

***Wetland Mitigation Monitoring Report 2***  
***2010***

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**Wintonbury Hills Golf Course**

**Bloomfield, Connecticut**



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**WETLAND MITIGATION MONITORING REPORT 2 - 2010**  
**WINTONBURY HILLS GOLF COURSE, BLOOMFIELD, CT**

**U.S. Army Corps of Engineers Permit 200001509**  
**CT Department of Environmental Protection Permits**  
**DIV200100725 & WQC-200100726**

December 2010

Prepared for:

The Town of Bloomfield

Prepared by:

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## APPENDIX A Permit Mitigation Special Conditions

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Note: Appendix B has been omitted from this monitoring report because there were no changes to the As-Built Planting Plan during 2010.

## WETLAND MITIGATION MONITORING REPORT 2 - 2010 WINTONBURY HILLS GOLF COURSE, BLOOMFIELD, CT

This report presents the results of wetland mitigation monitoring conducted during the second growing season (2010) following completion of mitigation construction. This report follows the format and content requirements set forth in U.S. Army Corps of Engineers Regulatory Guidance Letter No. 08-03 dated 10 October 2008.

### 1.0 PROJECT OVERVIEW

- (1) U.S. Army Corps of Engineers (ACOE): Permit No. 200001509  
Connecticut Department of Environmental Protection (CTDEP): Water Diversion Permit No. DIV200100725; Section 401 Water Quality Certificate No. WQC-200100726
- (2) **Party responsible for monitoring:** Mason & Associates, Inc., 771 Plainfield Pike, North Scituate, RI; (401) 647-3835  
**Monitoring Dates:** May 27, June 18, July 22, September 9, October 19, November 9, and November 11.
- (3) The purpose of the project was to construct an 18-hole municipal golf course, driving range, and associated amenities, and to provide compensatory mitigation. The total site is 298 acres. The project resulted in the filling of 32,751 square feet (s.f.) of palustrine wetland and 881 s.f. of lacustrine wetland. Also, 59,948 s.f. of palustrine open water was dredged / excavated, and 120,858 s.f. of palustrine wetland was cleared of trees or mowed / maintained. Mitigation included: creation of 46,174 s.f. of marsh/swamp; enhancement plantings in 46,993 s.f. of reed canary grass (*Phalaris arundinacea*) meadow and 30,308 s.f. of maintained shrub swamp; and preservation of 39.6+/- acres of palustrine wetland.
- (4) The project is located at 206 Terry Plains Road, Bloomfield, CT (Figures 1 – 5). Mitigation sites are near recognizable golf course elements and have coordinates as follows:

Main Creation Area: C2e – East of Hole 17	Coord: 41.862578 N, -72.756786 W
Enhancement Areas: E2a – West of tee for Hole 11	Coord: 41.86106 N, -72.756636 W
E2c – Hole 2 playover	Coord: 41.860117 N, -72.755928 W
E2d – Hole 11 playover	Coord: 41.861315 N, -72.755703 W
DR – Southeast of Driving Range	Coord: 41.861587 N, -72.761958 W
- (5) Mitigation construction was completed by 31 December 2008.
- (6) Performance standards are generally being met. Remedial actions are recommended.
- (7) Corrective or maintenance activities conducted during 2010 included measures to protect plantings from deer browse, invasive species control, and addition of coarse woody debris.
- (8) Additional recommended corrective or remedial actions include: invasive species control in E2c, supplemental planting in E2a and DR, tree & shrub protection measures as needed.



## 2.0 REQUIREMENTS

Monitoring requirements set forth in the *Wetland Mitigation Plan, Wintonbury Hills Golf Course, Bloomfield, Connecticut*, dated August 2006 (Mitigation Plan) were fulfilled, including seasonal evaluation of: vegetative cover, soils, hydrology, wildlife activity, presence of invasive / noxious species, permit compliance, and necessary remedial actions. Additionally, monitoring of aquatic vegetation in the Tunxis Reservoir and the upland buffer zone vegetation along Hole 14 were performed in accordance with CTDEP requirements.

### Mitigation Plan Requirements

Wetland Creation Area – A total of 1.06 acres of wetland creation are required per the Mitigation Plan. At the end of the 2010 monitoring year a total of approximately 1.03 acres of wetland creation were documented in C2e. It is expected that this area will expand as deep marsh vegetation spreads. A re-evaluation of this area is scheduled for Monitoring Year 3.

Coarse Woody Debris/Boulders – At least 2% areal coverage is required. This standard is met in C2e, E2d, and DR. It is not yet met in E2a or E2c. Remedial actions are recommended.

### Permit Requirements

In addition to the permit requirements described elsewhere in this document, the permit requires that a copy of the permit be kept at the site, and that a conservation easement or deed restriction be executed and recorded with the Town of Bloomfield and the State of Connecticut. Both of these requirements have been met.

### Performance Standards

Mitigation is generally successful or trending towards success based on the performance standards detailed in the Mitigation Plan.

1) *Does the site have at least 500 trees and shrubs per acre,*

Woody Zone	Trees & Shrubs Per Acre <sup>1</sup>	Success?	Comments
C2e – Shrub Swamp	5512	Yes	
E2a	151	No	
E2c	11024	Yes	Quadrat E2c3 overestimates actual density
E2d	1882	Yes	
DR	375	No	

<sup>1</sup> Based on sample quadrat data (C2e, E2c, E2d) or total inventory (E2a, DR)

*of which at least 350 per acre are trees for proposed forested cover types, that are healthy and vigorous and are at least 18" tall in 75% of each planned woody zone*

Forested Zone	Trees Per Acre <sup>1</sup>	Success?
E2a Forest Zone <sup>2</sup>	24	No

*and at least the following number of non-exotic species including planted and volunteer species?*

Mitigation Zone	Number of Non-Exotic Woody Species <sup>2</sup>			Success?
	Planted <sup>3</sup>	Required	Documented <sup>4</sup>	
C2e – Shrub Swamp	11	6	6	Yes
E2a	9	6	1	No*
E2c	8	5	5	Yes
E2d	9	6	4	No
DR	6	4	4	Yes

\*A total of 9 non-exotic woody species were counted in E2a; however, 8 of those species fell below the 50 individuals/acre threshold required by the ACOE standard. (Similarly, 6 non-exotic woody species were counted in DR but two of those species had fewer than 50 individuals/acre.) Due to the variety of species initially planted, our required species count is relatively high. Planting several species means planting fewer individuals of each species, as opposed to planting many individuals of just a few species. If a large variety of species is planted, a high survival rate of individuals within each species is needed to meet the standard, but if many individuals of few species were planted the survival rate can be much lower and the standard can still be met. The ACOE requirement that a non-exotic woody species must occur at a 50 individuals/acre density before it is counted towards meeting the woody species success standard appears to penalize mitigation projects with higher planned woody species diversity.

*2) Does each mitigation site have at least 80% areal cover, excluding planned open water areas or planned bare soil areas (such as for turtle nesting), by noninvasive species?*

Mitigation Zone	% Cover by Noninvasive Species <sup>1,5</sup>	Success?
C2e – Deep Marsh	>100	Yes
C2e – Shallow Marsh / Wet Meadow	>100	Yes
C2e – Shrub Swamp	>100	Yes
E2a	5	n/a
E2c	63*	No
E2d	>100	Yes
DR	29	n/a

\*Non-invasive species occur below and within the area of E2c dominated by common reed; therefore the total % Cover by Noninvasive Species in this area remains relatively high.

<sup>1</sup> Based on quadrat or total inventory data.

<sup>2</sup> Species were considered non-exotic if they are native to Connecticut based on data from the USDA PLANTS database.

<sup>3</sup> From 'Table 4. Planting Schedule' of the Mitigation Plan. Seed was not included as planted.

<sup>4</sup> Any plants identified only to Genus level were counted only if certain to be non-exotic. Only well-represented species counted. Considered well-represented if at least 50 individuals per acre were documented (trees & shrubs).

<sup>5</sup> Species on the IPANE Invasive Plants List were excluded from % cover calculation.

*Do planned emergent areas on each mitigation site have at least 80% cover by noninvasive hydrophytes?*

Emergent Zone	% Cover by Noninvasive Hydrophytes <sup>1,2</sup>	Success?
C2e – Deep Marsh	85	Yes
C2e – Shallow Marsh / Wet Meadow	>100	Yes

*Do planned scrub-shrub and forested cover types have at least 60% cover by noninvasive hydrophytes, of which at least 15% are woody species?*

Woody Zone	% Cover by Noninvasive Hydrophytes <sup>1,2</sup>	Success?	% Cover by Noninvasive Woody Hydrophytes <sup>1,2</sup>	Success?
C2e – Shrub Swamp	>100	Yes	17	Yes
E2a	<60	n/a	<15	n/a
E2c	57	No	28	Yes
E2d	72	Yes	20	Yes
DR	<60	n/a	<15	n/a

3) *Are common reed (Phragmites australis), purple loosestrife (Lythrum salicaria), Russian and autumn olive (Eleagnus spp.), buckthorn (Rhamnus frangula), and/or multiflora rose (Rosa multiflora) plants at the mitigation sites being controlled?* Yes. Common reed, purple loosestrife, Russian/autumn olive, and multiflora rose are actively being controlled on the site. Buckthorn is not a problem on the site but is being closely monitored.

4) *Are all slopes, soils, substrates, and constructed features within and adjacent to the mitigation sites stabilized?* Yes.

<sup>1</sup> Any plants identified only to Genus level were counted only if certain to be non-exotic.

<sup>2</sup> Noninvasive Hydrophytes include species which are not on the list of invasive species of hydrophytes from the Mitigation Plan.

### 3.0 SUMMARY DATA

#### 3.1 Monitoring Inspections

Monitoring inspections occurred at least once a season from April through November, 2010. During each of the three seasonal inspections, photographs were taken at each photo station, hydrology data were recorded, vegetation status was observed, and wildlife notes were made. Also, extensive vegetation data were collected during the summer and autumn months.

#### 3.2 Soils

Soil data collected during Monitoring Year 1 (2009) indicated that soils in wetland creation area C2e meet hydric soil criteria. Additional soil data collection is scheduled for Monitoring Year 3 (2011), as required.

#### 3.3 Hydrology

Hydrology data were collected for wetland creation area C2e (Figure 3); they indicate that target wetland hydrology throughout the area has been achieved. Wetland hydrology was demonstrated in late May, well into the growing season. Soil moisture and groundwater levels were lower in July and September, during an unusually dry period. (National Weather Service map data indicates that 50-75% of normal rainfall fell in the project area during July, August, and September 2010.) Despite this, shallow well data shows that groundwater levels were still within the target range for a scrub/shrub wetland. Soil moisture and shallow groundwater levels were collected at the highest elevation in C2e (south end), to be conservative.

Date	Available Soil Moisture (%)*				Average
	A 12	A 24	B 12	B 24	
Depth Below Grade	12"	24"	12"	24"	
5/27/2010	95.7	96.6	95.7	93.2	95.3
7/22/2010	89.3	84.8	56.1	85.0	74.6
9/9/2010	84.3	73.1	29.1	74.9	58.7

\* Calculated using polynomial equation extrapolated from Fig. 2 Meter Reading vs. Available Soil Moisture, Operating Instructions Model KS-D1 Soil Moisture Tester, Delmhorst Instrument Co.:

$$y = 4.084403056 \cdot 10^{-6} x^4 - 6.539238121 \cdot 10^{-4} x^3 + 2.857734023 \cdot 10^{-2} x^2 + 5.922732605 \cdot 10^{-1} x - 0.254432524$$

Date	Shallow Well Data		
	Depth to Groundwater From Top of Well (ft.)	Well Stickup Height Above Ground (ft.)	Depth to Groundwater from Ground Surface (ft.)
5/27/2010	2.88	2.25	0.63
7/22/2010	4.65	2.25	2.40
9/9/2010	4.60	2.25	2.35

### 3.4 Erosion Control Measures

The site was stabilized after earthwork was completed in 2003 and all erosion control measures were removed. Therefore, no erosion control measures were needed or inspected during 2010.

### 3.5 Vegetation

Quadrat sampling was performed to evaluate percent vegetative cover and percent cover of priority invasive species in all mitigation areas except DR and E2a, where a total inventory count was performed. The quadrats were 12 feet long from north to south and 9 feet wide from east to west. They were installed in 2009 by staking the southeast corner and using a compass and either a PVC frame or measured lengths of rope to determine the location of the other three corners. All four corners were then staked for future reference. In 2010, the staked corners were refreshed if necessary and used to determine the quadrat boundaries. All plant species within each 108 square foot quadrat were listed and percent areal coverage was determined for each. The total vegetative cover was also determined for each plot. In some cases total areal coverage is greater than 100% due to overlap between groundcover and taller vegetation. In addition to percent areal cover, all individual shrubs and trees greater than 18" tall were tallied for each quadrat.

In DR and E2a, a total inventory approach was used to determine vegetative composition. All species observed within these enhancement areas (6,820 square feet and 40,173 square feet, respectively) were listed and percent areal cover for each species was estimated and totaled. All trees and shrubs over 18" tall found within DR and E2a were tallied.

No significant new plant mortality occurred, although deer browse was still observed. Generally, planted and volunteer species continue to do well.

Invasive species of concern in the mitigation sites include great reed (*Phragmites australis*), purple loosestrife (*Lythrum salicaria*), reed canary grass (*Phalaris arundinacea*), multiflora rose (*Rosa multiflora*), and autumn olive (*Eleagnus umbellata*). Various efforts to control these species were undertaken in 2010, including hand pulling and cut stem/stump application of herbicides in accordance with the project invasive species control plan.

### 3.6 Wildlife

Wildlife sightings and/or wildlife sign were recorded during each site visit. The list below details observations made during our site visits and is not meant to be a comprehensive list of all species which may use the mitigation areas.



## Wildlife Observations 2010

Scientific Name	Common Name	Mitigation Areas	Likely Uses
<b>MACROINVERTEBRATES</b>			
<i>Formica subsericea</i>	Silky Ant	C2e	B, F, S
<i>Ixodes scapularis</i>	Deer Tick	C2e	B, F, S
<i>Pachydiplax longipennis</i>	Blue Dasher Dragonfly	C2e	B, F, S
[ <i>Pseudosuccinea collumella</i> ]	Freshwater Snail	C2e	B, F, S
<i>Sympetrum rubicundulum</i>	Ruby Meadowhawk	C2e	B, F, S
<b>AMPHIBIANS and REPTILES</b>			
<i>Rana catesbeiana</i>	Bullfrog	C2e	B, F, S
<i>Rana clamitans melanota</i>	Green Frog	C2e	F, S
<b>BIRDS</b>			
<i>Agelaius phoeniceus</i>	Red-winged Blackbird	C2e, E2c, E2d, E2a	B, F, S
<i>Buteo jamaicensis</i>	Red-tailed Hawk	C2e	F
<i>Carduelis tristis</i>	American Goldfinch	C2e	F, S
<i>Dumetella carolinensis</i>	Grey Catbird	C2e	F, S
<i>Parus atricapillus</i>	Black-capped Chickadee	C2e	F, S
<i>Tachycineta bicolor</i>	Tree Swallow	C2e, E2c, E2d, E2a	F, S
<b>MAMMALS</b>			
Muridae family	Unidentified Mouse	DR	B, F, S
<i>Odocoileus virginianus</i>	White-tailed Deer	C2e, E2c, E2d, E2a, DR	F, S
<i>Ondatra zibethicus</i>	Muskrat	C2e	B, F, S

**Key:**

B = Breeding/Nesting F = Foraging S = Shelter

### 3.7 Hole 14 Buffer Zone Monitoring

The 25-foot vegetated buffer between the Tunxis Reservoir and Hole 14 was inspected in May and September 2010 (Figures 6 & 7). The majority of natural vegetation is thriving in the buffer, and it is providing food, cover, and nesting sites for wildlife, particularly passerine birds. Shrub and fern plantings in a small portion of the buffer zone have not achieved the desired vegetation density.

### 3.8 Aquatic Weed Monitoring

Aquatic weed monitoring of the Tunxis Reservoir was conducted on May 27, July 22, October 19, and November 9, 2010. The 2010 surveys included complete reconnaissance of the Reservoir wetland vegetation, including targeted surveys in three areas: 1) emergent fringe next

to the 14<sup>th</sup>. Hole fairway, 2) emergent fringe (wet meadow) where the swamp lousewort (*Pedicularis lanceolata*) population is monitored, and 3) the wetland complex comprised of marsh, shrub swamp, stream, and shallow pools that occurs at the north end of the Reservoir (Figure 8). Observed water depths were similar to 2009 (generally less than 3 feet), and the substrate was mostly muck.

Aquatic vegetation occurs in four general types or patterns:

- 1) floating aquatic plants (duckweed and watermeal) which tend to form mats or rafts and which move around the Reservoir with the wind;
- 2) submerged aquatic plants (e.g. *Elodea* and *Potamogeton*) which occur in parts of the Reservoir where water depths are generally less than 3 feet;
- 3) emergent plants such as cattail and arrow arum which occur in shallower areas, generally less than 1.5 feet deep, in a relatively narrow shoreline fringe (except for the extensive cattail marsh at the north end of the Reservoir; and
- 4) wooded shoreline fringes, characterized by sparse fringes of emergent vegetation shaded by overhanging vegetation.

These vegetation types are depicted in Figures 8 - 10. Appendix C includes the plant species identified in the Tunxis aquatic weed survey. Qualitatively, the aquatic vegetation in the Tunxis Reservoir provides good wetland habitat for a variety of wildlife including warm water fish (panfish such as sunfish), reptiles such as painted turtle, amphibians such as green frog, birds such as Kingfisher, ducks and cormorant, and mammals such as muskrat. Painted turtles remain abundant, often seen basking on logs/snags. Filamentous green algae occur primarily as a submerged but free-floating (not-rooted) aquatic plant in the shallowest portions of the reservoir. During the summer, some filamentous algae will float to the surface, mix with duckweed and watermeal, and create large floating mats which will drift locally with the wind. They provide habitat for macroinvertebrates and predator species such as frogs and painted turtles (Figure 9). By fall, these mats have largely disappeared from the reservoir surface (Figure 10).

An expanded survey of the northern-most portion of the Reservoir in 2010 revealed a rich diversity of plant species and wetland types (Figure 10). Excursion through the wetland complex north of the cattail marsh revealed the following wetland types (per the U.S. Classification of Wetlands and Deepwater Habitats system): Riverine Unconsolidated Bottom & Aquatic Bed (inlet stream to the Reservoir); Palustrine Unconsolidated Bottom (shallow pools), Emergent Persistent (cattail marsh), Emergent Non-Persistent (e.g. arrowhead and sedge marsh), Scrub-Shrub (e.g. red maple, pussy willow, alder, silky dogwood, blueberry shrub swamp), and Forested (red maple swamp). Water regimes ranged from permanently flooded shallow pools to seasonally saturated swamp. The intermixing of these wetland types and the (relatively) large amount of surrounding upland buffer makes this wetland area particularly useful for wildlife. Muskrat, deer and waterfowl make frequent use of this area for forage and cover.

Comparison of aerial photography taken in 2004 - 2009 suggests no significant changes in the extent or pattern of emergent vegetation. Shoreline / near-shore surveys conducted to date have shown the presence of various aquatic weed species, but their abundance and distribution have not changed significantly subsequent to golf course construction.

### 3.9 Remedial Actions

Remedial actions performed during 2010 included installation of tree and shrub protection measures, invasive species control, and addition of coarse woody debris.

Tree and shrub protection measures undertaken in 2010 included: placement of garlic sticks on deer-browsed shrubs in C2e and E2a, placement of BLUE-X tree shelters on small shrubs and trees in E2a and DR, and installation of wire mesh deer fencing around groups of shrubs in C2e.

Invasive species control measures included: hand weeding in all mitigation areas as invasive species were observed, cut and paint herbicide treatment of multiflora rose and autumn olive in C2e, and cut and paint herbicide treatment of common reed in E2c. The herbicide treatment in E2c was applied by cutting the common reed stalks with a hedge trimmer. This trimmer was fitted with a sponge that was saturated with glyphosate, which allowed cutting and painting to be performed in one step.

Coarse woody debris was added to C2e on 12 November 2010. In addition to a large tree which had naturally fallen, logs and brush from the adjacent swamp were dragged into the shrub/scrub portion of the mitigation area.

Planting proposed last year was not accomplished during 2010. Rather, it has been deferred to the Spring of 2011. This allows the planting plan to incorporate data from both 2009 and 2010, resulting in a targeted approach that should more successfully meet the required mitigation standards.

#### RECOMMENDED REMEDIAL ACTIONS:

##### 1) Invasive Species Control

Species	Area	Appropriate Measures
<i>Phragmites australis</i>	E2c	cutting, herbicide application
<i>Lythrum salicaria</i>	C2e	biological control ( <i>Galerucella</i> spp. beetles)
<i>Phalaris arundinacea</i>	C2e	herbicide application
<i>Rosa multiflora</i>	C2e, E2d	observe closely, remove with weed wrench, cut-stump herbicide treatment
<i>Eleagnus umbellata</i>	C2e	observe closely, remove with weed wrench, cut-stump herbicide treatment

## 2) Supplemental Planting

Area	Appropriate Plantings
E2a	Tree species – e.g. green ash ( <i>Fraxinus pennsylvanica</i> ), pin oak ( <i>Quercus palustris</i> )
E2a, DR, E2c, E2d	Shrub species – e.g. speckled alder ( <i>Alnus incana</i> ), silky dogwood ( <i>Cornus amomum</i> ) winterberry ( <i>Ilex verticillata</i> ), highbush blueberry ( <i>Vaccinium corymbosum</i> ), and northern arrowwood ( <i>Viburnum dentatum</i> ).

3) Shrub & tree protection measures, such as deer fencing around woody plantings, on an as-needed basis.

4) Place additional coarse woody debris in E2a and E2c.

## 4.0 CONCLUSIONS

Generally, the mitigation sites are meeting success standards:

- Target hydrology achieved,
- 100% vegetative cover – no soil erosion and sedimentation issues,
- Close to meeting all vegetative success standards:

Shrub density in E2a and DR, tree density in E2a, and number of non-exotic woody species in E2a and E2d are below that which is required by the Performance Standards. These shortfalls are largely due to mortality of planted species (due largely to deer browsing). Supplemental plantings and additional tree and shrub protection measures (as necessary) should correct this.

E2c does not meet the required 80% areal cover by non-invasive species. Continuation of invasive control measures targeted to the eradication of *Phragmites* in this area are planned to correct this.

E2a and DR have a high percentage of invasive species – namely reed canary grass (established prior to construction). The mitigation proposed and permitted for these areas is enhancement of pre-existing reed canary grass meadows by planting woody species. As removal of existing invasive species in these two areas was not a mitigation goal, Performance Standard 2 does not apply to E2a and DR.

- Wetland mitigation areas are providing wetland functions including wildlife habitat. The mitigation areas provide forage, cover, nesting, and amphibian breeding habitat.

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U.S. Geological Survey 7 1/2-minute topographic quadrangle – Hartford North, CT; 1983.

## **FIGURES, MAPS & PLANS**

Figure 1 – Project Location

Figure 2 – Wetland Mitigation Sites

Figure 3 – Wetland Creation Area C2e

Figure 4 – Wetland Enhancement Areas E2a, E2c, E2d

Figure 5 – Wetland Enhancement Area DR

Figure 6 – Tunxis Reservoir Buffer Zone & Hole 14 Tee

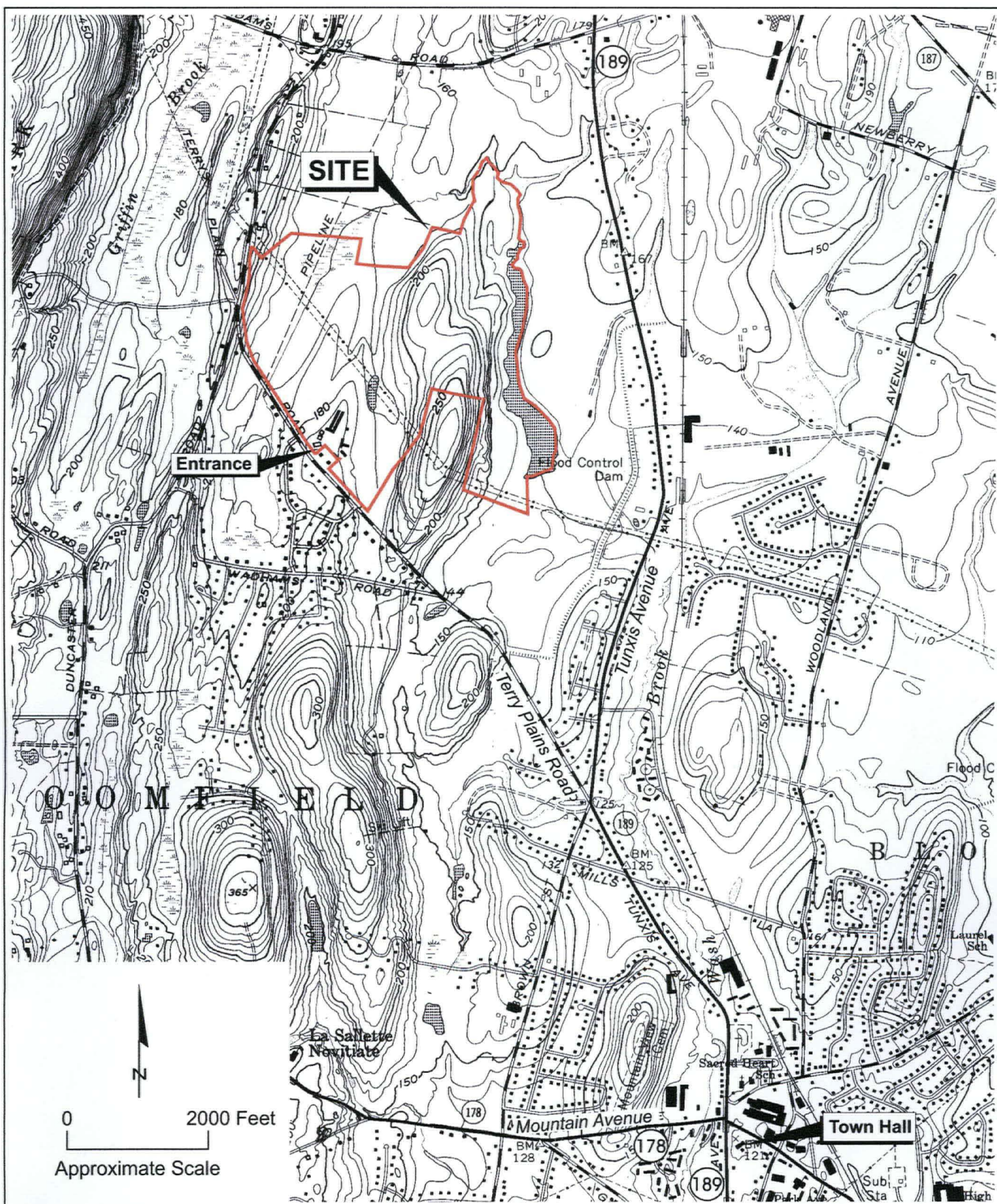
Figure 7 – Tunxis Reservoir Buffer Zone & Hole 14 Fairway

Figure 8 – 2010 Tunxis Reservoir Aquatic Vegetation Survey

Figure 9 – Tunxis Reservoir July 2010 Site Photographs

Figure 10 – Tunxis Reservoir November 2010 Site Photographs

Note – See Appendix D for representative photographs of wetland mitigation areas.



Wintonbury Hills Golf Course Wetland Mitigation  
Bloomfield, Connecticut



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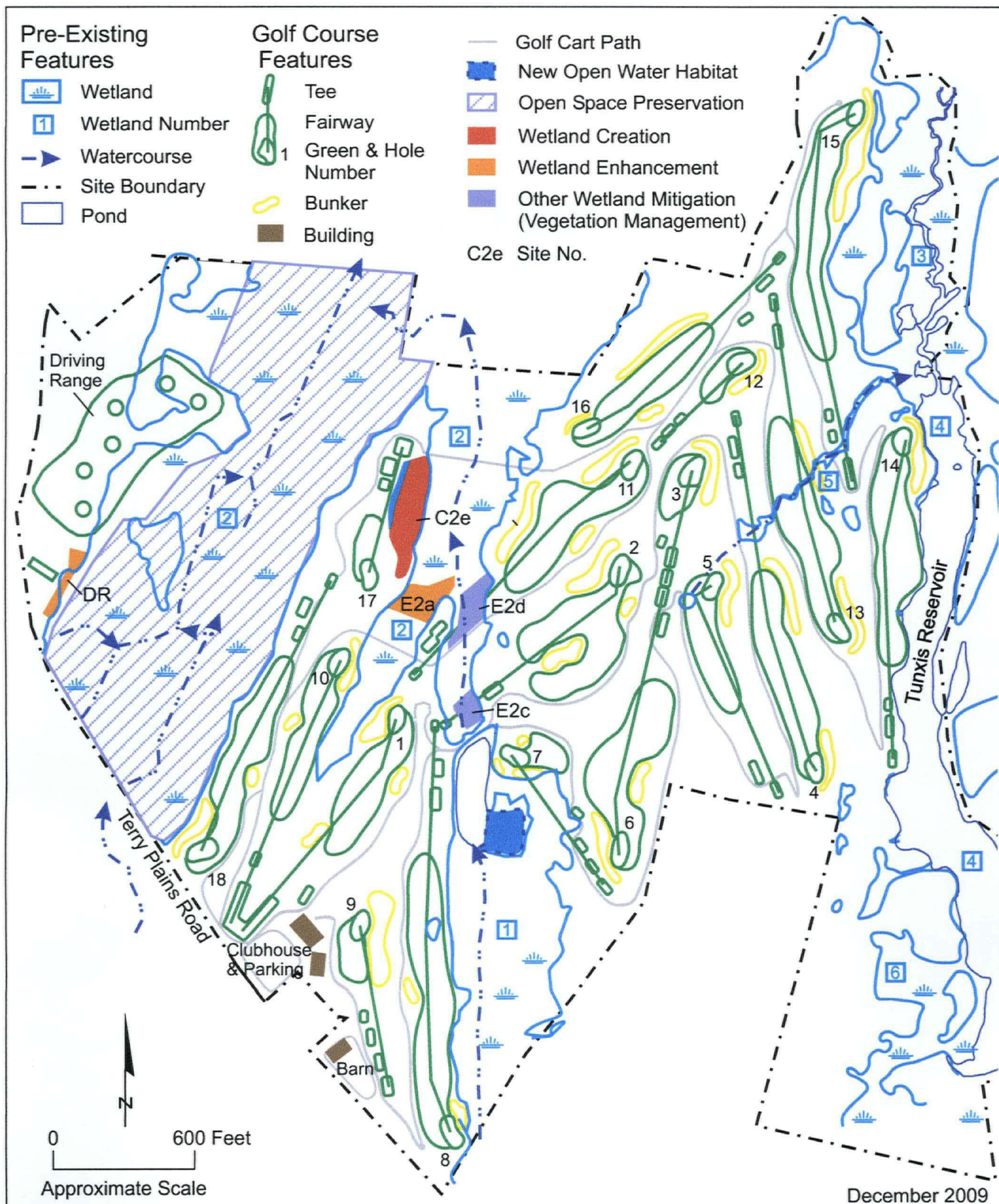
771 Plainfield Pike, North Scituate, Rhode Island 02857

## PROJECT LOCATION

Project No. 070306

Figure 1





Wintonbury Hills Golf Course Wetland Mitigation  
Bloomfield, Connecticut



**MASON & ASSOCIATES, INC.**  
Environmental Consulting & Projects

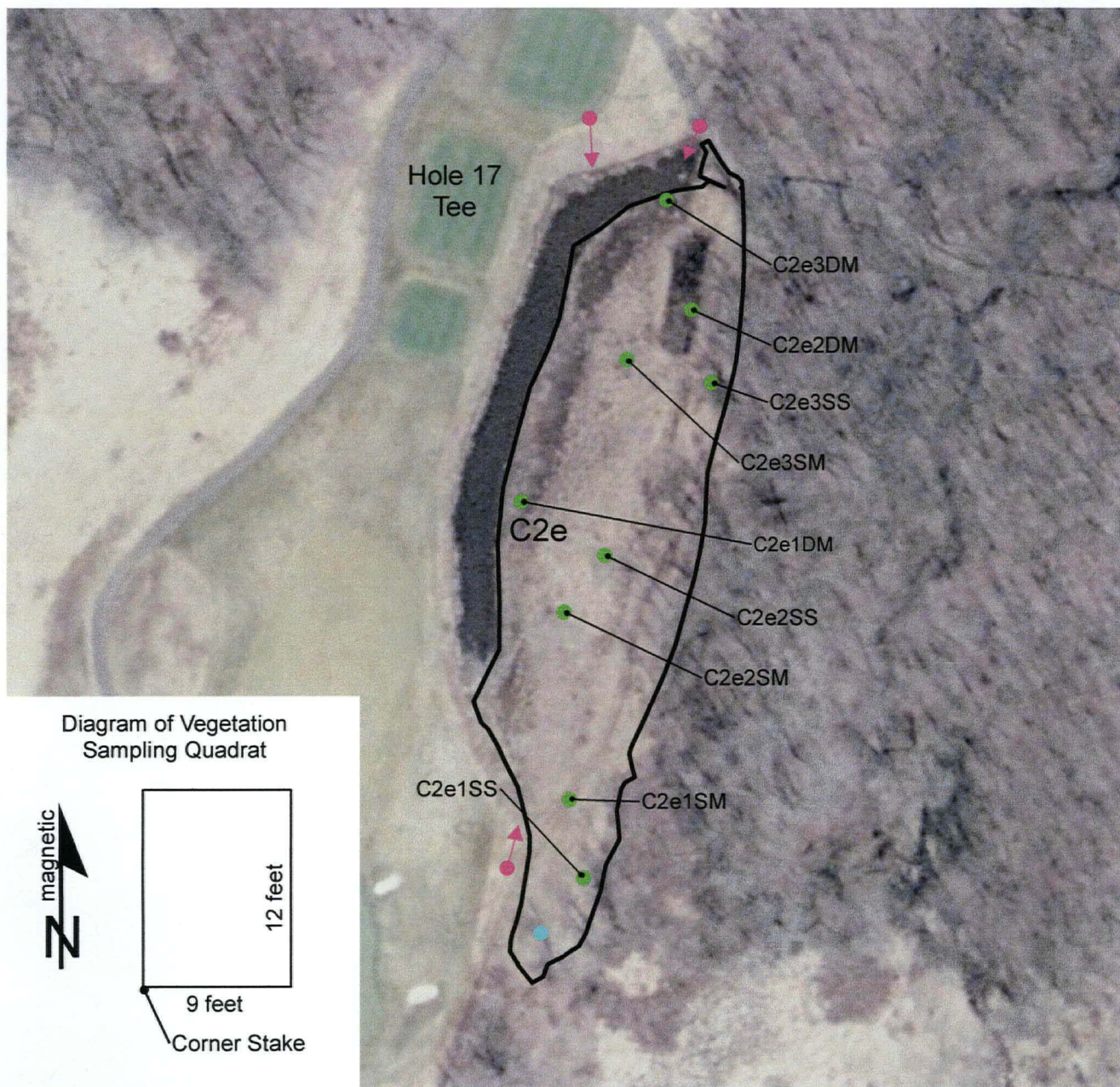
771 Plainfield Pike, North Scituate, Rhode Island 02857

## WETLAND MITIGATION SITES

M&A Project No. 070306

Figure 2





Wintonbury Hills Golf Course Wetland Mitigation  
Bloomfield, Connecticut

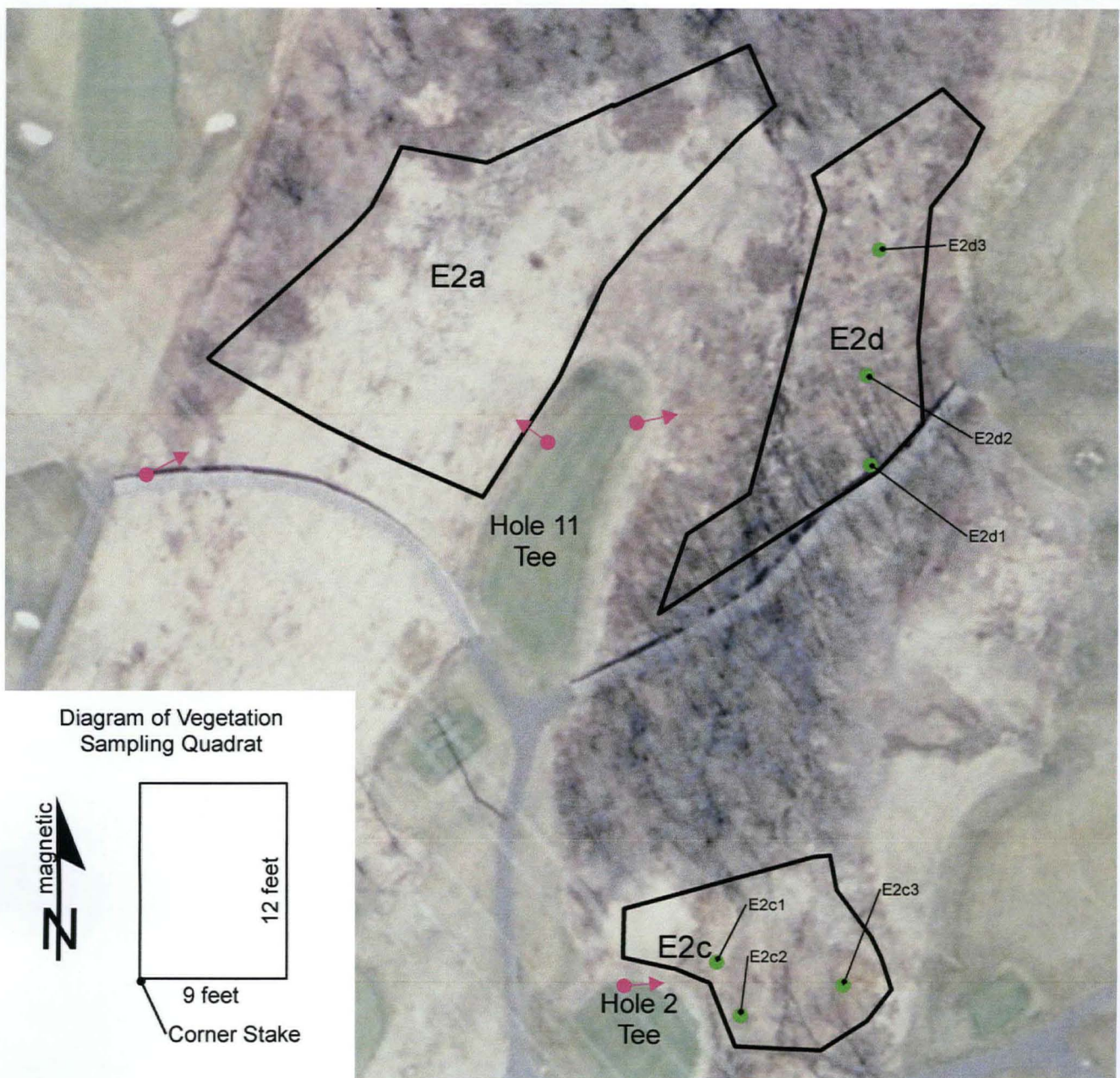
**M** **MASON & ASSOCIATES, INC.**  
Environmental Consulting & Projects  
771 Plainfield Pike, North Scituate, Rhode Island 02857

## WETLAND CREATION AREA

Project No. 070306

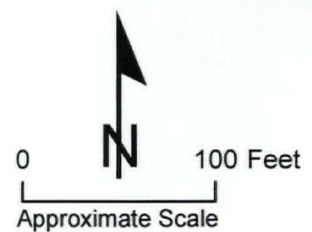
Figure 3





Approximate Location of:

- Hydrology Monitoring Station
- ➔ Photo Station
- Vegetation Monitoring Quadrat
- Mitigation Area Boundary



Wintonbury Hills Golf Course Wetland Mitigation  
Bloomfield, Connecticut

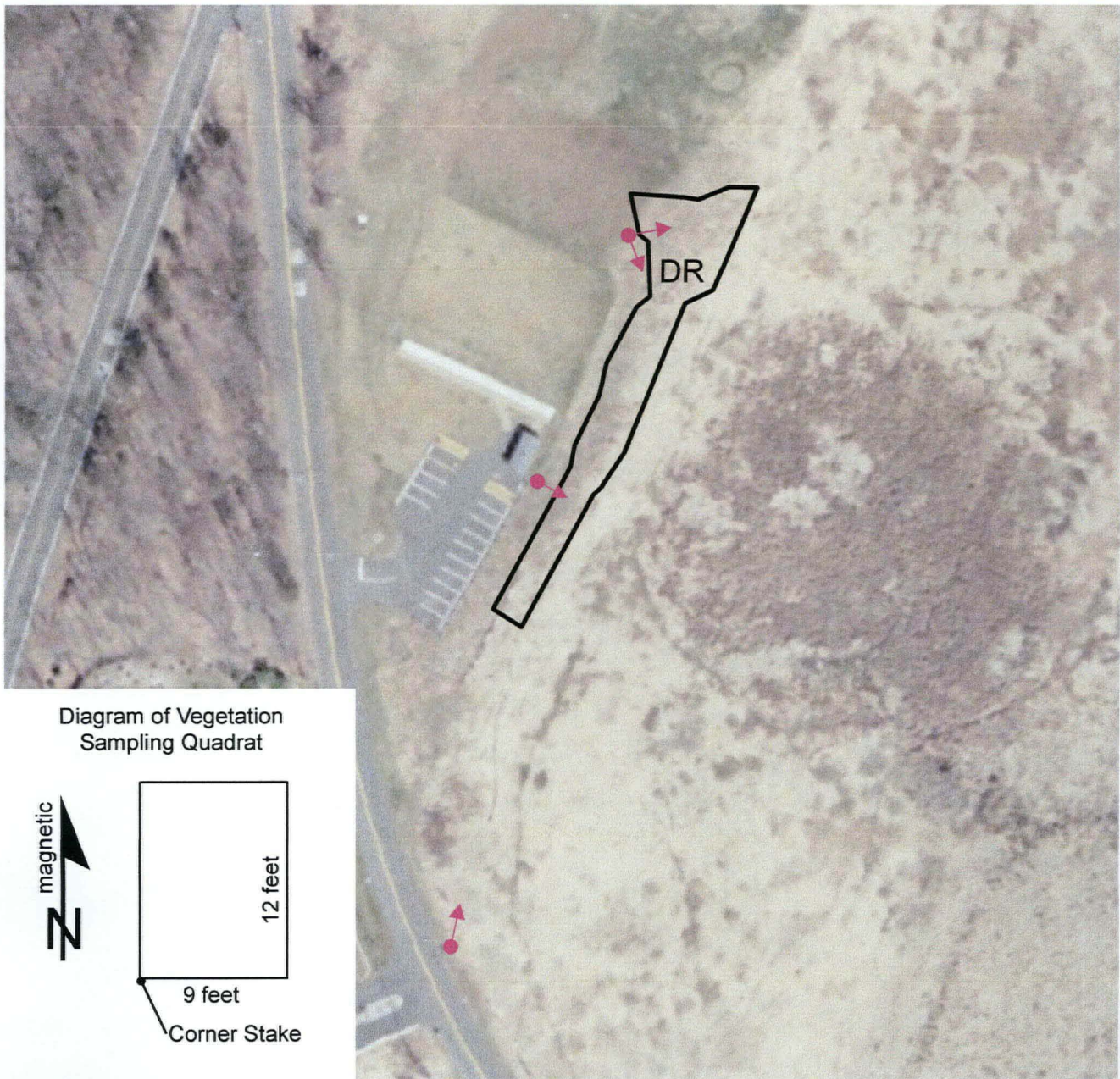
**M** **MASON & ASSOCIATES, INC.**  
*Environmental Consulting & Projects*  
771 Plainfield Pike, North Scituate, Rhode Island 02857

## ENHANCEMENT AREAS

Project No. 070306

Figure 4

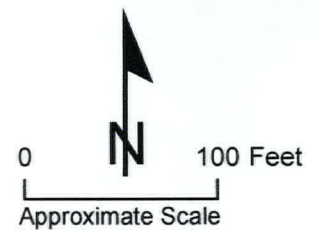




Approximate Location of:

- Hydrology Monitoring Station
- → Photo Station
- Vegetation Monitoring Quadrat

Mitigation Area Boundary



Wintonbury Hills Golf Course Wetland Mitigation  
Bloomfield, Connecticut

**MA** **MASON & ASSOCIATES, INC.**  
*Environmental Consulting & Projects*  
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**ENHANCEMENT AREA**

Project No. 070306

Figure 5





View North of Tunxis Reservoir Buffer Zone East of Hole 14 Tee, May 2010



View Northeast of Tunxis Reservoir Buffer Zone East of Hole 14 Tee, May 2010

Wintonbury Hills Golf Course Wetland Mitigation  
Bloomfield, Connecticut

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# **TUNXIS RESERVOIR BUFFER ZONE AT HOLE 14 TEE**

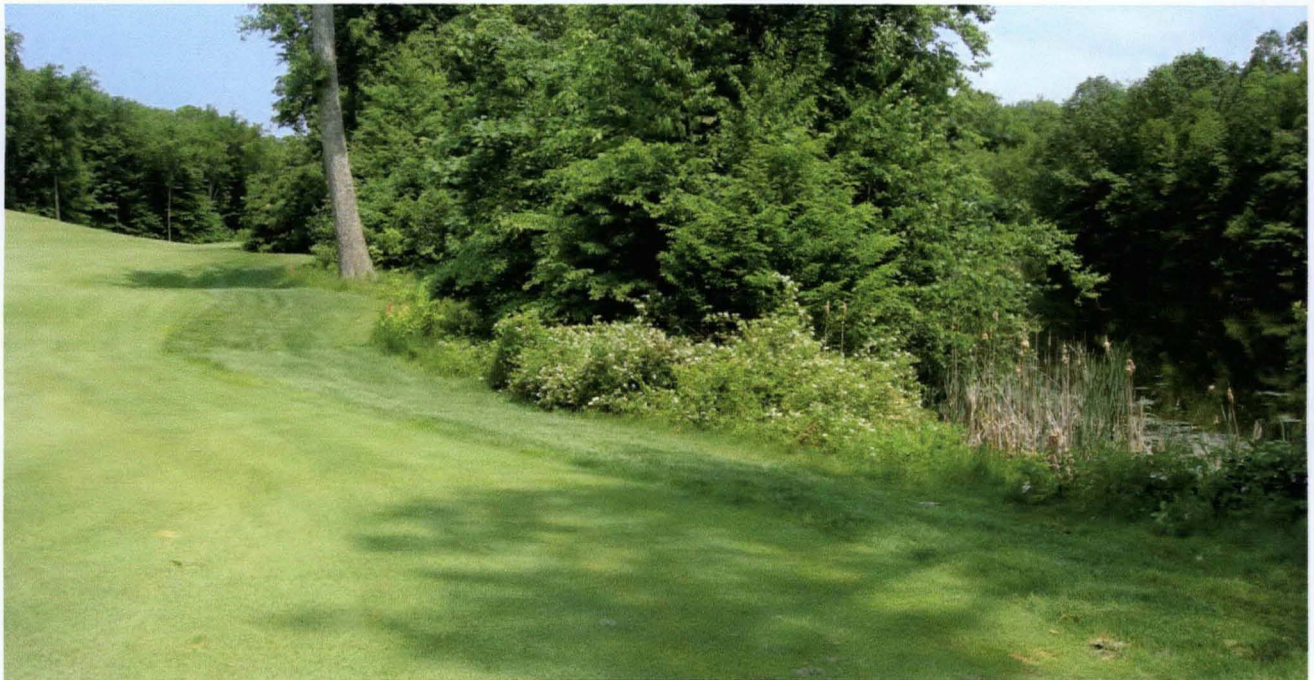
Project No. 070306

Figure 6





View South of Tunxis Reservoir Buffer Zone East of Hole 14 Fairway, May 2010



View North of Tunxis Reservoir Buffer Zone and Hole 14 Fairway, May 2010

Wintonbury Hills Golf Course Wetland Mitigation  
Bloomfield, Connecticut

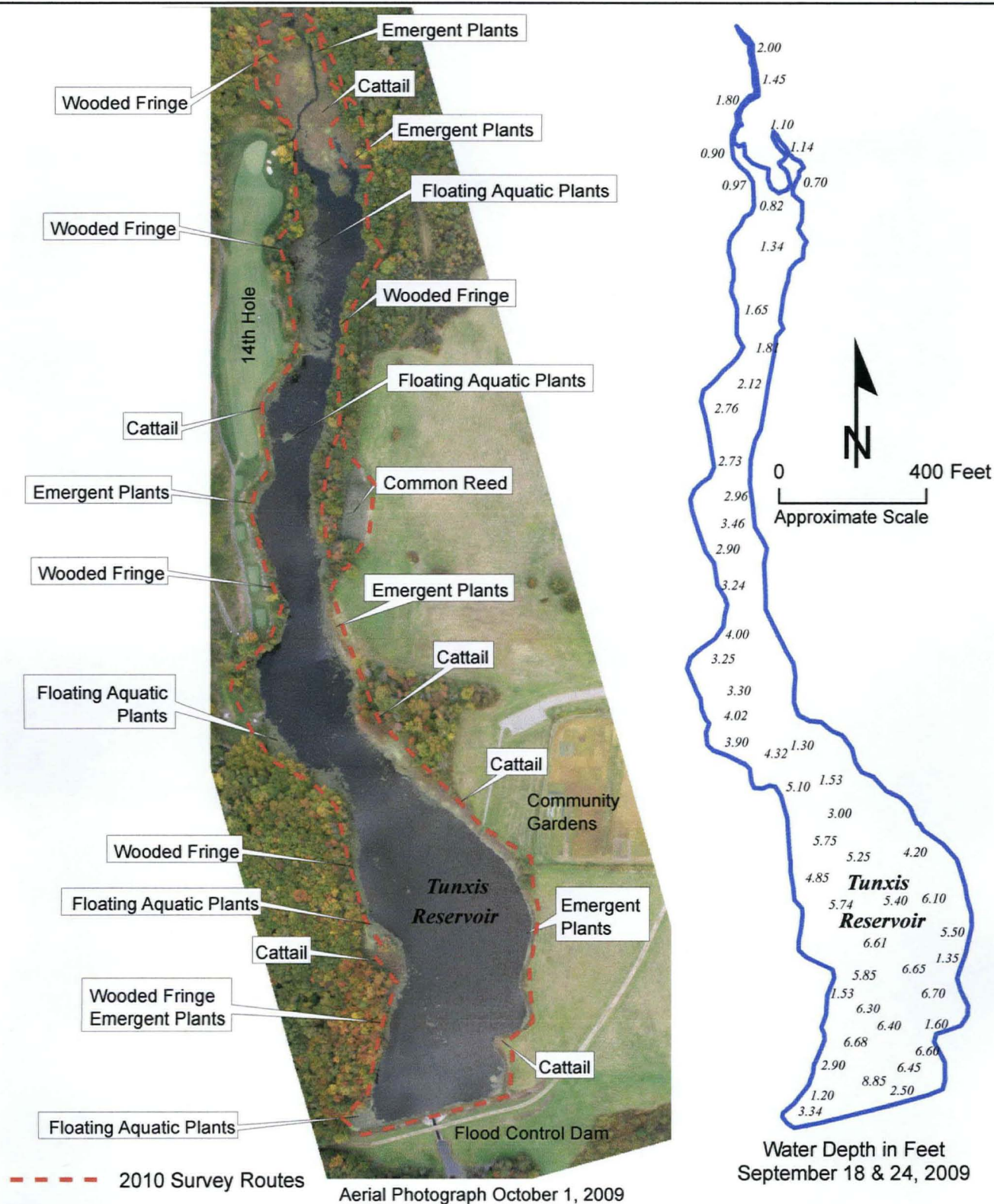
**MA** **MASON & ASSOCIATES, INC.**  
*Environmental Consulting & Projects*  
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# **TUNXIS RESERVOIR BUFFER ZONE AT HOLE 14 FAIRWAY**

Project No. 070306

Figure 7





Wintonbury Hills Golf Course Wetland Mitigation  
Bloomfield, Connecticut

**MASON & ASSOCIATES, INC.**  
Environmental Consulting & Projects  
771 Plainfield Pike, North Scituate, Rhode Island 02857

## 2010 TUNXIS RESERVOIR AQUATIC VEGETATION SURVEY

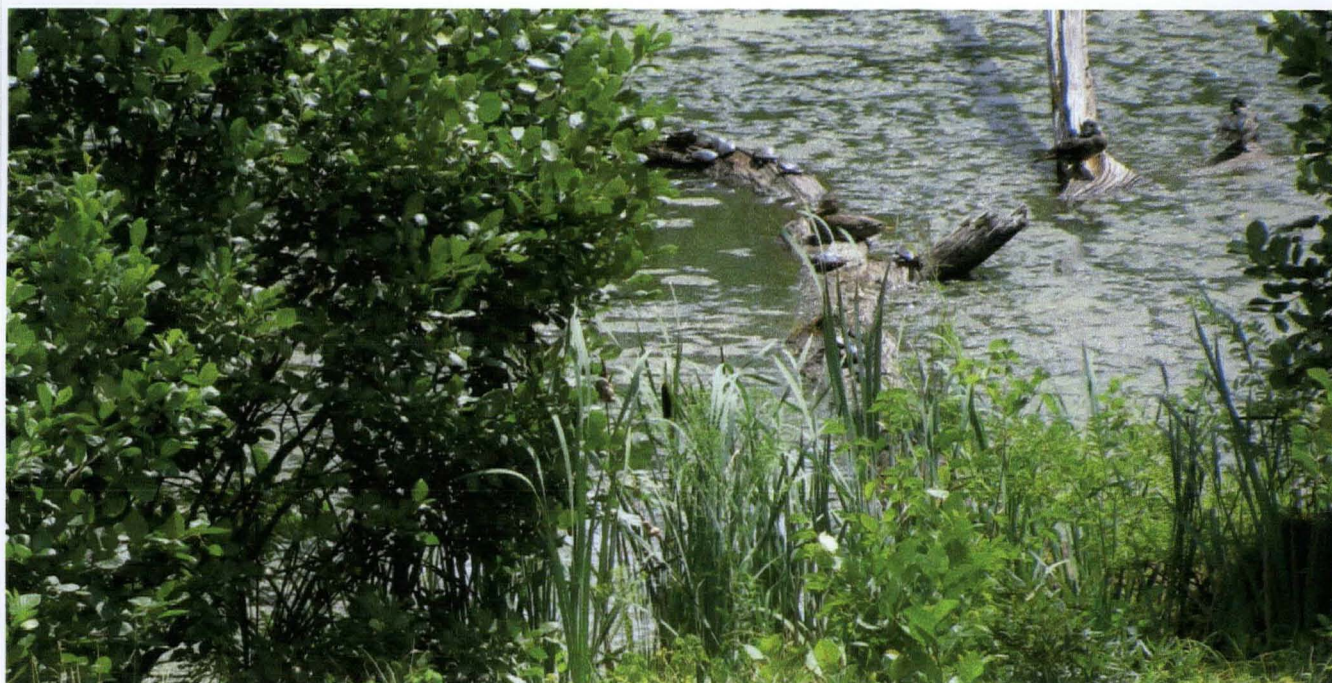
Project No. 070306

Figure 8





View North of Tunxis Reservoir July 2010



View East of Tunxis Reservoir, July 2010

Wintonbury Hills Golf Course Wetland Mitigation  
Bloomfield, Connecticut

**MA** **MASON & ASSOCIATES, INC.**  
*Environmental Consulting & Projects*  
771 Plainfield Pike, North Scituate, Rhode Island 02857

# **TUNXIS RESERVOIR JULY 2010**

Project No. 070306

Figure 9





View North of Tunxis Reservoir - North End - November 2010



View East of Tunxis Reservoir - Headwater Wetland Complex - November 2010

Wintonbury Hills Golf Course Wetland Mitigation  
Bloomfield, Connecticut

**MA** **MASON & ASSOCIATES, INC.**  
*Environmental Consulting & Projects*  
771 Plainfield Pike, North Scituate, Rhode Island 02857

**TUNXIS RESERVOIR NOVEMBER 2010**

Project No. 070306

Figure 10

## APPENDIX A

### Permit Special Conditions Related to Wetland Mitigation



DEPARTMENT OF THE ARMY  
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS  
696 VIRGINIA ROAD  
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO:  
ATTENTION OF:

September 26, 2007

Regulatory Division  
CENAE-R-PEB  
Permit Number: NAE-2000-01509

OCT 3 2007

Louie Chapman  
Town Manager  
Town of Bloomfield  
800 Bloomfield Avenue  
Bloomfield, Connecticut 06002

Dear Mr. Chapman:


In accordance with your recent request, your Department of the Army permit, number NAE-2000-01509, is hereby amended. This work is located in the wetlands/waters of Wash Brook, which is a tributary to the North Branch of the Parker River, and Griffin Brook, which is a tributary to the Farmington River, at Wintonbury Hills Golf Course, Bloomfield, Connecticut, and is described on the enclosed plans entitled "Wintonbury Hills Golf Course, Bloomfield, Connecticut" on 7 sheets, and dated "AUGUST 2006." This request involves the modification to the permitted mitigation.

Also, in accordance with your request, the time limit for completion of the mitigation construction work authorized by your Department of the Army permit, number NAE-2000-01509, is hereby extended until December 31, 2008.

All other conditions of the original permit remain in full force and effect.

We continually strive to improve our customer service. In order for us to better serve you, we would appreciate your completing our Customer Service Survey located at [http://www.nae.usace.army.mil/reg/Customer\\_Service\\_Survey.pdf](http://www.nae.usace.army.mil/reg/Customer_Service_Survey.pdf).

BY AUTHORITY OF THE SECRETARY OF THE ARMY:

  
Curtis L. Thalken  
Colonel, Corps of Engineers  
District Engineer

Enclosure as stated



DEPARTMENT OF THE ARMY PERMIT

Permittee Town of Bloomfield  
Permit No. 200001509  
Issuing Office New England District

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

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

**Project Description:**

To discharge fill material into approximately 0.5 acres of wetlands and excavation of 1.4 acres of pond and wet meadow for the construction of a municipal golf course in Bloomfield, CT.

Work to be done as shown on plans entitled "Municipal Golf Course, Bloomfield, Connecticut" in 9 sheets dated "February 2001".

**Project Location:**

Terry Plains Road, Bloomfield, Connecticut

**Permit Conditions:**

**General Conditions:**

1. The time limit for completing the work authorized ends on DECEMBER 31, 2007. If you find that you need more time to complete the authorized activity, submit your request for a time extension to this office for consideration at least one month before the above date is reached.
2. You must maintain the activity authorized by this permit in good condition and in conformance with the terms and conditions of this permit. You are not relieved of this requirement if you abandon the permitted activity, although you may make a good faith transfer to a third party in compliance with General Condition 4 below. Should you wish to cease to maintain the authorized activity or should you desire to abandon it without a good faith transfer, you must obtain a modification of this permit from this office, which may require restoration of the area.
3. If you discover any previously unknown historic or archeological remains while accomplishing the activity authorized by this permit, you must immediately notify this office of what you have found. We will initiate the Federal and state coordination required to determine if the remains warrant a recovery effort or if the site is eligible for listing in the National Register of Historic Places.

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

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

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

**Special Conditions:**

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

(Special Conditions continued on Page 4)

**Further Information:**

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

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

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

( ) Section 103 of the Marine Protection, Research and Sanctuaries Act of 1972 (33 U.S.C. 1416).

2. Limits of this authorization.

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

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

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

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

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

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

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

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

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

(Special Conditions continued from Page 2)

If the permit is issued after the construction specifications but before receipt of bids or quotes, the entire permit shall be included as an addendum to the specifications. If the permit is issued after receipt of bids or quotes, the entire permit shall be included in the contract or sub-contract as a change order. The term "entire permit" includes permit amendments. Although the permittee may assign various aspects of the work to different contractors or sub-contractors, all contractors and sub-contractors shall be obligated by contract to comply with all environmental protection provisions of the entire permit, and no contract or sub-contract shall require or allow unauthorized work in areas of Corps jurisdiction.

(2) All areas of wetlands and/or waters, which are disturbed during construction, **except those authorized herein for permanent impact**, shall be restored to their approximate original elevation (but not higher) and condition by careful protection, and/or removal and replacement, of existing soil and vegetation. In addition, if upland clearing, grubbing, or other construction activity results in, or may result in, soil erosion with transport and deposition into a wetland or waterway, devices such as geotextile silt fences, sediment trenches, etc., shall be installed and properly maintained to minimize such impacts during construction. These devices must be removed upon completion of work and stabilization of disturbed areas. The sediment collected by these devices must also be removed and placed upland, in a manner that will prevent its later erosion and transport to a waterway or wetland.

(3) Mitigation shall be performed in accordance with the attached mitigation plans entitled, "TOWN OF BLOOMFIELD" in 9 sheets dated "April 2002."

(4) The permittee shall execute and record a conservation easement or deed restriction with the registry of deeds for the Town of Bloomfield and the State of Connecticut, within 90 days of the date of this permit issuance. Before recording these documents a draft copy of the conservation easement or deed restriction must be sent to the Corps of Engineers for approval, in writing. Upon receipt of the approved document, the permittee shall then execute and record it with the registry of deeds having jurisdiction over the locals where the site or sites are located. A copy of the executed and recorded document must be sent to this office within 30 days of the date it was recorded. The conservation easement or deed restriction shall enable the site or sites to be protected in perpetuity from any future development. The conservation easement or deed restriction shall expressly allow for the creation, restoration, remediation and monitoring activities required by this permit on the site or sites. It shall prohibit all other filling, clearing, and other disturbances (including vehicle access) on these sites except for activities explicitly authorized by the Corps of Engineers in these approved documents.



**STATE OF CONNECTICUT**  
**DEPARTMENT OF ENVIRONMENTAL PROTECTION**  
**PERMIT**



**PERMITTEE:** Town of Bloomfield  
800 Bloomfield Avenue  
Bloomfield, CT 06002  
Attn: Louie Chapman, Jr., Town Manager

**PERMIT NO.:** DIV-200602901 & WQC-200602900  
**TOWN:** Bloomfield  
**WATERS:** Tunxis Reservoir, Hole 7 Storage Pond and Inland Wetlands and Watercourses

Pursuant to Section 401 of the Federal Clean Water Act (33 USC 1341) Water Quality Certification is hereby issued to the Town of Bloomfield ("the permittee") for the discharge(s) of material into water of the state, and the permittee is hereby authorized to divert the waters of the state pursuant to Connecticut General Statutes section 22a-368 at the Wintonbury Hills Golf Course located at 206 Terry Plains Road in Bloomfield, Connecticut (the "site") in accordance with the permittee's application dated October 30, 2006, filed with this Department on November 14, 2006 and described herein. The purpose of the discharges and the diversion is to complete a revised wetland mitigation plan and to provide water for golf course irrigation.

**This authorization supersedes the water diversion permit and 401 water quality certificate (DIV-200100725 & WQC-200100726) dated April 18, 2002 for the same project site.**

**AUTHORIZED ACTIVITY**

The permittee is authorized to: (1) withdraw a maximum of 0.25 million gallons of surface water per day at a maximum rate of 500 gallons per minute from Tunxis Reservoir and directly transfer it to the Hole 7 Storage Pond; (2) withdraw a maximum of 0.25 million gallons of water per day at a maximum rate of 500 gallons per minute from the Hole 7 Storage Pond for distribution to the golf course irrigation system; and (3) complete construction activities at Wetland Creation Area C2e and Driving Range Enhancement Area. The discharges and water diversion shall be conducted in accordance with plans entitled "Bloomfield Golf Course, Town of Bloomfield, CT," dated February 22, 2001 and revised through February 13, 2002, scale 1"=40', prepared by TRC and "Wetland Mitigation Plan, Wintonbury Hills Golf Course, Bloomfield, Connecticut", dated August 2006, and prepared by Mason & Associates, Inc., and documentation submitted as a part of the application.

This authorization is subject to the conditions described below.

**PERMITTEE'S FAILURE TO COMPLY WITH THE TERMS AND CONDITIONS OF THIS PERMIT SHALL SUBJECT PERMITTEE AND PERMITTEE'S CONTRACTOR(S) TO ENFORCEMENT ACTIONS AND PENALTIES AS PROVIDED BY LAW.**



### **SPECIAL CONDITIONS**

1. **Metering of Withdrawals.** The permittee shall install and maintain a totalizing flow meters to measure the total amount of water withdrawn from Tunxis Reservoir and the Hole 7 Storage Pond and shall for the duration of this permit continuously operate and maintain such meters. In the event of meter malfunction or breakage, the permittee shall repair or replace such meter within 72 hours.
2. **Record Keeping and Reporting.** The permittee shall maintain a daily record of the meter readings indicating the total volume of water in gallons withdrawn from Tunxis Reservoir and the Hole 7 Storage Pond that day. The daily record shall also record the hours of operation, the time of meter readings, and denote and explain any instances in which the diversion of water exceeded the authorized withdrawal limitation(s) specified in this permit. A copy of the daily record of withdrawals shall be included in the Annual Report to the Commissioner required by Special Condition #14 of this permit.
3. **Meter Calibration.** The permittee shall biennially test each meter referenced in Special Condition #1 above and calibrate to within two percent accuracy as shown through a post-calibration test. The permittee shall maintain a record of the accuracy and calibration tests along with supporting documentation and certifications. The permittee shall make a copy of said records available to the Commissioner or the Commissioner's designee immediately upon request.
4. **Reservoir/Pond Surface Elevations.** The permittee shall install and maintain staff gauges within Tunxis Reservoir and within the Hole 7 Storage Pond.
5. **Record Keeping and Reporting.** The permittee shall maintain a daily record of the water surface elevation readings for Tunxis Reservoir and the Hole 7 Storage Pond. A copy of the daily record of water surface elevation readings shall be included in the Annual Report to the Commissioner required by Special Condition #14 of this permit.
6. **Tunxis Reservoir Withdrawal Reductions.** When the surface water elevation of Tunxis Reservoir descends below elevation 134.65 (principal spillway elevation 135.15), the permittee shall reduce the withdrawals from the reservoir to a maximum of 0.20 million gallons per day until such time the surface water elevation returns to an elevation above 134.65.
7. **Hole 7 Storage Pond Withdrawal Restrictions.** The permittee shall utilize the Hole 7 Storage Pond as a supplementary supply source during the reduction period referenced in Special Condition 7. The permittee shall cease withdrawing water from the Hole 7 Storage Pond when the surface elevation falls below elevation 156.0.

8. **Chemigation.** The permittee is prohibited from using the irrigation system for the purpose of chemigation without the appropriate discharge permit and pesticide application permit from the Commissioner.
9. **Seasonal Irrigation Restrictions.** Irrigation withdrawals and associated metering, staff gauging and record keeping, authorized under this permit are restricted to the period April 15 through October 31, inclusive.
10. **Other Restrictions.** The DEP shall have the right to restrict the diversion authorized in this permit at any time the Commissioner in his judgment determines: a) a declared local, regional or state-wide drought advisory, watch, warning or emergency necessitates curtailment of non-essential water uses, or b) the continuation of the diversion would have an adverse effect on water quality, fisheries resources or aquatic habitat.
11. **Recording and Reporting Violations.** Within 48 hours after the permittee learns of a violation of this permit, the permittee shall report the violation in writing to the Commissioner. Such report shall be certified in accordance with General Condition #11 and shall include the following information:
  - a. The provision(s) of this permit that has been violated;
  - b. The date and time the violation(s) was first discovered and by whom;
  - c. The cause of the violation(s), if known;
  - d. If the violation(s) has ceased, the duration of the violation(s) and the exact date(s) and time(s) it was corrected;
  - e. If the violation(s) has not ceased, the anticipated date when it will be corrected; and
  - f. Actions taken and actions planned to prevent a recurrence of the violation(s) and the date(s) such actions were implemented or will be implemented.
12. **Wetland Mitigation Plan Implementation.** The permittee shall implement the mitigation and monitoring activities detailed in the document entitled "Wetland Mitigation Plan, Wintonbury Hills Golf Course, Bloomfield, Connecticut," dated August 2006 and prepared by Mason & Associates, Inc.
13. **Five-year Wetland Monitoring Plan.** The permittee shall submit an annual monitoring report for all wetland-planting areas to the Inland Water Resources Division for five years starting at the end of the first growing season following the plantings. The monitoring report shall include assessments of plant community composition and density, general health of the plants, and wildlife usage of the restoration areas; photographs of set data collection points from each restoration area; and a description of all measures taken to control the establishment and spread of invasive species.
14. **Annual Report.** The permittee shall submit by January 15 of each year, for the duration of this authorization, an Annual Report for the preceding calendar year. The Annual Report shall be certified in accordance with General Condition #11 of this permit and shall contain the following:

- a. A copy of the record of daily withdrawals and hours operated;
  - b. Denotation and explanation of any instances of violation of the authorized maximum withdrawal amounts or any other condition of this authorization;
  - c. Records of annual diversion shutdown and startup dates;
  - d. A copy of the record of daily staff gauge readings for Tunxis Reservoir and the Hole 7 Storage Pond; and
  - e. A copy of the wetland mitigation annual monitoring report.
15. The permittee, 60 days prior to the initiation of the approved wetland mitigation activities, shall retain a qualified biologist to conduct a survey of Wetland Creation Area C2e and the Driving Range Enhancement Area for the existence of any American kestrel (*Falco sparverius*) nests. If any nests are identified by the qualified biologist, the permittee, shall not operate any machinery or conduct any construction activities within 100' of said American kestrel nest between March 1 and July 31.
16. A qualified biologist shall supervise the completion of Wetland Creation Area C2e and the planting of trees and shrubs in the Driving Range Enhancement Area. Specifically, the qualified biologist shall, each day prior to initiation of construction activities, conduct a survey of the project site for the existence of any Eastern Box Turtles (*Terrapene carolina*), Eastern Ribbon snakes (*Thamnophis sauritus*) and Blue Spotted Salamanders (*Ambystoma laterale*) and relocate any turtles and/or salamanders found to a location outside the limits of construction.
17. The permittee shall maintain a 25-foot undisturbed buffer along the entire west shore of Tunxis Reservoir. No tree clearing, grading, or landscaping shall occur in this area without prior authorization from the Commissioner.

#### **GENERAL CONDITIONS**

1. The permittee shall notify the Commissioner in writing two weeks prior to: (A) commencing construction or modification of structures or facilities authorized herein; and (B) initiating the diversion authorized herein.
2. The permittee may not make any alterations, except de minimis alterations, to any structure, facility, or activity authorized by this permit unless the permittee applies for and receives a modification of this permit in accordance with the provisions of section 22a-377(c)-2 of the Regulations of Connecticut State Agencies. Except as authorized by subdivision (5) of section 22a-377(b)-1(a) of the Regulations of Connecticut State Agencies, the permittee may not make any de minimis alterations to any structure, facility, or activity authorized by this permit without written permission from the Commissioner. A de minimis alteration means an alteration which does not significantly increase the quantity of water diverted or significantly change the capacity to divert water.
3. All structures, facilities, or activities constructed, maintained, or conducted pursuant hereto shall be consistent with the terms and conditions of this permit, and any structure,

facility or activity not specifically authorized by this permit, or exempted pursuant to section 22a-377 of the General Statutes or section 22a-377(b)-1 of the Regulations of Connecticut State Agencies, shall constitute a violation hereof which may result in modification, revocation or suspension of this permit or in the institution of other legal proceedings to enforce its terms and conditions.

4. Unless the permittee maintains in optimal condition any structures or facilities authorized by this permit, the permittee shall remove such structures and facilities and restore the affected waters to their condition prior to construction of such structures or facilities.
5. In issuing this permit, the Commissioner has relied on information provided by the permittee. If such information was false, incomplete, or misleading, this permit may be modified, suspended or revoked and the permittee may be subject to any other remedies or penalties provided by law.
6. If construction of any structures or facilities authorized herein is not completed within three years of issuance of this permit or within such other time as may be provided by this permit, or if any activity authorized herein is not commenced within three years of issuance of this permit or within such other time as may be provided by this permit, this permit shall expire three years after issuance or at the end of such other time.
7. This permit is subject to and does not derogate any rights or powers of the State of Connecticut, conveys no property rights or exclusive privileges, and is subject to all public and private rights and to all applicable federal, state, and local law. In constructing or maintaining any structure or facility or conducting any activity authorized herein, the permittee may not cause pollution, impairment, or destruction of the air, water, or other natural resources of this State. The issuance of this permit shall not create any presumption that this permit should be renewed.
8. In constructing or maintaining any structure or facility or conducting any activity authorized herein, or in removing any such structure or facility under paragraph 4 hereof, the permittee shall employ best management practices to control storm water discharges, to prevent erosion and sedimentation, and to otherwise prevent pollution of wetlands and other waters of the State. The permittee shall immediately inform the Commissioner of any adverse impact or hazard to the environment which occurs or is likely to occur as the direct result of the construction, maintenance, or conduct of structures, facilities, or activities authorized herein.
9. This permit is not transferable without the prior written consent of the Commissioner.
10. **Expiration of Permit.** This 401 Water Quality Certificate shall expire upon the expiration date of the U.S. Army Corps of Engineers (USACOE) Section 404 permit for the same activity. The Water Diversion Permit shall expire on April 17, 2027.
11. **Certification of Documents.** Any document, including but not limited to any notice, which

is required to be submitted to the Commissioner under this permit shall be signed by the permittee or a responsible corporate officer of the permittee, a general partner of the permittee, and by the individual or individuals responsible for actually preparing such document, each of whom shall certify in writing as follows:

"I have personally examined and am familiar with the information submitted in this document and all attachments and certify that based on reasonable investigation, including my inquiry of those individuals responsible for obtaining the information, the submitted information is true, accurate and complete to the best of my knowledge and belief, and I understand that any false statement made in this document or its attachment may be punishable as a criminal offense in accordance with Section 22a-376 under 53a-157 of the Connecticut General Statutes."

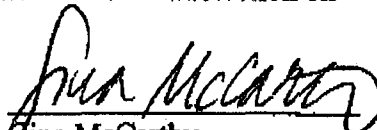
12. **Submission of Documents.** Any document or notice required to be submitted to the Commissioner under this permit shall, unless otherwise specified in writing by the Commissioner, be directed to:

Director  
DEP/Inland Water Resources Division  
79 Elm Street  
Hartford, CT 06106-5127

The date of submission to the Commissioner of any document required by this permit shall be the date such document is received by the Commissioner. The date of any notice by the Commissioner under this permit, including but not limited to notice of approval or disapproval on any document or other action, shall be the date such notice is personally delivered or the date three days after it is mailed by the Commissioner, whichever is earlier. Except as otherwise specified in this permit, the word "day" as used in this permit means any calendar day. Any document or action which is required by this permit to be submitted or performed by a date which falls on a Saturday, Sunday or legal holiday shall be submitted or performed by the next business day thereafter.

This authorization constitutes the permit required by section 22a-368(b) of the Connecticut General Statutes.

Issued as a permit of the Commissioner of Environmental Protection on 5/17/07.

  
Gina McCarthy  
Commissioner

APPENDIX C

Vegetative Species List

Vegetative Species List 2010  
Wetland Mitigation Sites - Wintonbury Hills Golf Course, Bloomfield, Connecticut

Common Name	Species Name	Creation Area C2e			Hole 2 Playover E2c	Hole 11 Playover E2d	Driving Range		Tunxis Reservoir
		Shallow Marsh	Deep Marsh	Shrub			E2a	DR	
red maple	<i>Acer rubrum</i> <sup>1</sup>			X		X	X		X
bentgrass	<i>Agrostis</i> sp.		X	X					
alder, speckled	<i>Alnus incana</i> <sup>1</sup>			X				X	X
American hog-peanut	<i>Amphicarpaea bracteata</i>			X					
swamp milkweed	<i>Asclepias incarnata</i>								X
milkweed	<i>Asclepias</i> sp.								
unidentified aster	<i>Aster</i> sp.			X	X				X
yellow birch	<i>Betula alleghaniensis</i> <sup>1</sup>						X		X
birch	<i>Betula</i> sp.			X					
beggar-ticks	<i>Bidens</i> sp.		X						X
false nettle	<i>Boehmeria cylindrica</i>								X
Bush's sedge	<i>Carex bushii</i> <sup>2</sup>	X							
clustered sedge	<i>Carex cumulata</i>					X			
fringed sedge	<i>Carex crinita</i>								X
lakebank sedge	<i>Carex lacustris</i>		X						
shallow lurid sedge	<i>Carex lurida</i>	X		X		X			X
unidentified sedges	<i>Carex</i> spp.	X	X	X		X			
tussock sedge	<i>Carex stricta</i>	X							X
fox sedge	<i>Carex vulpinoidea</i>			X		X			
bittersweet, oriental	<i>Celastrus orbiculatus</i>					X			
buttonbush	<i>Cephalanthus occidentalis</i> <sup>1</sup>		X						X
turtlehead	<i>Chelone glabra</i>								X
bulb bearing water hemlock	<i>Cicuta bulbifera</i>								X
bull thistle	<i>Cirsium vulgare</i>		X						
Virginia virgin's-bower	<i>Clematis virginiana</i>			X					
silky dogwood	<i>Cornus amomum</i> <sup>1</sup>	X		X	X	X	X	X	X
umbrella sedge	<i>Cyperus</i> sp.								X
wild carrot	<i>Daucus carota</i>	X							
deer-tounge witchgrass	<i>Dichanthelium clandestinum</i>								X
three-way sedge	<i>Dulichium arundinaceum</i>		X						
autumn olive	<i>Elaeagnus umbellata</i>			X					X
waterweed	<i>Elodea</i> sp.								X
willow herb	<i>Epilobium</i> sp.					X			X
horsetail	<i>Equisetum</i> sp.					X			X
American burn	<i>Erechtites hieraciifolia</i>		X						
white-top fleabane	<i>Erigeron annuus</i>				X				
prairie fleabane	<i>Erigeron strigosus</i>	X							
spotted joe pye weed	<i>Eupatoriadelphus maculatus</i>					X			X
common boneset	<i>Eupatorium perfoliatum</i>			X		X			X
burning bush	<i>Euonymus alatus</i>								X
flat-top fragrant goldenrod	<i>Euthamia graminifolia</i>							X	
American beech	<i>Fagus grandifolia</i>								X
green ash*	<i>Fraxinus pennsylvanica</i>	X	X	X	X	X	X	X	X
bedstraw	<i>Galium</i> sp.			X					X
St. Johnswort	<i>Hypericum</i> spp.								X
winterberry, common	<i>Ilex verticillata</i> <sup>1</sup>						X	X	X
touch-me-not, spotted	<i>Impatiens capensis</i>			X	X	X			X
blue flag	<i>Iris [versicolor]</i>								X
soft rush	<i>Juncus effusus</i>	X	X	X		X			X
path rush	<i>Juncus tenuis</i>	X							
duckweed	<i>Lemna minor</i>	X	X						X
spicebush	<i>Lindera benzoin</i>								X
Morrow's honeysuckle	<i>Lonicera morrowii</i>			X					

Vegetative Species List 2010  
Wetland Mitigation Sites - Wintonbury Hills Golf Course, Bloomfield, Connecticut

Common Name	Species Name	Creation Area C2e			Hole 2 Playover E2c	Hole 11 Playover E2d	E2a	Driving Range DR	Tunxis Reservoir
		Shallow Marsh	Deep Marsh	Shrub					
seedbox	<i>Ludwigia alternifolia</i>					X			X
water purslane	<i>Ludwigia palustris</i>								X
northern bugleweed	<i>Lycopus uniflorus</i>					X			
fringed loosestrife	<i>Lysimachia ciliata</i>					X			
purple loosestrife	<i>Lythrum salicaria</i>	X	X	X		X	X	X	X
Alleghany monkey-flower	<i>Mimulus ringens</i>					X			
true forget-me-not	<i>Myosotis scorpioides</i>								X
unidentified moss	Musci		X	X					
watercress	<i>Nasturtium sp.</i>								X
sensitive fern	<i>Onoclea sensibilis</i>			X		X			X
cinnamon fern	<i>Osmunda cinamomea</i>								X
royal fern	<i>Osmunda regalis</i>								X
virginia creeper	<i>Parthenocissus quinquefolia</i>				X	X			
arrow arum	<i>Peltandra virginica</i>								X
reed canary grass	<i>Phalaris arundinacea</i>			X		X	X	X	X
common or great reed	<i>Phragmites australis</i>				X	X			X
clearweed	<i>Pilea pumila</i>		X		X				X
unidentified grasses	Poaceae	X	X			X			
halberd-leaf tearthumb	<i>Polygonum arifolium</i>								
swamp smartweed	<i>Polygonum hydropiperoides</i>		X						X
arrow-leaf tearthumb	<i>Polygonum sagittatum</i>			X	X			X	X
pickerelweed	<i>Pontederia cordata</i> <sup>1</sup>		X						X
aspen / poplar sp.	<i>Populus</i> sp. (seedlings)	X							
common cinquefoil	<i>Potentilla simplex</i>			X					
leafy pondweed	<i>Potamogeton foliosis</i>								X
white oak	<i>Quercus alba</i>								X
red oak	<i>Quercus rubra</i>								X
pin oak	<i>Quercus palustris</i> <sup>1</sup>						X		X
oak seedling	<i>Quercus</i> sp.					X			
spotted buttercup	<i>Ranunculus repens</i>	X		X					
common buckthorn	<i>Rhamnus cathartica</i>				X				
American black currant	<i>Ribes americanum</i>			X	X				
multiflora rose	<i>Rosa multiflora</i>			X	X	X	X	X	
swamp rose	<i>Rosa palustris</i>								X
swamp dewberry	<i>Rubus hispidous</i>								X
blackberry	<i>Rubus</i> sp.	X							
water dock	<i>Rumex verticillatus</i>								X
northern arrowhead	<i>Sagittaria latifolia</i> <sup>1</sup>		X						X
elderberry	<i>Sambucus canadensis</i>								X
wool-grass	<i>Scirpus cyperinus</i>	X	X			X			X
unidentified bulrush	<i>Scirpus</i> sp.		X						X
pointed blue-eyed grass	<i>Sisyrinchium angustifolium</i>	X		X					
Canada goldenrod	<i>Solidago canadensis</i>				X				
tall goldenrod	<i>Solidago gigantea</i>	X				X		X	
wrinkled-leaved goldenrod	<i>Solidago rugosa</i>			X				X	X
unidentified goldenrod	<i>Solidago</i> sp.	X		X	X				
American burreed	<i>Sparganium americanum</i>								X
sphagnum moss	<i>Sphagnum</i> sp.					X			
broad leaf meadowsweet	<i>Spiraea latifolia</i> <sup>1</sup>						X		
steplebush	<i>Spiraea tomentosa</i> <sup>1</sup>					X			
lesser starwort	<i>Stellaria graminea</i>			X					
skunk cabbage	<i>Symplocarpus foetidus</i>				X	X			
marsh fern	<i>Thelepteris theleptroides</i>								X



Vegetative Species List 2010  
Wetland Mitigation Sites - Wintonbury Hills Golf Course, Bloomfield, Connecticut

Common Name	Species Name	Creation Area C2e			Hole 2 Playover E2c	Hole 11 Playover E2d	Driving Range		Tunxis Reservoir
		Shallow Marsh	Deep Marsh	Shrub			E2a	DR	
poison ivy	<i>Toxicodendron radicans</i>				X	X			
red clover	<i>Trifolium pratense</i>	X							X
broad-leaf cattail	<i>Typha latifolia</i>								
cattail	<i>Typha sp.</i>	X	X	X		X			X
American elm	<i>Ulmus americana</i>				X				
highbush blueberry	<i>Vaccinium corymbosum</i> <sup>1</sup>		X	X			X	X	X
blue vervain	<i>Verbena hastata</i>					X			X
New York ironweed	<i>Veronia noveboracensis</i>					X			
arrowwood	<i>Viburnum dentatum</i> <sup>1</sup>			X	X		X	X	X
river-bank grape	<i>Vitis riparia</i>				X				
watermeal	<i>Wolffia spp.</i>								X

<sup>1</sup> Species included in wetland plantings

<sup>2</sup> Tentative identification

## APPENDIX D

### Representative Photographs



May 2010 - View East of Hole 2 Playover (E2c)



May 2010 - View East of Hole 11 Playover (E2d)

Wintonbury Hills Golf Course  
Bloomfield, Connecticut

**MA** **MASON & ASSOCIATES, INC.**  
*Environmental Consulting & Projects*  
771 Plainfield Pike, North Scituate, Rhode Island 02857

## SITE PHOTOGRAPHS

Project No. 070306

Figure 1





May 2010 - View West of Enhancement Area E2a



May 2010 - View North of Driving Range Enhancement Area (DR)

Wintonbury Hills Golf Course  
Bloomfield, Connecticut

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*Environmental Consulting & Projects*  
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## SITE PHOTOGRAPHS

Project No. 070306

Figure 2





May 2010 - View North of Wetland Creation Area (C2e)



May 2010 - View South of Wetland Creation Area (C2e)

Wintonbury Hills Golf Course  
Bloomfield, Connecticut



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## SITE PHOTOGRAPHS

Project No. 070306

Figure 3





July 2010 - View East of Hole 2 Playover (E2c)



July 2010 - View East of Hole 11 Playover (E2d)

Wintonbury Hills Golf Course  
Bloomfield, Connecticut

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## SITE PHOTOGRAPHS

Project No. 070306

Figure 1





July 2010 - View West of Enhancement Area E2a



July 2010 - View North of Driving Range Enhancement Area (DR)

Wintonbury Hills Golf Course  
Bloomfield, Connecticut

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## SITE PHOTOGRAPHS

Project No. 070306

Figure 2





July 2010 - View North of Wetland Creation Area (C2e)



July 2010 - View South of Wetland Creation Area (C2e)

Wintonbury Hills Golf Course  
Bloomfield, Connecticut

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## SITE PHOTOGRAPHS

Project No. 070306

Figure 3





September 2010 - View East of Hole 2 Playover (E2c)



September 2010 - View East of Hole 11 Playover (E2d)

Wintonbury Hills Golf Course  
Bloomfield, Connecticut

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## SITE PHOTOGRAPHS

Project No. 070306

Figure 1





September 2010 - View West of Enhancement Area E2a



September 2010 - View North of Driving Range Enhancement Area (DR)

Wintonbury Hills Golf Course  
Bloomfield, Connecticut

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## SITE PHOTOGRAPHS

Project No. 070306

Figure 2





September 2010 - View North of Wetland Creation Area (C2e)



September 2010 - View South of Wetland Creation Area (C2e)

Wintonbury Hills Golf Course  
Bloomfield, Connecticut

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Figure 3