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Wetland Replication, Compensatory Storage, and Invasive Species Management Plans

0 Hudson Street
(Map 53, Lots 19, 20, 21)
Northborough, MA

Submitted to:
Northborough Conservation Commission
Northborough Town Hall
63 Main Street
Northborough, MA 01532

Prepared for:
Circle Assets, LLC
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Norse Environmental Services, Inc

1.0 Existing Conditions & Proposed Impacts

The property currently consists of vacant lots. A BVW system is located on site and is dominant in red maple, northern white oak, silky dogwood, sensitive fern, bittersweet and grape. The adjacent upland area is dominant in Japanese knotweed, bittersweet and northern white oak. The proposed project will result in approximately 520 sf of BVW alteration. The impact area is located between wetland flags A20-A23. Massachusetts Inland Wetland Replication Guidelines, March 1, 2002 states that wetland mitigation should involve reducing impacts to wetland resources through a three-step process:

1) Avoiding of BVW wetland impacts-

Due to lot size and wetland resources located on site, Buffer Zone of BVW impact is unavoidable; however, impacts to wetlands have been minimized to the greatest extent possible. Total avoidance was possible only with an extensively large amount of further impact to Riverfront Area.

2) Minimizing necessary impacts as much as possible-

The minimization of wetland impacts was performed by the reduction of each duplex size and location.

3) Replicating losses that cannot be avoided-

The project will impact approximately 520 square feet of BVW. Under this replication plan the project proposes a replication area of 800 square feet (1.5:1 ratio) as mitigation. The replication area is proposed directly adjacent to the impacted area. This replication plan was designed in accordance with the DEP "Massachusetts Wetland Replication Guidelines," dated March 2002.

2.0 Impact Area

The impact area is located between wetland flags A20-A23 in the northwest section of the parcel. The impact area is part of a scrub/shrub wetland system (see **Photo 1**). The wetland system is dominant in red maple, northern white oak, silky dogwood, sensitive fern, bittersweet and grape. Soils within the BVW consist of an O horizon of a 10YR2/1 at depth 1-12" with oxidized rhizospheres at 1" and a C horizon at a depth of 12-20" of a 10Y5/3 with mottles at 10YR5/6. Water was found at 12". Soils within the larger wetland and the impact area are classified by Natural Resource Conservation Service (NRCS) as Walpole Sandy Loam.



Photo 1: BVW impact area (2/12/19)

3.0 Function and Values of the Wetland and Proposed Wetland Replication Area

GROUNDWATER RECHARGE/DISCHARGE

The area seasonally holds surface water and acts as an area of storage and filtration of groundwater. The replication area will be hydrologically connected to existing BVW but at the same relative elevation and have similar topography.

FLOODFLOW ALTERATION

The BVW seasonally holds surface water and periodically retains flood water during precipitation events helping reduce potential for flood damage. The replication area will have similar topography and elevation as the adjacent BVW and an equal surface area available for water storage and flood damage prevention.

FISH AND SHELLFISH HABITAT

The BVW impact area and the adjacent BVW areas are part of a scrub shrub wetland system, and although the area seasonally floods, there is no open water which could serve as and sustain fish and shellfish habitat.

SEDIMENT/TOXICANT/PATHOGEN RETENTION

The area seasonally holds surface water and acts as an area of storage and filtration of groundwater. The seasonal ponding and slow-moving water allow suspended sediment particles to settle out of the water helping remove sediments, nutrients and pollutants. The replication area will have similar topography as the adjacent BVW and an equal surface area available for water storage, flood damage prevention, and sediment filtration. The selected vegetation will be similar to the existing cover within the existing BVW which will aid in nutrient and pollutant filtration.

NUTRIENT REMOVAL/RETENTION/TRANSFORMATION

The area seasonally holds surface water and acts as an area of storage and filtration of groundwater. The existing wetland plant community will continue to filter nutrients and retain surface and ground water. The replication area has been designed at a similar topography with similar vegetation in order to reproduce the nutrient removal and retention capacity of the existing BVW system on site.

PRODUCTION EXPORT (Nutrient)

The BVW onsite consists of a freshwater scrub shrub wetland with several shrubs that produce food (berries and seeds) for existing wildlife. These species of shrubs will remain in the un-impacted section of the wetland system. The wetland mitigation area will also be planted with these species so that the mitigated wetland areas will also provide this important wetland resource function.

SEDIMENT/SHORELINE STABILIZATION

The BVW seasonally holds surface water, ground water and flood water during storm events. Since the mitigation area will have twice the amount of surface area of the proposed impact area this additional area will aid in the prevention of flood damage and flood erosion on and off the site for both down-stream fresh water systems and water moving through these systems to the Cape Cod and Buzzards Bay shoreline.

WILDLIFE HABITAT

The site is not located within NHESP Priority Habitat. Existing wildlife habitat within the proposed Impact Area consists of: shelter, food, aestivation, hibernation and migratory opportunities. These habitat characteristics are provided by the presence of: fruiting shrubs, dense shrub thickets, a diverse herbaceous layer, rotting logs, and woody debris. These habitat features are common and present within both the adjacent wetland and upland areas on-site. These existing wetland habitat characteristics will remain in the un-impacted wetland area and will be replicated to the greatest extent practicable under this Replication Plan so that none of the current wildlife habitat features will be lost.

4.0 Proposed Replication Area

The proposed replication area will be located along wetland flags A15-A20 (see **Photo 2**). The replication area was selected due to its relative location and topography; which is similar to the adjacent wetland and wetland impact area. The replication area has Japanese Knotweed, bittersweet and northern white oaks. Soils consisted of 0-14" of 10YR2/2 silty loam and 14-20" of 10YR5/3 loam with 10YR5/6 mottles. Water was found at 16". The replacement area will have an unrestricted hydraulic connection to the same wetland system as the lost area. The replacement area connects to the same delineated BVW system as the lost area. The replication area will be created by excavating down to hydric soils and/or soils with strong redoximorphic features (i.e. mottles, presence of free water). The area will then be backfilled with organic soil from an outside source.



Photo 2: Proposed replication area (2/12/19)

4.1 Planting Selection

The vegetation selected for the replication area includes species that are native to the site and are also located within the adjacent wetland. Shrubs will be planted 8-10 feet on center unless the qualified wetland scientist in the field recommends otherwise. The vegetation selected for the restoration area includes species that are native to the site and are also located within the adjacent BVW. Precise placement of plants may be determined by the wetland scientist in the field prior to installation. All plants shall be distributed randomly throughout the area.

Trees:

- 2 Red Maples (*Acer rubrum*)(5-foot high)

Shrubs:

- 3 Sweet pepperbush (*Clethra alnifolia*)(one gal.pot)
- 3 Highbush blueberry (*Vaccinium corymbosum*)(one gal.pot)
- 7 Silky dogwood (*Cornus amomum*)(one gal.pot)

Ground Cover

- 15 Cinnamon fern (*Osmundastrum cinnamomeum*)
- 1lb, ERNST Seeds FACW Meadow Mix

4.2 General Installation Procedures

Supervision: A wetland scientist (with 2-years of experience in wetland replication construction) shall be on-site to monitor construction of the mitigation areas to ensure compliance with the mitigation plan and to make adjustments when appropriate to meet mitigation goals. The supervisor shall submit installation report to Northborough Conservation Commission as described below. Reports shall contain details of all work performed and photographs of completed conditions.

Timing: Replication construction should commence in the same season as the filling of the impacted wetland. The installation of plantings for replication area shall be accomplished during the growing season between April 16 and May 31 or between September 16 and October 30. Construction of the replication area can be accomplished outside the growing season if necessary, however stabilization measures may be required until the area is planted.

Step 1: Stake limits of work & install ECB. Stake out limits of all work for replication area. Erosion control barriers shall then be installed in the form of staked siltation fence and mulch sock (or similar invasive-free barrier) shall be placed at the limit of work for the replication area. **Erosion Controls removal deadline:** Temporary devices and structures to control erosion and sedimentation in and around mitigation sites will be kept in place until the replication area is stabilized, and shall be properly disposed of as soon as the site is stable. Sediment collected by these devices will be removed and placed upland in a manner that prevents its erosion and transport to a waterway or wetland.

Step 2: Remove trees and vegetation. Remove necessary vegetation for work and the construction of the replication area and access impact area.

Step 3: Excavation of replication Area. Prior to any soil excavation, a storage area for soil and leaf litter shall be prepared; soil shall not be stored in buffer zone. Topsoil, leaf litter, and subsoil shall be stockpiled separately. An excavator shall remove existing soils up to the edge of the staked replication area boundary, to a depth at which redoximorphic features become visible at the soil surface and/or 6-12 inches below proposed final grade.

Step 4: Excavation of impact area. An excavator shall remove existing organic soils up to the edge of the staked fill area boundary. Excavated organic soils from fill areas will be removed off-site due to invasive species seeds. Organic soil for the replication area will be supplied from an outside source. These supplemental soils will be uncontaminated and have an organic content of between 12-20%. A wetland scientist shall evaluate and confirm the cleanliness and organic content of the replication area soils.

Step 5: Final grading of replication area. Following excavation work, final grading and seeding should be completed as soon as possible to minimize erosion. Organic topsoil with an organic content of 12-20% shall be placed within the replication area to a depth even with the surrounding, existing wetland and in correlation with the proposed elevation on design plan.

Final elevation will be determined by the supervising wetland scientist while in the field during construction. Hummocks will be created atop final grade to mirror those of adjacent wetland.

Step 6: Add woody debris and rocks. Prior to planting, woody debris of various sizes and rocks shall be added to the replication area as to cover at least 4% of the ground throughout the mitigation area. These materials shall not include invasive species.

Step 7: Planting. The vegetation selected for the replication areas includes species that are native to the site. Precise citing of plants may be determined by the wetland scientist in the field prior to installation. All plants shall be distributed randomly throughout the area with shrubs spaced at 8'-10' on center, and herbaceous species 3' or less on center. Leaf litter shall be spread throughout area if available. All plants will have its roots thoroughly watered prior to backfilling with soil, and a soil saucer/berm constructed around trees and shrubs to retain water. Once all work is complete an erosion control barrier will be installed to enclose the replication area around trees and shrubs to retain water. Leaf litter shall be spread throughout area. Wetland seed mix consisting of ERNST FACW Meadow Mix or similar shall be scattered evenly by hand throughout the replication area.

Step 8: Replication Monitoring

a. **Seasonal monitoring reports** shall be prepared for the replication area by a qualified wetland scientist for a period of 2 additional years after installation. This monitoring program will consist of early summer and early fall inspections, and will include photographs and details about the vitality of the replication area. The replication area shall be monitored for invasive species during construction and during the post-construction monitoring period, by a qualified wetland scientist. If invasive species are observed, they will be addressed immediately through mechanical control methods involving hand-cutting and hand-removal of established species. Any removed species should be properly disposed of as well. Results of invasive species monitoring, and control measures will be reported as part of the yearly monitoring reports that will be required for the wetland mitigation areas. Monitoring reports shall be submitted to the Conservation Commission by December 30th of each year. Monitoring reports shall describe, using narratives, plans, and color photographs, the physical characteristics of the replication area with respect to stability, soil characteristics, survival of vegetation and plant mortality, aerial extent and distribution, species diversity and vertical stratification (i.e. herb, shrub and tree layers).

b. **At least 75% of the surface area** of the replication area shall be re-established with indigenous plant species within two growing seasons. If the replication area does not meet the 75% re-vegetation requirement by the end of the second growing season, after installation, the Applicant shall submit a remediation plan to the Conservation Commission for approval so that the replication area will achieve the 75% re-surfacing area goals.

Step 9: As-built Survey Upon meeting the criteria for 75% cover of indigenous species after two growing seasons, the replication areas will be surveyed for as-built conditions. The as-built

plan will be submitted to the Conservation Commission along with a request for a Certificate of Compliance.

5.0 Proposed Compensatory Storage

Pre-Construction meeting: Prior to the commencement of work, the site contractor shall meet with the supervising wetland scientist. Meeting shall explain how compensatory work shall be conducted to limit disturbance of natural woody vegetation.

Supervision: A wetland scientist shall monitor construction activities within the compensatory storage mitigation areas to ensure compliance with the mitigation plan and to make adjustments when appropriate to meet mitigation goals.

Step 1: Stake limits of work & install ECB. Stake out limits of all work for replication area. Erosion control barriers shall then be installed in the form of staked siltation fence and mulch sock (or similar invasive-free barrier) shall be placed at the limit of work for the replication area.

Erosion Controls Removal deadline. Temporary devices and structures to control erosion and sedimentation in and around mitigation sites will be kept in place until the replication area is stabilized, and shall be properly disposed of as soon as the site is stable. Sediment collected by these devices will be removed and placed upland in a manner that prevents its erosion and transport to a waterway or wetland.

Step 2: Excavate compensatory storage. Complete regrading required for compensatory storage. All graded areas should have 4" of top soil after grading is completed.

Step 3: Stabilize and seed compensatory storage. All areas of compensatory storage shall be seeded and then mulched with weed free straw. Ground surface shall result in a minimum of 90% ground cover. The seeding rate should follow manufacturers requirements. Seed mix shall be ERNST *PA New England Province Riparian Mix* or other seedmix approved by the Commission.

Step 4: As-built Survey.

Once grading is completed, the compensatory areas will be surveyed for as-built conditions. The as-built plan will be submitted to the Conservation Commission along with a request for a Certificate of Compliance.

6.0 Proposed Invasive Species Management Plan

6.1 Introduction

The purpose of this Invasive Species Management Plan (ISMP) is to restore natural riverfront and buffer zone from a nearly 100% invasive species cover to naturalized areas. This ISMP outlines the procedure for managing and the removal of invasive species within the Riverfront, Buffer Zone, and bordering vegetated wetlands (BVW) showed on the site plans (Map 53, Lot 19, 20, 21). Work will be performed in compliance with the Wetlands Protection Act and the Northborough Wetlands Protection Bylaws and Regulations.

6.2 Goals of the Invasive Species Management Plan

The primary goal of this ISMP is to eradicate, to the greatest extent practicable, the invasive plant species and in particular Japanese knotweed within the Management Area.

6.2.1 Location of the Planned Management Area

This ISMP specifies a portion of the area known as 0 Hudson Street, Northborough, MA (Map 53, Lot 19, 20, 21). This area is shown in **Figure 1** and also shown on the existing conditions plan in the NOI plans titled, *Existing Conditions Plan of 0 Hudson Street in Northborough, MA* (3 sheets), Connorstone Engineering, 12/24/2020

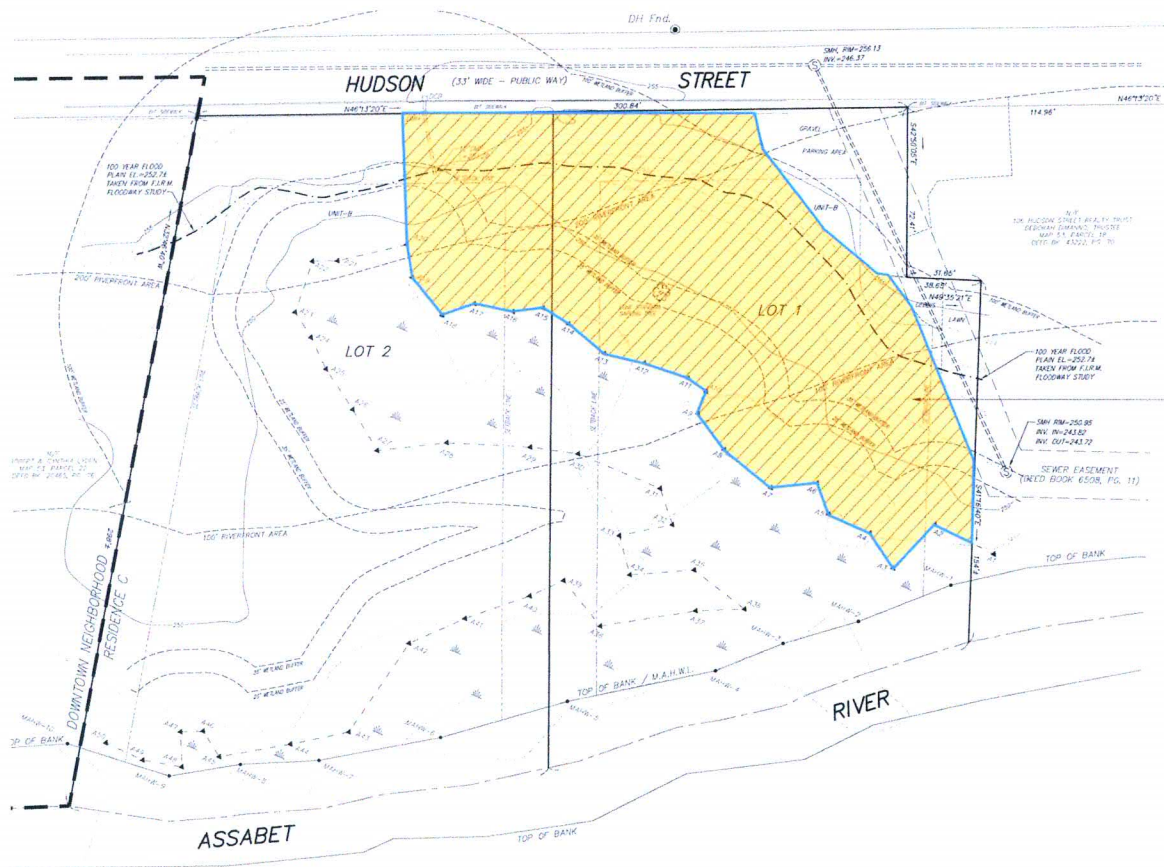


Figure 1: Invasive Species Management Zone (22,218 SF)

6.3 Protection Zones

The Riverfront and BVW is under the jurisdiction of both the MA WPA and the Northborough Wetlands Protection Bylaw. The site as shown on the existing conditions plan has a considerable amount of invasive plant species, particularly Japanese knotweed.

In order to protect the BVW, the following is recommended as regards to treatment within the Riverfront, Buffer Zone and edges of the BVW.

- a. Soils will be removed from the site to prevent future growth of invasive Japanese knotweed. This initial disturbance will significantly decrease the chances of regrowth and future eradication efforts. Soil amendments will be spread across the area to provide adequate growing mediums for upland plantings and seed mixes.
- b. Herbicide treatment will be limited to the regrowth of Japanese knotweed and woody invasive species that emerge after the initial soil removal and amendment effort.
- c. A licensed herbicide applicator chosen by the applicant and approved by the Northborough Conservation Commission shall perform all chemical treatments within the Riverfront Area and BVW.
- d. Chemical treatment should occur between early summer and late in the growing season but prior to plant senescence, or following the manufacturer's instructions regarding the species of plant and its responsiveness. Initial removal of vegetation and soils should occur before seed production.
- e. Foliar spray shall be used on new growth of Japanese Knotweed.
- f. A qualified professional should submit a brief annual report to the Northborough Conservation Commission during implementation of the ISMP. This report should document the results of management efforts, including methods, and temporal changes in the cover percentage of invasive plant species to ensure that the current methods are effective and to provide suggestions for adaptive management actions.

6.4 Methods of Invasive Species Management

Invasive species management will involve mechanical control methods and chemical control methods. The method chosen for a given vegetation management problem will attempt to achieve a long-term, low-maintenance invasive species management program through the encouragement of a stable native plant community. Vegetation management includes: invasive plant and top-soil removal, top-soil amendments, native species planting. Removal of trees isn't proposed.

The implementation of the ISMP by the owner shall commence upon the approval of the ISMP by the Northborough Conservation Commission and shall terminate on the two (2) year anniversary of said approval.

During the ISMP program, special care must be taken to prevent invasive species from expanding into the Riverfront, BVW and Buffer Zone area. Species such as:

1. Japanese knotweed (*Fallopia japonica*)

These species are already present on site and will be discouraged from expanding by mechanical and chemical methods listed above. Any proposed chemical management within the Riverfront or Buffer Zone must be performed per the regulations and following the manufacturer instructions.

The focus for the first two years will be the removal and prevention of re-sprouting of mature invasive species by removing the invasive vegetation and top-soil within the ISMP zone,

providing soil amendments, planting native species, and foliar spraying the regrowth of any invasive plant. The next four years of management will be focused on the continued removal and prevention through the encouragement of native plant growth and foliar spraying invasive sprouts with herbicide.

6.4.1 Specific Treatment Recommendations

- 1) Japanese knotweed (*Fallopia japonica*), other woody invasive species.
 - i) Remove invasive plants and top-soils within the ISMP zone. This will remove the root systems and seed bank of the Japanese knotweed.
 - ii) Removal from site only under Mass State laws to approved recycling sites.
 - iii) Amend the area with new top-soil, free of any invasive root systems or seeds.
 - iv) Plant native vegetation and seed mixes throughout the area.
 - v) Treat new growth with foliar herbicide spray.

6.5 ISMP Planting Plan

See **Table 1** for a list of the plants that will be installed in the ISMP area. The seed mix will be spread after the first treatment of the year. During the fall of the first year, shrubs will be planted.

Table 1: ISMP Planting Plan

Seed Mix			
ERNST Seeds FACW Meadow Mix or equivalent*	10 lbs (each application)		
Common Name	Scientific Name	Number	Size
Shrubs (n= 100)*			
Sweet Pepperbush (FAC+)	<i>Clethra alnifolia</i>	20	3 Gal. pot
Witch Hazel (FACU)	<i>Hamamelis virginiana</i>	20	3 Gal. pot
Alternate-leaved Dogwood (UPL)	<i>Cornus alternifolia</i>	20	3 Gal. pot
Silky Dogwood (FACW)	<i>Cornus amomum</i>	20	3 Gal. pot
Black Chokeberry (FAC)	<i>Aronia/Photinia melanocarpa</i>	20	3 Gal. pot

*Planting species and seed mixes may be substituted with Conservation Commission approval with similar native species with the same indicator status if certain species are unavailable.

6.7 ISMP management time

The management time frame will commence from the date the first invasive species removal work is completed. The annual monitoring report will review what was performed that year, what removal techniques were effective to reduce invasive plant species populations, and what removal techniques will be reused and which will be discarded for a more effective technique. The goal is that in 2 years, there will be a dominance of varied native plant species on site and the elimination of the invasive species that are currently within the Invasive Species Management Zone. The monitoring report will be sent to the Northborough Conservation Commission.

7.0 Conclusion

The project and proposed wetland impacts have been minimized to the greatest extent practicable. The mitigation measures that were described throughout this report were designed to improve the wetland resource areas throughout the site. The project design also satisfies all state and federal statutory interests and performance standards.

Please feel free to contact us if you have any questions.



Steve Eriksen
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