching Station Modifications (common with preferred overhead alternative)	$6,200,000
Total	$184,200,000

Note: These costs do not include property acquisition, if required.

5.6.4 Environmental and Other Considerations

For construction of the overhead transmission line in the TNEC ROW, TNEC would use construction techniques that minimize impacts on the natural environment. Disturbed areas would be allowed to re-vegetate with low growing plant species, similar to existing vegetation within the cleared portions of the ROW.

In the case of the underground alternative along existing roadways, the majority of the construction would occur within existing roadways. Assuming an on-road route, most of the environmental impacts would be to the manmade environment, and would primarily occur during the construction of the line. These would include temporary impacts on traffic during conduit and cable installation. The majority of the installation of an underground transmission system would be performed utilizing cut and cover techniques, where the roadway is excavated, the conduit and manhole system is installed, the trench is backfilled, and roadway is repaved. For much of the route, the roadway is only two lanes wide. Lane closures with alternating traffic patterns would be required during construction. There would also be temporary noise impacts to the homes and businesses located along the roadway route from construction equipment and vehicles.

The underground roadway route would cross a number of streams and small rivers, where the streams are culverted or where the roadway is in a bridge over the waterways. Wetlands and waterways would be crossed by installing the cables on bridges (if available and suitable), by cut and cover over or under culverted streams, or by trenchless techniques such as Horizontal Directional Drilling. Where the underground route would pass through buffer areas adjacent to wetlands, proper construction techniques and BMPs, such as the use of hay bales or other sedimentation barriers, would be employed to protect these areas.

In addition to the impacts summarized above, an underground line will also require the following equipment installed above ground at the terminal switching station: shunt reactors, circuit breakers and associated switches, multiple cable terminations, and surge arresters. The additional equipment potentially increases the environmental impact of an underground project as additional space within the switching stations will be needed to connect the underground line to the switching station.

5.6.5 Underground Operational Issues

In addition to the significantly higher costs and the schedule impacts summarized in Section 5.6.3, there are a number of system and operational issues associated with underground transmission lines. These include:

- Lengthy Outage Repair Times: When an overhead transmission line experiences an outage, it can typically be repaired within 24 to 48 hours. In the case of a failure of an underground transmission cable, repair times for a 345 kV XLPE circuit can be in the range of a month or more. The extended outage times for underground cables would limit the ability of CREC to generate power during this time period. Extended underground outage repair times can expose the remainder of the transmission system to emergency loadings for longer periods of time. There is also increased exposure to loss of another transmission element, with possible loss of load, during the extended underground outage.

- Cable Capacitance: Underground cables have significantly higher capacitance than overhead transmission lines, meaning that it takes reactive power (Megavolt Ampere Reactive [MVARs]) to "charge up" the cable before the cable can transmit real power (Megawatt [MWs]). This has several ramifications:

  – Part of the cable's capacity is used up by the charging current, so larger conductors are needed to transmit an equivalent amount of power. These have been included in the system design described above.

  – Capacitance can create voltage control problems, meaning that the voltage can get too high when the transmission system is at light load. If the CREC interconnection were to be constructed underground, there would be approximately 140 MVAR of cable charging per cable, or 280 MVAR for the initially developed two cable system. The transmission system cannot absorb this much charging MVARs and it would be necessary to install additional equipment, in the form of shunt reactors, at one or both terminal switching stations.

  – Cable capacitance causes higher switching transient voltages on the system (voltage "spikes" during switching). This can damage other system components, may trigger the need to replace surge arresters throughout the area, and complicates future system expansions.

- Effect on Reclosing: Many faults on overhead lines are temporary in nature. Often it is possible to "reclose" (re-energize) an overhead line after a temporary fault, and return the line to service with only a brief interruption, measured in seconds. Faults on underground transmission cables are almost never temporary, and the cable must remain out of service until the problem is diagnosed and repairs can be completed.

- Ratings: It is often difficult to match overhead line ratings with underground cables. It is also much more difficult to upgrade ratings on underground lines should that become necessary in the future. The proposed design for the underground alternative makes some accommodation for this, but the issue remains.

5.6.6 Underground Dips

During siting of overhead transmission lines, questions are often raised regarding the possibility of installing short segments of underground transmission line at discrete locations along the route. This type of short underground segment is often referred to as a "dip." TNEC developed an estimated cost for a "generic" one mile underground dip for the 3052 Line. This underground dip would utilize two sets of 5,000 kcmil cu 345 kV XLPE cable per line, installed in a ductline. For a generic dip, the route would follow the existing ROW alignment. See Figure 5-2 (trench cross section).

At each end of the dip, there would be a transition station. This would be a fenced switching station, approximately 125 feet by 125 feet at a minimum, and similar in appearance to an electrical substation. The transition station would terminate the overhead line, and would contain cable terminations, a control house, and accessory equipment. The cost of a one mile generic underground dip, utilizing similar assumptions as the underground alternative, is as follows:

TABLE 5-3 ESTIMATED GENERIC COSTS FOR A ONE-MILE DIP SEGMENT

SYSTEM COMPONENT	ESTIMATED COST (MILLIONS)
Underground Transmission Cable Costs	$18,000,000
Transition Stations	$10,000,000
Total	$28,000,000

The average overhead transmission line cost along the route is approximately $4.43 million per mile. For a one mile dip, the underground line represents more than a six-fold increase in costs over the overhead line. An underground dip would expose the entire line segment to the underground transmission operational issues discussed above. These include:

- Lengthy outage repair times for underground transmission cables.
- Effect on reclosing for temporary faults.
- Cable capacitance effects (less for dips).
- Ratings – potential for future bottlenecks.

Underground dips represent a large cost increase, may require additional property rights, and introduce operational disadvantages when compared to the proposed overhead line.

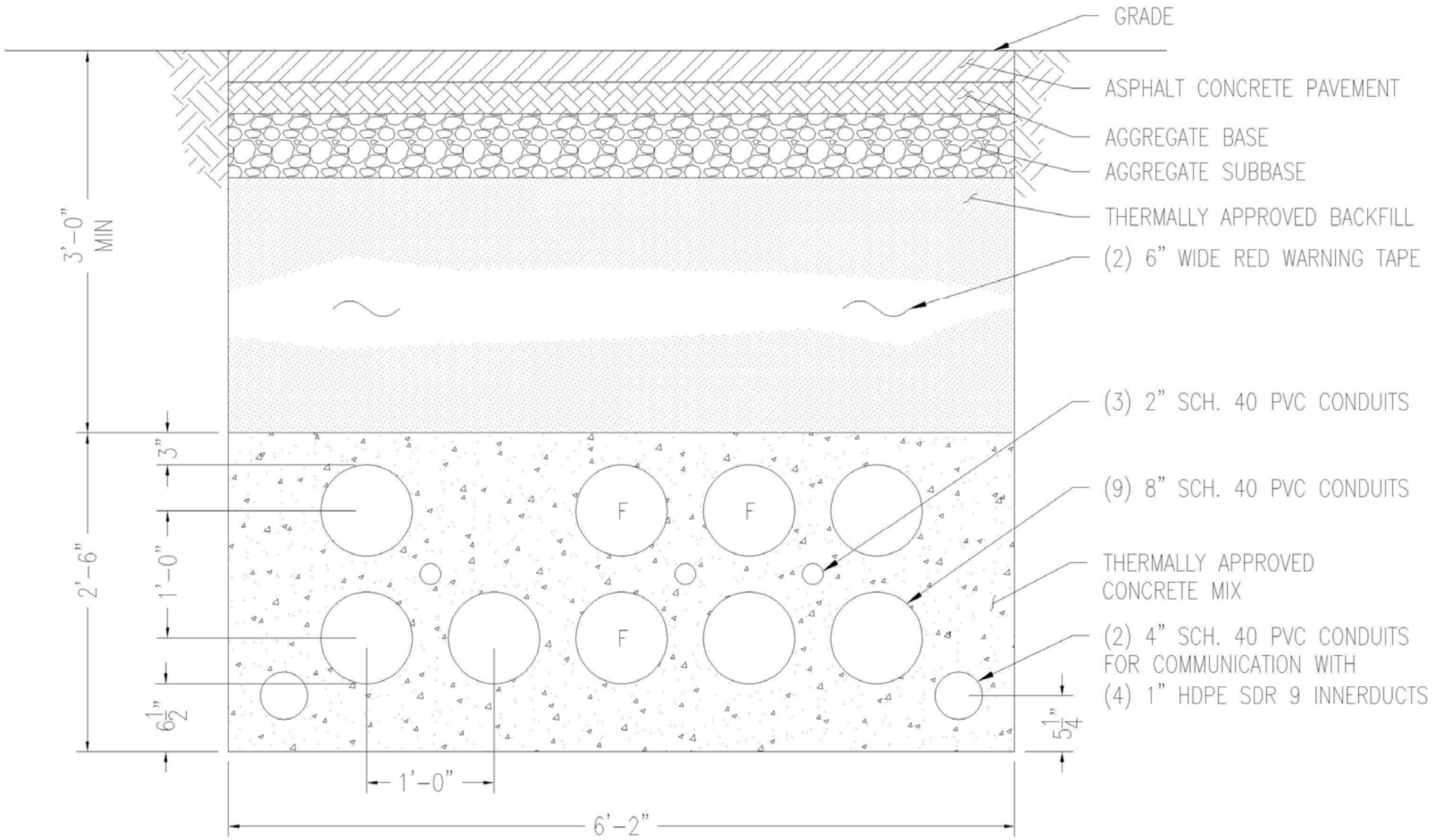


Figure 5-2 Underground Transmission Trench Detail

This page intentionally blank

5.6.7 Underground Alternative Conclusions

Both the overhead and underground alternatives would meet the identified needs of the Project and would be expected to have high levels of reliability. The underground alternative has significant operational issues, longer restoration times, and voltage control issues that make it technically inferior to the proposed Project. Generally, the underground alternatives on the public roadway network would have fewer environmental impacts than the preferred overhead alternative. There would, however, be greater temporary impacts to the public during construction of an underground alternative in the public roadways. In most instances, a cross-country underground alternative would have more environmental impacts than the preferred overhead alternative because of the need to excavate a continuous open trench along the ROW and the need to construct a continuous access route. The significantly higher cost and the operational issues make the underground alternative much less preferred than the Project as proposed.

5.7 Summary of Alternatives and Conclusions

In the development of the Project and selection of the preferred alternative, TNEC evaluated a variety of alternatives. Alternatives to the construction of the 345 kV transmission line included electrical alternatives, alternative overhead routes, and underground transmission alternatives.

Following an evaluation of the relative merits and disadvantages of the various alternatives, the overhead alternative as proposed is superior to other routing alternatives because it:

- Utilizes an existing ROW dedicated to existing overhead transmission lines, thus avoiding acquisition of new ROW and reducing environmental impacts.
- Meets the energy needs of the state and region by providing an interconnection for the proposed generation plant.
- Provides the lowest reasonable Project cost and is substantially less expensive than any of the other alternatives considered.
- Is designed to not cause unacceptable harm to the environment, and to enhance the socioeconomic fabric of the state by providing a reliable energy source.

Appendix P

Wetland Invasive Species Management Plan

WETLAND INVASIVE SPECIES CONTROL PLAN

Burrillville Interconnection Project
Burrillville, Rhode Island

Prepared For:

The Narragansett Electric Company
280 Melrose Street
Providence, RI 02907

March 2017

TABLE OF CONTENTS

Attachments

Index of Tables

ABSTRACT

The Narragansett Electric Company d/b/a National Grid (TNEC), and Clear River Energy LLC, a project company of Invenergy Thermal Development LLC (Invenergy) (collectively the Applicant) are proposing to construct a new approximately 6.8 mile 345 kilovolt (kV) transmission line (the 3052 Line) in the Town of Burrillville, Rhode Island, to interconnect the proposed Clear River Energy Center (CREC) to the existing electric transmission system (the Burrillville Interconnection Project or the Project). The 3052 Line will begin at the proposed CREC to be located off of Wallum Lake Road in Burrillville. From the CREC facility, it will extend approximately 0.8-mile within a new right-of-way (ROW) on an easement owned by CREC (CREC ROW) to its intersection with an existing TNEC transmission line ROW (TNEC ROW). The 3052 Line will then continue east approximately six miles within the TNEC ROW to the existing Sherman Road Switching Station in Burrillville (refer to Figure 1-1). The 3052 Line will share the TNEC ROW with the two existing 345 kV lines, the 347 Line and the 341 Line. The 341 Line was recently installed as part of the Interstate Reliability Project (IRP).

This *Wetland Invasive Species Control Plan* (WISCP) addresses the procedures the Applicant will implement to minimize the spread and/or introduction of invasive species in wetlands along the Project ROWs during construction. The WISCP first identifies the invasive wetland plant species that are of concern in the Project region and then reviews the wetlands along the Project ROWs where such species have been found.

Although not all of the wetlands within the transmission line ROWs will be affected as a result of Project construction activities, those that will be disturbed could be more susceptible to colonization by invasive species. In addition, movement of construction equipment and materials through wetlands that presently contain invasive plants could promote the spread of invasive species to nearby, un-infested wetlands.

The overall objective of the WISCP is to define the procedures to be used during Project construction to preserve the value and functions of wetlands along the Project ROWs that presently do not contain invasive species and to minimize the further spread of invasive plants within wetlands that already contain them.

1.0 Introduction

1.1 Overview of the Project and Wetland Resources

The Applicant is proposing to construct the 3052 Line for the purpose of interconnecting the CREC to the existing electric transmission network. The 3052 Line will be built within the CREC and TNEC ROWs. The TNEC ROW is currently occupied by two 345kV transmission lines, designated as the 341 and 347 Lines. The 341 Line is primarily supported by steel H-frame structures, with a typical height of approximately 88 feet. The 347 Line is currently primarily supported by wooden H-frame structures, with a typical height of approximately 78 feet. The components of the Project are as follows:

- Construct a new 6.8-mile 345 kV transmission line between the CREC and the Sherman Road Switching Station, which includes modifications to the 341 and 347 Lines. The Project ROW consists of the following three segments:
    - Segment 1 – CREC ROW from the CREC to the TNEC ROW (0.8 mile)
    - Segment 2 – TNEC ROW from the junction of CREC ROW to a point 0.19 mile west of the Clear River (1.6 miles)
    - Segment 3 – TNEC ROW from 0.19 mile west of the Clear River to the Sherman Road Switching Station (4.4 miles)
- Improvements to the existing Sherman Road Switching Station, including the realignment of an approximate 260 foot span of the existing 345 kV 328 Line at the station.

The ROWs along which the proposed new transmission line will be located range in width from approximately 150 to 300 to 500 feet and are sufficiently wide to accommodate the proposed 345-kV transmission line adjacent to the existing transmission line, with the exception of the new 0.8 mile CREC ROW. Mandatory federal standards require that TNEC operate and maintain the transmission lines to provide specified clearances between vegetation (trees) and the overhead transmission line conductors. The objective of National Grid's well-established vegetation management program is to maintain safe access to its transmission facilities and to promote the growth of vegetative communities along its ROW that are compatible with transmission line

operation and in accordance with federal and state standards. TNEC has conducted Integrated Vegetation Management (IVM) within ROWs as a matter of good utility practice since the late 1980s. National Grid's vegetation management program is designed to allow the safe operation of transmission lines by preventing the growth of incompatible vegetation that would interfere with the transmission facilities or access along the ROW. As a result, the vegetation within the maintained portions of TNEC's ROW typically consists of shrubs, herbaceous species, and other low-growing species. Portions of TNEC's ROW that are not proximate to an existing line may support taller vegetation, as long as it will not conflict with the construction or operation of the lines.

As part of the Project planning process, the Applicant conducted extensive field investigations to delineate jurisdictional wetlands within the ROWs. Some of these wetlands are within the presently managed portions of the ROWs, whereas others are within portions of the ROWs that currently are undisturbed. In most areas, Project construction activities will not affect the entire width of the existing easements.

As part of the water resource delineations along the Project ROWs, wetlands in which invasive plant species are prevalent were identified. Invasive plants are species that are not native or indigenous to a region and that can thrive in areas beyond their natural dispersal range, often out-competing native plants for space, nutrients, sunlight, and water. Invasive species are highly adaptable and have few natural control agents in the environment into which they have been introduced, making them very prolific plant species. Invasive species may also be referred to as nuisance, undesirable, noxious, or exotic species.

Generally, disturbances to wetlands caused by land use development, flooding, erosion, or similar activities leave areas more susceptible to colonization by invasive plants. Project construction will involve certain activities that will affect wetlands, either temporarily or permanently, along the ROWs. Such disturbances could make the affected wetlands more prone to colonization by invasive plant species. Further, construction activities in wetlands in which invasive species are already prevalent could promote additional colonization or the spread of invasive species along the ROWs to other wetlands that are not presently infested.

The construction of the new overhead 345-kV transmission line will involve a series of sequential activities, most of which will not disturb wetland vegetation or soils and thus will not present a risk

for the spread of invasive wetland plants. However, the construction activities with the potential to influence the spread of invasive plant species in wetlands include:

- Vegetation clearing within wetlands for the construction and subsequent operation and maintenance of the transmission line;
- Temporary or permanent improvements to existing access roads or the development of new access roads (temporary or permanent) across wetlands;
- The use of temporary access routes across wetlands to facilitate the movement of vegetation clearing equipment;
- The installation of temporary work pads in wetlands;
- Drilling or other types of excavation for transmission line structure foundations within wetlands containing invasive plant species (soil disturbance); and
- The removal of temporary fills (e.g., access roads, work pads) and the restoration of affected wetlands.

1.2 Wetland Invasive Species Control Plan Objectives

This WISCP describes the baseline procedures that the Applicant proposes to apply for minimizing the potential for the spread of invasive plant species in wetlands located within the Project ROWs during construction. This WISCP was developed in light of the U.S. Army Corps of Engineers (USACE) *Invasive Species Control / Management (ISCP) Guidance*. The procedures described in this WISCP will be implemented in wetlands containing invasive species that are affected by Project development activities.

Accordingly, the specific objectives of this plan are as follows:

- List the invasive plant species known to occur in wetlands along the Project ROWs that were identified based on wetland delineations of the Project ROWs.
- Identify as a baseline the wetlands along the ROWs in which such invasive species presently exist.
- Describe TNEC's existing ROW vegetation management programs (e.g., integrated vegetative management), discuss how these existing programs contribute to minimizing the

proliferation of invasive species within the ROWs, and explain the constraints to long-term invasive species management along portions of the ROWs.

- Summarize the procedures that the Applicant proposes to implement to minimize the potential for the spread of wetland invasive species during the construction of the Project.

Overall, the goal of the wetland invasive species control program is to protect the ecological conditions of wetlands within the Project ROWs, specifically focusing on minimizing the spread of invasive species within affected wetlands and avoiding the introduction of invasive species to those wetlands in which invasive species are not currently present.

It should be noted that certain wetlands containing invasive plants extend well beyond the Project ROWs and outside of areas in which any Project activities are proposed. Therefore, attempting to eradicate invasive species from portions of such wetlands within the proposed work areas within the ROWs is unlikely to be successful and is not considered a practical goal of this program.

2.0 Invasive Species of Concern in Wetlands

Federal and State resource agencies maintain information regarding invasive wetland plants. For example the Rhode Island Department of Environmental Management (RIDEM) maintains lists of invasive wetland species. Similarly, the U.S. Department of Agriculture, Natural Resource Conservation Service (NRCS) also maintains a list of noxious plants, by state.

Based on a review of these lists and the characteristics of the existing Project ROWs (as determined by field investigations), the most abundant invasive species located in wetlands along the ROWs are multiflora rose, reed canary grass, purple loosestrife, common reed, Japanese barberry, and tartarian honeysuckle. Where there is an ample seed stock or a system of rhizomes of these invasive species, communities of these plants will tend to be the first "pioneer" species to populate and colonize areas that have been disturbed and left exposed. Table 2-1 lists the wetland invasive plants that are generally found in the Project region.

Table 2-1: Common Invasive Species Found in Wetlands in the Project Area

Common Name	Latin Name
Purple loosestrife	*Lythrum salicaria L.*
Common reed	*Phragmites australis*
Multiflora rose	*Rosa multiflora*
Asiatic bittersweet	*Celastrus orbiculatus*
Japanese barberry	*Berberis thunbergii*
Glossy Buckthorn	*Frangula alnus*
Tatarian honeysuckle	*Lonicera tatarica*
Autumn olive	*Elaeagnus umbellata*
Reed canary grass	*Phalaris arundinacea L.*
Japanese knotweed	*Polygonum cuspidatum*
Privet	*Ligustrum vulgare*
Spurge (leafy)	*Euphorbia esula L.*

3.0 Baseline Characterization of Project Wetlands and Locations of Invasive Species

During the Project planning process, field surveys were conducted to identify vegetative communities, including wetlands, along the transmission line ROWs. The field delineations of wetlands along the Project ROWs included the identification of predominant vegetation species in each wetland.

During the wetland delineations, invasive wetland plant species observed were recorded on the wetland delineation data forms. Invasive plants were reported based on the abundance criteria identified on the wetland data forms: that is, S = Sparse (< 5 % total cover); C = Common (6 to 25 % total cover); A = Abundant (26 to 50 % total cover); D = Dominant (> 50 % total cover). Thus, while the data compiled from the wetland delineation forms does not necessarily encompass every wetland in which small quantities of invasive plants are present, it does indicate the wetlands where invasive species constitute a large enough percentage of total wetland vegetation cover to warrant inclusion on the data forms.

Because the proposed Project will involve construction activities only within portions of the entire width of the ROWs, not all of these wetlands will be affected. The Applicant anticipates that the consistent implementation of best management practices (BMPs) during construction will minimize the potential for spreading invasive species to wetlands that presently do not contain such species.

In addition, using the information compiled during the field delineations, the wetland characteristics and functional attributes of each wetland were assessed based on the following functions and values:

- Ecological integrity
- Wildlife habitat
- Finfish habitat
- Educational potential
- Visual/aesthetic quality
- Water-based recreation
- Flood control
- Groundwater availability
- Nutrient and sediment retention opportunity / removal efficiency

Wetland scientists assigned each wetland a rating (i.e., “high”, “medium”, or “low”) based on wetland functional quality criteria.

To provide a baseline for designing and implementing an invasive species control program for the Project, the information compiled regarding invasive plant species during the field surveys was assembled from the wetland data forms/reports and is compiled in Attachment 1 of this WISCP. Attachment 1summarizes baseline information concerning the wetlands along the Project ROWs and the types and abundance of invasive species, if present.

- Lists each of the wetlands along the Project ROWs;
- Identifies the predominant vegetative species in each wetland;
- Identifies the wetland rating; and
- Indicates the types of invasive species (if any) present, using the list of such species contained in Table 2-1.

This baseline information provides the framework for the methods that the Applicant will use to minimize the spread of invasive wetland plants as a result of Project construction activities. The most common species are multiflora rose, Phragmites, purple loosestrife, and reed canary grass.

4.0 Review of Existing Vegetation Management Programs and Habitat Benefits

4.1 ROW Vegetation Management Requirements

New 345-kV transmission lines will be aligned along TNEC's existing ROWs, portions of which are presently managed according to national and regional standards and regulations for electric transmission line operation, including required clearances between conductors and vegetation. These standards and regulations include but are not limited to:

- Federal Energy Regulatory Commission (FERC) Commissioner Order 603, effective date of March 16, 2007;
- North American Electric Reliability Corporation (NERC) Standard FAC-003-1 – Transmission Vegetation Management Program, effective date of April 7, 2006; and
- National Electrical Safety Code (NESC) Section 21, Part 2, Rule 218 and the American National Standards Institute (ANSI) pruning standards, A300, Part 1, Part 7 and Z-133.

National Grid has established plans and procedures for applying an IVM approach to manage vegetation along the ROWs in accordance with these standards[1]. These IVM programs focus on managing vegetation that could obstruct access along the ROWs and/or has the potential to grow tall enough to interfere with the overhead lines, or otherwise violate minimum clearance requirements, causing a disruption in service.

IVM is defined as a system of managing plant communities in which managers set objectives; identify compatible and incompatible vegetation; consider action thresholds; and evaluate, select, and implement the most appropriate control methods to achieve those objectives[2] (Miller, 2007). IVM provides a proven range of techniques to manage ROW vegetation to conform to federal and regional standards for transmission line operation; accommodate the varying interests of

[1] National Grid's vegetation management program is defined in its *Right-of-Way Vegetation Management Plan*.

[2] Miller, Randall H. 2007. Best Management Practices: Integrated Vegetation Management. ANSI A300, Part 7: Tree, Shrub and Other woody Plant Care Maintenance-Standard Practices.

stakeholders along the ROW; minimize environmental effects; and balance cost considerations[3] (Ferrandiz, 2008).

In accordance with the primary objective of managing the ROWs to promote scrub-shrub habitats or other low-growth vegetation that will not interfere with the operation of the overhead transmission lines, various mechanisms have proven effective. For example, mechanical and chemical controls (i.e., mowing, hand cutting and herbicide application) are the direct techniques used to target vegetation that may impact the operation and safety of the transmission lines. However, ultimately the goal is to manage the upland and wetland vegetation within the ROWs using natural vegetative control. Natural control (i.e., the result of the conscientious, educated use of mechanical and chemical controls) is the process of working with the cycles of plant succession and interspecies competition to facilitate the spread and stabilization of native, early successional plant communities that discourage the establishment of taller woody vegetation[4] (Bramble et al. 1990).

Therefore, target undesirable vegetation such as trees and limbs, tall growing shrubs, vegetation growing around substations, structures, guy wires, access roads, gates, and anywhere vegetation impedes access to the ROW. Because of this IVM approach, ROWs are one of the primary remaining early successional ecological communities in New England. These dense, low growing plant communities help discourage the establishment of undesirable vegetation, do not hinder access to the ROWs, and do not generally interfere with the operation and maintenance of the transmission lines.

Plant species that are generally encouraged on the ROWs include herbaceous and shrub species and other vegetation that has a mature height of less than approximately 12 feet. These types of vegetative communities are generally compatible with ROW management objectives for maintaining safe clearances between conductors and vegetation. As a result of these ROW

---

[3] Ferrandiz, L.S. 2008. A Broad-Based, IVM Approach to Right-of-Way Management on Long Island, NY. In Proceeding of the Eighth International Symposium on Environmental Concerns in Rights-of-Way Management. (J. W. Goodrich, L. P. Abrahamson, J. L. Ballard, S. M. Tikalsky, Eds.). Electric Power Research Institute, Washington, D.C., pages 65-69.

[4] Bramble, W.C., W.R. Byrnes, and R.J. Hutnik. May 1990. Resistance of Plant Cover Types to Tree Seeding Invasion on an Electric Utility Transmission Right-of-Way. Journal of Arboriculture, 16(5); W.A. Neiring and R.H. Goodwin. 1974. Creation of Relatively Stable Shrublands with Herbicides: Arresting Succession on Rights-of-Way and Pastureland. Ecology, 55(4); F.E. Putz and C.D. Canham. Mechanisms of Arrested Succession in Shrublands: Root Comparison between Shrubs and Tree Seedlings. Ecology and Forest Management 49, April 1993.

vegetation management practices, most of the wetland habitats within the managed portions of the ROWs consist of scrub-shrub or emergent marsh.

4.2 Habitat Benefits of ROW Management

The management and maintenance of ROW creates early successional habitats dominated by scrub-shrub vegetation and open areas with dense grasses and other herbaceous vegetation. Many animal species use the habitats provided along the ROWs as their homes, feeding and breeding grounds, migration corridors or nurseries, and many plant species adapt to the growing conditions provided within the managed portions of the ROWs. The early successional landscape maintained within the ROWs, however, is not by nature stable; it is instead the sustained result of the IVM program National Grid established in the late 1980s.

The removal of the forested areas and subsequent maintenance of the ROW to promote scrub-shrub and emergent habitats to accommodate the Project will not result in a loss of overall wetland habitat, but rather will create a change in habitat type, from forested to scrub-shrub or emergent wetland.

Different types of successional communities have various benefits to flora and fauna. For example, a study in Massachusetts indicated an increase in wildlife use, notably avian species, following clearing of ROWs[5] (Nickerson and Thibodeau, 1984). This study attributed the increase in wildlife use to the conversion of forested areas into wetland and upland shrub and emergent plant communities.

Creating and maintaining additional shrub-land habitat along the ROWs, in many instances, represents a long-term positive effect on some species, since shrub-land habitat is otherwise declining in New England. This is important because land use trends suggest that this habitat type will continue to decline and ROWs will become increasingly significant[6]. This decline is a result of various factors (e.g., development, ecological succession, absence of fire). A managed

[5] Nickerson, N.H. and F.R. Thibodeau. 1984. Wetlands and Rights-of-way. Final report submitted to the New England Power Company, 25 Research Drive, Westboro, Massachusetts.

[6] Confer, J.L. 2003. The diversity and abundance of birds nesting under power lines of New England Electric System Companies and Eastern Utilities Associates.

transmission ROW is considered a major source of shrub-land habitat[7,8], in fact in the eastern United States, utilities maintain more acreage of managed shrub-lands on ROWs than all other sources of this habitat combined[9] (Saucier, 2003; Confer and Pascoe, 2003; Confer et al. 2004).

Other studies also have indicated that this change may be beneficial[10,11,12] (King et.al., 2009; Yahner et. Al., 2004; Bramble et. al. 1992). Scrub-shrub habitats within the ROW can provide wildlife habitat such as nesting for birds, browse for deer, and cover for small mammals[13] (Ballard et al., 2004). The establishment of low-growing species, i.e., grasses and forbs, is also a form of biological control that reduces the re-invasion of the ROW corridor by tree species[13] (Money, 2008). Some plant species also have the ability to inhibit the growth or invasion of other species which is referred to as allelopathy[14] (Money, 2008). Establishment of such dense shrub and herbaceous emergent plant communities that do not require continued disturbances for management activities may contribute to minimizing the spread of invasive species.

In this regard, some invasive plant communities have been shown to provide some beneficial effects such as breeding bird nesting habitat, cover for animals traversing the ROWs, food sources (fruit-bearing plants), buffers to sensitive areas (such as along riparian zones) and, in some instances, serve as a deterrent to unwarranted access (e.g., all-terrain vehicle use) along the ROWs due to the dense thickets and thorn-producing shrubs that may colonize certain areas. The eradication of invasive plants could, therefore, eliminate some of the beneficial uses on the

---

[7] Shrubland habitat information from "Wildlife Habitat in Connecticut: Shrubland", Laura Saucier, Habitat Management Program, in Connecticut Wildlife, July/August 2003.

[8] Confer, J.L. and S.M. Pascoe. 2003. Avian communities on utility rights-of-ways and other managed shrublands in the northeastern United States. Forest Ecology and Management 185:193-205.

[9] Confer, J.L., T. Hauck, M.E. Silvia, and V. Fray. 2004. Avian shrub land management and shrub land nesting success. In Proceeding of the Eighth International Symposium on Environmental Concerns in Rights-of-Way Management. (J. W. Goodrich, L. P. Abrahamson, J. L. Ballard, S. M. Tikalsky, Eds.). Electric Power Research Institute, Washington, D.C., pages 407-412.

[10] King, D.I., R.B. Chandler, J. Collins, W.R. Peterson, and T.E. Lautzenheiser. 2009. Effects of width edge and habitat on the abundance and nesting success of scrub-shrub birds on powerline corridors.

[11] Yahner, R.H., R.J. Hutnick, and R.J. Lisccinsky. 2004. Long-term trends in bird population on an electrical transmission right-of-way.

[12] Bramble, W.C., Yahner, R.H., and W.R. Byrnes. 1992. Nesting of breeding birds on an electric utility line right-of-way.

[13] Ballard, B.D., H.L. Whittier, and C.A. Nowak. 2004. Northeastern Shrubs and Short Tree Identification, A Guide for Right-of-way Vegetation Management. State University of New York-College of Environmental Science and Forestry.

[14] Money, Nelsen, R. 2008. Development of an Integrated Resource Management Strategy for Transmission Right-of-Way Corridors for Successful Implementation of Integrated Vegetation Management in California. In Proceeding of the Eighth International Symposium on Environmental Concerns in Rights-of-Way Management. (J. W. Goodrich, L. P. Abrahamson, J. L. Ballard, S. M. Tikalsky, Eds.). Electric Power Research Institute, Washington, D.C., pages 33-36.

ROWs. In addition continued regular treatment of invasive plants could inadvertently result in minimizing wildlife use of the ROWs through the frequency of human contact, removal of cover (albeit invasive), and reduction of food sources.

5.0 Invasive Species Management in Wetlands During Project Construction

During the construction of the Project, the Applicant will implement measures to control the spread of invasive plant communities during performance of construction activities and as a result of the movement of construction vehicles and equipment across wetlands along the Project ROWs. The main objectives will be to:

- Perform construction activities so as to minimize the spread of invasive plant species within wetlands or from wetland-to-wetland along the ROWs; and
- Restore wetlands affected by the Project promptly to limit the potential for invasive species to colonize disturbed soils.

5.1 Pre-Construction Phase Measures

As part of Project planning conducted to date, the Applicant has:

- Identified the invasive plant species of concern in wetlands along the ROWs.
- Determined the location of wetlands populated with invasive plant communities where specific construction BMPs should be used to target invasive species control.
- Developed Project-wide invasive species control BMPs to be implemented during construction. Such measures will typically include identifying the locations of wetlands containing invasive species on Project mapping provided to contractors, and also training construction workers in the BMPs required to avoid the spread of invasive wetland plants within the ROW. The BMPs also require cleaning of equipment after removal from wetlands with invasive species, prior to being redeployed to other wetlands.

Invasive species control requirements will be incorporated into construction contracts for the Project. Prior to construction, the Applicant will provide environmental training to the contractors, inspectors, and work crews responsible for implementing this WISCP. This training will also include an overview of the WISCP, a review of the ROW mapping, a discussion and listing of the target species and the known locations, ways to identify invasive plants in the field, and presentation of the BMPs to be implemented during construction in these areas.

5.2 Construction Phase Measures

During construction, the Applicant will reinforce to all Project construction personnel the importance of adherence to the WISCP and will require contractors to attend environmental training in an effort to promote a full understanding of the WISCP requirements applicable to the construction work. Further, Applicant's Project teams will include monitors, who will perform site inspections and will oversee the contractors' compliance with applicable federal, state, and local permit conditions, Project plans (including this WISCP), and National Grid policies and procedures.

Care and consideration will be taken during construction to prevent and/or reduce the introduction of, or the spread of target invasive species. Wetland invasive species control efforts will be important throughout the construction of the Project, but the focus of these efforts will be during the following construction phases, which will involve work directly in wetlands and thus will have the greatest potential for construction equipment to come into contact with invasive species:

- Clearing vegetation;
- Placing and removing swamp (timber) mats, corduroy roads, and other temporary access roads and work pads; and
- Moving equipment and vehicles through areas containing invasive species, such as for the installation, maintenance, and final removal of temporary soil erosion and sedimentation controls.

Other construction activities (e.g., foundation work, structure installation, conductor and wire stringing) typically will not require work outside of pre-established access roads and work pads. As a result, the equipment and vehicles involved in these activities will not come into contact with wetland soils or plant materials.

To control the spread of target wetland invasive plant species, the Applicant will require construction contractors to implement the procedures described below, as appropriate to the phase of construction that each contract will perform:

- All construction equipment, vehicles, and materials (e.g., equipment mats) must be clean and free of excess soil, debris, and vegetation before being mobilized to the Project ROWs.

- Swamp mats or equivalent (e.g., corduroy roads) will be used in wetlands during clearing operations to minimize spread of invasive species within a wetland by the clearing equipment itself.

- To minimize the potential for spreading invasive plant species from wetland-to-wetland along the ROW, any equipment working in or traversing a wetland containing invasive plant species will be cleaned prior to relocating to another work site. Cleaning of vehicles and other equipment (including the tracks and tires) will involve removal of visible dirt, debris and vegetation through the use of brooms, shovels, and, if needed, compressed air.

- Swamp mats or equivalent will be used at wetland crossings so construction vehicles that frequently travel along on-ROW access roads, such as pickups carrying personnel or material delivery trucks, can avoid direct wetland interaction.

- Mats used in wetlands containing invasive species will be cleaned prior to relocation to other work areas or wetlands. Cleaning of matting will involve dropping mats one on top of another to shake loose any sediment and debris. The matting will then be swept to remove loose soil and any plant material.

- Construction equipment and excavated soil material will be contained within the approved limits of work areas within the ROW; these limits of work will be defined on Project plans.

- Soils excavated from wetlands or riparian areas containing a predominance of target invasive plants will be stockpiled separately (to the extent that there is sufficient work space) and contained within staked bales, silt fence or other approved soil erosion and sedimentation control device to minimize the potential of spreading these soils elsewhere onto the ROW.

- Final restoration of the ROW will be performed in accordance with National Grid's Environmental Guidance Document *EG-303 – ROW Access, Maintenance and Construction Best Management Practices*.

As described previously, once construction is completed, National Grid's IVM programs may contribute to minimizing the spread of invasive species through the establishment of relatively stable, dense shrub and herbaceous plant communities. By implementing the pre-construction and construction-phase measures described above, in combination with these long-term IVM procedures, the introduction, spread, and increased risk of proliferation of invasive plant species in the Project area wetlands will be minimized.

ATTACHMENT 1

SUMMARY OF WETLANDS CONTAINING INVASIVE SPECIES

INTRODUCTION

As part of the Project planning process, National Grid commissioned field surveys to identify vegetative communities, including wetlands, along the Project transmission line ROWs. During the jurisdictional wetland delineations conducted as part of these surveys, information regarding the presence and relative abundance of invasive species in each wetland was documented.

Specifically, invasive species identified in wetlands were listed on the standard wetland delineation data forms. These data forms and associated representative photographs of the delineated wetlands are appended to the state-specific wetland and watercourse reports included in Appendix F of RIDEM Application to Alter.

Attachment 1 tabulates information regarding all the wetlands along the Project transmission line ROWs. This attachment consists of a table that identifies each wetland by Project-specific number and location (municipality), and list the wetland's classification, functions and values, principal overall vegetative species, and whether invasive plant species were identified in the wetland and, if so, the relative abundance of the invasive species found. The attachment includes all wetlands delineated within National Grid's ROWs along which the proposed 345-kV transmission lines will be located. However, not all of the wetlands listed will be affected by Project construction, operation, and maintenance.

The information regarding the location and abundance of invasive plant species in wetlands along the Project ROWs provides a baseline for planning construction activities to minimize the potential for spreading invasive species along the ROWs to other, non-infested wetlands. This information also illustrates the locations of high-quality wetlands (exhibiting high functions and values) where particular attention should be paid during construction to avoid the spread of invasive species.

Attachment 1
Summary of Existing Wetland Characteristics, including Invasive Species

Wetland No.	Wetland Classification Type	Wetland Functions / Values Rating	Principal Vegetative Species	Invasive Species Currently Present	Relative Abundance of Invasive Species within ROW (S/C/A/D)
W03PR164	PFO/PEM	Moderate	Gray birch, black gum, red maple, swamp azalea, sweet pepperbush, highbush blueberry, cattail, skunk cabbage.	N	
W03PR163	PFO/PEM	Moderate	Red maple, black gum, speckled alder, witch-hazel, sweet pepperbush, maleberry, gray birch, sensitive fern.	N	
W03PR162	PEM/PFO	Moderate	Red maple, gray birch, witch-hazel, highbush blueberry, sweet pepperbush, maleberry, steeplebush, woolgrass, tussock sedge.	N	
W03PR161	PFO	Moderate	Red maple, gray birch, witch-hazel, yellow birch, cinnamon fern, New York fern.	N	
W03PR160	PEM	Moderate	Red maple, steeplebush, gray birch, woolgrass, bentgrass.	N	
W03PR159	PFO	Moderate	Red oak, red maple, sweet pepperbush, highbush blueberry, swamp azalea.	N	
W03PR158	PEM/PFO	Moderate	Scarlett oak, red maple, witch-hazel, highbush blueberry, sweet pepperbush, maleberry, gray birch, goldenrod.	N	
W03PR157	PEM/PFO	Moderate	Witch-hazel, arrowwood, meadowsweet, goldenrod, cinnamon fern, dewberry.	N	
W03PR156	PFO	Moderate	Red maple, gray birch, sweet pepperbush, winterberry, highbush blueberry, dewberry, black gum.	N	
W03PR155	PFO	Moderate	Red maple, gray birch, sweet pepperbush, highbush blueberry,	N	
W03PR154	PEM	Moderate	Red maple, sweet pepperbush, steeplebush, sensitive fern, goldenrod, maleberry, witch-hazel, gray birch.	N	
W03PR153	PSS	Moderate	Highbush blueberry, maleberry, meadowsweet, steeplebush, witch-hazel.	N	
W03PR152	PEM	Moderate	Maleberry, witch-hazel, meadowsweet, steeplebush, sensitive fern, goldenrod, Joe-pye-weed, blackberry, sphagnum moss.	N	
W03PR151	PFO/PEM	Moderate	Sweet pepperbush, maleberry, goldenrod, cinnamon fern, dewberry.	N	
W03PR150	PFO/PEM	Moderate	Red oak, gray birch, witch-hazel, winterberry, sweet pepperbush, woolgrass, goldenrod, dewberry,	N	
W03PR149	PFO/PEM	Moderate	Yellow birch, red maple, hemlock, arrowwood, sweet pepperbush,	Buckthorn	C

Attachment 1
Summary of Existing Wetland Characteristics, including Invasive Species

Wetland No.	Wetland Classification Type	Wetland Functions / Values Rating	Principal Vegetative Species	Invasive Species Currently Present	Relative Abundance of Invasive Species within ROW (S/C/A/D)
			cinnamon fern, meadowsweet, buckthorn, sensitive fern.		
W03PR148	PFO/PEM	Moderate	Hemlock, red maple, sweet birch, maleberry, highbush blueberry, woolgrass, meadowsweet, steeplebush, sweet pepperbush, Sphagnum, sensitive fern.	N	
W03PR147	PFO	Moderate	Hemlock, red maple, sweet birch, maleberry, highbush blueberry.	N	
W03PR146	PFO/PEM	Moderate	Hemlock, Witch-hazel, gray birch, arrowwood, goldenrod. highbush blueberry.	N	
W03PR145	PFO	Moderate	Red maple, red oak, hemlock, cinnamon fern, winterberry, black gum.	N	
W03PR144	PFO	Moderate	Red maple, red oak, witch-hazel, highbush blueberry, swamp azalea, cinnamon fern, meadowsweet, steeplebush, goldenrod, bluejoint grass, sweet pepperbush.	N	
W03PR143	PFO/PEM	Moderate	Red maple, red oak, sweet pepperbush, witch-hazel, cinnamon fern, black gum, steeplebush, goldenrod, sensitive fern, cattail, sphagnum moss	N	
W03PR142	PFO/PEM	Moderate	Red oak, green ash, sweet pepperbush, witch-hazel, meadowsweet, steeplebush, sensitive fern, Joe-pye-weed, dewberry, greenbrier.	N	
W03PR141	PEM	Moderate	Red maple, sweet pepperbush, steeplebush, woolgrass, goldenrod, sphagnum moss, sheep laurel,	N	
W03PR140	PFO	Moderate	Red oak, green ash, red maple, black birch, winterberry, American hornbeam, Sphagnum moss.	N	
W03PR139	PEM	Moderate	Red maple, maleberry, sheep laurel, goldenrod, Joe-pye-weed, dewberry, fox grape	N	
W03PR138	PFO	Moderate	Red maple, red oak, green ash, winterberry, arrowwood, witch-hazel, steeplebush, sedge, cinnamon fern, greenbrier.	N	
W03PR137	PEM	High	Red maple, highbush blueberry, sweet pepperbush, cinnamon fern, greenbrier.	N	
W03PR136	PFO/PEM	Moderate	Red maple, red oak, white oak, witch-hazel, sweet pepperbush, highbush blueberry, cinnamon fern, arrowwood, sassafras, sensitive fern, cinnamon fern, Joe-pye-weed, fox grape,	N	

Attachment 1
Summary of Existing Wetland Characteristics, including Invasive Species

Wetland No.	Wetland Classification Type	Wetland Functions / Values Rating	Principal Vegetative Species	Invasive Species Currently Present	Relative Abundance of Invasive Species within ROW (S/C/A/D)
W03PR135	PFO	Moderate	Red maple, red oak, green ash, black gum, yellow birch, witch-hazel, sweet pepperbush, highbush blueberry, winterberry, spicebush, cinnamon fern	N	
W03PR134	PFO	Moderate	Red maple, red oak, yellow birch, highbush blueberry, withe-rod, hazelnut, winterberry, cinnamon fern, sphagnum moss, poison ivy, green ash,	N	
W03PR133	PFO	Moderate	Red maple, red oak, green ash, yellow birch, highbush blueberry, American hornbeam winterberry, sweet pepperbush, cinnamon fern, sphagnum moss.	N	
W03PR132	PFO/PEM	Moderate	Red maple, tulip tree, yellow birch, sweet pepperbush, maleberry, spicebush, witch-hazel, woolgrass, meadowsweet, steeplebush, goldenrod, cinnamon fern, dewberry.	N	
W03PR131	PFO/PEM	Moderate	Red maple, red oak, green ash, black gum, gray birch, sweet pepperbush, highbush blueberry, woolgrass, winterberry, spicebush, cinnamon fern, tussock sedge.	N	
W03PR130	PEM	Moderate	Meadowsweet, steeplebush, willow, cinnamon fern, woolgrass.	N	
W03PR129	PFO/PEM	Moderate	Red maple, gray birch, black birch, highbush blueberry, cinnamon fern, New York fern.	N	
W03PR128	PFO	Moderate	Red maple, black birch, black gum, green ash, white pine, yellow birch, speckled alder, sweet pepperbush, winterberry, spicebush, cinnamon fern.	N	
W03PR127	PFO/PEM	Moderate	Red maple, black gum, green ash, white pine, yellow birch, red oak, tulip tree, sweet pepperbush, winterberry, steeplebush, meadowsweet, highbush blueberry, New York fern, cinnamon fern.	N	
W03PR126	PSS/PFO	Moderate	sweet pepperbush, steeplebush, meadowsweet, blackberry, water horehound, panic grass, bluejoint grass, fox grape, dewberry, cranberry.	N	
W03PR125	PFO	Moderate	Red maple, green ash, highbush blueberry, sweet pepperbush, witch-hazel, steeplebush, bog muhly, panicgrass, Canadian rush, beggartick, woolgrass, dew berry.	N	

Attachment 1
Summary of Existing Wetland Characteristics, including Invasive Species

Wetland No.	Wetland Classification Type	Wetland Functions / Values Rating	Principal Vegetative Species	Invasive Species Currently Present	Relative Abundance of Invasive Species within ROW (S/C/A/D)
W03PR124	PFO	Moderate	Red maple, blackgum, green ash, red oak, witch-hazel, sheep laurel, cinnamon fern, highbush blueberry.	N	
W05PR002	PSS	High	Sweet pepperbush, multiflora rose, steeplebush, woolgrass, giant goldenrod, sensitive fern,	Multiflora rose	S
W03PR123	PFO	Moderate	Red maple, white oak, red oak, swamp azalea, winterberry, sweet pepperbush, highbush blueberry, steeplebush, sensitive fern, dewberry, bluejoint grass, goldenrod, flat-top goldentop, marsh fern, golden rod, water horehound, cinnamon fern, greenbrier,	N	
W03PR122	PFO/PEM	Moderate	Red maple, swamp azalea, highbush blueberry, winterberry.	N	
W05PR005	PFO	Low	Red maple, white pine, red oak, highbush blueberry, maleberry, witch-hazel.	N	
W03PR121	PFO	Moderate	Red maple, black birch, sweet pepperbush, witch-hazel, highbush blueberry,	N	
W03PR120	PFO	Moderate	Red maple, yellow birch, witch-hazel, sweet pepperbush.	N	
W03PR119	PSS	Moderate	Steeplebush, meadowsweet, sweet pepperbush, sheep laurel, dewberry, horehound.	N	
W03PR118	PSS	Moderate	Sweet pepperbush, highbush blueberry, maleberry, sheep laurel, woolgrass, dewberry,	N	
W03PR117	PEM	Moderate	Steeplebush, meadowsweet, sweet pepperbush, sensitive fern, dewberry, fox grape, sphagnum moss.	N	
W03PR116	PFO	Moderate	Red maple, gray birch, black birch, swamp azalea, sweet pepperbush.	N	
W03PR115	PFO	Moderate	Red maple, red oak, gray birch, highbush blueberry, winterberry, sweet pepperbush, witch-hazel.	N	
W03PR114	PFO/PEM	Moderate	Hemlock, red oak, red maple, highbush blueberry, sweet pepperbush, mountain laurel, sheep laurel, cinnamon fern, princess pine, goldthread.	N	
W03PR113	PEM	Moderate	Sheep laurel, steeplebush, dogwood, woolgrass, sedge, sensitive fern.	N	
W03PR112	PSS	Moderate	Red maple, white oak, gray birch, sheep laurel, winterberry, highbush blueberry, marsh fern.	N	

Attachment 1
Summary of Existing Wetland Characteristics, including Invasive Species

Wetland No.	Wetland Classification Type	Wetland Functions / Values Rating	Principal Vegetative Species	Invasive Species Currently Present	Relative Abundance of Invasive Species within ROW (S/C/A/D)
W03PR111	PFO	Moderate	Ash, white pine, highbush blueberry, arrowwood, Alder, multiflora rose, silky dogwood, sensitive fern, horehound.	multiflora rose	C
W03PR110	PFO/PEM	High	Hemlock, red maple, yellow birch, hornbeam, white pine, winterberry, highbush blueberry, sweet pepperbush, maleberry, steeplebush, tussock sedge, cinnamon fern, sensitive fern, cattail, woolgrass, skunk cabbage.	N	
W03PR109	PFO	High	Red maple, green ash, hemlock, winterberry, arrowwood, highbush blueberry, cattail, lurid sedge, soft rush, beggartick.	N	
W03PR108	PFO	High	Red maple, winterberry, arrowwood.	N	
W03PR106	PFO	Moderate	Red maple, green ash, white pine, winterberry, sweet pepperbush, steeplebush, cinnamon fern, sensitive fern, elderberry.	N	
W03PR107	PFO	Moderate	Red maple, black birch, winterberry, greenbrier, highbush blueberry.	N	
W03PR105	PSS/PEM	Moderate	Sweet pepperbush, dewberry, woolgrass, bluejoint grass.	N	
W03PR104	PFO/PSS	Moderate	Red maple, white pine, winterberry, dewberry, sphagnum moss.	N	
W03PR103	PFO	Moderate	Red maple, highbush blueberry, sphagnum moss.	N	
W03PR102	PFO	Moderate	Red maple, sweet pepperbush, maleberry, highbush blueberry, winterberry, cinnamon fern, goldthread.	N	
W03PR101	PEM	Moderate	Maleberry, highbush blueberry, willow, maleberry, steeplebush.	N	
W03PR100	PFO/PEM	Moderate	Red maple, white pine, speckled alder, winterberry, highbush blueberry, woolgrass, steeplebush, tussock sedge, goldthread, dewberry.	N	
W03PR099	PEM/PFO	High	Red maple, gray birch, silky dogwood, speckled alder, steeplebush, leather leaf, tussock sedge, Phragmites.	Phragmites	C
W03PR098	PEM	High	Speckled alder, willow.	N	
W03PR097	PFO/PEM	High	Speckled alder, willow, elderberry, steeplebush, cattail, reed canarygrass, purple loosestrife.	Reed canary grass, Purple loosestrife	C,C
W03PR097A	PFO/PEM	Low	Red maple, white pine, swamp white oak, sweet pepperbush, highbush blueberry, swamp azalea.	N	

Attachment 1
Summary of Existing Wetland Characteristics, including Invasive Species

Wetland No.	Wetland Classification Type	Wetland Functions / Values Rating	Principal Vegetative Species	Invasive Species Currently Present	Relative Abundance of Invasive Species within ROW (S/C/A/D)
W03PR098A	PFO	Low	Red maple, white pine, willow, witch-hazel, cinnamon fern, sensitive fern, horse tail, hayscented fern.	N	
W03PR099A	PFO	Low	Red maple, white pine, witch-hazel, cinnamon fern, sensitive fern, hayscented fern.	N	
W03PR096	PEM/PFO	High	Red maple, Phragmites, sweet pepperbush, winterberry, white pine, willow, speckled alder, and cinnamon fern, reed canary grass.	Phragmites, Reed canary grass.	C,C

1. Invasive wetland species are: *Phragmites* (common reed grass), purple loosestrife, tartarian honeysuckle, Japanese barberry, Japanese knotweed, buckthorn, multiflora rose, autumn olive, reed canary grass, privet (*Ligustrum*), and spurge.
2. The principal vegetation species listed for each wetland were compiled from the results of wetland delineations. Species listed in this table are those identified on the wetland delineation as abundant – moderate density in each wetland. However, any occurrence of an invasive species is identified; invasive species are assumed to be either abundant – moderate unless otherwise noted.
3. Wetland classification is based on the Cowardin et al. (1979) system. PFO = palustrine forested, PSS = palustrine shrub/scrub, PEM = palustrine emergent, POW = palustrine open water.
4. Relative abundance : S = Sparse (< 5 % total cover); C = Common (6 to 25 % total cover); A = (26 to 50 % total cover); Abundant D = Dominant (> 50 % total cover)