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Transmittal

To: Jay Clement (USACE), Bill Bullard (MDEP)

CC: Deane Van Dusen (MaineDOT), Jim Wendel (Scarborough), Ken Grondin (Grondin), Rich Jordan (Boyle Associates)

From: David Brenneman (Boyle Associates) on behalf of Grondin Aggregates/Larrabee Farms Wetland Mitigation Site

Date: 1/7/2011

Re: **Maine DOT Gorham Bypass Wetland Mitigation Project at Larrabee Farms Wetland Mitigation Site – YEAR THREE (2010) MONITORING REPORT**

Corps Permit No.: NAE-2005-4220

Maine DEP NRPA Project Number: L-23402-TH-A-N

Attached, please find the third year (2010) wetland mitigation project monitoring report for the above-mentioned project.

If you have any questions or would like to conduct a site visit, please contact Ken Grondin (207-854-1147) or Richard Jordan (207-671-2760).

Thank you,

David Brenneman, Environmental Scientist
dbrenneman@boyleassociates.net

MITIGATION REPORT

TRANSMITTAL AND SELF-CERTIFICATION

DEPARTMENT OF THE ARMY PERMIT NUMBER: NAE-2005-4220

MAINE DEP NRPA PERMIT NUMBER: L-23402-TH-A-N

PROJECT TITLE: Maine Department of Transportation Gorham Bypass Project: Larrabee Farms Wetland Mitigation Project

PERMITTEE: Maine Department of Transportation (MaineDOT)

MAILING ADDRESS:

Deane Van Dusen, Environmental Dept.

State House Station 16

Augusta, Maine 04333

TELEPHONE: 207.624.3088

AUTHORIZED AGENT: Grondin Aggregates, LLC

MAILING ADDRESS:

Ken Grondin

11 Bartlett Road

Gorham, Maine 04038

TELEPHONE: 207.854.1147

ATTACHED MITIGATION REPORT TITLE: Maine Department of Transportation Gorham Bypass: Third Year Wetland Mitigation Monitoring Report

PREPARERS: Boyle Associates (207.591.5220)

DATE: December 21, 2010

CERTIFICATION OF COMPLIANCE: I certify that the attached report is accurate and discloses that the mitigation required by the Department of the Army Permit [is] **is not** in full compliance with the terms and conditions of that permit.

CORRECTIVE ACTION: A need for corrective action **is** **is not** identified in the attached report.

CONSULTATION: I [do] **do not** request consultation with the Corps of Engineers to discuss a corrective strategy or permit modification.

CERTIFIED: _____ {Signature on File (y.1)} _____
(Signature of permittee) Date

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<u>Appendix B</u> – A vegetative species list of volunteers in each plant community type. The volunteer species list should, at a minimum, include those that cover at least 5% of their vegetative layer.	
<u>Appendix C</u> – Representative photos of each mitigation site taken from the same locations for each monitoring event. Photos should be dated and clearly labeled with the direction from which the photo was taken. The photo sites must also be identified on the appropriate maps.	
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Project Overview Form

Corps Permit No.: NAE-2005-4220 **Maine DEP NRPA Project Number:** L-23402-TH-A-N
Mitigation Site Name: Larrabee Farms Wetland Mitigation Site: MaineDOT Gorham Bypass Mitigation
Monitoring Report: Year 3 of 10

Name and Contact Information for Permittee (left) and Agent (right):

Maine Department of Transportation (MaineDOT) Deane Van Dusen: Phone # 207.592.3198 State House Station 16 Augusta, Maine 04333	Grondin Aggregates, LLC Ken Grondin: Phone # 207.854.1147 11 Bartlett Road Gorham, ME 04038
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Name of Party Conducting the Monitoring: Boyle Associates (phone # 207.591.5220)

Date(s) of Inspection(s) (Specific to Monitoring): March 31, April 6, 13, and 23, and October 22, 25, 28, & 29, of 2010.

Project Summary:

Third year monitoring procedures were conducted at the vernal pool, herbaceous, scrub-shrub, and forested wetland creation areas at the Larrabee Farms Wetland Mitigation Site. These wetland mitigation areas were designed as compensation for wetland, stream and vernal pool functions and values impacted by MaineDOT's Gorham Bypass Project. Construction of the MaineDOT project impacted approximately 11 acres of forested, scrub-shrub, wet meadow, and emergent wetlands, and nine streams with associated wetlands. The project also relocated approximately 290 linear feet of Brandy Brook near Flaggy Meadow Road and realigned a section of an unnamed Brandy Brook tributary. Wetland compensation included 67.5 acres comprised of 15.7 acres of wetland creation (14.1 acres of PFO, 1.2 acres of PSS and 0.4 acres of PEM); 12.8 acres of wetland preservation; 28.4 acres of upland buffer preservation; and creation of four vernal pools (0.3 acres +/- of created pool area and preservation of 10.3 acres of upland and wetland habitat buffers adjacent to the pools). The preservation area includes 2,042 linear feet of a wooded, intermittent stream and 100 linear feet of the Nonesuch River.

Location of and Directions to Mitigation Site:

The Larrabee Farms Wetland Mitigation Site is located in the town of Scarborough. The site entrance is located approximately 1 mile southeast of the corner of Route 114 and Beech Ridge Road.

Start and Completion Dates for Mitigation:

Conservation easement recorded - Cumberland County Registry of Deeds	Feb. 2007
Final wetland creation grading began	March 2007
Vernal pools constructed	March 2007
Final wetland grading completed	Oct. 15, 2007
Hydroseeding with wetland herbaceous seed mix completed and installation of woody vegetation completed	Oct. 15, 2007

Performance Standards are/are not being met:

The success standards for hydrology, invasive species, aerial cover, woody species diversity, and slope and soils stabilization are being met. The success standards planted woody species densities are not yet being met.

Dates of Corrective or Maintenance Activities Conducted Since Last Report:

Add clean sand to basins of created vernal pools 1 and 2 (northeastern corner of Larrabee site)	10/2009
Add one additional vernal pool creation area in upland forest southeast of wetland creation area	03/2010
Invasive species control within and around the perimeter of the creation area	07/2010

Recommendations for Additional Remedial Actions:

- Add additional woody plant material to forested and scrub-shrub creation areas in 2011;
- Continue on-going invasive plant monitoring and removal efforts; and,
- Add some additional egg mass attachment debris to vernal and ephemeral pools.

Requirements (1 page)

Performance Standards

The wetland and vernal pool creation and buffer areas will be assessed annually during the growing season (May-October for creation areas, April-May for VPs) for at least 10 years. Monitoring will take place twice per season during the first through fifth years following planting. For the wetland creation areas, one visit will take place in the spring, and will include a general site walk and assessment of general site health, an assessment of any winter damage and in order to determine any corrective needs. A second site visit will take place between June and October to assess plant mortality/vitality and to gather data for the annual monitoring reports. The data gathering and reporting procedure will then take place once during the first through fifth years, and during the 7th and 10th years, if necessary, following construction.

Success Standards:

1. Hydrology	
• Adequate to support the designed wetland type:	Yes
• Proposed hydrology being met:	Yes
• Percentage of site meeting proposed hydrology:	95-100
• Too wet/dry areas identified and corrective measures proposed:	N.A.
2. Proposed vegetation diversity and/or density goals for woody plants from the plan met:	No
3. Aerial cover	
A. Each mitigation site has at least 80% aerial cover, by noninvasive species:	Yes
B. Emergent areas have at least 80% cover by noninvasive hydrophytes:	No
C. Scrub-shrub and forested cover types have at least 60% cover by noninvasive hydrophytes, of which at least 15% are woody species:	Yes
4. Common reed (<i>Phragmites australis</i>), Purple loosestrife (<i>Lythrum salicaria</i>), Russian and Autumn olive (<i>Elaeagnus</i> spp.), Buckthorn (<i>Rhamnus</i> spp.), Japanese knotweed (<i>Polygonum cuspidatum</i>), and/or Multiflora rose (<i>Rosa multiflora</i>) plants at the mitigation site(s) are being controlled:	Yes
5. All slopes, soils, substrates, and constructed features within and adjacent to the mitigation site(s) are stable:	Yes

In general, the mitigation area is doing well and is successfully providing wetland functions and values similar to a natural mixed (PFO/PSS/PEM) wetland system. Wetland functions and values being provided across the site include wildlife habitat, groundwater recharge/discharge, floodflow alteration, educational and scientific value, production export, and great scenic and recreational values. There is a dominance of hydrophytic vegetation, indicators of hydric soil formation, and abundant evidence of hydrology. Finally, apparent health and vitality of the planted shrubs and trees is good.

Ground cover by non-invasive hydrophytes has increased since 2009, and including both planted woody and herbaceous species, the site meeting the aerial cover requirements.

While the surviving planted woody plants are doing well, woody vegetation density is not meeting the Corps density standards of approximately 500 trees and shrubs per acre. Mortality, however, does not seem to be a factor, as only a few dead or dying plants were located. Planting methodology may be one reason for the low density count. Plants were clumped around the site rather than planted in evenly spaced rows, and there is inconsistency in plant densities between the monitoring plots. As described in the mitigation plan, if the site does not meet the density standards in planned PFO and PSS areas by the end of the third growing season (2010), Grondin may need to install additional woody stock in order to comply with the standards.

Summary Data (maximum of 4 pages)

Describe the monitoring inspections, and provide their dates, that occurred since the last report.

Vernal Pool Habitat Creation Monitoring

The three created vernal pools created in 2008 were monitored once in March and three times in April of 2010. Egg mass counts were conducted at each visit to ensure that all masses were accounted for. A fourth pool was added on March 30 and 31, 2010 to provide compensation for a manmade vernal pool habitat that had been inadvertently impacted by construction of the Gorham Bypass. This pool was constructed in an upland forest southeast of the wetland creation area and was monitored throughout April and May, 2010.

Wetland Creation Monitoring

Site walks were conducted throughout winter, spring and summer of 2010 to assess general site health and to determine if any winter damage occurred that would require correction measures. No significant damage was observed, and no corrective measures were recommended.

As stated above previous year data indicated that the site has not been meeting the woody plant density requirement, but monitors noted variability in density data between the plots. Plot locations used during the 2008 and 2009 monitoring sessions were chosen randomly. For the 2010 monitoring effort, site monitors moved the plot locations in order to help assess if monitoring location was a factor in the low-density data. Monitors chose new random plot locations for the 2010 monitoring effort in the same fashion originally used in year one (2008). The area sampled is the same as in previous monitoring efforts. Centers were chosen randomly by dropping a pencil onto the drawing and then adjusting the center and plot size so that the plot would fit within the nearest mitigation area to the pencil point. In the field, these areas were slightly adjusted in order to sample the most representative areas and to avoid planned open water areas. Plot centers were flagged and GPS-located.

In-depth monitoring of the creation area occurred in October, 2010. Round monitoring plots with 50-foot radii were used to sample 2.94 acres of the forested wetland creation area. Round monitoring plots with a radius of 30 feet were used to sample 0.25 acres of the scrub-shrub creation area. The entire PEM creation area was monitored (no sample plots were used). The sample area represents approximately 25% of the entire wetland creation site (100% of the PEM, 22.3% of the PFO areas and 22.5% of the PSS areas).

Success Standards

1) Hydrology

Is the proposed hydrology met at the site?

Yes.

As anticipated, the primary source of hydrology in the wetland creation area comes from groundwater interception. Further hydrologic input is provided by surface runoff and atmospheric deposition. General hydrology across the wetland creation area varies from seasonally saturated to occasionally flooded. A portion of the 2010 growing season was unseasonably dry (late summer to early fall), however hydrology was still evident across the site. Saturation was found in most places with a few wetter pit areas flooded. Indicators of hydrology include standing water (inundation) in many of the pits across the creation area and flowing water in several swales fed by groundwater seeps within and around the site perimeter.

What percentage of the site is meeting projected hydrology levels?

95-100%.

Areas that are too wet or too dry should be identified along with suggested corrective measures.

Groundwater discharge and surface flow was evident across the creation site throughout the spring, summer and fall, from ice-out in April through the date of this monitoring report. Pits not inundated during the monitoring visits show evidence of former flooding/ponding during the growing season. All four of the observed soil profiles keyed as hydric using the *Field Indicators of Hydric Soils in the United States, version 7*. Most of the wetland shrubs and trees observed are alive and growing, indicating an adequate hydrologic regime.

The three created ephemeral ponds were dry or nearly dry during monitoring in the fall. The southeastern pool was saturated and the other two pools were flooded with approximately 8 to 12 inches of water. Spring depth in these pools has generally been three to four feet.

In the previous year monitoring report a recommendation was made to move some of the planted woody species that were growing on mounds to lower elevations within the creation area due to an apparent lack of water. Prior to performing this remedial action, in 2010, further inspection was conducted to see if moving these species would be more beneficial than leaving them in place. As of the monitoring in October of 2010 all species identified in 2009 growing on mounds that appeared to be performing poorly now appear to be doing satisfactorily. This is presumably due to a wetter fall, but acclimation by the trees and shrubs to the area may also be a factor. Following 2010 monitoring, monitors decided that moving these individuals would cause more undo stress than leaving in place and a better likelihood of survival would occur if plants are not moved at this point.

2) The proposed vegetation diversity and density goals for woody plants from the plan are met.

Diversity Goal being met: Yes – Of the 12 species of shrubs and trees planted at the mitigation site, six species have more than 50 individual plants per acre.

Density Goal being met: No – The woody vegetation density success standard, as described in the mitigation plan, is 500 trees and shrubs per acre in planned planted areas (of which at least 350 per acre are tree species for PFO creation areas). In order to achieve that goal, following the ACOE's, *Guidance for the New England Division Mitigation Plan Checklist (10/24/2006 Draft)*, and as described in the planting plan, Grondin installed 400 trees/acre in PFO areas and 600 shrubs/acre in planned PSS areas. However, since the area planted as PFO creation is much larger than that planted as PSS, overall plant density is closer to that installed in PFO creation areas (*i.e.* 400 plants/acre).

In 2010, the average density of woody plants across both PFO and PSS creation areas is 315 trees and shrubs per acre. Within the PSS creation areas the average density is 294 shrubs/acre and within the PFO creation areas the average density is 320 trees/acre. Data indicate a total of 4505 surviving woody plants within the entire planned-to-be-planted creation area. Presuming the entire stock of 5,940 plants were installed as planned, this represents a mortality rate of approximately 25% after three years. Little winter damage has been noted and only a few dead individuals have been found during each year's monitoring.

It should be noted that these data does not include any volunteer species. While several volunteer plants were noted to have a height of greater than 18 inches, none have a density of 50 or more plants per acre. Monitors anticipate that additional volunteer species and seedlings from reproduction within the creation area will reach sufficient height (18 inches) and sufficient density to be included in future monitoring assessments; these additional plants may help bring the overall woody plant density closer to the Corp standards.

Choosing new random plot locations to get a more accurate representation of the site has shown that while the creation area is responding well overall after three growing seasons there is a lower-than-expected density of woody individuals. As discussed in the 2009 monitoring report, if woody plant densities were not meeting goals in 2010, monitors would recommend additional plantings to bring the densities in line with Corp standards.

3) a. Each mitigation site has at least 80% aerial cover, excluding planned open water areas or planned bare soil areas (such as for turtle nesting), by noninvasive species (See Table 8 in App. D).

Yes.

Monitors recorded an average of 90% aerial cover by non-invasive species throughout the wetland creation site. Average percent aerial cover increased from 77 in 2009 to 90 in 2010. Herbaceous vegetation is spreading well across the mitigation site and trees and shrubs will provide additional aerial coverage as they mature.

Additionally, based on recommendations included in the 2008 monitoring report, a large (approximate 3-acre) area of the northwestern end of the mitigation site was hydroseeded in 2009. Similar planting experience has shown that, for unknown reasons, this particular mix of herbaceous vegetation (*New England Wet Mix*) does not seem to sprout well until the second growing season after application. In 2010 this area was responding well and aerial cover in this area is high despite the relatively dry summer experienced in 2010.

3) b. Planned emergent areas on each mitigation site have at least 80% cover by noninvasive hydrophytes.

No.

While the PEM creation site is stable and has approximately 115% aerial coverage by plants, only 69% of the cover comes from non-invasive hydrophytes - the rest of the cover is nearly all broadleaf cattail (*Typha latifolia*). In 2009, cattails contributed to the majority of herbaceous plant cover, but non-invasive hydrophytes such as creeping bentgrass (*Agrostis stolonifera*) and soft rush (*Juncus effusus*) were beginning to flourish. Cattails have continued to grow thickly in the semi-permanently flooded areas within the site, but these areas now also support a growing population of water plantain (*Alisma triviale*) and beggar's ticks (*Bidens frondosa*). Barnyard grass (*Echinochloa crusgalli*) cover was significantly reduced across the mitigation site in 2009 and is almost non-existent in 2010. Reduction in cover by barnyard grass after the first couple of growing seasons is typical of wetland creation sites, as barnyard grass only tends to flourish in the absence of competition. No additional planting is suggested in this area for 2011 because it appears that natural regeneration and spreading of the existing herbaceous plants will lead to attainment of coverage goals during the 2012 growing season.

3) c. Planned scrub-shrub and forested cover types have at least 60% cover by noninvasive hydrophytes, of which at least 15% are woody species.

No.

Monitors tallied an average of 86% aerial cover by non-invasive hydrophytes in the scrub-shrub and forested creation areas but only 9 to 10% aerial cover from woody hydrophytes. Even though densities of planted woody material are below the standard, many individual woody plants are doing very well and have shown signs of increasing aerial coverage over the last three years. In particular, there were many individuals of tamarack (*Larix laricina*) that have attained heights of over 10 feet tall. As stated in #2 above, since the woody density requirement was not met in 2010 it will be our recommendation to install additional plants during the 2011 growing season. Growth from remaining plants and the addition of new plants in 2011 should allow the site to meet the 15% requirement in 2011.

4) Common reed, Purple loosestrife, Russian and Autumn olive, Buckthorn, Japanese knotweed, and/or Multiflora rose plants at the mitigation site(s) are being controlled.

Yes.

The site was inventoried in July of 2010 for any invasive species. Individuals found were mapped and flagged in the field for removal. Japanese knotweed and glossy buckthorn were found on the slopes adjacent to the site. Less than a dozen purple loosestrife individuals and two small clumps of common reed were observed within the wetland creation area. Shortly after inventory a small crew removed all mapped/flagged plants. In October of 2010 a follow-up visit was conducted to look for any invasive plants possibly missed during the July inventory. A few more individuals were removed during this effort. Other noxious species observed within the creation area were Bird's-foot trefoil (*Lotus corniculatus*), reed canary-grass (*Phalaris arundinacea*), and broadleaf cattail. No treatment methods were applied to these herbaceous species within the site.

5) All slopes, soils, substrates, and constructed features within and adjacent to the mitigation site(s) are stable.

Yes.

All slopes, soils, substrates, and constructed features within and adjacent to the mitigation site are stable.

Soils data:

Four soil profiles were investigated within the wetland creation site. Soils observed consisted of grayish-brown layers with redoximorphic features, some of which underlie dark A horizons. Four of the profiles keyed as hydric following the *Field Indicators of Hydric soils in the United States, version 7* (HSUS7). Please see Tables 1 through 4 in Appendix D for representative soil profile descriptions for each creation type.

Remediation:

Planting remediation: as described in the mitigation plan, if the wetland creation site does not meet the Corps density standards for woody vegetation in PFO and PSS areas by the third growing season (2010) remediation may be recommended. Due to the fact that repeated monitoring efforts have not produced data that indicate failing planting densities, it is our recommendation to plant additional woody plants across the site to bring the planted densities up to the Corp requirements.

Plot data from this third growing season (2010) showed an average density of 320 trees and 294 shrubs per acre. An additional 400 trees and 230 shrubs (+/-) will be needed to reach the minimum average density of 350 trees per acre. For trees, a mix of quick growing and hardy black willow (*Salix nigra*) and green ash (*Fraxinus pennsylvanica*) (or equivalents) should be installed, and for shrubs, we suggest using speckled alder (*Alnus incana*). Native alders were not available at the time of planting in 2007, so the site only has a few, small volunteer alders.

In general, plants will be installed evenly throughout appropriate habitats within the creation area, with grouping of plants installed in areas of lesser woody cover. Potted nursery stock or plugs can be used, with trees and shrubs at least 18 to 24 inches tall. All shrub and trees planted on the site should be mulched with a wood-fiber mulch (aged bark mulch or erosion control mix) to reduce competition from herbaceous vegetation. Mulch should be added to an average depth of three inches and to a radius of approximately three feet around plantings. Mulch will help to keep herbaceous vegetation from competing with the newly planted tree and shrubs.

Erosion Control Measures:

No erosion concerns were observed within the creation area and no control measures are in place.

Visual Estimate of Percent Cover of Non-invasive and Invasive Species:

The average percent vegetative cover by non-invasive plants at the mitigation site is 90%. The average percent cover of invasive species is 22% (primarily cattails). The cattails within the site are relegated to the deeper ponded areas and swales and as such do not seem to be spreading while the cover of other herbaceous species is growing. Because they do not seem to pose a risk of spreading throughout the site and are not impeding woody plant success, and because the pockets of cattails are providing significant nesting habitat for red-winged blackbirds, we do not suggest any remediation efforts target the cattails at this point.

Fish and Wildlife Use at the Site:

Please see Table 5 in Appendix D.

General health and vigor of the surviving plants, prognosis for their future survival, and a diagnosis of the cause(s) of morbidity or mortality:

Overall, planted shrub species (*Aronia melanocarpa*, *Betula populifolia*, *Cornus sericea*, *Ilex verticillata*, *Salix discolor*, *Vaccinium corymbosum*, *Viburnum cassinoides*, and *Viburnum dentatum*) and tree species (*Abies balsamea*, *Acer rubrum*, *Fraxinus pennsylvanica*, *Larix laricina*, *Pinus strobus*, *Quercus bicolor*, and *Ulmus americana*) appear to be healthy and growing. Hydrology appears adequate for these plants and there is limited evidence of death from herbivory, flooding, or desiccation. Over most of the creation site, our best professional judgment is that the plants have a high likelihood of survival.

VERNAL POOL CREATION:

Three vernal pools were created in 2008, and are located on the northeastern corner of the Larrabee Farms parcel, within an approximately 10-acre habitat preservation area. A fourth vernal pool was constructed in late March, 2010, as discussed above. This pool was created southwest of the wetland creation area, within the existing MDOT easement for the original mitigation project. The pool's upland and wetland habitat is further buffered on the west by an additional conservation easement for a separate mitigation project.

Does the vernal pool creation take into account the critical need for unobstructed access to and from the pool, as well as an adequate extent of upland habitat to ensure success?

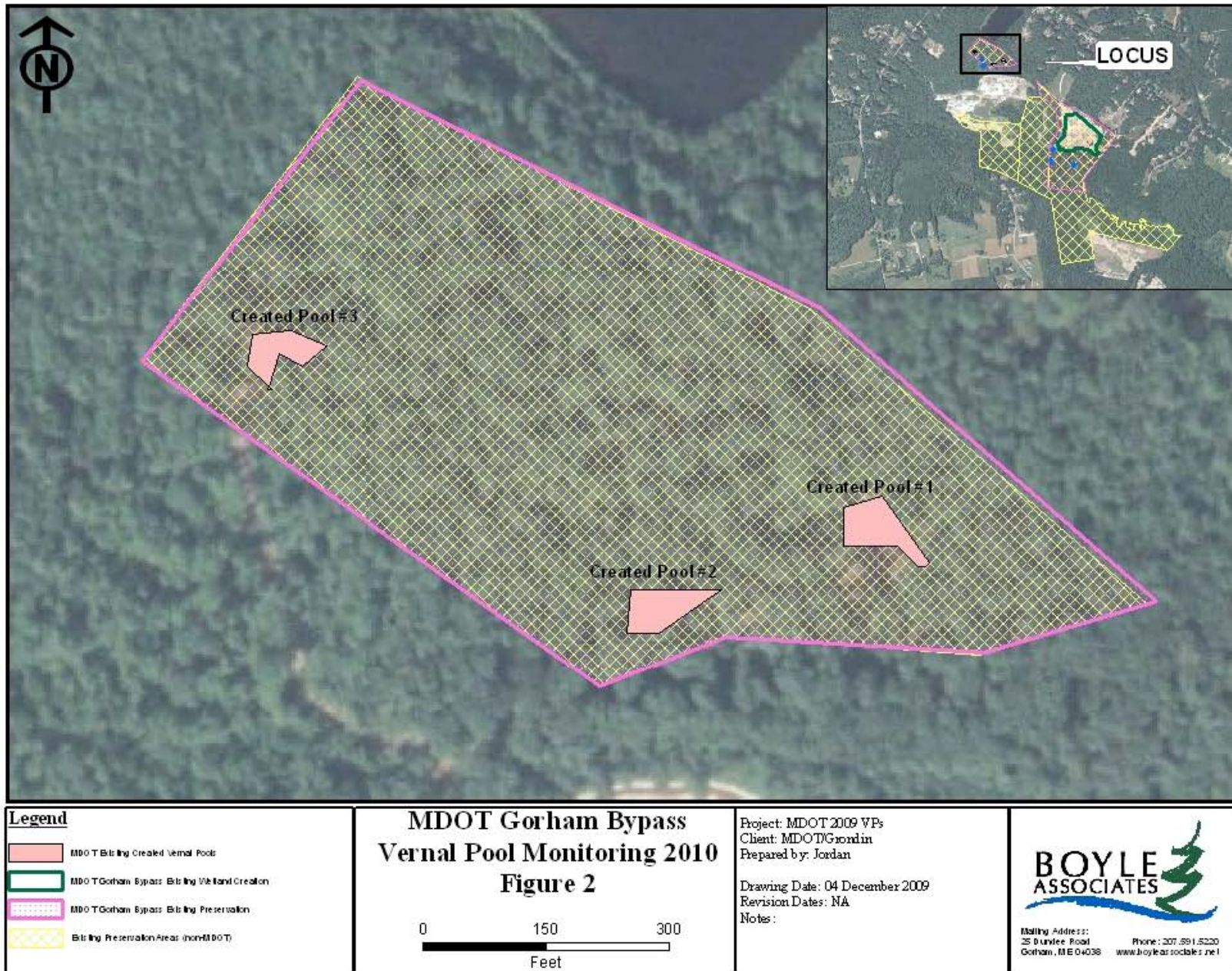
Yes – The upland areas around the pools is preserved via a conservation easement and there has been very little (mainly foot) traffic on the nearby trails. Please see mitigation plan and drawings for more information.

Pool(s) are monitored for obligate and facultative vernal pool species weekly for four weeks from the beginning of the vernal pool activity in the spring and then biweekly until the end of July for the entire monitoring period.

The three vernal pools on the northwestern side of the site were visited starting during the first week of ice-out in 2010 (approximately late March in 2010). The pools were monitored once in March, three times in April, and occasionally throughout the summer and again in September. The pool constructed in 2010 was visited in April and May, but since it was created during the latter part of the breeding season, we anticipate beginning full VP monitoring next year. Table 6, in Appendix D, provides the findings from the VP monitoring efforts.

In addition, photographs of the pool(s) taken monthly during the pool monitoring period (March/April-August) from a set location(s) will be included.

Please see Appendix C for photos the vernal pools and surrounding habitat. Additional photos are available if requested.

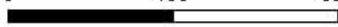




Legend


	MDOT Created Vernal Pool 03/2010
	MDOT Gorham Bypass: Existing Wetland Creation
	MDOT Gorham Bypass: Existing Preservation
	Existing Preservation Areas (non-MDOT)

**MDOT Gorham Bypass
Vernal Pool Monitoring 2010
Figure 3**

0 150 300

 Feet

Project: MDOT 2010 VPs
 Client: MDOT/Grondin
 Prepared by: DRB

Drawing Date: 20 December 2010
 Revision Dates: NA
 Notes:

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Conclusions (1 page)

In general, and as can be observed in the accompanying photographs and data, the vernal pool habitat and wetland creation areas are fairing well after the third year of growth. In the wetland creation area, hydrology appears to be adequate to achieve wetland conditions. Pockets of standing water are abundant across the creation area, there is evidence of reducing conditions in the soil profiles and planned open water areas are nearly full throughout the year. Planted woody vegetation is growing well, and herbaceous cover increased throughout the third year. Wildlife usage within the wetland creation site and surrounding habitat preservation areas is abundant year-round. In the vernal pool creation areas, all four pools are providing breeding habitat for vernal pool indicator species. Green frog tadpole predation still seems to be an issue in the original three pools, despite the remediation effort taken in 2009 meant to reduce two of the pools' hydroperiod. The remediation appears to have positively affected the pools hydrology, but green frogs tadpoles are still over-wintering within the pools, apparently surviving in wet leaf litter and small pockets of water.

Corrective actions taken to address concerns noted in the 2009 report are discussed below.

Low Vegetation Coverage Areas in the Wetland Creation Area:

A few of the wetland creation areas were re-seeded in the summer of 2009. These areas were reviewed during the 2010 monitoring effort and are now meeting the aerial cover requirement. Hydrology seems to be adequate to support these plants as those found were healthy and robust.

Failure to Meet Woody Plant Density Requirements:

As mentioned above, the density specifications for woody species have not yet been met within the wetland creation areas. We have made the recommendation to remediate this during the 2011. Additional volunteer species have not achieved densities sufficient to be included in the monitoring data in 2010, as was hoped. Monitors suggest the addition of woody plants as described above. Grondin may wish to meet with representatives of the Corps and DEP to discuss any required remediation efforts regarding plant placement, species type and densities.

Vernal Pool Hydroperiod Adjustment:

In October 2009, the base elevations of vernal pools 1 and 2 were raised in order to shift the hydrologic regime from permanently and semi-permanently flooded to ephemerally flooded. Additionally Grondin installed additional dead and dying attachment sites during the winter. Many of the site goals appear to be achieved within the vernal pool habitat creation areas. All three pools provided breeding habitat for wood frogs and spotted salamanders as evidenced by the presence of egg masses (see Table 6 in Appendix D.) During 2010 monitoring, pool 1 had dried out completely by late summer as it had in previous years. Pool 2 dried out completely for the first time. Pool 3 was nearly dry (much improved from previous years) with a few small areas in the lowest elevations still holding approximately 1-2" of water. Both vernal pool 1 and vernal pool 2 have provided year-round habitat for green frogs. Future monitoring will show if the change in hydrologic regime of the pools is successful at decreasing the amount of green frogs breeding within the pool and increasing the viability to provide good habitat for wood frogs and spotted salamanders.

Vernal Pool Four – added in 2010

One additional vernal pool was created in 2010 per recommendations from federal regulators. The construction of the Gorham Bypass had led to partial drainage of a man-made vernal pool habitat adjacent to the project. For compensation, Grondin designed and built a vernal pool habitat southwest of the MDOT wetland creation site on Larrabee. The pool was completed on March 31, 2010. In May, seven spotted salamander egg masses were observed in the created pool. The pool was dry during a site visit in July.

Appendix A -- An as-built plan showing topography to 1-foot contours, any inlet/outlet structures and the location and extent of the designed plant community types (e.g., shrub swamp). Within each community type, the plan shall show the species planted—but it is not necessary to illustrate the precise location of each individual plant. There should also be a soil profile description and the actual measured organic content of the topsoil. This should be included in the first monitoring report unless there are grading or soil modifications or additional plantings of different species in subsequent years.

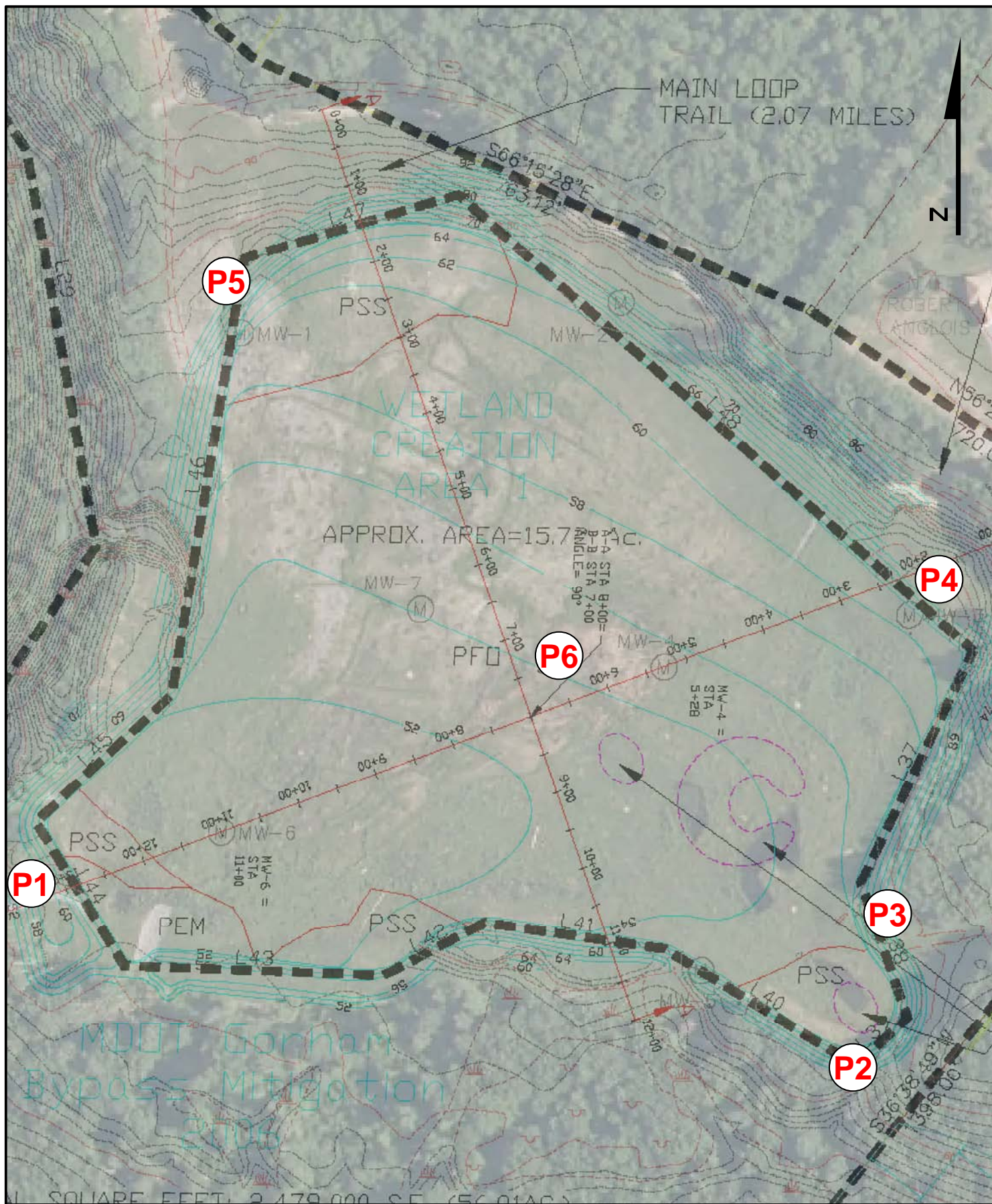
- As built plans were included in Year 1 monitoring and are available upon request.
- Soil profile data is included in Appendix D in tables 1 through 4.

Appendix B – A vegetative species list of volunteers in each plant community type. The volunteer species list should, at a minimum, include those that cover at least 5% of their vegetative layer*.

Common Name	Scientific Name	Indicator Status	Percent Aerial Cover
Shallow Sedge	<i>Carex lurida</i>	OBL	3
Pointed Broom Sedge	<i>Carex scoparia</i>	FACW	2
Fringed Willowherb	<i>Epilobium ciliatum</i> spp. <i>glandulosum</i>	FAC	1
Toad Rush	<i>Juncus bufonius</i>	FACW	1
Bird's-foot Trefoil	<i>Lotus corniculatus</i>	FACU	5
Reed canary-grass	<i>Phalaris arundinacea</i>	FACW	1
Little Bluestem	<i>Schizachyrium scoparium</i>	FACW	1
Woolgrass	<i>Scirpus cyperinus</i>	FACW	
Haresfoot Clover	<i>Trifolium arvense</i>	NI	1
Red Clover	<i>Trifolium pratense</i>	FACU	1
White Clover	<i>Trifolium repens</i>	FACU	2
Broad-leaved Cattail	<i>Typha latifolia</i>	OBL	16

*Being that this is the third year of monitoring, percent aerial cover by volunteer species is relatively low. Therefore, all volunteer species with 1% aerial cover or greater (within the area of the mitigation site surveyed) are included in the volunteer species table. No significant numbers (50 plants per acre) of woody volunteers greater than 18 inches were observed.

Appendix C -- Representative photos of each mitigation site taken from the same locations for each monitoring event. Photos should be dated and clearly labeled with the direction from which the photo was taken. The photo sites must also be identified on the appropriate maps.



Project: # 236
 Prepared by: DRB
 Drawing Date: 21 Dec 2010

Notes:
 Drawing Clip (with permission)
 Sebago Technics Project
 (Dated 11/17/2007)

Larrabee Farms: MDOT Gorham Bypass Creation Area - PHOTO LOCATIONS

0 85 170 340
 Feet

BOYLE ASSOCIATES

Mailing Address:
 25 Dundee Road
 Gorham, Maine 04038

Phone 207.591.5220
 www.boyleassociates.net

Wetland Creation Area (NOTE: see photo location drawing FMI):



Photolocation 1 (Year 1). Facing northeast across PEM, PSS and PFO creation areas, snags are evident in the background, 11-Sep-2008.



Photolocation 1 (Year 1). Facing east across the PEM creation area at the southwestern end of the site, 11-Sep-2008.



Photolocation 1 (Year 2). Facing northeast across PEM, PSS and PFO creation areas, snags are evident in the background, 21-July-2009.



Photolocation 1 (Year 2). Facing east across the PEM creation area at the southwestern end of the site, 21-July-2009.



Photolocation 1 (Year 3). Facing northeast across PEM, PSS and PFO creation areas,, 9-Sep-2010.



Photolocation 1 (Year 3). Facing east across PEM creation area at the southwestern end of the site, 9-Sep-2010.



Photolocation 2 (Year 1). Facing northwest across PSS and PFO creation areas and southernmost ephemeral pool, shrubs and trees are still difficult to discern amongst the herbaceous growth, 11-Sep-2008.



Photolocation 2 (Year 2). Facing northwest across PSS and PFO creation areas and southernmost ephemeral pool, shrubs and trees are still difficult to discern amongst the herbaceous growth, 29-July-2009.



Photolocation 2 (Year 3). Facing northwest across PSS and PFO creation areas and southernmost ephemeral pool, pool dried completely in 2010, 9-Sep-2010.



Photolocation 3 (Year of construction). Planting installation near one of the wildlife/ephemeral pools, facing west from eastern boundary of creation area, 04-Sep-2007.



Photolocation 3 (Year 2). Wetland creation area near one of the wildlife/ephemeral pools, facing west near eastern boundary of creation site, 28-July-2009.



Photolocation 3 (Year 3). Facing west near wildlife/ephemeral pool, 9-Sep-2010.



Photolocation 4 (Year of construction). Facing west towards sand removal from northeastern boundary of creation site, 04-Sep-2007.



Photolocation (between 4 and 5) (Year 2). Facing southwest from the northern boundary of creation site, 21-July-2009.



Photolocation (between 4 and 5) (Year 3). Facing southwest from the northern boundary of creation site, 9-Sep-2010.



Photolocation 5 (Year 1). Facing east across PFO creation area at an area that was re-seeded in 2009, 11-Sep-2008.



Photolocation 5 (Year 2). Facing southeast across northernmost PSS creation area and PFO creation area, 21-July-2009.



Photolocation 5 (Year 3). Facing SE across northernmost PSS creation area and PFO creation area, 9-Sep-2010.



Photolocation 6 (Year 2). Facing west within PFO creation area, 23-July-2009.



Photolocation 6 (Year 2). Facing north from within creation site, 28-July-2009.

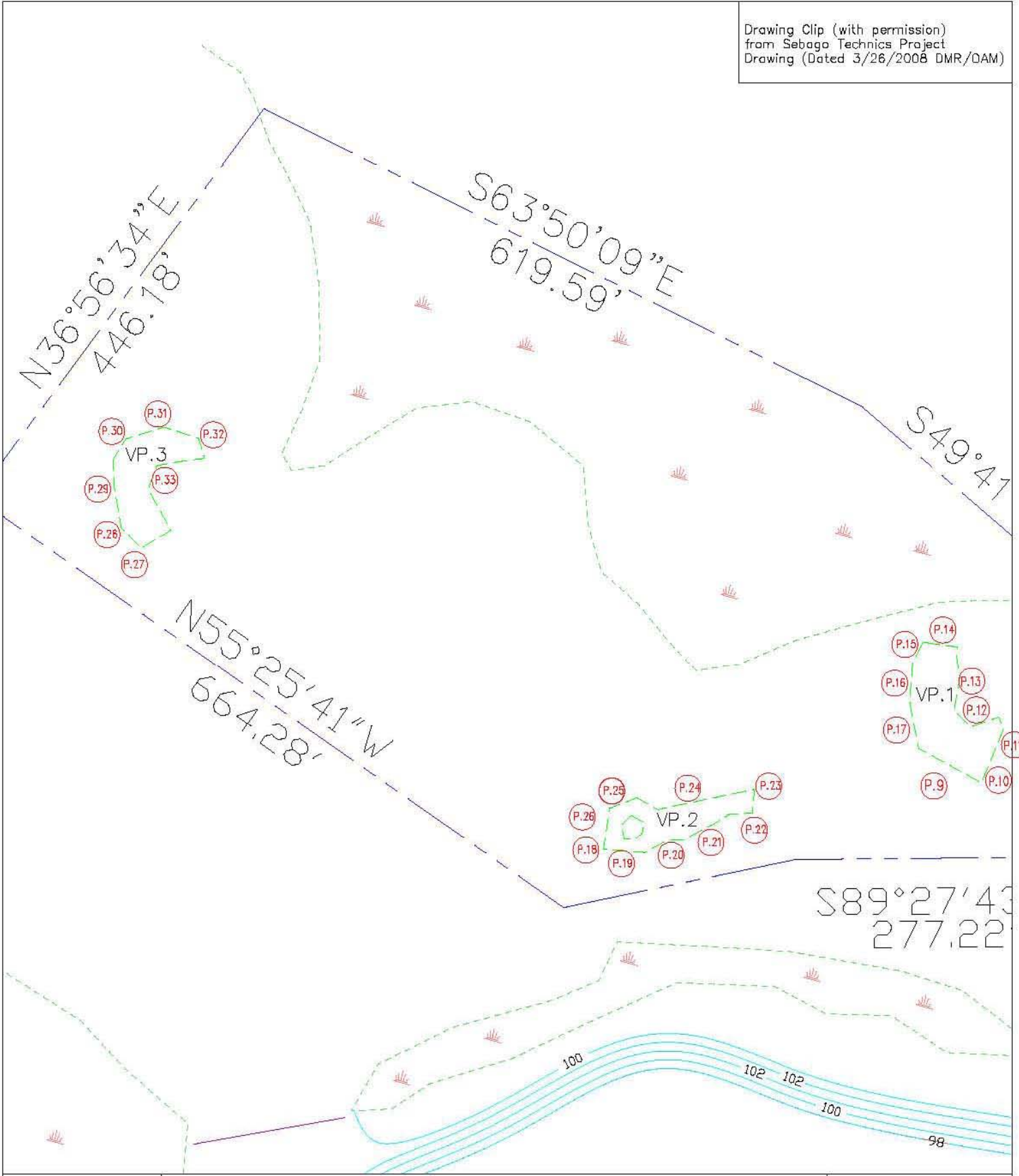


Photolocation 6 (Year 3). Facing west from within PFO creation site, 9-Sep-2010.



Photolocation 6 (Year 3) Facing north from within creation site, 9-Sep-2010.

Drawing Clip (with permission)
 from Sebago Technics Project
 Drawing (Dated 3/26/2008 DMR/DAM)



Date: 2008-Dec-15
 Job #: 237
 Scale: NTS
 Created By: REJ

Larrabee Farms: MDOT Gorham Bypass
Vernal Pool Creation Areas
PHOTO LOCATIONS



BOYLE ASSOCIATES
 Mailing Address:
 25 Dundee Road
 Gorham, Maine 04038
www.boyleassociates.net

10.3 acres of vernal pool habitat creation and preservation (3 distinct pools)
Vernal Pool One (Northeastern-most Pool)



Photolocation 9 (Year of construction). Facing north across area used for vernal pool 1, 08-March-2007.



Photolocation 9 (Year of construction). Facing northwest at vernal pool 1 during first season, 19-April-2007.



Photolocation 9 (Year 3). Facing northwest at vernal pool 1, pool nearly dry, 10-September-2010.



Photolocation 11 (Year of construction). Facing west at excavation work in vernal pool 1, 13-March-2007.



Photolocation 11 (Year of construction). Facing southwest at subsoil removal in vernal pool 1, 13-March-2007.



Photolocation 12 (Year 2). Facing northwest at vernal pool 1 two years after construction, 16-April-2009.



Photolocation 13 (Year 2). Facing southwest at vernal pool 1, 16-April-2009.



Photolocation 16 (Year 3). Facing northeast at vernal pool 1, 23-April-2010.



Photolocation 17 (Year of construction). Facing north at vernal pool 1 just after initial construction, 16-March-2007.



Photolocation 17 (Year 2). Facing north over vernal pool one just after addition of sand and "living islands", 10-October-2009.



Photolocation 17 (Year 3). Facing northwest over vernal pool one. Note mound from sand addition on right side of photo, 23-April-2010.

Vernal Pool 2 (Central Pool)



Photolocation 18 (2009). Facing northeast across vernal pool 2, 16-April-2009.



Photolocation 18 (Year 1). Facing east across vernal pool 2 towards VP monitor, 28-April-2008.



Photolocation 18 (Year 3). Facing east across vernal pool, 23-April-2010.



Photolocation 20 (Year 2). Facing west across vernal pool 2 in spring, 16-April-2009.



Photolocation 20 (Year 3). Facing west across vernal pool 2 in spring, 23-April-2010.



Photolocation 21 (Year of construction). Facing west across mostly dry vernal pool 2, 05-July-2007.



Photolocation 23 (year 1). Facing west at part of pool that remained flooded throughout 2008, 23-June-2009.



Photolocation 24 (Year 2). Facing east across vernal pool 2 towards VP monitor, 16-April-2009.



Photolocation 24 (Year 3). Facing northeast across vernal pool 2, 23-April-2010.



Photolocation 25 (Year 2). Facing east at vernal pool 2 – in 2009, a hen mallard nested on the island shown in the foreground of this photo, 16-April-2009.



Photolocation 26 (Year of construction). Facing east at vernal pool 2 creation process, 16-March-2007.



Photolocation 26 (Year 1). Facing east across dry portion of vernal pool 2, 23-June-2008.



Photolocation 26 (Year 1). Facing east from eastern boundary across vernal pool 2, 11-September-2008.



Photolocation 26 (Year 2). Reinstalling mucky substrate after installing sand to lower water depth, 10-October-2009.



Photolocation 26 (Year 3). Facing east across pool, 10-September-2010.

Vernal Pool 3 (Southwestern-most Pool)



Photolocation 27 (Year of construction). Facing northwest across vernal pool 3 during dry season, 05-July-2007.



Photolocation 27 (Year 1). Facing northwest across vernal pool 3 during dry season, 23-June-2008.



Photolocation 27 (Year 1). Facing northwest across vernal pool 3 at the intrepid VP monitor, 28-April-2008.



Photolocation 27 (Year 3). Facing northwest across vernal pool 3 during dry season, 10-September-2010.



Photolocation 28 (Year 2). Facing northwest across vernal pool 3 during dry season, 10-September-2009.



Photolocation 28 (Year 2). Facing northwest across vernal pool 3 during wet season, 16-April-2009.



Photolocation 28 (Year 3). Facing northwest across pool 3 in spring, 23-April-2010.



Photolocation 29 (Year of construction). Facing north across a portion of vernal pool 3, 18-March-2007.



Photolocation 29 (Year 1). Facing south across vernal pool 3, 11-September-2008.



Photolocation 29 (Year 2). Facing north across a portion of vernal pool 3, 16-April-2009.



Photolocation 30 (Year 1). Spotted salamander spermatophore in vernal pool 3, 13-April-2008.



Photolocation 30 (Year 2). Wood frog egg masses desiccating onshore of vernal pool 3, 16-April-2009.



Photolocation 30 (Year 2). Facing northwest across vernal pool 3, 07-April-2009.



Photolocation 30 (Year 3) Facing northwest across vernal pool 3, 23-April-2010.



Photolocation 31 (Year 2). Facing northwest across vernal pool 3 during wet season, 16-April-2009.



Photolocation 31 (Year 2). Facing south across vernal pool 3, 22-April-2009.



Photolocation 31 (Year 3). Facing south across pool 3, 23-April-2010.



Photolocation 32 (Year 2). Facing northwest at northern portion of vernal pool 3, 22-April-2009.



Photolocation 32 (Year 3) Facing northwest at pool 3, 10-September-2010.

Newly created vernal pool (March, 2010)



Area identified for vernal pool creation south of current MDOT wetland creation site, 22-July-2010



Area identified in 2009 for vernal pool creation, 12-November-2009.



Construction of vernal pool south of current MDOT wetland creation area, 31-March-2010.



Created vernal pool post construction, 31-March-2010.

Appendix D. Tables

Table 1. Soil profile 1 in PEM creation area (National Wetland Soil Indicators: F6)

<u>Depth</u>	<u>Horizon</u>	<u>Matrix</u>	<u>Redox</u>	<u>Texture</u>
0-13	A1	10YR 3/1	10YR 5/4 (5%) Redox in Pore Linings	SL
13-18	A2	10YR 3/2	10Y 5/1 (15%)	SL
18-20+	B	10Y 6/1	7.5YR 4/4 (8%)	LC

Table 2. Soil profile 2 in PSS creation area (National Wetland Soil Indicators: F6).

<u>Depth</u>	<u>Horizon</u>	<u>Matrix</u>	<u>Redox</u>	<u>Texture</u>
0-10	A1	10YR 3/2	10YR 4/6 (5%) Redox in Pore Linings	SL
10-20	A2	10YR 3/1	5GY 5/1 (10%)	SL
20+	B	10Y 5/1	10YR4/6 (5%)	LC

Table 3. Soil profile 3 in PFO creation area (National Wetland Soil Indicators: F3).

<u>Depth</u>	<u>Horizon</u>	<u>Matrix</u>	<u>Redox</u>	<u>Texture</u>
0-8	A1	10YR 4/1	10YR 4/6 (5%)	SL
8-14	A2	10YR 4/2	5G 5/1 (10%) 10YR 4/6 (2%)	SL
14-20+	B	2.5Y 6/3	10YR 5/1(5%) 10YR 4/6 (2%)	S (Abrupt Texture Change)

Table 4. Soil profile 4 in PFO creation area (National Wetland Soil Indicators: F6).

<u>Depth</u>	<u>Horizon</u>	<u>Matrix</u>	<u>Redox</u>	<u>Texture</u>
0-6	A1	10YR 3/1	10YR 4/4 (8%)	fSL
6-18	A2	10YR 4/1	10YR5/1 (5%) 10YR4/6 (2%) Redox In Pore linings	SL
18-20+	B	5GY 6/1	10YR 4/4 (10%)	LC

Table 5: Fauna Species List April 2008 through October 2010 (wetland creation and vernal pool creation areas)

Common Name	Scientific Name	Field ID Methodology	Observed Use
Birds:			
American crow	<i>Corvus brachyrhynchos</i>	visual	feeding, roosting
American goldfinch	<i>Carduelis tristis</i>	song	feeding, nesting
American robin	<i>Turdus migratorius</i>	visual	feeding
American woodcock	<i>Solopax minor</i>	visual	feeding, roosting
Bald Eagle	<i>Haliaeetus leucocephalus</i>	visual	feeding
Black duck	<i>Anas rubripes</i>	visual	feeding
Black-capped chickadee	<i>Parus atricapillus</i>	song	feeding, nesting
Barn swallow	<i>Hirundo rustica</i>	visual	feeding
Cedar waxwing	<i>Bombycilla cedrorum</i>	visual, song	feeding
Downy woodpecker	<i>Picoides pubescens</i>	song	feeding, nesting
Eastern bluebird	<i>Sialia sialis</i>	visual	feeding
Eastern phoebe	<i>Sayornis phoebe</i>	visual	feeding
European starling	<i>Sturnus vulgaris</i>	visual	feeding
Great blue heron	<i>Ardea herodias</i>	visual	feeding
Killdeer	<i>Charadrius vociferus</i>	visual	feeding, nesting
Lesser yellowlegs	<i>Tringa flavipes</i>	visual	feeding, nesting
Mallard	<i>Anas platyrhynchos</i>	visual	feeding
Mourning dove	<i>Zenaida macroura</i>	visual	roosting
Northern harrier	<i>Circus cyaneus</i>	visual	feeding
Palm warbler	<i>Dendroica palmarum</i>	visual	feeding
Red-tailed hawk	<i>Buteo jamaicensis</i>	visual, song	feeding
Red-winged blackbird	<i>Agelaius phoeniceus</i>	visual	feeding, nesting
Savannah sparrow	<i>Passerculus sandwichensis</i>	visual	feeding
Solitary sandpiper	<i>Tringa solitaria</i>	visual	feeding
Song sparrow	<i>Melospiza melodia</i>	visual	feeding, nesting
Tree swallow	<i>Tachycineta bicolor</i>	visual	feeding
Turkey vulture	<i>Cathartes aura</i>	visual	feeding
White-breasted nuthatch	<i>Sitta carolinensis</i>	visual	feeding
Wild turkey	<i>Meleagris gallopavo</i>	visual	Feeding
Mammals:			
Grey squirrel	<i>Sciurus carolinensis</i>	visual	feeding
Moose	<i>Alces alces</i>	tracks	feeding
Raccoon	<i>Procyon lotor</i>	tracks	feeding
Red fox	<i>Vulpes vulpes</i>	visual	feeding
Red squirrel	<i>Tamiasciurus hudsonicus</i>	visual	feeding
Skunk	<i>Mephitis mephitis</i>	tracks	feeding
White-tailed deer	<i>Odocoileus virginianus</i>	scat, tracks	feeding

Table 5. Continued...

Common Name	Scientific Name	Field ID methodology	Observed Use
Insects:			
American bumble bee	<i>Bombus pennsylvanicus</i>	visual	feeding, breeding, shelter
Backswimmer	<i>Notonectidae</i> family	visual, nest	feeding, breeding, shelter
Bald-faced hornet	<i>Vespula maculate</i>	visual	feeding, breeding, shelter
Beetles	Order Coleoptera	visual	feeding, breeding, shelter
Caddisfly	<i>Limnephilidae</i> family	visual	feeding, breeding, shelter
Dragonflies	Order Odonata	visual	feeding, breeding
Monarch butterfly	<i>Danaus plexippus</i>	visual	feeding
Mosquitoes	<i>Culicidae</i> family	visual	feeding, breeding
Water boatman	<i>Corixidae</i> family	visual	feeding, breeding, shelter
Water strider	<i>Gerridae</i> family	visual	feeding, breeding, shelter
Arachnids:			
Goldenrod spider	<i>Misumena vatia</i>	visual	feeding, breeding, shelter
American dog tick	<i>Dermacentor variabilis</i>	visual	feeding, breeding
Deer tick	<i>Ixodes scapularis</i>	visual	feeding, breeding
Amphibians:			
American toad	<i>Bufo americanus</i>	visual	feeding, breeding
Green frog	<i>Rana clamitans</i>	visual	feeding, breeding
Snapping turtle	<i>Cheyldra serpentine</i>	visual	feeding
Spotted salamander	<i>Ambystoma maculatum</i>	egg masses	feeding, breeding
Wood frog	<i>Rana sylvatica</i>	visual, egg masses	feeding, breeding

Table 6a. 2010 MDOT Mitigation Created Vernal Pool Survey Information from 4 Site Visits in March/April 2010 (max # observed in bold). Pool 4 contained 7 spotted salamander egg masses in May 2010 (no wood frogs due presumably to late construction date) – data for this pool will be included in future monitoring reports.

POOL #	DATE	Egg Masses			Max Depth (Ft.)	General Observations*
		Wood Frog	Spotted Salamander	Bl. Spotted Salamander		
1	3-31	69	1	0	5.0	Breeding activity early in this and all pools.
	4-6	7	5	0	-	Green frog tadpoles observed on a raft of wood frog egg masses.
	4-13	0	15	0	-	
	4-23	0	23	0	3.0	No Wood frog EM's found, but 30+ wood frog tadpoles observed.
2	3-31	81	0	0	3.0	
	4-6	84	4	0	-	
	4-13	59	3	0	-	Wood frog EM count is approximate. EM's found were completely disassociated with some hatched.
	4-23	40	4	0	2.0	Wood frog tadpoles observed (approximately 100). Eastern portion of pool was dry.
3	3-31	62	3	0	3.0	Green frog tadpoles were observed predated this huge raft of wood frog EM's.
	4-6	4	16	1	-	Wood frog EM's noted to have been predated upon by green frog tadpoles, despite the fact that this pool completely dried during the 2009 growing season.
	4-13	0	27	1	-	Cigar tube caddisfly larvae seen predated on spotted salamander EM's.
	4-23	0	23	1	2.0	

*See previous year data for plant species found in/around pool and other general observations.

Table 6b. 2008 & 2009 MDOT Mitigation Created Vernal Pool Survey Information - Maximum Number of Egg Masses Observed

POOL #	Year	Egg Masses			Pool Conditions			General Observations			
		Wood Frog	Spotted Salamander	Bl. Spotted Salamander	Max Depth (Ft.)	pH	Temp (°C)	Substrate	Vegetation In Pool*	Vegetation Around Pool	Other Species Observed
1	2009	96	9	0	2.0	5.51	11.7	Leaf litter/muck/mineral	Ace rub, Jun eff, Sci cyp	Abi bal, Pin str, Kal ang	Green frog tadpoles (hundreds), water striders, water boatman, whirligig beetles
	2008	69	8	0	2	5.50	12.5	Mineral	Ace rub, Jun sp.	Pin str, Abi bal, Gau pro, Kal ang, Que rub, Ace rub	Backswimmer, green frog tadpoles
2	2009	11	0	0	2.2	4.60	9.5	Leaf litter/mineral/muck	Jun eff, Car sp.	Tsu can, Gal pro, Pin str, Que rub, Ace rub, Ham vir, Abi bal, Vac ang, Rub sp., Pan sp.	Green frog tadpoles, water striders, mosquito larvae
	2008	17	0	0	2	4.60	17.6	Mineral	None	Pin str, Abi bal, Gau pro, Kal ang, Que rub, Ace rub	Adult wood frogs (10), water striders, water boatman
3	2009	33	17	0	3.0	4.75	8.9	Leaf litter/organic/muck	Car sp.	Pte aqu, Pin str, Vac ang, Abi bal, Kal ang, Pic mar, Ace rub, Que rub, Rub sp., Fag gra, Pan sp.	Green frog tadpoles, mosquito larvae
	2008	63	9	0	2.25	5.04	11.7	Leaf litter/mineral	None	Pin str, Abi bal, Gau pro, Kal ang, Que rub, Ace rub	

Table 7. MDOT Wetland Mitigation Year Three Monitoring Results - 2010
Scrub/Shrub and Forested Wetland Areas

Plot # Mitigation Type (Date Surveyed)	Radius (ft)	Area (plot acreage) ¹	Plants	Number of Plants	Tree & Shrub Species/Acre
1	30	0.062	Cose	3	177
PSS Creation			Ilve	1	
(10/25/2010)			Sadi	5	
			Vide	2	
			Total	11	
2	30	0.062	Arme	7	290
PSS Creation			Cose	3	
(10/25/2010)			Ilve	3	
			Sadi	3	
			Vide	2	
			Total	18	
3	50	0.173	Abba	20	491
PFO Creation			Acru	2	
(10/25/2010)			Bepo	1	
			Frpe	19	
			Lala	40	
			Pist	2	
			Sadi	1	
			Total	85	
4	50	0.173	Abba	19	468
PFO Creation			Frpe	23	
(10/28/2010)			Lala	34	
			Pist	5	
			Total	81	
5	50	0.173	Abba	13	295
PFO Creation			Bepo	1	
(10/28/2010)			Frpe	11	
			Lala	21	
			Pist	5	
			Total	51	
6	50	0.173	Abba	44	520
PFO Creation			Acru	2	
(10/28/2010)			Bepo	2	
			Frpe	11	
			Lala	25	
			Pist	6	
			Total	90	
7	50	0.173	Abba	23	376
PFO Creation			Frpe	24	
(10/28/2010)			Lala	18	
			Total	65	
8	50	0.173	Abba	12	289
PFO Creation			Bepo	1	
(10/28/2010)			Frpe	22	
			Lala	11	
			Pist	3	
			Sadi	1	
			Total	50	
9	50	0.173	Abba	11	104
PFO Creation			Frpe	5	
(10/28/2010)			Lala	1	
			Pist	1	
			Total	18	
10	50	0.173	Abba	25	289
PFO Creation			Frpe	12	
(10/28/2010)			Lala	8	
			Pist	5	
			Total	50	

Plot # Mitigation Type (Date Surveyed)	Radius (ft)	Area (plot acreage) ¹	Plants	Number of Plants	Tree & Shrub Species/Acre
11 PFO Creation (10/28/2010)	50	0.173	Abba	16	225
			Frpe	8	
			Lala	10	
			Pist	5	
			Total	39	
12 PFO Creation (10/29/2010)	50	0.173	Abba	16	353
			Acru	1	
			Bepo	4	
			Frpe	11	
			Lala	22	
			Pist	7	
			Total	61	
13 PFO Creation (10/29/2010)	50	0.173	Abba	18	410
			Bepo	1	
			Frpe	19	
			Lala	26	
			Total	71	
14 PFO Creation (10/28/2010)	50	0.173	Abba	23	358
			Frpe	19	
			Lala	15	
			Pist	5	
			Total	62	
15 PFO Creation (10/29/2010)	50	0.173	Abba	39	457
			Frpe	31	
			Lala	5	
			Pist	4	
			Total	79	
16 PFO Creation (10/29/2010)	50	0.173	Abba	12	150
			Frpe	2	
			Lala	11	
			Pist	1	
			Total	26	
17 PFO Creation (10/29/2010)	50	0.173	Abba	4	75
			Frpe	5	
			Lala	4	
			Total	13	
			18 PFO Creation (10/28/2010)	50	
Frpe	10				
Lala	19				
Pist	4				
Total	51				
19 PFO Creation (10/28/2010)	50	0.173	Abba	18	277
			Frpe	8	
			Lala	16	
			Pist	6	
			Total	48	
20 PSS Creation (10/29/2010)	30	0.062	Arme	1	306
			Cose	2	
			Ilve	3	
			Sadi	13	
			Total	19	
21 PSS Creation (10/28/2010)	30	0.062	Abba	2	403
			Arme	3	
			Bepo	4	
			Cose	5	
			Ilve	1	
			Sadi	5	
			Vica	3	
			Vide	2	
Total	25				

Plot # Mitigation Type (Date Surveyed)	Radius (ft)	Area (plot acreage) ¹	Plants	Number of Plants	Tree & Shrub Species/Acre
PSS Creation Area Average Plants/Acre					294
PFO Creation Area Average Plants/Acre					320
Overall Average # Woody Plants per Acre					315
Total PSS surveyed (ac)				0.25	
Total PFO surveyed (ac)				2.94	
Total acreage surveyed (ac):				3.19	
Percentage of total planted area* (14.3 acre) surveyed:				22.3%	
Percentage of total PSS area planted (1.1 acre) surveyed:				22.5%	
Percentage of total PFO area planted (13.2 acre) surveyed:				22.3%	

*Calculated plot area excludes "planned non-planted areas" or approximately 4% (e.g. ephemeral pools, nesting islands, and coarse woody debris.)

PLANT CODE TABLE		
Plant Code	Plant Name (scientific)	Common Name
Abba	<i>Abies balsamea</i>	Balsam Fir
Acru	<i>Acer rubrum</i>	Red Maple
Arme	<i>Aronia melanocarpa</i>	Black Chokeberry
Bepo	<i>Betula populifolia</i>	Gray Birch
Cose	<i>Cornus sericea</i>	Red Osier Dogwood
Frpe	<i>Fraxinus pennsylvanicum</i>	Green Ash
Ilve	<i>Ilex verticillata</i>	Winterberry
Lala	<i>Larix laricina</i>	Tamarack
Pist	<i>Pinus strobus</i>	White Pine
Sadi	<i>Salix discolor</i>	Pussy Willow
Vica	<i>Viburnum cassinoides</i>	Wild Raisin
Vide	<i>Viburnum dentatum</i>	Arrowwood

**Table 8. Herbaceous Vegetation Findings by Transect
(MDOT Wetland Creation Area 2010)**

Species average % cover over area surveyed

Scientific Name	Common Name	Indicator Status	Species average % cover over area surveyed												
			T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	PEM		
<i>Alopecurus species</i>	Foxtail species	FACW or OBL													1
* <i>Agrostis alba</i>	Redtop	FACW					1								
<i>Agrostis perennans</i>	Upland bentgrass	FACU									1				
* <i>Agrostis stolonifera</i>	Creeping Bentgrass	FACW	25	10	25	35	35	25	15	25	15	25	25		
<i>Aster vimineus</i>	Small-White Aster	FAC	1			1			1	1	2				2
<i>Bidens frondosa</i>	Devil's Beggar-ticks	FACW		1											3
<i>Carex lurida</i>	Shallow Sedge	OBL	10	7	5	2	3	5	5	3	10	2			1
<i>Carex scoparia</i>	Pointed Broom Sedge	FACW	5	5	3	5	2	5	1	5	2	2	2		2
* <i>Carex vulpinoidea</i>	Fox Sedge	OBL	2	5	3		10	2	15	15	2	10	2		2
<i>Eleocharis acicularis</i>	Least Spikerush	OBL						1		1					1
<i>Echinochloa crusgalli</i>	Barnyard Grass	FACU													2
* <i>Elymus virginicus</i>	Virginia Wild Rye	FACW-					1	1		1	2				1
<i>Epilobium ciliatum</i> <i>ssp.glandulosum</i>	Fringed willowherb	FAC			2			10	1	2	1				
* <i>Eupatorium perfoliatum</i>	Common Boneset	FACW	3	7	2		2	2	1	2	2	2	2	3	
* <i>Euthamia graminifolia</i>	Grass-leaved Goldenrod	FAC	2	3	3	2	5	2	1	1	5	2	5		
<i>Festuca rubra</i>	Creeping Red Fescue	FACU								1	1	2			
<i>Galium sp.</i>	Bedstraw species	FACW										1			
<i>Juncus bufonius</i>	Toad Rush	FACW			3				2	1	2	3	1		
<i>Juncus canadensis</i>	Canada Rush	OBL		3				1	1						
* <i>Juncus effusus</i>	Soft Rush	FACW	35	30	30	30	20	25	25	10	15	10	15		
<i>Lolium perenne</i>	Perennial Ryegrass	FACU										1			
<i>Lotus corniculatus</i>	Bird's-foot Trefoil	FACU	5	2	3	2	2	1	5	10	5	10			
<i>Lupinus sp.</i>	Lupine species	NI								1					
* <i>Panicum virgatum</i>	Switchgrass			1	1					1	5	6			
<i>Phalaris arundinacea</i>	Reed canary-grass	FACW				2	3	1	1	1					2
<i>Polygonum pennsylvanicum</i>	Pennsylvania Smartweed	FACW													2
<i>Potentilla species</i>	Cinquefoil species	NI			1				1				1		
<i>Potamogeton epihydrus</i>	Ribbon-leaf Pondweed	OBL													1
<i>Scirpus atrovirens</i>	Green Bulrush	OBL							1						
<i>Scirpus cyperinus</i>	Woolgrass	FACW	2	2	3	3		2	1	5	5	5	1		
<i>Schizachyrium scoparium</i>	Little Bluestem	FACU	1	3	2								3	2	
<i>Solidago rugosa</i>	Rough-Stemmed Golden Rod	FAC									1				
<i>Trifolium arvense</i>	Haresfoot Clover	NI	2		1		1		1		2	2			

Scientific Name	Common Name	Indicator Status	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	PEM
<i>Trifolium pratense</i>	Red Clover	FACU			1		1		1	1	2		
<i>Trifolium repens</i>	White Clover	FACU		1			1		1	2	2	2	
<i>Typha latifolia</i>	Broad-leaved Cattail	OBL	25	20	15	15	10	35	12	8	5		40
* <i>Verbena hastata</i>	Blue Vervain	FACW	2	5	2	2	3	2	1	1	1		3
<i>Vicia cracca</i>	Cow Vetch	UPL				1			1	1			
% aerial cover by herbaceous vegetation in plot			120	105	105	100	100	120	95	100	90	85	115
% cover of non-invasive herbaceous vegetation in plot			90	83	87	81	85	83	77	81	80	75	71
% cover of hydrophytic non-invasive herb. vegetation in plot			87	79	82	80	82	83	71	74	71	67	69
% cover of planted woody vegetation			8	5	10	20	10	5	12	10	12	10	0
% cover of planted woody hydrophytes			8	5	10	20	10	5	12	10	12	10	0
% aerial cover of non-invasive herbaceous & woody veg			98	88	97	101	95	88	89	91	92	85	71
% aerial cover of non-invasive herbaceous & woody hydrophytes			95	84	92	100	92	88	83	84	83	77	69

Red = Invasive or noxious species

Green = hydrophyte

Appendix E: Permits

Submitted in earlier reports. Available upon request.

Appendix F: Army Corps Memorandum

CENAE-R-PT

24 September 2010

MEMORANDUM FOR File

SUBJECT: Site visit to Larrabee Farms mitigation site for MEDOT – Gorham Bypass; Scarborough, Maine; File No. NAE-2005-4220

Inspection Date: 24 September 2010
Time arrived: 1100 Time departed: 1130
Weather conditions: overcast, 70 degrees

This is the oldest of the three existing mitigation projects at this pooled mitigation site.

This site has a good mix of topographic levels across it, in excess of typical microtopography. There are some areas of standing water, though reduced with the dry season.

There is good herbaceous diversity across the site, though there are some patches of *Typha latifolia*. Woody species diversity and health appear to be improving from that found in previous visits. Red-tailed Hawks were observed utilizing the site.

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