## SECTION 3: WETLAND REPLICATION ASSESSMENTS

As described in Section 2.1, twelve wetland replication projects (comprising fourteen replication areas) permitted in Franklin between 1987 and 1998 were selected for a comprehensive assessment. A list of these sites is provided below in Table 1. The replication sites ranged in approved size from 250 square feet to 14,945 square feet, with an average size of roughly 4,500 square feet. One of the selected sites (site #11) involved three distinct replication areas that were evaluated separately.

Figure 1 provides an overview of the replication site locations. The pages that follow provide a summary assessment of each wetland replication and an associated GIS map. Field data sheets and wetland functions and values assessment sheets related to each assessment are provided as Appendices A and B respectively. Section 4 provides an overall analysis of the sites involved in the study, and related recommendations. A summary analysis of all fourteen wetland replication sites is provided in Table 2 on page 37 of this report.

**Table 1: Wetland Replication Assessment Sites**

| Wetland Replication # | Location | Year Permitted | Approved Size (square feet) | DEP File # |
|---|---|---|---|---|
| **1** | Pleasant View Estates, Pleasant Street | 1987 | 4,500 | 159-169 |
| **2** | 585 Union Street | 1989 | 1,621 | 159-266 |
| **3** | 420 Lincoln street | 1991 | 6,000 | 159-275 |
| **4** | JoAnne Estates (off Washington Street) | 1994 | 13,100 | 159-359 |
| **5** | 628 Washington Street | 1994 | 1,170 | 159-409 |
| **6** | Acorn Woods II (off Acorn Place) | 1995 | 7,700 | 159-436 |
| **7** | 85 Highland street | 1995 | 3,000 | 159-445 |
| **8** | Paddock Lane | 1995 | 4,960 | 159-458 |
| **9** | Partridge Woods II (off Tanglewood Drive) | 1999 | 14,945 | 159-536 |
| **10** | 7 Oak Tree Lane | 1996 | 1,500 | 159-509 |
| **11-a** | off Pond Street | 1997 | 1,600 | 159-586 |
| **11-b** | off Pond Street | 1997 | 1,000 | 159-586 |
| **11-c** | off Pond Street | 1997 | 2,900 | 159-586 |
| **12** | 783 West Central Street | 1998 | 350 | 159-594 |

INSERT FIGURE 1 - OVERVIEW MAP OF REPLICATION SITES

**WETLAND REPLICATION #1:** Pleasant View Estates, Pleasant Street
**Year Permitted:** 1987
**Approved Size:** 4,500 square feet **Estimated Actual Size:** 2,015 square feet
**DEP File #:** 159-169

**Summary of Design Specifications / Approved Replication Plan:**

- Only wetland replication size and location were specified in the approved Order of Conditions and supporting documents provided by Franklin Conservation Commission.

**Replication Constructed in Substantial Compliance with the Approved Plan?**

No. It appears that less than half of the proposed area was actually constructed, and the constructed area does not meet the regulatory definition of a wetland.

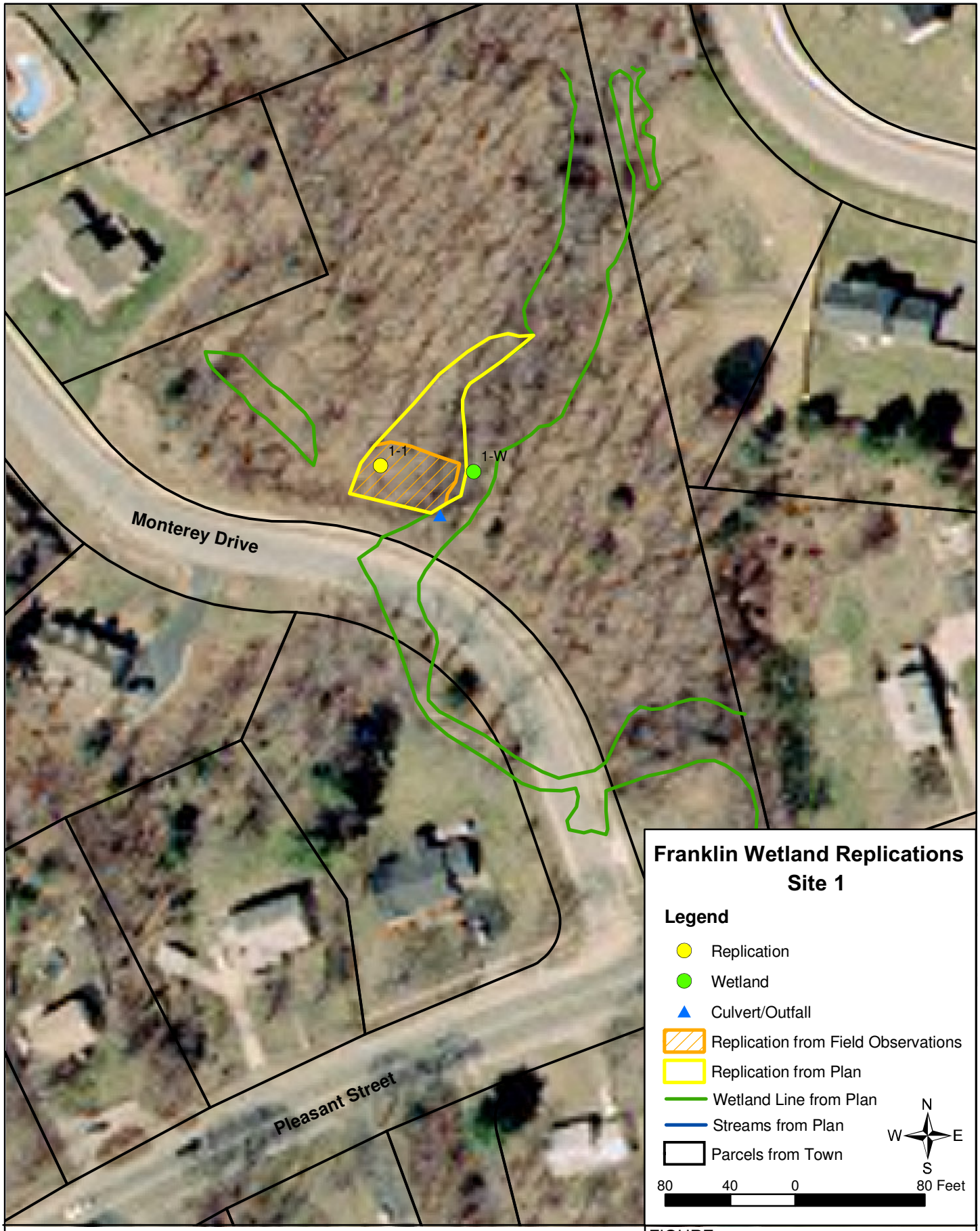
**Summary of Existing Conditions in Replication Area:**

This wetland replication area appears to have been undersized by over 50% based on the approved design plan and observations that the remaining design location was never cleared. Site grading on average appears to be slightly higher in elevation than the adjacent wetland, contributing to inadequate wetland hydrology. The replication area's vegetative community does not exhibit wetland characteristics. The dominant species within the replication were Concord Grape (FACU) and Sassafras (FACU-) with scarce (less than 5 percent) amounts of Canada Golden Rod, Red Maple and Raspberry in the herbaceous layer. The replication area soils do not exhibit hydric characteristics and refusal was consistently reached at around 14 inches. The slopes bordering the replication are dominated by the invasive Japanese Knotweed. However, Japanese Knotweed was scarce within the replication area.

The adjacent wetland community is a forested (predominantly Red Maple) wetland with a thick shrub layer dominated by Northern Arrowwood.

*View of replication area monitoring plot, dominated by Concord Grape.*

*Adjacent wetland monitoring plot 1-w, dominated by Red Maple and Northern Arrowwood.*




## Franklin Wetland Replications
## Site 1

**Legend**

- Replication
- Wetland
- Culvert/Outfall
- Replication from Field Observations
- Replication from Plan
- Wetland Line from Plan
- Streams from Plan
- Parcels from Town

N
W E
S

80 40 0 80 Feet

GeoSyntec Consultants
BOXBOROUGH, MASSACHUSETTS (978) 263-9588

| | |
|---|---|
| FIGURE | 1 |
| PROJECT | BW0007 |
| DATE | 1/30/03 |
| FILE | report.mxd |

Q:\GISPROJECTS\BW0007-franklinT\report.mxd

**WETLAND REPLICATION #2:** 585 Union Street
**Year Permitted:** 1989
**Approved Size:** 1,621 square feet **Estimated Actual size:** 0 square feet
**DEP File #:** 159-266

**Summary of Design Specifications / Approved Replication Plan:**

- The wetland replication was to be constructed immediately to the west of a parking area, adjacent to an existing wet meadow.
- The approved plan specified a wetland seed mixture with two species (Reed Canary Grass @ 20 lbs. per acre, Ladino White Clover @ 1 lb. per acre).
- Soils from disturbed wetlands were to be re-used in the replication.
- Finished grade elevations of the replication area required to be "as close as possible" to the adjacent wetlands.

**Replication Constructed in Substantial Compliance with the Approved Plan?**

No. It appears that the replication area was never constructed.

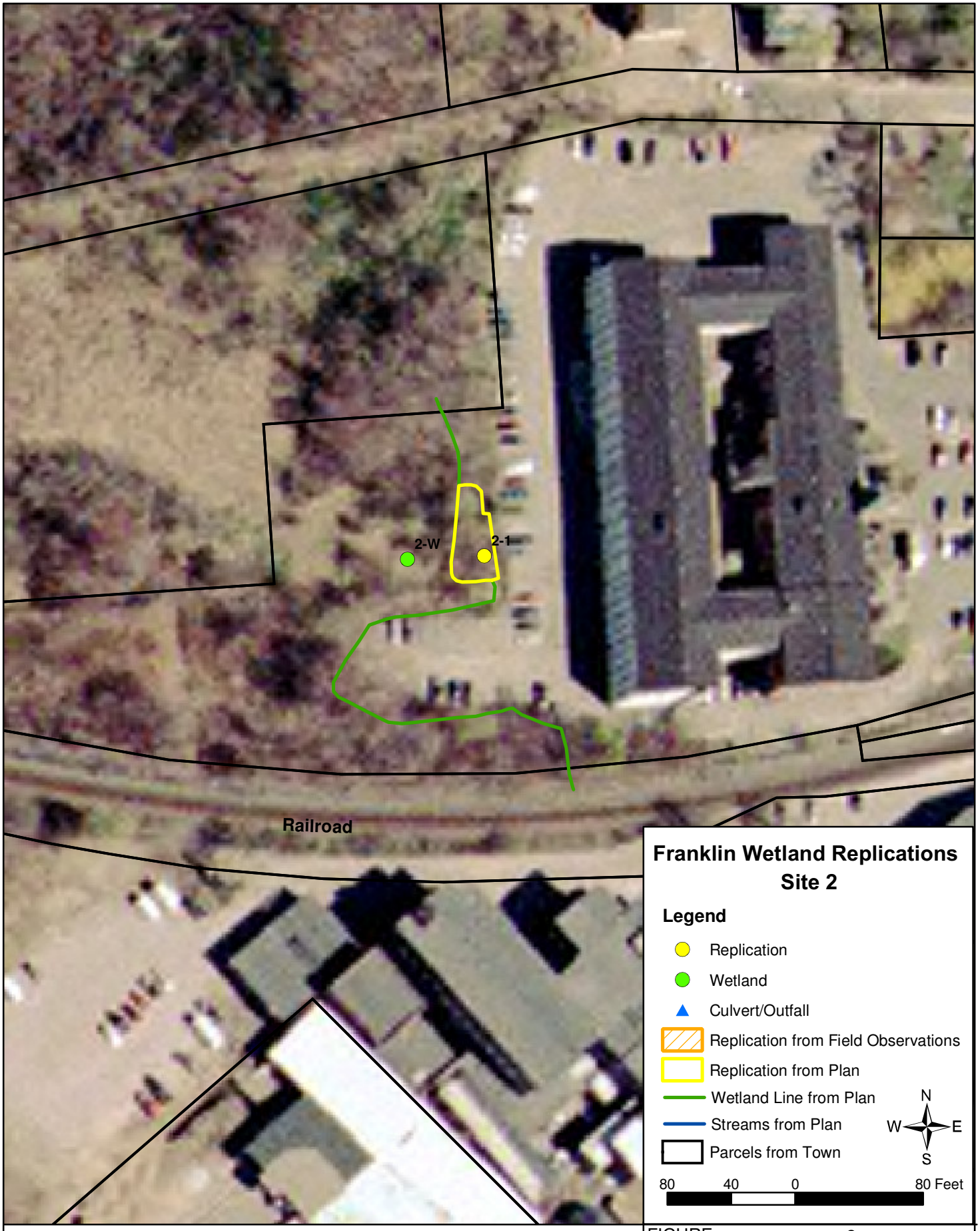
**Summary of Existing Conditions in Replication Area:**

The permitted replication area is dominated by dense growth of mature Staghorn Sumac. Other common species include Wild Raisin, Concord Grape and Virginia Creeper. The area is noticeably upgradient from the adjacent wet meadow area to the west. There is no evidence that the area was ever cleared, graded and seeded with a wetland seed mixture according to the approved plan. The two wetland seed mixture species specified in approved plan were not identified in the replication area.

The adjacent wet meadow is dominated by Small Reed Grass and several other herbaceous species such as Broad-leaf Cattail, Skunk Cabbage and Virginia Creeper.

*View of approved replication area*

*View of adjacent wet meadow monitoring plot 2-w, looking towards approved replication area.*




## Franklin Wetland Replications
## Site 2

**Legend**

- Replication
- Wetland
- Culvert/Outfall
- Replication from Field Observations
- Replication from Plan
- Wetland Line from Plan
- Streams from Plan
- Parcels from Town

N
W E
S

80 40 0 80 Feet

GeoSyntec Consultants
BOXBOROUGH, MASSACHUSETTS (978) 263-9588

| | |
|---|---|
| FIGURE | 2 |
| PROJECT | BW0007 |
| DATE | 1/30/03 |
| FILE | report.mxd |

Q:\GISPROJECTS\BW0007-franklinT\report.mxd

**WETLAND REPLICATION #3:** 420 Lincoln Street (south of Bridle Path Road)
**Year Permitted:** 1991
**Approved Size:** 6,000 square feet **Estimated Actual Size:** 5,826 square feet
**DEP File #:** 159-275

**Summary of Design Specifications / Approved Replication Plan:**

- Detailed planting plan, including planting densities for ten wetland species in three vegetation layers (herb, shrub swamp and tree canopy).
- Replication area to be excavated to 6" below adjacent wetland, and backfilled with loam or other organic materials. To the extent possible, original wetland soils from disturbed area to be used for backfilling replication.
- Replication to have unrestricted hydraulic connection to adjacent wetland.
- Plants from disturbed wetland area to be transplanted to wetland replication area.
- Post-project monitoring required twice per year for two years.

**Replication Constructed in Substantial Compliance with the Approved Plan?**

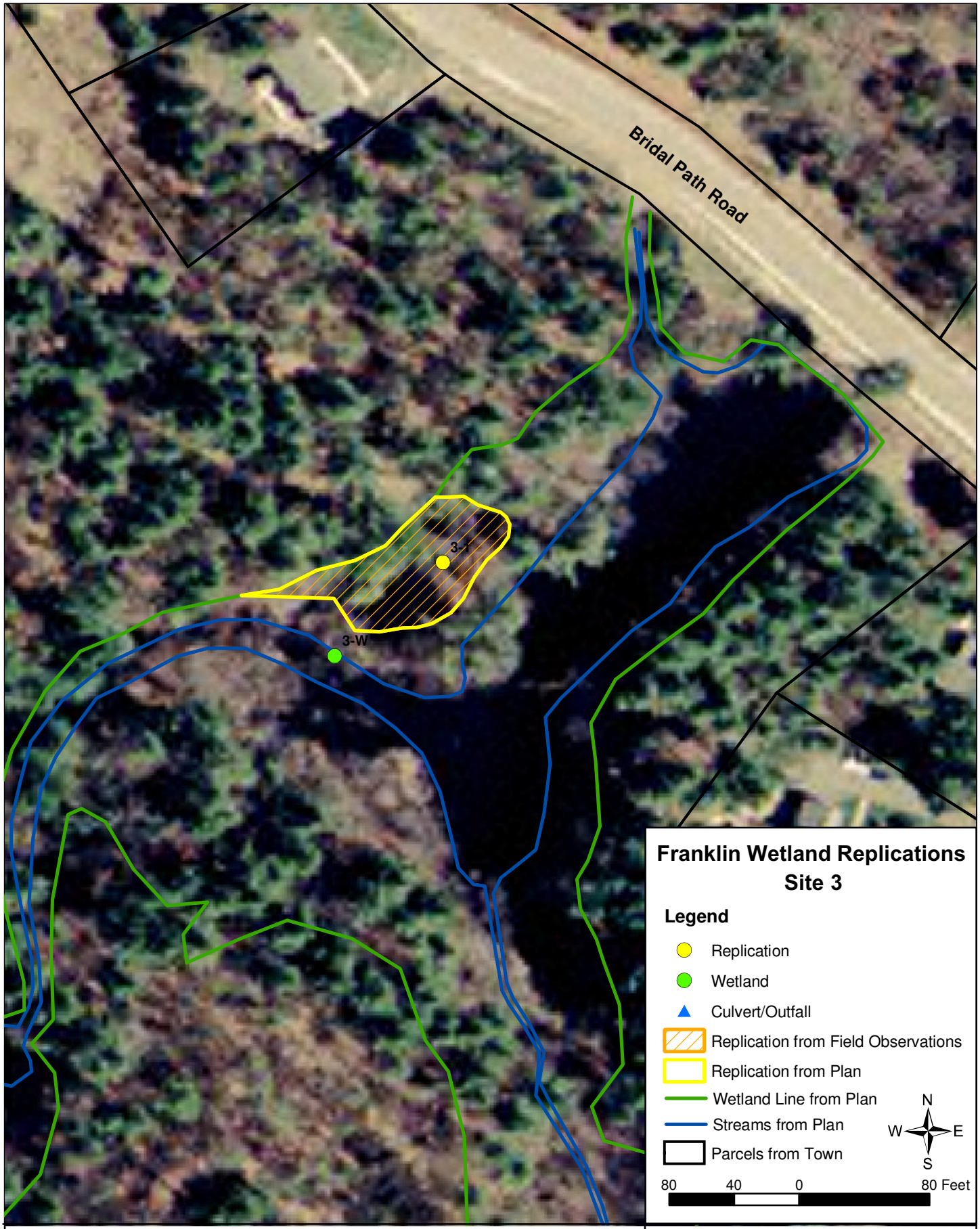
Overall, yes. However, the site appears to have been excavated to an elevation significantly lower than the adjacent wetland. No post-project monitoring reports were found in the project file.

**Summary of Existing Conditions in Replication Area:**

This wetland replication appears to have been well constructed and has ample hydrology to support an emergent wetland community. The replication appears to be functioning very well and is providing excellent wildlife habitat. At the time of inspection, the replication area had 6"-9'' of standing water, making it considerably wetter than the adjacent wetland. The replication is dominated by Bur-reed and a variety of other emergent herbaceous species including Narrow-leaved Cattail, Lurid Sedge, Soft Rush, Wool Grass, Three-way Sedge, and Arrowhead. Overall plant densities are moderate, but are expected to increase as the wetland area continues to develop and mature over time. Abundant signs of wildlife use were present, including beaver chewings, muskrat and other mammal paths, and a variety of birds.

Replication area.

Adjacent wetland area.




## Franklin Wetland Replications
## Site 3

**Legend**

- Replication
- Wetland
- Culvert/Outfall
- Replication from Field Observations
- Replication from Plan
- Wetland Line from Plan
- Streams from Plan
- Parcels from Town

N
W E
S

80 40 0 80 Feet

GeoSyntec Consultants
BOXBOROUGH, MASSACHUSETTS (978) 263-9588

| | |
|---|---|
| FIGURE | 3 |
| PROJECT | BW0007 |
| DATE | 1/30/03 |
| FILE | report.mxd |

Q:\GISPROJECTS\BW0007-franklinT\report.mxd

**WETLAND REPLICATION #4:** JoAnne Estates (off Washington Street)
**Year Permitted:** 1994
**Approved Size:** 13,100 square feet (*Note: although stated as 13,100 square feet in the NOI and Site Plan, GeoSyntec calculated the proposed Site Plan area to be 11,416 square feet.)*
**Estimated Actual Size:** 9,722 square feet
**DEP File #:** 159-359

**Summary of Design Specifications / Approved Replication Plan:**

- Replication area to be excavated to 6" below adjacent wetland, and backfilled with hydric peat soils.
- Planting plan specified 25-30 red maple saplings, 50 shrubs and various herbaceous layer plantings.
- Slope stabilization around replication with vegetative matting and rye grass planting.
- Monitoring program specifies inspections 6 months, 1-year and 2-years after planting.

**Replication Constructed in Substantial Compliance with the Approved Plan?**

No. The site was poorly graded and the replication area is substantially undersized.

**Summary of Existing Conditions in Replication Area:**

It appears that construction of this replication area did not extend far enough to its approved southern extent, limiting both its size and connection to the adjacent wetland. Overall, the site grading was done poorly and the site is significantly upgradient from the adjacent forested wetland to the southeast. As such, the site hydrology appears to be a limiting factor for the marginal wetland community that has become established. In general, the southeast portion of the site is more successful due to its lower elevation, with more strongly developed hydric soils and a dominant hydric vegetation community including Soft Rush, Spicebush and Elderberry. The northwest end of the site (closer to Washington Street) is upgradient, and has a variety of upland plants such as Staghorn sumac and Concord grape.

The adjacent forested wetland overstory includes Red maple, River Birch and Ash. The diverse understory includes wetland shrub and herbaceous species including Northern Arrowwood, Poison Sumac, Sensitive Fern, Jewelweed, Skunk Cabbage, and Burr-reed. This wetland also exhibits deep, mucky organic soils.

*Replication area.*

*Adjacent wetland area.*


## Franklin Wetland Replications
## Site 4

**Legend**

- Replication
- Wetland
- Culvert/Outfall
- Replication from Field Observations
- Replication from Plan
- Wetland Line from Plan
- Streams from Plan
- Parcels from Town

N
W E
S

80 40 0 80 Feet

GeoSyntec Consultants
BOXBOROUGH, MASSACHUSETTS (978) 263-9588

| | |
|---|---|
| FIGURE | 4 |
| PROJECT | BW0007 |
| DATE | 1/30/03 |
| FILE | report.mxd |

Q:\GISPROJECTS\BW0007-franklinT\report.mxd

**WETLAND REPLICATION #5:** 628 Washington Street (Remmington Jefferson School)
**Year Permitted:** 1994
**Approved Size:** 1170 square feet **Estimated Constructed Size:** 1170 square feet
**DEP File #:** 159-409 ***Current Size:** 391 square feet (see below)

**Summary of Design Specifications / Approved Replication Plan:**

- Planting plan specifying location and quantity of four tree and shrub species as well as locations of "typical hummock clusters".
- Topsoil/organic material for replication to be taken from disturbed on-site wetlands.
- Grading designed so that shrubs are planted approximately 1-2 feet "above the surrounding water level".
- Monitoring required twice per year for two years. If 75% establishment success of planted species is not achieved after two years, full replacement planting required.

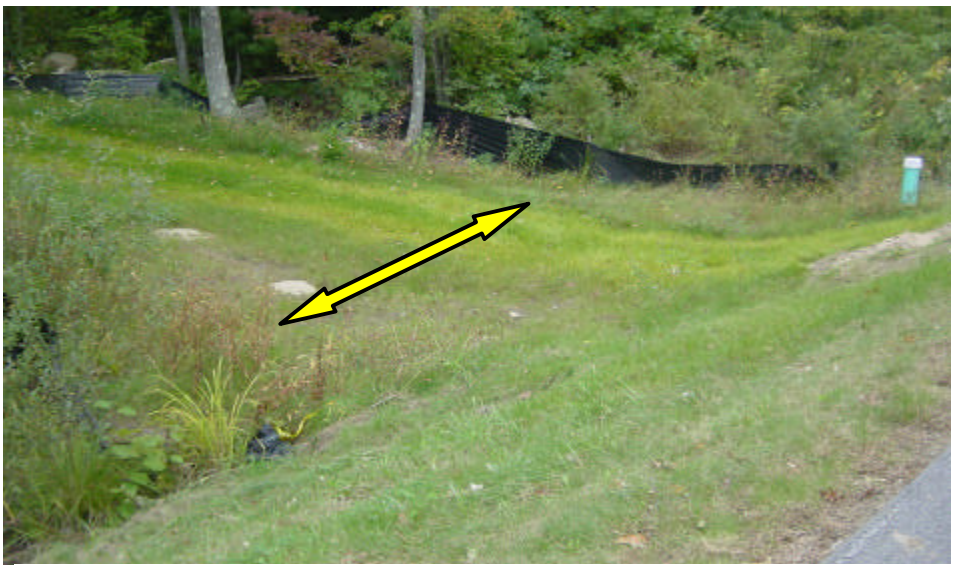
**Replication Constructed in Substantial Compliance with the Approved Plan?**

Yes, although the site does not appear to support its intended function as a vernal pool.

**Summary of Existing Conditions in Replication Area:**

This vernal pool replication area appears to have been constructed in compliance with the size, location, grading and planting specifications of the approved plan. However, the area does not appear to exhibit vernal pool features and is not likely to provide the specialized habitat of a vernal pool. The replication area is a narrow, channel-like depression that more closely resembles a vegetated roadside ditch. The hydrology, size and water-holding capacity of this area make it unlikely that it would seasonally hold water to the extent required of a certifiable vernal pool. The vegetation community is dominated by wetland species, including those specified in the planting plan (Highbush Blueberry, Sweet Pepperbush, Red Maple) and a variety of grasses and sedges such as Wool Grass, Lurid Sedge and Fringed Sedge.

As shown in the photograph below, 67% of this replication area was recently filled in to create a construction access roadway for a project on an adjacent parcel.



*View of current vernal pool replication areas and recently filled access road.*


## Franklin Wetland Replications
## Site 5

**Legend**

- Replication
- Wetland
- Culvert/Outfall
- Replication from Field Observations
- Replication from Plan
- Wetland Line from Plan
- Streams from Plan
- Parcels from Town

N
W E
S

80 40 0 80 Feet

GeoSyntec Consultants
BOXBOROUGH, MASSACHUSETTS (978) 263-9588

| | |
|---|---|
| FIGURE | 5 |
| PROJECT | BW0007 |
| DATE | 1/30/03 |
| FILE | report.mxd |

Q:\GISPROJECTS\BW0007-franklinT\report.mxd

**WETLAND REPLICATION #6:** Acorn Woods II (off Acorn Place)
**Year Permitted:** 1995
**Approved Size:** 7,700 square feet **Estimated Actual Size:** 3,916 square feet
**DEP File #:** 159-436

**Summary of Design Specifications / Approved Replication Plan:**

- Replication area to be excavated to 6" below finished grade, and backfilled with hydric soils from on-site disturbed wetlands or peat from off site. Soils to be covered with leaves or mulch to retain moisture.
- Planting plan including hand planting of a tree layer (12 Red Maple saplings), shrub layer (Sweet Pepperbush, Highbush Blueberry), and ground layer (6 species).

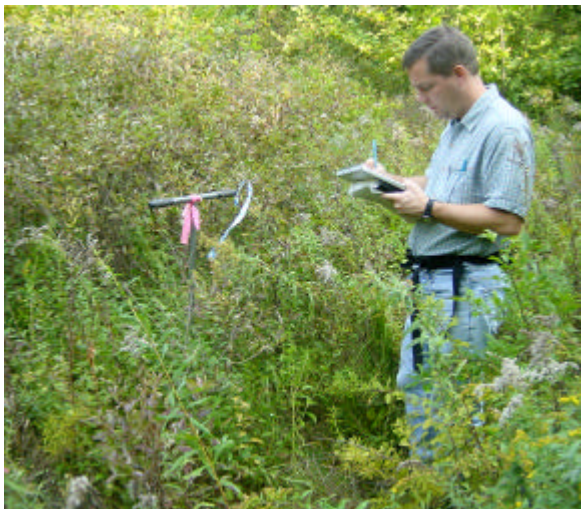
**Replication Constructed in Substantial Compliance with the Approved Plan?**

No, the site appears to be substantially undersized.

**Summary of Existing Conditions in Replication Area:**

The replication area appears to have been constructed at approximately 50% of its approved size. Soil profiles from the replication area and adjacent wetland were quite similar. However, the adjacent wetland (which is situated downgradient from the replication) had a greater presence of redoximorphic features within the B soil layer, indicating that site grading did not adequately match the replication area's groundwater hydrology to that of the adjacent wetland.

Site grading with the replication was noticeably uneven, with lower elevations (and 'wetter" conditions) found adjacent to the natural wetland boundary. Overall, the constructed portion of the site exhibits a predominantly wetland shrub/herbaceous community with a limited presence of transitional species such as Quaking Aspen and White Pine. Abundant and common species within this area included Canada Goldenrod, Red Osier Dogwood, Broad-leaf Meadowsweet, Broom Sedge, and Poison Ivy. The portion of the replication area that was not constructed is comprised of a cart path and a mowed turf grass area.



*Replication Area Monitoring Plot 6-1.*

*Adjacent Wetland Area Monitoring Plot 6-w.*


## Franklin Wetland Replications
## Site 6

**Legend**

- Replication
- Wetland
- Culvert/Outfall
- Replication from Field Observations
- Replication from Plan
- Wetland Line from Plan
- Streams from Plan
- Parcels from Town

N
W E
S

80 40 0 80 Feet

GeoSyntec Consultants
BOXBOROUGH, MASSACHUSETTS (978) 263-9588

| | |
|---|---|
| FIGURE | 6 |
| PROJECT | BW0007 |
| DATE | 1/30/03 |
| FILE | report.mxd |

Q:\GISPROJECTS\BW0007-franklinT\report.mxd

**WETLAND REPLICATION #7:** 85 Highland Street
**Year Permitted:** 1995
**Approved Size:** 3,000 square feet **Estimated Actual Size:** 2,993 square feet
**DEP File #:** 159-445

Summary of Design Specifications / Approved Replication Plan:

- Top 12 inches of hydric soil to be stripped from wetland impact area for use in replication. Any additional required topsoil will be a mix of 2 parts peat to 3 parts loam.
- Replication topsoil shall be placed in a minimum of 2 layers, to 4 inches above final grades to allow settling.
- Detailed planting plan specifying quantity and location of six species (1 tree species, 2 shrub species and 3 herbaceous species).
- Monitoring required after 1 full growing season, with replacement planting of areas with less than 75% survival of planted species.

**Replication Constructed in Substantial Compliance with the Approved Plan?** Yes.

**Summary of Existing Conditions in Replication Area:**

This wetland replication exhibits a diverse and vigorous wetland shrub/herbaceous community, and appears to have been properly graded to ensure appropriate hydrology and connection to the adjacent wetland. Based on the planting locations indicated on the Site Plan, a number of the planted tree and shrub saplings appear to have died, although overall plant density (including "self-selected" wetland species) is quite good. Tree saplings within the area included common growth of Speckled Alder, and a limited presence of other species including Red Maple, Quaking Aspen, and American Elm. Shrub and herb species are too numerous to list, with abundant growth of Tussock Sedge, and the invasive Purple Loosestrife. Other common plants included Northern Arrowwood, Virginia Creeper, Arrow-leaf Tearthumb, Jewelweed, and Common Reed. Soils within the replication had well-developed hydric soil characteristics, with a very dark, mucky A layer and significant redoximorphic features within the top seven inches.

The adjacent wetland was slightly lower and wetter than the replication, but exhibited many of the same wetland plant species found in the replication.

*View of replication area from Highland Street.*

*Adjacent wetland Monitoring Plot 7-w.*


## Franklin Wetland Replications
## Site 7

**Legend**

- Replication
- Wetland
- Culvert/Outfall
- Replication from Field Observations
- Replication from Plan
- Wetland Line from Plan
- Streams from Plan
- Parcels from Town

N
W E
S

80 40 0 80 Feet

GeoSyntec Consultants
BOXBOROUGH, MASSACHUSETTS (978) 263-9588

| | |
|---|---|
| FIGURE | 7 |
| PROJECT | BW0007 |
| DATE | 1/30/03 |
| FILE | report.mxd |

Q:\GISPROJECTS\BW0007-franklinT\report.mxd

**WETLAND REPLICATION #8:** Paddock Lane (Dover Farms Subdivision)
**Year Permitted:** 1995
**Approved Size:** 4,960 square feet **Estimated Actual Size:** 4,560 square feet
**DEP File #:** 159-458

Summary of Design Specifications / Approved Replication Plan:

- Topsoil from filled wetland or a 50% peat / 50% sand mixture to be used as topsoil for replication.
- Grading shall incorporate topographic variations, slopes and drainage pattern to match those of the impacted filled wetland.
- Planting plan involves transplantation of shrubs from the impacted wetland (plus herbaceous seed bank in transplanted soils), and/or nursery transplants and wetland seed mixture.
- Monitor after first year of growth. Areas of high shrub mortality "should be transplanted".

**Replication Constructed in Substantial Compliance with the Approved Plan?** No. Site grading clearly does not match that of the "filled wetland" or adjacent wetland, as required.

**Summary of Existing Conditions in Replication Area:**

This replication area is functioning only marginally well as a wetland due to inadequate grading, which limits its supporting hydrology. Indicative of the site's marginal wetland status is the presence of transitional species in the tree, sapling and shrub layers, such as Eastern Cottonwood, Grey Birch, Quaking Aspen Red Oak, Witch Hazel, and White Pine. However, the herb layer was dominated by hydrophytic vegetation including Cinnamon Fern, Highbush Blueberry, and Tussock Sedge. By comparing the overall wetland community with that of the adjacent wetland, it appears as though grading to a slightly lower elevation would have yielded a more predominantly wetland vegetation community and increased wetland functions.

The adjacent forested wetland was dominated by Red Maple and White Oak in the overstory, with Sweet Pepperbush and Wild Raisin in the Shrub layer and a variety of wetland species in the herb layer.

*Replication monitoring plot 8-1.*

*Adjacent wetland monitoring plot 8-w.*


## Franklin Wetland Replications
## Site 8

**Legend**

- Replication
- Wetland
- Culvert/Outfall
- Replication from Field Observations
- Replication from Plan
- Wetland Line from Plan
- Streams from Plan
- Parcels from Town

N
W E
S

80 40 0 80 Feet

GeoSyntec Consultants
BOXBOROUGH, MASSACHUSETTS (978) 263-9588

| | |
|---|---|
| FIGURE | 8 |
| PROJECT | BW0007 |
| DATE | 1/30/03 |
| FILE | report.mxd |

Q:\GISPROJECTS\BW0007-franklinT\report.mxd

**WETLAND REPLICATION #9:** Partridge Woods II (off Tanglewood Drive)
**Year Permitted:** 1999
**Approved Size:** 14,945 **Estimated Actual Size:** 10,437 square feet
**DEP File #:** 159-536

**Summary of Design Specifications / Approved Replication Plan:**

- Excavate to one foot below final grade and replace topsoil with "mature dark brown loam or a mix of 50% peat and 50% sand by volume".
- *Recommend* broadcast of wetland seed mixture to provide herbaceous diversity.
- Shrub planting plan specifies 1 shrub per 64 square feet, including Yellow Birch, Red Maples, Arrowwood, Highbush Blueberries, and Winterberries.
- Inspection after first full year of growth, replacement of dead shrubs. Two years of monitoring with report to Conservation Commission at end of each growing season.

**Replication Constructed in Substantial Compliance with the Approved Plan?** No. The replication appears to be functioning well but is only 70% of its approved size.

**Summary of Existing Conditions in Replication Area:**

Despite being undersized by roughly 4,500 square feet, this replication area appears to be functioning well as a predominantly herbaceous wet meadow. Twenty-four healthy Red maple saplings (and one dead sapling) were counted within the replication area, as well as lesser number of River Birch, Arrowwood, Grey Birch and Speckled Alder. The diverse herb layer within the monitoring plot was dominated by Soft Rush, Wool Grass, Tussock Sedge, and Blue Vervain. Other common species outside of the plot included New York Ironweed, Sensitive Fern, Lurid Sedge and Joe-Pye Weed. The replication also exhibited well-developed hydric soils, with significant redoximorphic features within the top six inches of the A layer.

The adjacent wetland area monitoring plot was comprised of many of the same wetland herbaceous species found in the replication, and was dominated by species including Soft Rush, Broad-leaf Cattail, New York Aster, and Square-stemmed Monkeyflower.

*View of replication area from access roadway off of Tanglewood Drive.*

*Adjacent wetland area.*


## Franklin Wetland Replications
## Site 9

**Legend**

- Replication
- Wetland
- Culvert/Outfall
- Replication from Field Observations
- Replication from Plan
- Wetland Line from Plan
- Streams from Plan
- Parcels from Town

N
W E
S

80 40 0 80 Feet

GeoSyntec Consultants
BOXBOROUGH, MASSACHUSETTS (978) 263-9588

| | |
|---|---|
| FIGURE | 9 |
| PROJECT | BW0007 |
| DATE | 1/30/03 |
| FILE | report.mxd |

Q:\GISPROJECTS\BW0007-franklinT\report.mxd

**WETLAND REPLICATION #10:** 7 Oak Tree lane
**Year Permitted:** 1996
**Approved Size:** 1,500 square feet **Estimated Actual Size:** 0 square feet
**DEP File #:** 159-509

**Summary of Design Specifications / Approved Replication Plan:**

Transplant shrubs and plants from filled area to replication area. Shrubs: Highbush blueberry and swamp azalea, 8 ' apart. Plants: skunk cabbage, sensitive fern, cinnamon fern, and sphagnum moss.

Excavate to approx. 2 feet below proposed final grade. Replace topsoil with that of filled wetland or 50/50 mix of peat and sand.

Grade/shape wetland for adequate slope and proper drainage, similar to that of the adjacent wetlands.

**Replication Constructed in Substantial Compliance with the Approved Plan?** No.

**Summary of Existing Conditions in Replication Area:**

It appears that this wetland replication was never constructed. The project associated with the replication area involved filling wetlands and installing a 16-inch pipe to replace a section of drainage channel. The replicated wetland was to be constructed roughly parallel to the western edge of the property at 7 Oak Tree Lane (off-set approximately 15 feet from the property boundary). Field measurements from the wetland boundary (original flags were observed) revealed that the approved replication area is currently forested with medium diameter trees, having never been cleared, graded, or planted to replicate wetland conditions.

A review of the adjacent wetland indicated that this area has, at best, a marginal wetland community. It seems possible that some of the hydrology previously supporting a wetland vegetation community in this area may have been diverted due to the piping of the drainage ditch. The area's overstory is dominated by a mix of Red Maple (FAC) and Red Oak (FACU-), with a transitional understory of Sweet Pepperbush (FAC+), Witch Hazel (FAC-), Wild Raisin (FACW), and Common Greenbrier (FAC).

*Approved wetland replication area.*

*Adjacent wetland monitoring plot 10-w.*


## Franklin Wetland Replications
## Site 10

**Legend**

- Replication
- Wetland
- Culvert/Outfall
- Replication from Field Observations
- Replication from Plan
- Wetland Line from Plan
- Streams from Plan
- Parcels from Town

N
W E
S

80 40 0 80 Feet

GeoSyntec Consultants
BOXBOROUGH, MASSACHUSETTS (978) 263-9588

| | |
|---|---|
| FIGURE | 10 |
| PROJECT | BW0007 |
| DATE | 1/30/03 |
| FILE | report.mxd |

Q:\GISPROJECTS\BW0007-franklinT\report.mxd

**WETLAND REPLICATION #11-A:** off Pond Street (MHD road improvement project)
**Year Permitted:** 1997
**Approved Size:** 1,600 square feet **Estimated Actual Size:** approx. 1,600 square feet
**DEP File #:** 159-586

**Summary of Design Specifications / Approved Replication Plan:**

- Planting plan indicated location and quantity of shrub plantings, including 18 Highbush Blueberry, 5 Northern Arrowwood, and 7 Red Maple.
- Wetland soil to be 12 inches of hydric soil or 6 inches of hydric soil over a 1:1 ratio of loam and peat. To extent possible, use wetland soils from filled wetland areas.
- Seed basin with perennial Ryegrass (80%) and White Clover (20%) mixture and apply water soluble, quick-release fertilizer.
- Monitoring inspections and report at the end of the 1st and 2nd growing seasons (October). Replace dead nursery stock and re-seed areas with less than 50% cover.

**Replication Constructed in Substantial Compliance with the Approved Plan?**

Yes, although a majority of planted shrubs are dead or missing.

**Summary of Existing Conditions in Replication Area:**

This replication area seems to be thriving as an intermittently flooded wet meadow community. At the time of the site inspection, most of the 30 shrubs specified in the planting plan were either found dead or absent from the replication area. Two Red Maples and Two Highbush Blueberry plantings were still alive. It is possible that the shrub plantings did not survive because the site is too wet for these species to thrive. Regardless, this replication can certainly be considered a success based on the health and vigor of its wetland herbaceous community, the habitat it provides, and its flood storage functions. The site exhibits well-developed hydric soils, with significant redoximorphic features within the top 12 inches (see photo below). Common plants include Canada rush, Soft Rush, Spike Rush, and Pennsylvania Smartweed.

*Replication monitoring plot 11A-1, exhibiting strongly developed hydric soils.*

*Adjacent wetland monitoring plot area, showing Eastern Burning Bush.*


## Franklin Wetland Replications
## Sites 11a and 11b

**Legend**

- Replication
- Wetland
- Culvert/Outfall
- Replication from Field Observations
- Replication from Plan
- Wetland Line from Plan
- Streams from Plan
- Parcels from Town

N
W E
S

80 40 0 80 Feet

GeoSyntec Consultants
BOXBOROUGH, MASSACHUSETTS (978) 263-9588

| | |
|---|---|
| FIGURE | 11 |
| PROJECT | BW0007 |
| DATE | 1/30/03 |
| FILE | report.mxd |

Q:\GISPROJECTS\BW0007-franklinT\report.mxd

**WETLAND REPLICATION #11-B:** off Pond Street (MHD road improvement project)
**Year Permitted:** 1997
**Approved Size:** 1,000 square feet **Estimated Actual Size:** approx. 1,000 square feet
**DEP File #:** 159-586

**Summary of Design Specifications / Approved Replication Plan:**

- Planting plan indicated location and quantity of shrub plantings, including 14 Highbush Blueberry, 5 Northern Arrowwood, and 5 Red Maple.
- Wetland soil to be 12 inches of hydric soil or 6 inches of hydric soil over a 1:1 ratio of loam and peat.
- Seed basin with perennial Ryegrass (80%) and White Clover (20%) mixture and apply water soluble, quick-release fertilizer.
- Monitoring inspections and report at the end of the 1st and 2nd growing seasons (October). Replace dead nursery stock and re-seed areas with less than 50% cover.

**Replication Constructed in Substantial Compliance with the Approved Plan?** Yes.

**Summary of Existing Conditions in Replication Area:**

This replication area appears to be thriving, as is particularly notable for the survival rate and vigor of its planted trees and shrubs. Based on a comparison of site conditions with the approved planting plan, it appears that all of the planted shrubs/trees are alive and well established, as seen in the photo below. As expected from the planting plan, saplings and shrubs at the site include Red Maple, Highbush Blueberry, and Northern Arrowwood. The herbaceous community is dominated by one wetland species (Soft Rush, FACW+) and one facultative upland species (Autumn Bent Grass, FACU). Swamp Buttercup is also common. Hydric soils are present at the site.

The adjacent wetland monitoring plot area is a sparsely forested area located downgradient from the replication, with Red Maple dominating the overstory and Tussock Sedge dominating the understory

*Replication area 11-B. Planted trees and shrubs appear to be thriving.*

*Adjacent wetland monitoring plot 11B-w.*


## Franklin Wetland Replications
## Sites 11a and 11b

**Legend**

- Replication
- Wetland
- Culvert/Outfall
- Replication from Field Observations
- Replication from Plan
- Wetland Line from Plan
- Streams from Plan
- Parcels from Town

N
W E
S

80 40 0 80 Feet

GeoSyntec Consultants
BOXBOROUGH, MASSACHUSETTS (978) 263-9588

| | |
|---|---|
| FIGURE | 11 |
| PROJECT | BW0007 |
| DATE | 1/30/03 |
| FILE | report.mxd |

Q:\GISPROJECTS\BW0007-franklinT\report.mxd

**WETLAND REPLICATION #11-C:** off Pond Street ((MHD road improvement project)
**Year Permitted:** 1997
**Approved Size:** 2,900 square feet **Estimated Actual Size:** approx. 2,900 square feet
**DEP File #:** 159-586

**Summary of Design Specifications / Approved Replication Plan:**

- Planting plan indicated location and quantity of shrub plantings, including 35 Highbush Blueberry, 20 Northern Arrowwood, and 20 Red Maple.
- Wetland soil to be 12 inches of hydric soil or 6 inches of hydric soil over a 1:1 ratio of loam and peat.
- Seed basin with perennial Ryegrass (80%) and White Clover (20%) mixture and apply water soluble, quick-release fertilizer.
- Monitoring inspections and report at the end of the 1st and 2nd growing seasons (October). Replace dead nursery stock and re-seed areas with less than 50% cover.

**Replication Constructed in Substantial Compliance with the Approved Plan?** Yes.

**Summary of Existing Conditions in Replication Area:**

This outstanding replication area provides excellent wildlife habitat and flood storage functions. Most of the area hosts a diverse and thriving emergent herbaceous wetland community, with some areas that appear to be permanently flooded. Similar to site 11-A, a significant percentage of the 75 planted shrubs/trees indicated on the planting plan appear to have failed, possibly due to conditions being too wet for their survival. However, sixteen herbaceous wetland species were found growing densely in the area around the monitoring plot, including Wool Grass, Soft Rush, Water Starwort, Marsh Seedbox, Pennsylvania Smartweed, and Swamp Loosestrife.

The replication area is contiguous with a flood plain wetland adjacent to Mine Brook (just prior to its confluence with the Charles River). This herbaceous/shrub community is dominated by Fringed Sedge and the invasive Purple Loosestrife, with species including Red Maple, Wild Raisin and Buttonbush in the Tree and Shrub layers. Although Purple Loosestrife was not found within the replication monitoring area, the proximity of this aggressive species in the adjacent wetland poses a threat to future species diversity within the replication.

*Replication area 11-C.*

*Adjacent wetland monitoring plot 11C-w.*


## Franklin Wetland Replications
## Site 11c

**Legend**

- Replication
- Wetland
- Culvert/Outfall
- Replication from Field Observations
- Replication from Plan
- Wetland Line from Plan
- Streams from Plan
- Parcels from Town

N
W E
S

80 40 0 80 Feet

GeoSyntec Consultants
BOXBOROUGH, MASSACHUSETTS (978) 263-9588

| | |
|---|---|
| FIGURE | 11c |
| PROJECT | BW0007 |
| DATE | 1/30/03 |
| FILE | report.mxd |

Q:\GISPROJECTS\BW0007-franklinT\report.mxd

**WETLAND RESTORATION #12:** 783 West Central Street
**Year Permitted:** 1998
**Approved Size:** 350 square feet **Estimated Actual Size:** 350 square feet
**DEP File #:** 159-594

**Summary of Design Specifications / Approved Restoration Plan:**

- Remove soil over restoration area to grade of original wetland soils. Final 12 inches of soil removal shall be done with hand tools to avoid disturbing wetland soils.
- If required, additional topsoil shall be a mix of loam with peat at 3:2 ratio by volume. This soil shall be mixed into natural wetland soils with hand tools to match original grade.
- The wetland restoration area shall be planted with a combination of seeds such as Switchgrass (*Panicum virgatum*) and plants such as Sedge (*Carex spp.*), with seeding between April 1 and May 15 or September 5 and October 15.
- Monitor after one full growing season. Replant areas with less than 75% plant coverage.

**Restoration Constructed in Substantial Compliance with the Approved Plan?**

Yes, although grading to a slightly lower elevation would have improved site hydrology and function.

**Summary of Existing Conditions in Restoration Area:**

This site is a small wetland restoration area that was constructed by removing improperly placed fill material and replanting with wetland species. Overall, the restoration area appears to have been constructed properly, although it was graded to a slightly higher elevation than that of the adjacent wetland. As a result of this higher elevation, the common plants within the herbaceous community are more characteristic of a transitional wetland. Common plants included Canada Goldenrod (FACU), Wrinkled Goldenrod (FAC), New York Ironweed (FACW) and Fragrant Goldenrod (FAC) and Common Sneezeweed (FACW+).

The adjacent wetland monitoring plot was heavily dominated by Calico Aster (FACW-), with a lesser presence of Sedges (Carex spp.), Water Smartweed and Virginia Creeper.

*Replication monitoring plot 12-1.*

*Adjacent wetland monitoring plot 12-w.*


## Franklin Wetland Replications
## Site 12

**Legend**

- Replication
- Wetland
- Culvert/Outfall
- Replication from Field Observations
- Replication from Plan
- Wetland Line from Plan
- Streams from Plan
- Parcels from Town

N
W E
S

80 40 0 80 Feet

GeoSyntec Consultants
BOXBOROUGH, MASSACHUSETTS (978) 263-9588

| | |
|---|---|
| FIGURE | 12 |
| PROJECT | BW0007 |
| DATE | 1/30/03 |
| FILE | report.mxd |

Q:\GISPROJECTS\BW0007-franklinT\report.mxd