US 202/NH 123 RECONSTRUCTION
NHDOT PROJECT 12915
PETERBOROUGH, NH

2008 WETLAND MITIGATION MONITORING REPORT

US ACOE 404 PERMIT NO. NAE-2004-1169
NHDES WETLANDS PERMIT NO. 2002-00899

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November 26, 2008

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1.0 INTRODUCTION

The New Hampshire Department of Transportation (NHDOT) received an Army Corps of Engineers (ACOE) permit pursuant to Section 404 of the Clean Water Act, as well as a Standard Dredge and Fill Permit under the New Hampshire Wetland Regulations (RSA 482-A) for approximately 3.45 acres of wetland impact resulting from the US Route 202/NH Route 123 improvement project ("the Project"). The project involved the widening of approximately 2 miles of US Route 202/NH Route 123 in Peterborough, New Hampshire. As compensation for the 3.45 acres of wetland impact, a 3.10-acre wetland mitigation site was created on a 12-acre parcel along the Contoocook River in Peterborough. The wetland mitigation site, along with the remainder of the 12-acre parcel was placed under a conservation easement. A Site Locus Map, showing the approximate location of the mitigation site is included as Figure 1.

This mitigation monitoring report is required in the permit conditions for the project (refer to Appendix A) and is also identified as a required task in the Wetland Mitigation Report, dated June 2002. Section 11.0 of that report requires the establishment and monitoring of vegetation plots, photo-documentation of the site conditions, and the collection of well data from eight monitoring wells.

The wetland mitigation site was constructed in July 2006. This monitoring report documents site conditions after the second full growing season (2008). It is the second of two annual reports that have been prepared for the mitigation site.

The purpose of this report is to provide documentation of site conditions to demonstrate compliance with the 2002 Wetland Mitigation Report and Site Plans. In addition, there are five success standards established by the ACOE for mitigation sites that include the following:

1.) Is the proposed hydrology met at the site? What percentage of the site is meeting projected hydrology levels?
2.) Are the proposed vegetation diversity and/or density goals for woody plants met?
3.) Does the mitigation site have at least 80% areal cover, excluding planned open water areas or planned bare soil area (such as for turtle nesting), by noninvasive species? Do planned emergent areas have at least 80% cover by noninvasive hydrophytes? Do planned scrub-shrub and forested cover types have at least 60% cover by noninvasive hydrophytes, of which at least 15% are woody species?
4.) Are common reed (*Phragmites australis*), purple loosestrife (*Lythrum salicaria*), Russian and autumn olive (*Elaeagnus* spp.), buckthorn (*Rhamnus* spp.), Japanese knotweed (*Polygonum cuspidatum*), and/or multiflora rose (*Rosa multiflora*) plants at the mitigation site being controlled?
5.) Are all slopes, soils, substrates, and constructed features within and adjacent to the mitigation site stable?

Quantitative data for this report were collected and site observations were made to serve as the basis for an assessment of achievement of the success standards. The following data have been compiled:

- Groundwater levels in eight monitoring wells located in and adjacent to the mitigation site were measured throughout the 2008 growing season. Two of these monitoring wells were installed after the mitigation site was constructed. An additional six shallow monitoring wells were installed in April 2008 to obtain additional information on groundwater levels in the mitigation site.
- Vegetation monitoring plot data were collected in October 2008;
- Soil test pits were dug and the soils were evaluated in October 2008.

This report provides a discussion of conditions at the mitigation site at the end of the 2008 growing season. Site plans, photographs, plant species lists, and hydrologic data are provided in appendices to this report.

2.0 MITIGATION WETLAND DESIGN GOALS

The wetland mitigation site was designed and created to compensate for the wetland impacts resulting from the Project after avoidance and minimization measures were incorporated. As stated in the 2002 Wetland Mitigation Report, the principal function of the impacted wetlands was sediment and toxicant retention. As a result, the intended goal of the mitigation site is to provide sediment and toxicant retention, as well as wildlife habitat and flood storage. The mitigation site is located in the Contoocook River watershed, which is the same as the wetlands which were impacted by the Project.

3.0 DESIGN

The wetland mitigation site was designed to include emergent, scrub-shrub, and forested wetland areas. In addition, a forested upland buffer surrounding the wetland was included in the design. Table 3-1 includes the approximate areas of each proposed wetland type. The locations of the proposed cover types are shown in Figure 2.

Table 3-1: Summary of Proposed Wetland Types

Cover Type	Area (acres)	Area (hectares)
Emergent – shallow marsh	0.08	0.033
Emergent – pit and mound	1.85	0.749
Scrub-Shrub	0.64	0.259
Forested	0.53	0.215
Total Wetland Area	**3.10**	**1.256**

The eastern portion of the emergent wetland area was designed to include vegetation soil blocks that were transplanted from impacted wetlands. Prior to construction of the project, the wetlands within the proposed impact area were reviewed to determine which areas could serve as sources of the vegetation blocks. Wetlands that were free of invasive species were identified as source areas. The mitigation site was designed so that the blocks would be randomly spaced throughout the eastern portion of the mitigation site.

4.0 CONSTRUCTION AND POST-CONSTRUCTION MONITORING

The wetland mitigation site was constructed in July 2006. Follow-up site visits were conducted by the ACOE after construction was completed and in October 2007 at the end of the first full growing season.

During mitigation site construction, sand and gravel fill in the area was removed and the site was excavated to subgrades. Once subgrades were established, wetland topsoil was brought in and applied at approximately 12 inches thick. Wetland topsoil was obtained from impacted wetlands within the project area.

Wetland vegetation soil blocks were used in the eastern portion of the mitigation site. The vegetation blocks were transplanted from the project's impacted wetlands. Source areas were reviewed prior to transplanting and wetlands that did not contain invasive plants were used. The vegetation blocks were generally 2.5 feet wide, 4 feet long, and 1.5 feet thick.

After the wetland topsoil and vegetation blocks were placed, the mitigation site was seeded with a wetland seed mix. Four different seed mixes were used throughout the site, including an emergent marsh mix, a scrub-shrub mix, a shrub/forested mix, and an upland slope mix. The compositions of each seed mix, as listed in the construction specifications, are included in Appendix B.

4.1 Vegetation Monitoring

Vegetation sampling for the mitigation site was based on a random sampling strategy and data specific to each plant community were collected. Vegetation monitoring plots were randomly selected within each proposed plant community type. The locations of the plots were staked during the 2007 vegetation monitoring to ensure that the same areas were sampled during the 2008 vegetation monitoring. A total of five data plots were established, including two in the emergent wetland, one in the scrub-shrub wetland, one in the forested wetland, and one in the upland buffer.

Vegetation plots were nested and included 0.1 square meter for herbaceous density, 1 square meter for herbaceous species percent cover, and a 4.5 meter radius for woody vegetation. Woody vegetation density was examined in the 1 square meter plot as well. Vegetation data from each plot included total coverage within the plot, individual species cover, and density. Plant density identifies the number of each species occurring in each plot, while percent cover

refers to an estimate of the percent cover for each species and/or the percent of bare ground within a plot. The results of the vegetation plot data collection are provided in Appendix C and summarized in the discussion for each vegetation plot.

Vegetation monitoring plots provided quantitative data, while a qualitative assessment of the site was used to judge issues such as overall health and survival of plant species, presence of volunteer species, and other features such as evidence of wildlife use of the site. Vegetation plot sampling data are provided in Appendix C.

4.2 Photographic documentation

Four photo stations were established at the mitigation site to provide consistent photo documentation. Figure 2 shows the approximate locations of the four photo stations in the mitigation site. Photographs taken in October 2007 and October 2008 are included in Appendix D.

4.3 Soil development

The development of wetland soils at the mitigation site was documented by collecting soil data near each vegetation monitoring plot. Soil colors, texture, redoximorphic features, and amount of saturation were recorded for each site. Soil data collected at the end of the second growing season (October 2008) are documented in Section 5.4.

4.4 Hydrology

Hydrologic data were collected periodically throughout the 2008 growing season from the eight monitoring wells located at the mitigation site. Two of these wells were installed after construction in 2006 and are located at the edge of the mitigation site. In April 2008, six addition shallow monitoring wells were installed. Five of these wells are located in the wetland mitigation site and one well (reference well) is located in an adjacent wetland. A graph detailing site hydrology is included in Section 5.5. Monthly rainfall data collected by the National Weather Service are included in and discussed in Section 5.5.

5.0 MONITORING RESULTS

5.1 Site Description

The wetland mitigation site is located on a 12-acre parcel of land along the Contoocook River in Peterborough, New Hampshire. The total wetland creation area is approximately 3.1 acres, with the remaining 8.9 acres consisting of multiple-use recreation and preservation land. The recreation and preservation land includes forested wetland and upland areas.

The wetland creation site was constructed in July 2006. The creation site was designed to include emergent, scrub-shrub, and forested areas. The site is fed by both groundwater and periodic flooding from the Contoocook River.

5.2 Construction Issues and Mitigative Measures

The mitigation site was constructed in July 2006. There were no major issues with site construction. The proposed grades were reviewed during construction to determine if they should be raised or lowered. A meeting was held to review site conditions. It was determined that the proposed grades would provide adequate hydrology and they were not changed.

5.3 Vegetation Analysis and Site Conditions

Vegetation monitoring plots were sampled on October 2, 2008. A total of five randomly-selected monitoring plots had been established throughout the site in 2007 (refer to Figure 2). Two plots are located in the proposed palustrine emergent (PEM) wetland area, one plot is located in the proposed palustrine scrub-shrub (PSS) wetland area, one plot is located in the proposed palustrine forested (PFO) wetland area, and one plot is located in the proposed upland buffer area.

Total coverage of wetland species reported is the sum of the percent coverage of each species observed in a one meter square plot and therefore may be greater than 100% due to the overlapping of plants. Table 5-1 provides a summary of the total coverage of wetland species, exclusive of invasive species, for each vegetation plot.

Table 5-1: Summary of Vegetation Cover

Vegetation Plot	Proposed Cover Type	Existing Cover Type	Total Wetland Vegetation Coverage (excluding invasive species)
1	PEM	PEM	132.5%
2	PEM	PEM	79.5%
3	PSS	PEM	96%
4	PFO	PEM	145.5%
5	Upland buffer	Upland buffer	28.5%

Common species at vegetation plots 1, 2, 3, and 4 included soft rush (*Juncus effusus*), toad rush (*Juncus bufonius*), creeping bentgrass (*Agrostis stolonifera*), crowned beggarticks (*Bidens coronata*), Canada rush (*Juncus canadensis*), lurid sedge (*Carex lurida*), and broom sedge (*Carex scoparia*). Common species at vegetation plot 5 included bentgrass, crowned beggarticks, and common cinquefoil (*Potentilla simplex*).

Several tree and shrub seedlings were noted in the vegetation plots. Species included red maple (*Acer rubrum*), speckled alder (*Alnus rugosa*), dogwood (*Cornus* spp.), and birch (*Betula* spp.). The majority of the tree species appeared to be in good condition, however they were generally small since they are either volunteer species or have germinated from the wetland seed mix. The

alder seedlings were the largest, with several over 12 inches in height. The dogwood, birch, and red maple seedlings were generally less than 6 inches in height.

5.4 Soils

Table 5-2 provides soil data from the test pits completed at the end of the second full growing season (October 2008). In general, the soil consisted of sandy loam. All of the test pits were saturated within the upper 24 inches with the exception of Plots 4 and 5. The upland buffer test pit (Plot 5) could not be sampled below 5 inches due to rock and gravel.

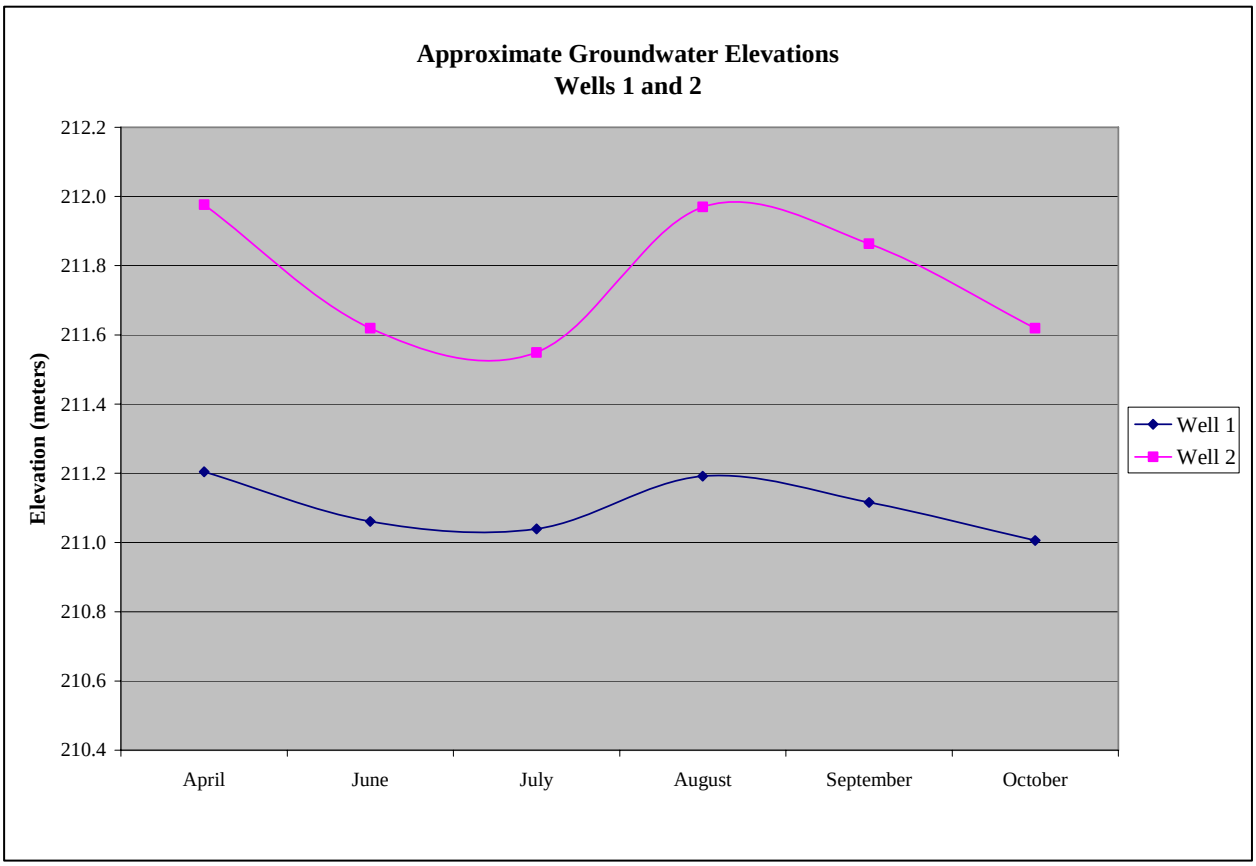
Table 5-2: Second Year Soil Properties

	HORIZON	DEPTH (inches)	COLOR	TEXTURE	COMMENTS
PLOT 1	A	0-16	10 YR 3/2, 2.5 Y 5/4 , (mixed) 2.5 Y 3/1	Sandy loam	16-18" gravel, saturated at 16" below surface
	B	16-24	Gravel, 10 YR 2/2	Loam	
PLOT 2	A	0-10	10 YR 3/1 with 7.5 YR 5/6 redox. features (2%)	Sandy loam with gravel	Soil damp, saturated at 8" below surface
PLOT 3	A	0-14	7.5 YR 2.5/2	Sandy loam	Saturated at 22" below surface
	B	14-24	10 YR 5/6 and 7.5 YR 5/8 (mixed)	Silty loam	
PLOT 4	A	0-16	10 YR 3/2 and 10 YR 3/3 (mixed)	Loam	Soil damp 20" below surface
	B	16-20	10 YR 5/6	Sandy loam (fine)	
		20-24+	10 YR 4/2	Sandy loam (fine)	
PLOT 5	A	0-5	10 YR 3/3	Loam	Could not be sampled below 5" due to gravel

5.5 Hydrology

Groundwater data were collected during the growing season from eight monitoring wells located throughout the mitigation site. The approximate locations of the monitoring wells are shown in Figure 2.

The following graph provides a summary of the groundwater levels in the two deeper wells installed after construction at the edge of the site. Since the wells were not surveyed after construction, elevations were estimated from the proposed grading plan (included as Figure 3). As a result, the groundwater elevations shown in the following graph are approximate.



Six additional shallow monitoring wells were installed in April 2008 throughout the site. Wells 1 through 5 (MW-1 to MW-5) were installed in the created wetland mitigation site and Well 6 (MW-6) was installed in the adjacent existing wetland as a reference well. The following table provides a summary of the groundwater level data collected from these wells during the growing season. Since the wells were not surveyed and the exact elevations are not known, the well data are shown as the depth to groundwater below the surface (or above the surface if standing water was present).

Table 5-3: 2008 Groundwater Levels Measured in Shallow Monitoring Wells

Monitoring Well	Depth to Water Below Ground (inches)*					
	April	June	July	August	September	October
1	7.0	13.5	15.7	0.5	12.5	15.3
2	0.8	15.5	16.6	+1.0 (inundated)	2.5	12.5
3	Dry	Dry	16.4	3.8	15.8	15.8
4	Dry	Dry	Dry	6.3	Dry	18.3
5	1.0	Dry	Dry	+0.5 (inundated)	4.0	Dry
6	18.0	Dry	Dry	+0.5 (inundated)	16.5	Dry

*Well data was not collected in May 2008.

In general, the majority of the site was observed to have indicators of wetland hydrology at some point during the growing season. Shallow monitoring wells 3, 4, 5, and 6 were dry for a portion of the summer. Shallow monitoring wells 1 and 2 contained water throughout the growing season. High water levels observed during the month of August were likely due to above average rainfall in July. Rainfall data for 2008 obtained from the National Weather Service and average rainfall amounts obtained from www.weather.com are provided in Table 5-3.

Table 5-4: Monthly Precipitation Data

Month	2008 Precipitation Inches (centimeters)	Average Precipitation Inches (centimeters)
January	2.91 (7.39)	3.58 (9.09)
February	9.53 (24.21)	2.94 (7.47)
March	5.14 (13.06)	3.58 (9.09)
April	3.75 (9.53)	3.71 (9.42)
May	1.20 (3.05)	3.74 (9.50)
June	4.72 (11.99)	3.70 (9.40)
July	6.76 (17.17)	4.05 (10.29)
August	3.86 (9.80)	4.12 (10.46)
September	7.46 (18.95)	3.37 (8.56)
October	2.40 (6.10)	4.00 (10.16)
November	*Not available*	4.11 (10.44)
December	*Not available*	3.78 (9.60)
Total (as of October 31st)	47.73 (121.25)	44.68 (113.49)

Source: 2008 data obtained from The National Weather Service, http://www.erh.noaa.gov/box/dailystns.shtml, and average precipitation data obtained from www.weather.com. Precipitation data recorded in Jaffrey, NH.

5.6 Wildlife Utilization

Wildlife observations were conducted during the vegetation monitoring and monitoring well data collection (refer to Table 5-4). The mitigation site has a large number of flowering plants, which provides a food source for nectar-gathering insects. The small ponded area in the eastern portion of the site (emergent marsh cover type) provides habitat for amphibians. In April 2008, American toads were observed breeding in the ponded area in the eastern portion of the site. Mating pairs and egg masses were observed.

Table 5-5: Wildlife Observations in Vicinity of Mitigation Site

Common Name	Scientific Name	Notes
American toad	*Bufo americanus*	Breeding pairs and eggs observed in ponded water in eastern portion of mitigation site (April 2008).
Turkey vulture	*Cathartes aura*	Observed flying near mitigation site (April 2008).
Osprey	*Pandion haliaetus*	Observed a few miles north of mitigation site near a pond off of Route 202 (April 2008).
Red tailed hawk	*Buteo jamaicensis*	Observed flying over mitigation site (October 2008)

5.7 Standards

Based on the success standards outlined in Section 1.0 of this report, the mitigation site addresses the following:

1.) *Is the proposed hydrology met at the site? What percentage of the site is meeting projected hydrology levels?*

As discussed in Section 5.5, groundwater levels were recorded in two monitoring wells located at the edge of the mitigation site, five shallow monitoring wells located in the mitigation site, and one shallow reference well located in the adjacent existing wetland. Visual observations of hydrology throughout the rest of the mitigation site were made during each site visit. The majority of the site appears to be meeting proposed hydrology levels. The shallow emergent marsh in the eastern portion of the mitigation site was observed to have several inches of standing water throughout the growing season. In April 2008, a large portion of the eastern half of the mitigation site (proposed emergent covertype) was flooded with approximately 4 to 10 inches of standing water.

The northwestern portion of the mitigation site has lower groundwater levels than the eastern half of the site. This area corresponds to the proposed scrub-shrub and forested portions of the site. Shallow monitoring wells 3 and 4, which are located in this area, were generally dry during the spring and early summer, which meant that groundwater levels were more than 20 inches below the surface. Above-average rainfall during July 2008 caused the water levels in these wells to rise. During the autumn months, groundwater in Wells 3 and 4 were within approximately 15 to 20 inches of the soil surface.

Based on visual observations, it appears that approximately 75% of the mitigation site has adequate wetland hydrology. The northwestern portion of the mitigation site (proposed forested and scrub-shrub covertypes) did not generally have groundwater levels within 12 inches of the surface during the 2008 growing season, however there appears to be enough hydrology to support wetland vegetation.

2.) *Are the proposed vegetation diversity and/or density goals for woody plants met?*

Vegetation diversity and density goals were not proposed in the mitigation plan. According to ACOE guidelines (ACOE, 2007), woody plant density should be at least 500 trees and shrubs per acre, of which at least 350 per acre are trees for proposed forested cover types, that are healthy and vigorous and are at least 18 inches tall in 75% of each planted woody zone. Table 5-4, which was obtained from ACOE mitigation guidelines, lists the number of species required compared to the number of species planted. These numbers include noninvasive planted and volunteer species. Volunteer species should support functions consistent with the design goals. To count a species, it should be well represented on the site (e.g., at least 50 individuals of that species per acre).

Table 5-6: Required Number of Species
ACOE Guidelines

Number of Species Planted	Minimum Number of Species Required (volunteer and planted)
2	2
3	3
4	3
5	4
6	4
7	5
8	5
9 or more	6

Since container-grown trees and shrubs were not planted within the mitigation site, woody plants that have grown from the seed mixes and volunteer species were counted during the vegetation monitoring. Tree and shrub species that were in the scrub-shrub and forested wetland seed mixes included red maple, gray birch (*Betula populifolia*), speckled alder, silky dogwood (*Cornus amomum*), and winterberry (*Illex verticillata*). Tree and shrub species that were observed within the vegetation monitoring plots included red maple, speckled alder, dogwood, and birch. Autumn olive (*Elaeagnus umbellata*) and elm (*Ulmus spp*.) were also observed in the upland buffer plot. Table 5-5 provides a summary of the species observed within each of the five vegetation monitoring plots. Since a total of five species were included in the wetland seed mix, the minimum number of volunteer and planted species is four. Based on this guideline, the site meets the general vegetation diversity goals.

The site generally meets the goals for woody plant density. ACOE guidelines require at least 500 trees and shrubs per acre, which includes at least 350 trees per acre for forested cover types. As shown in Table 5-5, the five vegetation monitoring plots represent an average of 888 trees and shrubs per acre. The proposed forested cover type is estimated to have about 1,418 trees and shrubs per acre. This includes approximately 247 red maples, 1,048 speckled alders, and 123 unknown plant species per acre. Since the only identified tree species for this plot is red maple, it does not meet the requirement for 350 trees per acre for forested covertypes. It is anticipated, however, that tree species will continue to germinate and mature in this portion of the site and that the area will eventually develop into a forested wetland. The estimated number of trees per acre for the proposed forested covertype has increased from 62 for the 2007 monitoring to 247 for this year's monitoring.

Shrub species were included in the vegetative blocks that were placed in the eastern portion of the mitigation site. Highbush blueberry (*Vaccinium corymbosum*) and birch were the primary woody species present in the vegetative blocks. The plants that were originally transplanted during construction generally did not survive, however new growth was observed during the monitoring visit in October 2008. Species observed in the new growth included red maple, highbush blueberry, and speckled alder. Since none of the monitoring plots are located in the vegetative block portion of the site, transplanted species are not included in the data for Table 5-5.

Table 5-7: Summary of Trees and Shrubs per Acre

Plot	Proposed Cover Type	Species	Trees and shrubs per 15-foot radius plot	Estimated Trees and shrubs per acre
1	PEM	Red maple	1	62
		Speckled alder	9	555
		Dogwood	4	247
		Total	**14**	**864**
2	PEM	Red maple	2	123
		Speckled alder	8	493
		Birch	1	62
		Total	**11**	**678**
3	PSS	Speckled alder	2	123
		Dogwood	3	185
		Total	**5**	**308**
4	PFO	Red maple	4	247
		Speckled alder	17	1048
		Unknown	2	123
		Total	**23**	**1418**
5	Upland buffer	Speckled alder	2	123
		Red maple	4	247
		Birch	5	308
		Elm	1	62
		Dogwood	6	370
		Autumn olive	1	62
		Total	**19**	**1172**
Average			**14**	**888**

3.) *Does the mitigation site have at least 80% areal cover, excluding planned open water areas or planned bare soil area (such as for turtle nesting), by noninvasive species? Do planned emergent areas have at least 80% cover by noninvasive hydrophytes? Do planned scrub-shrub and forested cover types have at least 60% cover by noninvasive hydrophytes, of which at least 15% are woody species?*

As shown in Table 5-1, the mitigation site generally has at least 80% areal cover by noninvasive species. Portions of the site that do not have at least 80% cover include shallow emergent marsh areas that are inundated throughout most of the year. The proposed scrub-shrub and forested cover types do not yet have at least 15% cover of woody species since the woody species are either volunteer or germinated from seed since the construction of the site in July 2006.

4.) *Are common reed (Phragmites australis), purple loosestrife (Lythrum salicaria), Russian and autumn olive (Elaeagnus spp.), buckthorn (Rhamnus spp.), Japanese knotweed (Polygonum cuspidatum), and/or multiflora rose (Rosa multiflora) plants at the mitigation site being controlled?*

One purple loosestrife plant was noted in Plot 2 during the 2008 vegetation monitoring. No other areas with purple loosestrife were observed during the 2008 field reviews, although it is likely that the species is present in other areas of the mitigation site. The purple loosestrife plant observed at Plot 2 was removed by hand. No other areas with purple loosestrife were noted during the field reviews, so a control plan is not proposed at this time. The majority of the mitigation site is dominated by native plant species.

Autumn olive was noted in the upland buffer plot (Plot 5). Several mature autumn olive plants are located along the edge of the forested area to the west of the site. Autumn olive most likely spread into the upland buffer of the site from this area. A control plan for this species is currently not in place. Any remedial action would need to involve removal of the mature plants located in the adjacent forested area to prevent the future spread of this species.

5.) *Are all slopes, soils, substrates, and constructed features within and adjacent to the mitigation site stable?*

The slopes adjacent to the mitigation site and the soils within the mitigation site have been stabilized.

5.8 Recommendations and Remedial Actions Required

The mitigation site appears to be functioning as a wetland community and contains few invasive plant species. A variety of emergent plant species including soft rush, crowned beggarticks, broom sedge, creeping bentgrass, toad rush, Canada rush, and lurid sedge are present. The site meets the success standard for percent areal cover in the proposed emergent cover types since there is generally at least 80% cover (with the exception of areas that are frequently flooded). The site currently does not meet the success standard for percent areal cover in the proposed scrub-shrub and forested cover types since there is not at least 15% cover by woody species. Most of the woody species are small since they germinated from seed after the site was constructed in 2006. The site, however, does meet the success standard for woody vegetation density since there are more than 500 trees and shrubs per acre. It is anticipated that as the site matures, the woody species will cover a larger area. It will most likely take several years for the site to reach the success standards for woody species areal cover. No remedial measures are recommended at this time.

6.0 INVASIVE SPECIES

One purple loosestrife plant was noted in Plot 2 during the vegetation monitoring. No other purple loosestrife plants were observed during the vegetation monitoring, however it is likely that a few other plants are located in the site. Since very few plants were observed and the species does not currently appear to be an issue, remedial action is not proposed at this time. Throughout the majority of the site, native plants are dominant and well-established.

Autumn olive was observed in the upland buffer along the western edge of the site. This species most likely spread from mature plants that are located at the edge of the forested area west of the

mitigation site. Removal of autumn olive plants in the upland buffer will only be effective in the long term if the mature plants adjacent to the site are removed.

7.0 SUMMARY

Currently, the site is an emergent wetland with scattered tree and shrub seedlings. As the site matures, it is expected that forested and scrub-shrub covertypes will develop. The wetland mitigation site currently meets most of the success standards outlined by the ACOE. Approximately 75% of the site has adequate wetland hydrology as shown in the monitoring well data collected during the 2008 growing season and based on observations of inundated and saturated soils during field reviews. The site typically has at least 80% areal cover of noninvasive wetland vegetation and has diverse herbaceous vegetation. This site has also shown an increase in the number of tree and shrub seedlings since 2007. The density requirement for woody plants is met since the site has more than 500 trees and shrubs per acre. The site currently does not meet the percent areal cover for woody plants requirement (15%) since the tree and shrub species are still small. As the site matures, it is expected that this requirement will be met since the tree and shrub species will grow and cover a larger area.

Evidence of wildlife use was found in the mitigation site during the 2008 growing season. In the spring, toads were observed mating and laying eggs in the eastern half of the site. The site also appears to provide habitat for a variety of bird species.

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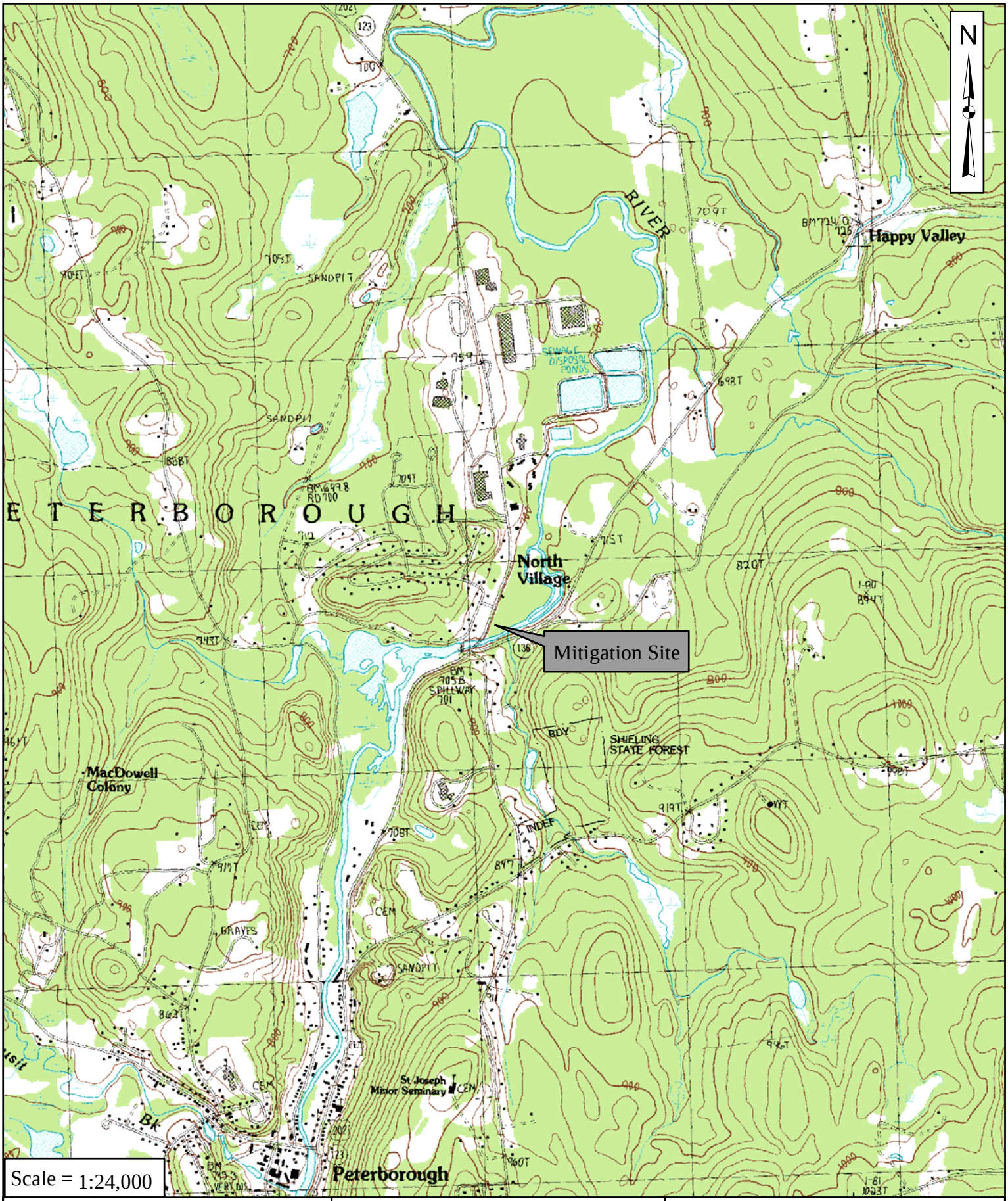
FIGURES



US Route 202/NH Route 123
Reconstruction
Peterborough, NH

Figure 1
Site Locus Map

The Smart Associates
Environmental Consultants, Inc.

SEEDING & PLANTING PLAN

0.033 hectares **Shallow Marsh Wetland Emergent Wetland**

0.749 hectares **Emergent Wetland – PIT & MOUND**

ITEM 644.73
EMERGENT MARSH SEED MIX — APPLICATION RATE

TOTAL 13.5 kg.

0.259 hectares **Scrub Shrub Wetland**

ITEM 644.21
SHRUB SWAMP SEED MIX — APPLICATION RATE

TOTAL 4.5 kg.

0.215 hectares **Forest Wetland**

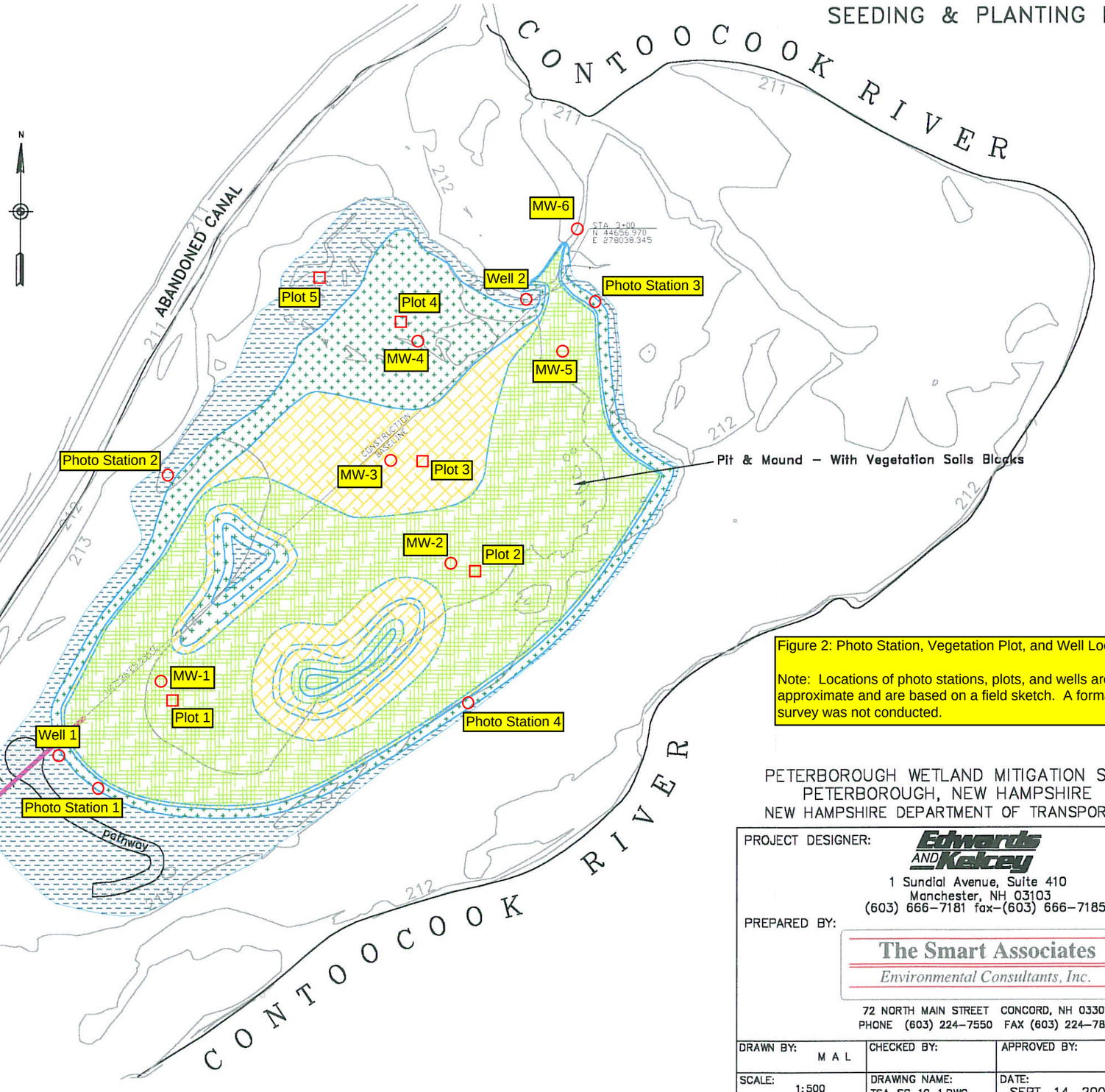
ITEM 644.22
FORESTED WETLAND — APPLICATION RATE

6.5 kg.

N O T E : SEEDED AREA TO BE MULCHED, ITEM 645.11
TOTAL AREA = 4,451.40 sq. meters

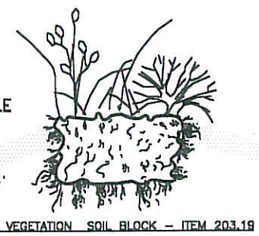
KEY

- Shrub Scrub Wetland
- Emergent Wetland
- Forest Wetland
- Forest Buffer



Note:
Baseline cross section depicting anticipated water table elevations and planting zones, see figure titled: MITIGATION SITE TYPICAL CROSS SECTION

NOT TO SCALE



NATURAL VEGETATION SOIL BLOCK – ITEM 203.19

S C A L E: 1:500

STA. 0+40
N 44476.356
E 277941.155

Figure 2: Photo Station, Vegetation Plot, and Well Locations

Note: Locations of photo stations, plots, and wells are approximate and are based on a field sketch. A formal survey was not conducted.

PETERBOROUGH WETLAND MITIGATION SITE
PETERBOROUGH, NEW HAMPSHIRE
NEW HAMPSHIRE DEPARTMENT OF TRANSPORTATION

PROJECT DESIGNER:
Edwards AND Kelcey
1 Sundial Avenue, Suite 410
Manchester, NH 03103
(603) 666-7181 fax-(603) 666-7185

PREPARED BY:
The Smart Associates
Environmental Consultants, Inc.
72 NORTH MAIN STREET CONCORD, NH 03301
PHONE (603) 224-7550 FAX (603) 224-7890

DRAWN BY: M A L	CHECKED BY:	APPROVED BY:	
SCALE: 1:500	DRAWING NAME: TSA_SG_10-1.DWG	DATE: SEPT. 14, 2002	SHEET NO.

REVISIONS AFTER PROPOSAL

NUMBER	DATE	STATION	DESCRIPTION

SDR PROCESSED	M.A. LAMBERT	DATE 5/02
NEW DESIGN	M.A. LAMBERT	DATE 8/14/02
SHEET CHECKED		DATE
AS BUILT DETAILS		DATE

GRID N

U.S. 202/N.H. 123

ABANDONED CANAL

CONTOOCOOK RIVER

ELEVATION 211.25
Hydraulic Connection
Between Mitigation Area
And Seasonal River Flooding

CONCRETE
BOUND
Construction
Baseline
N 44656.970
E 278038.345 STA. 3+00

MONITORING
WELL

CONSTRUCTION
BASELINE

STA. 2+00

N47°36'25.936"E

CONCRETE
BOUND
Construction
Baseline
STA. 1+40

MONITORING
WELL

PROPOSED
GRAVEL ACCESS

EXISTING
TREELINE

LIMIT OF
WORK (TYP.)

Construction
Baseline
STA. 0+40 N 44476.956
E 277841.155

CONTOOCOOK RIVER

N O T E :
No Clearing Beyond Slopeline
Do Not Remove Trees >9" Unless Approved By Engineer

Figure 3: Proposed Grading Plan

PROJECT DESIGNER:

Edwards AND Kelcey
1 Sundial Avenue, Suite 410
Manchester, NH 03103
(603) 666-7181 fax-(603) 666-7185

PREPARED BY:

The Smart Associates
Environmental Consultants, Inc.
72 NORTH MAIN STREET CONCORD, NH 03301
PHONE (603) 224-7550 FAX (603) 224-7890

MITIGATION SITE GRADING PLAN

SHEET SCALE	DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
1: 500	TSA_GP_10-1.dwg			

APPENDIX A

PERMIT CONDITIONS

DEPARTMENT OF THE ARMY PERMIT

Permittee NH DOT

Permit No. NAE-2004-1169

Issuing Office New England District

NOTE: The term "you" and its derivatives, as used in this permit, means the permittee or any future transferee. The term "this office" refers to the appropriate district or division office of the Corps of Engineers having jurisdiction over the permitted activity or the appropriate official of that office acting under the authority of the commanding officer.

You are authorized to perform work in accordance with the terms and conditions specified below.

Project Description:

Discharge fill material into approximately 3.5 acres of waters and wetlands adjacent to the Contoocook River in Peterborough, New Hampshire as shown on the attached plans, entitled, PETERBOROUGH U.S. 202/N.H. 123 , in 30 sheets, undated

Project Location:

Permit Conditions:

General Conditions:

1. The time limit for completing the work authorized ends on 5/21/2009. If you find that you need more time to complete the authorized activity, submit your request for a time extension to this office for consideration at least one month before the above date is reached.

2. You must maintain the activity authorized by this permit in good condition and in conformance with the terms and conditions of this permit. You are not relieved of this requirement if you abandon the permitted activity, although you may make a good faith transfer to a third party in compliance with General Condition 4 below. Should you wish to cease to maintain the authorized activity or should you desire to abandon it without a good faith transfer, you must obtain a modification of this permit from this office, which may require restoration of the area.

3. If you discover any previously unknown historic or archeological remains while accomplishing the activity authorized by this permit, you must immediately notify this office of what you have found. We will initiate the Federal and state coordination required to determine if the remains warrant a recovery effort or if the site is eligible for listing in the National Register of Historic Places.

4. If you sell the property associated with this permit, you must obtain the signature of the new owner in the space provided and forward a copy of the permit to this office to validate the transfer of this authorization.

5. If a conditioned water quality certification has been issued for your project, you must comply with the conditions specified in the certification as special conditions to this permit. For your convenience, a copy of the certification is attached if it contains such conditions.

6. You must allow representatives from this office to inspect the authorized activity at any time deemed necessary to ensure that it is being or has been accomplished in accordance with the terms and conditions of your permit.

Special Conditions:

1. The permittee shall ensure that a copy of this permit is at the work site whenever work is being performed and that all personnel performing work at the site of the work authorized by this permit are fully aware of the terms and conditions of the permit. This permit, including its drawings and any appendices and other attachments, shall be made a part of any and all contracts and sub-contracts for work which affects areas of Corps of Engineers jurisdiction at the site of the work authorized by this permit. This shall be done by including the entire permit in the specifications for work.

(Special Conditions continued on Page 4)

Further Information:

1. Congressional Authorities: You have been authorized to undertake the activity described above pursuant to:

( ) Section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C. 403).

(X) Section 404 of the Clean Water Act (33 U.S.C. 1344).

( ) Section 103 of the Marine Protection, Research and Sanctuaries Act of 1972 (33 U.S.C. 1413).

2. Limits of this authorization.

a. This permit does not obviate the need to obtain other Federal, state, or local authorizations required by law.

b. This permit does not grant any property rights or exclusive privileges.

c. This permit does not authorize any injury to the property or rights of others.

d. This permit does not authorize interference with any existing or proposed Federal project.

3. Limits of Federal Liability. In issuing this permit, the Federal Government does not assume any liability for the following:

a. Damages to the permitted project or uses thereof as a result of other permitted or unpermitted activities or from natural causes.

b. Damages to the permitted project or uses thereof as a result of current or future activities undertaken by or on behalf of the United States in the public interest.

c. Damages to persons, property, or to other permitted or unpermitted activities or structures caused by the activity authorized by this permit.

d. Design or construction deficiencies associated with the permitted work.

e. Damage claims associated with any future modification, suspension, or revocation of this permit.

4. Reliance on Applicant's Data: The determination of this office that issuance of this permit is not contrary to the public interest was made in reliance on the information you provided.

5. Reevaluation of Permit Decision. This office may reevaluate its decision on this permit at any time the circumstances warrant. Circumstances that could require a reevaluation include, but are not limited to, the following:

a. You fail to comply with the terms and conditions of this permit.

b. The information provided by you in support of your permit application proves to have been false, incomplete, or inaccurate (See 4 above).

c. Significant new information surfaces which this office did not consider in reaching the original public interest decision.

Such a reevaluation may result in a determination that it is appropriate to use the suspension, modification, and revocation procedures contained in 33 CFR 325.7 or enforcement procedures such as those contained in 33 CFR 326.4 and 326.5. The referenced enforcement procedures provide for the issuance of an administrative order requiring you to comply with the terms and conditions of your permit and for the initiation of legal action where appropriate. You will be required to pay for any corrective measures ordered by this office, and if you fail to comply with such directive, this office may in certain situations (such as those specified in 33 CFR 209.170) accomplish the corrective measures by contract or otherwise and bill you for the cost.

6. Extensions. General condition 1 establishes a time limit for the completion of the activity authorized by this permit. Unless there are circumstances requiring either a prompt completion of the authorized activity or a reevaluation of the public interest decision, the Corps will normally give favorable consideration to a request for an extension of this time limit.

Your signature below, as permittee, indicates that you accept and agree to comply with the terms and conditions of this permit.

_____ 5/27/04

(PERMITTEE) *(DATE)*

This permit becomes effective when the Federal official, designated to act for the Secretary of the Army, has signed below.

Christine Godfrey 5-24-04

(DISTRICT ENGINEER) *(DATE)*

for Thomas L. Koning
Colonel, Corps of Engineers

When the structures or work authorized by this permit are still in existence at the time the property is transferred, the terms and conditions of this permit will continue to be binding on the new owner(s) of the property. To validate the transfer of this permit and the associated liabilities associated with compliance with its terms and conditions, have the transferee sign and date below.

_____ _____

(TRANSFEREE) *(DATE)*

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☆U.S. GOVERNMENT PRINTING OFFICE: 1986 — 717-425

(Special Conditions continued from Page 2)

2. Mitigation shall be performed in accordance with the attached mitigation plan entitled, "Wetland Mitigation Report, State of New Hampshire Department of Transportation # 12915, PETERBOROUGH, NEW HAMPSHIRE" and dated "September 25, 2002."

3. The permittee shall execute and record a conservation easement or deed restriction with the registry of deeds for the Town of Peterborough and the State of New Hampshire, within 180 days of the date of this permit issuance. Before recording these documents a draft copy of the conservation easement or deed restriction must be sent to the Corps of Engineers for approval, in writing. Upon receipt of the approved document, the permittee shall then execute and record it with the registry of deeds having jurisdiction over the locales where the site or sites are located. A copy of the executed and recorded document must be sent to this office within 90 days of the date it was recorded. The conservation easement or deed restriction shall enable the site or sites to be protected in perpetuity from any future development. The conservation easement or deed restriction shall expressly allow for the creation, restoration, remediation and monitoring activities required by this permit on the site or sites. It shall prohibit all other filling, clearing, and other disturbances (including vehicle access) on these sites except for activities explicitly authorized by the Corps of Engineers in these approved documents.

State of New Hampshire
DEPARTMENT OF ENVIRONMENTAL SERVICES
6 Hazen Drive, P.O. Box 95, Concord, NH 03302-0095
(603) 271-2147 FAX (603) 271-6588

March 12, 2004

Dennis J. Dana, Chief
Technical Section
NH Dept of Transportation
Po Box 483
Concord, NH 03301

RE: NH Dept of Transportation - File # 2002-00899 - Peterborough

Dear Mr. Dana:

Attached please find Wetlands Permit # 2002-00899 to impact 3.45 acres of open water, emergent shrub scrub and forested wetlands to reconstruct and widen 2 miles along Route 202 generally providing two 12 foot wide travel lanes and 8 to 10 wide paved shoulders.

Mitigation is on a 12-acre parcel along the Contoocook River at North Village and will include the construction of 3.10 acres of emergent, shrub scrub and forested wetlands with the remainder to become a Conservation Easement area. NHDOT project #12915..

The decision to approve this application was based on the following findings:

1. This is a major impact project per Administrative Rule Wt 303.02(c), alteration of nontidal wetlands and surface water exceeding 20,000 sq. ft.
2. The need for the proposed impacts has been demonstrated by the applicant per Wt 302.01.
3. The applicant has provided evidence, which demonstrates that this proposal is the alternative with the least adverse impact to areas and environments under the department's jurisdiction per Wt 302.03.
4. The applicant has demonstrated by plan and example that each factor listed in Wt 302.04(a), Requirements for Application Evaluation, has been considered in the design of the project.
5. The least impacting alternative chosen and the purpose of the project are met by the online upgrade.
6. The project will raise the roadway above the 100-year floodplain.
7. In addition to the overall widening, the project will provide adjustments to the horizontal and vertical profile.
8. DES Staff conducted a field inspection of the proposed project on July 21, 2002. Field inspection determined the wetland areas on either side of the roadway are of high value, the mitigation area is ideal for wetland construction and is of high value due to the adjacency to the river.
9. The principal purposes of the mitigation work is to compensate for the loss of sediment/ toxicant retention functions provided by the wetlands, which will be impacted by the project and to provide wildlife habitat.

10. Coordination meetings with the Natural Resource Agencies have provided the opportunity for comment and input on the design on at least four occasions prior to and at least once since the filing of the application.
11. The Department of Transportation held a Public Informational Meeting and a Public Hearing on the proposal.
12. There have been no written comments on the proposal since the application was filed.
13. The public hearing is waived with the finding that upon completion of the mitigation the project impacts will not significantly impair the resources of this palustrine and riverine wetland ecosystem.

Any party may apply for reconsideration with respect to any matter determined in this action within 20 days from the date of this letter. A motion for reconsideration must specify all grounds upon which future appeals may be based, and should include information not available to the Department when the decision was made. The department may grant reconsideration if, in its opinion, good reason is provided in the motion.

Your permit must be signed, and a copy must be posted in a prominent location on site during construction. If you have any questions please contact our office at (603) 271-2147.

Sincerely,

Gino E Infascelli
Public Works Supervisor
DES Wetlands Bureau

cc: Peterborough Conservation Commission
Peterborough Board of Selectmen/ Municipal Clerk
The Smart Associates

99-160

State of New Hampshire
DEPARTMENT OF ENVIRONMENTAL SERVICES
6 Hazen Drive, P.O. Box 95, Concord, NH 03302-0095
(603) 271-2147 FAX (603) 271-6588

WETLANDS AND NON-SITE SPECIFIC PERMIT 2002-00899

Permittee: NH Dept of Transportation,Po Box 483,Concord, NH 03301
Project Location: Rte 202, Peterborough
Peterborough Tax Map/Lot No.
Waterbody: Unnamed Wetland

APPROVAL DATE: 03/12/2004 **EXPIRATION DATE: 03/12/2009**

Based upon review of the above referenced application, in accordance with RSA 482-A and RSA 485-A:17, a Wetlands Permit and Non-Site Specific Permit was issued. This permit shall not be considered valid unless signed as specified below.

PERMIT DESCRIPTION: Impact 3.45 acres of open water, emergent shrub scrub and forested wetlands to reconstruct and widen 2 miles along Route 202 generally providing two 12 foot wide travel lanes and 8 to 10 wide paved shoulders.

Mitigation is on a 12-acre parcel along the Contoocook River at North Village and will include the construction of 3.10 acres of emergent, shrub scrub and forested wetlands with the remainder to become a Conservation Easement area. NHDOT project #12915.

THIS APPROVAL IS SUBJECT TO THE FOLLOWING PROJECT SPECIFIC CONDITIONS:

1. All work shall be in accordance with plans by NHDOT Bureau of Highway Design dated 9-26-01, as received by the Department on May 3, 2002 except as superceded by the Mitigation Plans and Report by The Smart Associates dated September 25, 2002 and received on October 16, 2002.
2. This permit is contingent upon the submission of a project specific stream diversion and erosion control plans to the DES Wetlands Bureau. Those plans shall detail the timing and method of stream flow diversion during construction, and shall show the temporary siltation, erosion and turbidity control measures to be implemented.
3. This permit is contingent on the approval of a Section 401 Water Quality Certificate.
4. Dredged material shall be placed out of the DES Wetlands Bureau jurisdiction unless utilized in the Mitigation Construction area.
5. Unconfined work within the river, exclusive of work associated with installation of a cofferdam, shall be done during periods of low flow.
6. Cofferdams shall not be installed during periods of high flow, whether due to seasonal runoff or precipitation. Once a cofferdam is fully effective, confined work can proceed without restriction.
7. Temporary cofferdams shall be entirely removed immediately following construction.
8. Construction equipment shall not be located within surface waters.
9. Discharge from dewatering of work areas shall be to sediment basins that are: a) located in uplands; b) lined with hay bales or other acceptable sediment trapping liners; and c) set back as far as possible from wetlands and surface waters, in all cases with a minimum of 20 feet of undisturbed vegetated buffer.
10. Appropriate siltation/erosion/turbidity controls shall be in place prior to construction, shall be maintained during construction, and shall remain until the area is stabilized.
11. Within three days of final grading in an area that is in or adjacent to wetlands or surface waters, all exposed soil areas shall be stabilized by seeding and mulching during the growing season, or if not within the growing season, by mulching with tack or netting and pinning on slopes steeper than 3:1.
12. Where construction activities have been temporarily suspended within the growing season, all exposed soil areas shall be stabilized within 14 days by seeding and mulching.
13. Where construction activities have been temporarily suspended outside the growing season, all exposed areas shall be stabilized within 14 days by mulching and tack. Matting and pinning shall stabilize slopes steeper than 3:1.
14. The contractor responsible for completion of the work shall utilize techniques described in the DES Best Management Practices for Urban Stormwater Runoff Manual (January, 1996) and the Stormwater Management and Erosion and Sediment Control Handbook for Urban and Developing Areas in New Hampshire (August, 1992).

15. Extreme precautions to be taken within riparian areas to limit unnecessary removal of vegetation during road construction and areas cleared of vegetation to be revegetated as quickly as possible.
16. There shall be no further alteration to wetlands or surface waters without amendment of this permit.
17. Standard precautions shall be taken to prevent import or transport of soil or seed stock from nuisance, invading species such as purple loosestrife or Phragmites.
18. The impacts associated with the temporary work shall be restored immediately following construction.

Mitigation:
19. This permit is contingent upon the creation and restoration of 3.1 acres of wetlands in accordance with plans received on October 16, 2002.
20. The mitigation shall be in accordance with the Wetland Mitigation Report by The Smart Associates dated September 25, 2002 and received on October 16, 2002.
21. The principal purposes of the mitigation work is to compensate for the loss of sediment/toxicant retention functions provided by the wetlands, which will be impacted by the project and to provide wildlife habitat.
22. The applicant shall consider modifications to the mitigation proposal if through amendments filed during final design and construction work, project impacts exceed amounts represented in the approved permit.
23. A copy of the deed shall be submitted to the DES Wetlands Bureau following DOT purchase of the property. The Wetlands Bureau shall be notified of subsequent transferals of the property to another agency that has been retained for management purposes.
24. The applicant shall designate a qualified professional who will have the responsibility to assure that the mitigation area is constructed in accordance with the mitigation plan, that monitoring is accomplished in a timely fashion, and remedial measures are taken if necessary. The Wetlands Bureau shall be notified of the designated professional prior to the start of work and if there is a change of status during the project.
25. The schedule for mitigation construction shall be submitted to the Wetlands Bureau.
26. At least 48 hours prior to the start of construction, a pre-construction meeting shall be held with NHDES Land Resources Management Program staff at the project site or at the DES Office in Concord, N.H. to review the conditions of this wetlands permit. It shall be the responsibility of the permittee to schedule the pre-construction meeting, and the meeting shall be attended by the permittee, his/her professional engineer(s), wetlands scientist(s), and the contractor(s) responsible for performing the work.
27. The Wetland Construction site shall be graded prior to the commencement of the roadway work.
28. Wetland soils from areas vegetated with purple loosestrife shall not be used in the wetland creation site. In other areas the permittee considers spreading the spoils, the potential for the establishment of the invasive species should be considered to limit its further establishment.
29. Wetland creation and enhancement areas shall have at least 75% successful establishment of wetlands vegetation after two (2) growing seasons, or it shall be replanted and re-established until a functional wetland is replicated in a manner satisfactory to the DES Wetlands Bureau.
30. Wetland creation and enhancement areas shall be properly constructed, landscaped, monitored and remedial actions taken that may be necessary to create functioning wetland areas similar to those of the wetlands destroyed by the project. Remedial measures may include replanting, relocating plantings, removal of invasive species, changing soil composition and depth, changing the elevation of the wetland surface, and changing the hydraulic regime.
31. The NHDOT shall monitor the initial construction of the mitigation area to assure the work is accomplished in accordance with the plan, and that the necessary soil, water and vegetation is present upon completion of work. Site monitoring shall include a plan for removing invasive species and shall be reviewed by the Wetlands Bureau prior to implementation.
32. The NHDOT shall conduct a follow-up inspection after the first growing season, to review the success of the mitigation area and schedule remedial actions if necessary. A report outlining these follow-up measures and a schedule for completing the remedial work shall be submitted by December 1 of that year. Similar inspections, reports and remedial actions shall be undertaken in at least the second and third years following the initial completion of each mitigation site. After at least five full growing seasons, the NHDOT shall delineate the wetlands within the mitigation site and document the delineation with data forms and depict the delineation as an overlay of the final as built plans.

Preservation:

33. This permit is contingent upon the execution of a conservation easement on 11.86 acres as depicted in the Wetland Mitigation Report received on October 16, 2002.
34. The conservation easements that may be placed on the preservation areas shall be written to run with the land, and both existing and future property owners shall be subject to this easement.
35. Draft conservation easement language shall be submitted to the Wetlands Bureau for review and approval.
36. The plan noting the conservation easement with a copy of the final easement language shall be recorded with the Registry of Deeds Office for each appropriate lot and a copy of the recording from the County Registry of Deeds Office shall be submitted to the DES Wetlands Bureau.
37. The conservation easement area shall be marked by stakes and signs indicating the location and restrictions of the area prior to the removal of the final erosion controls.
38. There shall be no removal of the existing vegetative undergrowth within the easement area and the placement of additional fill, construction of structures, and storage of vehicles or hazardous materials is prohibited.
39. Activities in contravention of the conservation easement shall be construed as a violation of RSA 482-A, and those activities shall be subject to the enforcement powers of the Department of Environmental Services (including remediation and fines).

GENERAL CONDITIONS WHICH APPLY TO ALL DES WETLANDS PERMITS:

1. A copy of this permit shall be posted on site during construction in a prominent location visible to inspecting personnel;
2. This permit does not convey a property right, nor authorize any injury to property of others, nor invasion of rights of others;
3. The Wetlands Bureau shall be notified upon completion of work;
4. This permit does not relieve the applicant from the obligation to obtain other local, state or federal permits that may be required (see attached form for status of federal wetlands permit);
5. Transfer of this permit to a new owner shall require notification to and approval by the Department;
6. This permit shall not be extended beyond the current expiration date.
7. This project has been screened for potential impacts to **known** occurrences of rare species and exemplary natural communities in the immediate area. Since many areas have never been surveyed, or have received only cursory inventories, unidentified sensitive species or communities may be present. This permit does not absolve the permittee from due diligence in regard to state, local or federal laws regarding such communities or species.

APPROVED: _____
DES Wetlands Bureau

==========

BY SIGNING BELOW I HEREBY CERTIFY THAT I HAVE FULLY READ THIS PERMIT AND AGREE TO ABIDE BY ALL PERMIT CONDITIONS.

_____ OWNER'S SIGNATURE (required)

_____ CONTRACTOR'S SIGNATURE (required)

APPENDIX B

SEED MIX TYPES

Seed Mix Types
Wetland Mitigation Site
US Route 202/NH Route 123 Reconstruction, Peterborough, NH

Emergent Marsh Seed Mix

Common Name	Scientific Name	Application Rate Pure Live Seed Lbs./Acre (Kg./Ha.)
Rice cut-grass	*Leersia oryzoides*	1.1 (1.2)
Blue vervain	*Verbena hastate*	1.1 (1.2)
Fox sedge	*Carex vulpinoides*	0.6 (0.7)
Fringed sedge	*Carex crinata*	0.6 (0.7)
Beggar-ticks	*Bidens frondosa*	1.1 (1.2)
Smartweed	*Polygonum pensylvanicum*	2.2 (2.4)
Soft rush	*Juncus effusus*	0.3 (0.3)
	Total	**7.0 (7.7)**

Shrub Swamp Seed Mix

Common Name	Scientific Name	Application Rate Pure Live Seed Lbs/Acre (Kg/Ha)
Alder	*Alnus rugosa*	0.5 (0.6)
Silky dogwood	*Cornus amomum*	2.0 (2.2)
Winterberry	*Ilex verticillata*	1.0 (1.1)
Fox sedge	*Carex vulpinoides*	2.2 (2.4)
Fringed sedge	*Carex crinita*	1.0 (1.1)
Beggar-ticks	*Bidens frondosa*	2.0 (2.2)
Soft rush	*Juncus effusus*	0.2 (0.2)
	Total	**7.7 (9.8)**

Shrub/Forest Wetland Seed Mix

Common Name	Scientific Name	Application Rate Pure Live Seed Lbs/Acre (Kg/Ha)
Red maple	*Acer rubrum*	4.0 (4.4)
Gray birch	*Betula populifolia*	0.5 (0.6)
Alder	*Alnus rugosa*	0.5 (0.6)
Silky dogwood	*Cornus amomum*	2.0 (2.2)
Winterberry	*Ilex verticillata*	1.0 (1.1)
Fox sedge	*Carex vulpinoides*	2.2 (2.4)
Fringed sedge	*Carex crinita*	1.0 (1.1)
Beggar-ticks	*Bidens frondosa*	2.0 (2.2)
Soft rush	*Juncus effusus*	0.2 (0.2)
	Total	**12.2 (14.8)**

Slope Seed Mix (Upland Buffer)

Common Name	Scientific Name	Application Rate Pure Live Seed Lbs/Acre (Kg/Ha)
Creeping red fescue	*Festuca rubra*	35 (40)
Perennial ryegrass	*Lolium perenne*	30 (35)
Red top	*Agrostis gigantea*	5 (5)
Alsike clover	*Trifolium hybridum*	5 (5)
Ox-eye daisy	*Leucanthemum vulgare*	3 (3)
Plains coreopsis	*Coreopsis tinctoria*	3 (3)
Black-eyed Susan	*Rudbeckia hirta*	3 (3)
	Total	**84 (94)**

APPENDIX C

VEGETATIVE SPECIES LIST AND
VEGETATION MONITORING DATA SHEETS

2008 VEGETATION LIST

COMMON NAME	LATIN NAME	WETLAND INDICATOR STATUS	PLOT 1	PLOT 2	PLOT 3	PLOT 4	PLOT 5 (UPLAND)
red maple	Acer rubrum	FAC	X	X		X	X
creeping bentgrass	Agrostis stolonifera	FACW	X			X	
bentgrass	Agrostis spp.	varies			X		X
speckled alder	Alnus rugosa	FACW+	X	X	X	X	X
aster	Aster spp.	varies					X
birch	Betula spp.	varies		X			X
crowned beggarticks	Bidens coronata	OBL	X	X		X	X
shallow sedge	Carex lurida	OBL	X			X	
broom sedge	Carex scoparia	FACW				X	
sedge	Carex spp.	varies	X		X		
dogwood	Cornus spp.	varies	X		X		X
autumn olive	Elaeagnus umbellata*	NI					X
boneset	Eupatorium perfoliatum	FACW+		X			
bedstraw	Galium spp.	varies	X				
St. John's Wort	Hypericum spp.	varies	X	X			
toad rush	Juncus bufonius	FACW	X				
Canada rush	Juncus canadensis	OBL		X			
soft rush	Juncus effusus	FACW+	X	X	X		
rice cutgrass	Leersia oryzoides	OBL	X				
purple loosestrife	Lythrum salicaria*	FACW+		X			
deer tongue grass	Panicum clandestinum	FAC+				X	X
common cinquefoil	Potentilla simplex	FACU-					X
rabbit tobacco	Pseudognaphalium obtusifolium	NI					X
woolgrass	Scirpus cyperinus	FACW+		X	X		
flat top goldenrod	Solidago graminifolia	FAC		X			X
wrinkleleaf goldenrod	Solidago rugosa	FAC					X
elm	Ulmus spp.	varies					X
grass	Unknown	-					X
blue vervain	Verbena hastata	FACW+	X	X			

*Invasive species

Peterborough, NH

VEGETATION MONITORING PLOT DATA

2008 Monitoring FIELD REPORT

SITE: Peterborough, NH - US Route 202/NH Route 123

LOCATION: NE Quad of Plot # 1 **DATE: 10/2/2008**

COVER TYPE: PEM

MONITORING YEAR: 2008 (2nd)

15-ft Radius Plot							
SPECIES	**WETLAND INDICATOR STATUS**	**COUNT**	**VOLUNTEER**	**RELATIVE VIGOR**			
				Vigorous	**Fair**	**Non-Vigorous**	**Dead**
Alnus rugosa	FACW+	9	X				
Acer rubrum	FAC	1	X				
Cornus spp.	varies	4	X				

1 Square Meter Plot			
SPECIES	**WETLAND INDICATOR STATUS**	**PERCENT COVER**	**STEM COUNT (1/10 sq. m)**
Juncus effusus	FACW+	63	46
Bidens coronata	FACW+	20.5	-
Alnus rugosa	FACW+	3	-
Hypericum spp.	varies	<1	-
Leersia oryzoides	OBL	3	2
Carex lurida	OBL	10.5	2
Verbena hastata	FACW+	10.5	3
Juncus bufonius	FACW	10.5	42
Agrostis stolonifera	FACW	10.5	18
Acer rubrum	FAC	<1	-
Galium spp.	varies	<1	-
Carex spp.	varies	3	-
TOTAL PERCENT COVER		**137.5**	
TOTAL WETLAND COVER		**132.5**	

prepared by:

The Smart Associates
Environmental Consultants, Inc.

Peterborough, NH

VEGETATION MONITORING PLOT DATA

2008 Monitoring FIELD REPORT

SITE: Peterborough, NH - US Route 202/NH Route 123

LOCATION: NW Quad of Plot # 2 **DATE: 10/2/2008**

COVER TYPE: PEM

MONITORING YEAR: 2008 (2nd)

15-ft Radius Plot							
SPECIES	**WETLAND INDICATOR STATUS**	**COUNT**	**VOLUNTEER**	**RELATIVE VIGOR**			
				Vigorous	**Fair**	**Non-Vigorous**	**Dead**
Acer rubrum	FAC	2	X				
Alnus rugosa	FACW+	8	X				
Betula spp.	varies	1	X				

1 Square Meter Plot			
SPECIES	**WETLAND INDICATOR STATUS**	**PERCENT COVER**	**STEM COUNT (1/10 sq. m)**
Juncus effusus	FACW+	38	28
Juncus canadensis	OBL	10.5	2
Bidens coronata	OBL	10.5	6
Lythrum salicaria*	FACW+	<1	-
Eupatorium perfoliatum	FACW+	3	-
Verbena hastata	FACW+	3	2
Hypericum spp.	varies	3	3
Scirpus cyperinus	FACW+	10.5	45
Solidago graminifolia	FAC	3	-
Acer rubrum	FAC	<1	1
TOTAL PERCENT COVER		**83.5**	
TOTAL WETLAND COVER		**79.5**	

***Invasive species**

prepared by:

The Smart Associates
Environmental Consultants, Inc.

Peterborough, NH

VEGETATION MONITORING PLOT DATA

2008 Monitoring FIELD REPORT

SITE: Peterborough, NH - US Route 202/NH Route 123

LOCATION: SE Quad of Plot # 3 **DATE: 10/2/2008**

COVER TYPE: PEM

MONITORING YEAR: 2008 (2nd)

15-ft Radius Plot							
SPECIES	**WETLAND INDICATOR STATUS**	**COUNT**	**VOLUNTEER**	**RELATIVE VIGOR**			
				Vigorous	**Fair**	**Non-Vigorous**	**Dead**
Alnus rugosa	FACW+	2	X				
Cornus spp.	varies	3	X				

1 Square Meter Plot			
SPECIES	**WETLAND INDICATOR STATUS**	**PERCENT COVER**	**STEM COUNT (1/10 sq. m)**
Juncus effusus	FACW+	85.5	88
Carex spp.	varies	20.5	-
Agrostis spp.	varies	10.5	-
Scirpus cyperinus	FACW+	10.5	-
TOTAL PERCENT COVER		**127**	
TOTAL WETLAND COVER		**96**	

prepared by:

The Smart Associates
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Peterborough, NH

VEGETATION MONITORING PLOT DATA

2008 Monitoring FIELD REPORT

SITE: Peterborough, NH - US Route 202/NH Route 123

LOCATION: NE Quad of Plot # 4 **DATE: 10/2/2008**

COVER TYPE: PEM

MONITORING YEAR: 2008 (2nd)

15-ft Radius Plot							
SPECIES	**WETLAND INDICATOR STATUS**	**COUNT**	**VOLUNTEER**	**RELATIVE VIGOR**			
				Vigorous	**Fair**	**Non-Vigorous**	**Dead**
Acer rubrum	FAC	4	X				
Unknown	-	2	X				
Alnus rugosa	FACW+	17	X				

1 Square Meter Plot			
SPECIES	**WETLAND INDICATOR STATUS**	**PERCENT COVER**	**STEM COUNT (1/10 sq. m)**
Carex scoparia	FACW	85.5	48
Bidens coronata	OBL	10.5	3
Agrostis stolonifera	FACW	38	65
Acer rubrum	FAC	<1	2
Panicum spp.	varies	3	-
Carex lurida	OBL	10.5	-
TOTAL PERCENT COVER		**148.5**	
TOTAL WETLAND COVER		**145.5**	

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Peterborough, NH

VEGETATION MONITORING PLOT DATA

2008 Monitoring FIELD REPORT

SITE: Peterborough, NH - US Route 202/NH Route 123

LOCATION: SW Quad of Plot # 5 **DATE: 10/2/2008**

COVER TYPE: Upland buffer

MONITORING YEAR: 2008 (2nd)

15-ft Radius Plot							
SPECIES	**WETLAND INDICATOR STATUS**	**COUNT**	**VOLUNTEER**	**RELATIVE VIGOR**			
				Vigorous	**Fair**	**Non-Vigorous**	**Dead**
Alnus rugosa	FACW+	2	X				
Acer rubrum	FAC	4	X				
Betula spp.	varies	5	X				
Ulmus spp.	varies	1	X				
Cornus spp.	varies	6	X				
Elaeagnus umbellata*	NI	1	X				

1 Square Meter Plot			
SPECIES	**WETLAND INDICATOR STATUS**	**PERCENT COVER**	**STEM COUNT (1/10 sq. m)**
Agrostis spp.	varies	20.5	39
Bidens coronata	FACW+	20.5	6
Psuedognaphalium obtusifolium	NI	<1	-
Potentilla simplex	FACU-	10.5	4
Solidago rugosa	FAC	3	1
Solidago graminifolia	FAC	3	-
Panicum clandestinum	FAC+	<1	-
Aster spp.	varies	3	-
Unknown grass	-	3	-
Acer rubrum	FAC	<1	-
TOTAL PERCENT COVER		**66.5**	
TOTAL WETLAND COVER		**28.5**	

***Invasive species**

prepared by:

The Smart Associates

Environmental Consultants, Inc.

APPENDIX D

PHOTOGRAPHS

PHOTO STATION 1
PHOTO FACING NORTH
OCTOBER 2, 2007

PHOTO STATION 1
PHOTO FACING NORTH
OCTOBER 2, 2008

US ROUTE 202/NH ROUTE 123 IMPROVEMENT PROJECT PETERBOROUGH, NH	PHOTO DOCUMENTATION WETLAND MITIGATION SITE 2008 POST-CONSTRUCTION MONITORING	The Smart Associates *Environmental Consultants, Inc.* 72 North Main Street • Concord, NH 03301-4983 New Hampshire DOT

PHOTO STATION 2
PHOTO FACING SOUTH
OCTOBER 2, 2007

PHOTO STATION 2
PHOTO FACING SOUTH
OCTOBER 2, 2008

US ROUTE 202/NH ROUTE 123 IMPROVEMENT PROJECT PETERBOROUGH, NH	PHOTO DOCUMENTATION WETLAND MITIGATION SITE 2008 POST-CONSTRUCTION MONITORING	The Smart Associates *Environmental Consultants, Inc.* 72 North Main Street • Concord, NH 03301-4983 New Hampshire DOT

PHOTO STATION 3
PHOTO FACING SOUTHEAST
OCTOBER 2, 2007

PHOTO STATION 3
PHOTO FACING SOUTHEAST
OCTOBER 2, 2008

US ROUTE 202/NH ROUTE 123 IMPROVEMENT PROJECT PETERBOROUGH, NH	PHOTO DOCUMENTATION WETLAND MITIGATION SITE 2008 POST-CONSTRUCTION MONITORING	The Smart Associates *Environmental Consultants, Inc.* 72 North Main Street • Concord, NH 03301-4983 New Hampshire DOT

PHOTO STATION 4
PHOTO FACING SOUTHWEST
OCTOBER 2, 2007

PHOTO STATION 4
PHOTO FACING SOUTHWEST
OCTOBER 2, 2008

US ROUTE 202/NH ROUTE 123 IMPROVEMENT PROJECT PETERBOROUGH, NH	PHOTO DOCUMENTATION WETLAND MITIGATION SITE 2008 POST-CONSTRUCTION MONITORING	The Smart Associates *Environmental Consultants, Inc.* 72 North Main Street • Concord, NH 03301-4983 New Hampshire DOT