# Environmental Assessment

## U.S. Army Reserve
## Land Acquisition
## 53.8 acres at 218 Boardman Lane

## Middletown, Connecticut

**JUNE 2010**

***Prepared for***
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# Draft
# Finding of No Significant Impact (FNSI)
# BRAC 2005 U.S. Army Reserve
# Land Acquisition of 53.8 acres at 218 Boardman Lane, Middletown, Connecticut
# Off-Site Compensatory Mitigation

**Federal Action.** The Proposed Action is the acquisition and long-term habitat management of a 53.8-acre parcel from the 89-acre parcel at 218 Boardman Lane, Middletown, Connecticut (Boardman Lane parcel). The acquisition of this parcel of land is specified as off-site compensatory mitigation in the Clean Water Act Section 404(b)(1) Permit No. NAE-2008-2372 issued for the construction and operation of the Middletown Armed Forces Reserve Center (AFRC) in Middletown that resulted in the direct loss of about 1.5 acres of jurisdictional wetlands. The Proposed Action satisfies one component of the permit's required mitigation. The permit was required after the selection of the 42-acre parcel on Smith Street (formerly Cucia Park) for the Middletown AFRC under the 2005 BRAC Commission's recommendations (Public Law 101-510).

**Real Estate Land Acquisition Strategies.** The preferred plan is to acquire the Boardman Lane parcel and implement the mitigation outlined in the CWA Section 404(b)(1) permit using one of three real estate acquisition strategies: Third-party Acquisition, Direct Acquisition by the Army with a subsequent transfer to a Third-Party Owner, or Direct Acquisition by the Army. The preferred strategy is through Third-party acquisition, where the Army would enter into a cooperative agreement with a private entity to perform the wetlands mitigation (acquisition and implementation of the enhancement and long-term stewardship). Under the agreement, the Army would provide funds to the Third-party to acquire the property at Boardman Lane and manage the property in perpetuity in accordance with the terms and conditions of the Clean Water Act Section 404(b)(1) permit. The Army would remain responsible to the regulator for the required wetlands mitigation, but the mitigation would be performed by a Third-party. Since all three acquisition strategies would have similar, almost identical, impacts on the environment, they are collectively analyzed as the proposed action.

**Decision Basis.** This decision was based on a thorough review of the siting alternatives and potential environmental impacts disclosed in this Environmental Assessment (EA). The EA identifies, evaluates, and documents the environmental and socioeconomic effects of acquisition, protection, preservation, and enhancement of the site for conservation management and ecological purposes. This decision is in accordance with the National Environmental Policy Act (NEPA) of 1969 (Public Law 91-90), as amended, and the Council on Environmental Quality Regulations for Implementing the Procedural Provisions of NEPA (40 CFR 1500-1508).

**Alternatives.** Two alternatives are presented in the EA: (1) the Proposed Action, which is the acquisition of the 53.8 acre Boardman Lane parcel, and (2) the No Action Alternative. Eight other sites were evaluated by the Regulatory Division, New England District-Corps of Engineers and U.S. Environmental Protection Agency in the Clean Water Act Section 404(b)(1) permitting process to identify off-site compensatory mitigation areas. Following a detailed review of the sites available, the New England District Regulatory Division and U.S. EPA, in consultation with the USACE Louisville District concluded the Boardman Lane parcel provided the conditions for compensatory mitigation that could directly offset the unavoidable functional impacts to wetlands from development of the AFRC on Smith Street in the Sawmill Brook Watershed.

**Reasons for the Decision.** This EA for land acquisition and management of the Boardman Lane parcel, which incorporates by reference previous Federal NEPA and Clean Water Act determinations for the Middletown AFRC, indicates that no significant short-term or long-term adverse impacts to the environment are anticipated. To achieve the final conditions of the site, some of the planned restoration/enhancement projects will have short-term minor impacts. The proposed acquisition and long-term management of the parcel will result in the permanent preservation of 53.8 acres that will provide a viable and sustainable compensatory mitigation site, and an area of aquatic resources enhancement. My determination of a Finding of No Significant Impact is based the following considerations:

- The Federal action provides long-term protection and management of the mitigation area over the life of the site, and prohibits incompatible uses that would jeopardize the objectives of this parcel of land side aside for conservation management and ecological purposes;
- The project will have no known adverse impacts to Federal or state-listed rare or endangered species.
- No archaeological or historical resources will be affected by this project;
- Impacts associated with the proposed work will be minimal, consisting of temporary increases in air emissions from gasoline-powered engine equipment and temporary displacement of wildlife during wetland enhancement and associated vegetation plantings;
- No identified significant adverse indirect or cumulative impacts will be caused by action;
- Selection of the Boardman Lane parcel is the preferred mitigation from the Clean Water Act Section 404(b)(1) permit No. NAE-2008-2372 and will not require implementation of mitigation measures because of the Federal action.

An Integrated Wetland Resources Stewardship Plan (IWRSP) will be used at the site. This formal plan requires that within the 53.8 acre parcel a minimum 40-acre area will receive proactive management that involves an existing 14-acre grazed wet meadow to be enhanced through grassland management (10 acres) designed to protect the Eastern box turtle's use of the site, and reestablishing native riparian vegetation by plantings on a 4-acre area adjacent to Richards Brook. The plantings are intended to improve the resource habitat value and maximize the ability of this area to protect the water quality of the watershed and Sawmill Brook. In addition, the parcel will receive invasive species plant control, environmental management, and monitoring for restoration success for a minimum of 10 years.

Based on my review and evaluation of the environmental effects as presented in the Environmental Assessment, I have determined that the proposed land acquisition and the long-term habitat management of the Boardman Lane Parcel satisfies the requirements for off-site compensatory mitigation indentified in the Clean Water Act permit No. NAE-2008-2372, and is not a major Federal action significantly affecting the quality of the human environment. Therefore, I have determined that this project is exempt from requirements to prepare an Environmental Impact Statement.

**JOSE E. CEPEDA**
Colonel, U.S. Army Reserve
Regional Engineer

**Environmental Assessment**
**BRAC 2005**
**U.S. Army Reserve**
**Land Acquisition of 53.8 acres at 218 Boardman Lane**
**Off-Site Compensatory Mitigation**
**Middletown, Connecticut**

**99th Regional Support Command**

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**JOSE E. CEPEDA**
Colonel, U.S. Army Reserve
Regional Engineer

Environmental Assessment
Land Acquisition of 53.8 acres at 218 Boardman Lane as Off-site Compensatory Mitigation, Middletown, Connecticut

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## Acronyms and Abbreviations

| | |
|---|---|
| AFRC | Armed Forces Reserve Center |
| AIRFA | American Indian Religious Freedom Act |
| AMSA | Area Maintenance Support Activity |
| ARPA | Archaeological Resources Protection Act |
| BRAC | Base Realignment and Closure |
| CAA | Clean Air Act |
| CEQ | Council on Environmental Quality |
| CFR | Code of Federal Regulations |
| CT | Connecticut |
| CTARNG | Connecticut Army National Guard |
| CTDEP | Connecticut Department of Environmental Protection |
| CT SHPO | Connecticut State Historic Preservation Office |
| CWA | Clean Water Act |
| DoD | Department of Defense |
| EA | Environmental Assessment |
| EIS | Environmental Impact Statement |
| EO | Executive Order |
| ESA | Endangered Species Act |
| FNSI | Finding of No Significant Impact |
| IWRSP | Integrated Wetland Resources Stewardship Plan |
| IT | Interstate Trade |
| MEP | Military Equipment Parking |
| NDDB | Natural Diversity Database |
| NEPA | National Environmental Policy Act |
| NHPA | National Historic Preservation Act |
| NOA | Notice of Availability |
| NRHP | National Register of Historic Places |
| POV | Privately-owned Vehicle |
| RSC | Readiness Support Command |
| sf | Square Feet |
| U.S. | United States |
| USACE | U.S. Army Corps of Engineers |
| USAR | U.S. Army Reserve |
| USDA | U.S. Department of Agriculture |
| USFWS | U.S. Fish and Wildlife Service |

# ENVIRONMENTAL ASSESSMENT
# BRAC 2005
# LAND ACQUISITION OF 53.8 ACRES AT 218 BOARDMAN LANE
# MIDDLETOWN, CONNECTICUT

## 1.0 INTRODUCTION

This Environmental Assessment (EA) has been prepared by the Assistant Chief of Staff for Installation Management—Army Reserve Division, and the 99th Regional Support Command of the U.S. Army Reserve (USAR) to evaluate the environmental impacts of the acquisition and long-term habitat management of a 53.8 acre parcel of land at 218 Boardman Lane (Boardman Lane parcel) in Middletown, Middlesex County, Connecticut.

The objective of this EA under the National Environmental Policy Act (NEPA) is to ensure consideration of the environmental aspects of proposed actions in the Federal decision-making process and to make environmental information available to the public before decisions are made and actions taken. The findings and conclusions in this EA will be used to assist the Federal Government in making decisions regarding the acquisition of the subject property.

The U.S. Army Corps of Engineers (USACE) New England District Regulatory Division issued a Clean Water Action Section 404(b)(1) permit to the U.S. Army following the selection of a 42-acre parcel for the Middletown Armed Forces Reserve Center (AFRC) under the 2005 BRAC Commission's recommendations (Public Law 101-510) that resulted in the unavoidable loss to 1.5 acres of inland wetlands from construction of the AFRC on Smith Street (formerly Cucia Park). The wetland impact is in the Sawmill Brook Watershed, a tributary of the Mattabessett River. With limited on-site mitigation capability the CWA permit requires on-site and off-site compensatory mitigation for the lost functions and habitat values in the Sawmill Brook watershed where the AFRC is being constructed. On-site mitigation consists of enhancement of 0.75-acre wetland buffer, invasive plant control, monitoring and long-term stewardship of about 20 acres at the AFRC property on Smith Street. Off-site mitigation consists of a minimal 40-acres of combined upland and wetlands designed and located specifically with the intent to replace the estimated lost functions and services of the 1.5 acres of impacted wetlands by providing permanent preservation and enhancement of wetland and upland habitats, wet meadow enhancement and long-term habitat management.

The preferred off-site mitigation area is an 89-acre property owned by Middle Boardman Associates at 218 Boardman Lane (see Figure 1). If the government acquires the preferred site, due to Federal purchasing regulations that require the Government to offer to purchase a remnant that is determined to be an uneconomic remnant, an additional 12.9 acres is proposed to be purchased. In acquiring the parcel the Army would implement a long-term protection and management plan for the 40 acres, in perpetuity, with the remaining 12.9 acres to be protected and undeveloped.

The Middletown AFRC is a new facility required by the 2005 Defense Base Closure and Realignment (BRAC) Commission recommendations which became law in November 2005. The Army completed an Environmental Assessment and Finding of No Significant Impact on April 24, 2009 for the construction and operation of the AFRC. On the 42-acre site, construction and operation will result in the development of a 17.2 acre area and include a new five-story, 164,000 square foot AFRC that is a 900-member training facility with administrative, educational, assembly, library, vault, weapons

simulator, physical fitness areas and learning center space, for Army Reservists and civilians. Facilities to support the Reserve units and equipment includes a 34,979 square foot vehicle maintenance shop, 3,886 square foot unheated storage building, about 3.8 acres of military equipment parking (219 unit vehicles) and unloading areas, and 4.96 acres of private vehicle parking, walkways and access roads.

This EA incorporates directly the results and findings outlined in the Department of the Army permit no NAE-2008-2372 (25 March 2009) authorizing the work for the Middletown AFRC, and the associated *Permit Evaluation and Decision Document* completed by the New England District Regulatory Division. This EA also incorporates the results and findings of the Environmental Assessment and a Finding of No Significant Impact that was signed on July 24, 2009 that selected a 42-acre parcel of land (formerly Cucia Park) on Smith Street in Middletown for the Armed Forces Reserve Center (AFRC).

## 2.0 PURPOSE AND NEED FOR THE PROPOSED ACTION

### 2.1 Purpose

The purpose of the Proposed Action (real estate acquisition and long-term management) is to fulfill the Clean Water Act Section 404 permit compliance standards issued by the USACE New England District Regulatory Division. With the acquisition and implementation of an Integrated Wetland Resources Stewardship Plan, the property will be protected from future development, and protect the existing habitats and supporting landscapes, in perpetuity.

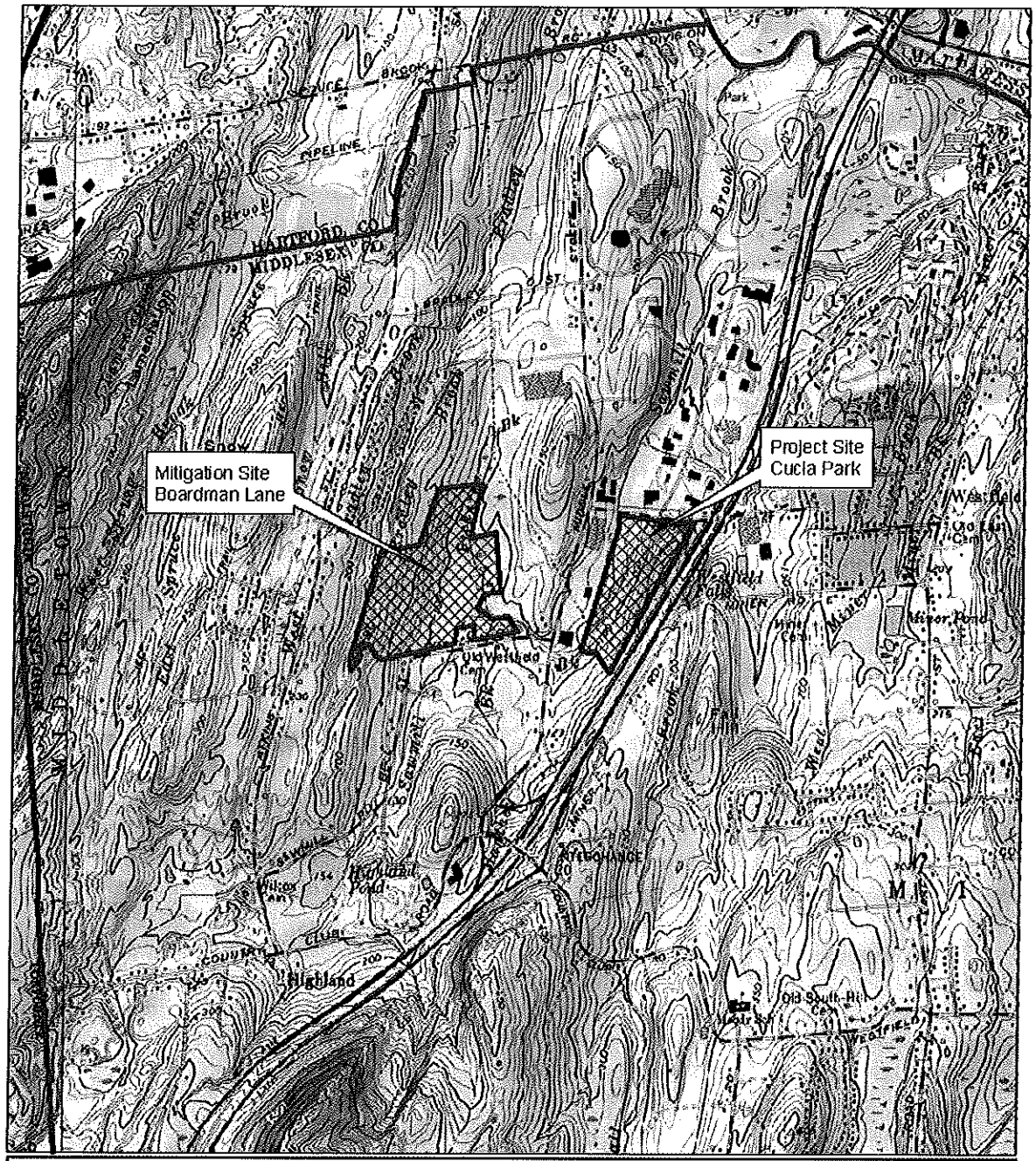
### 2.2 Need

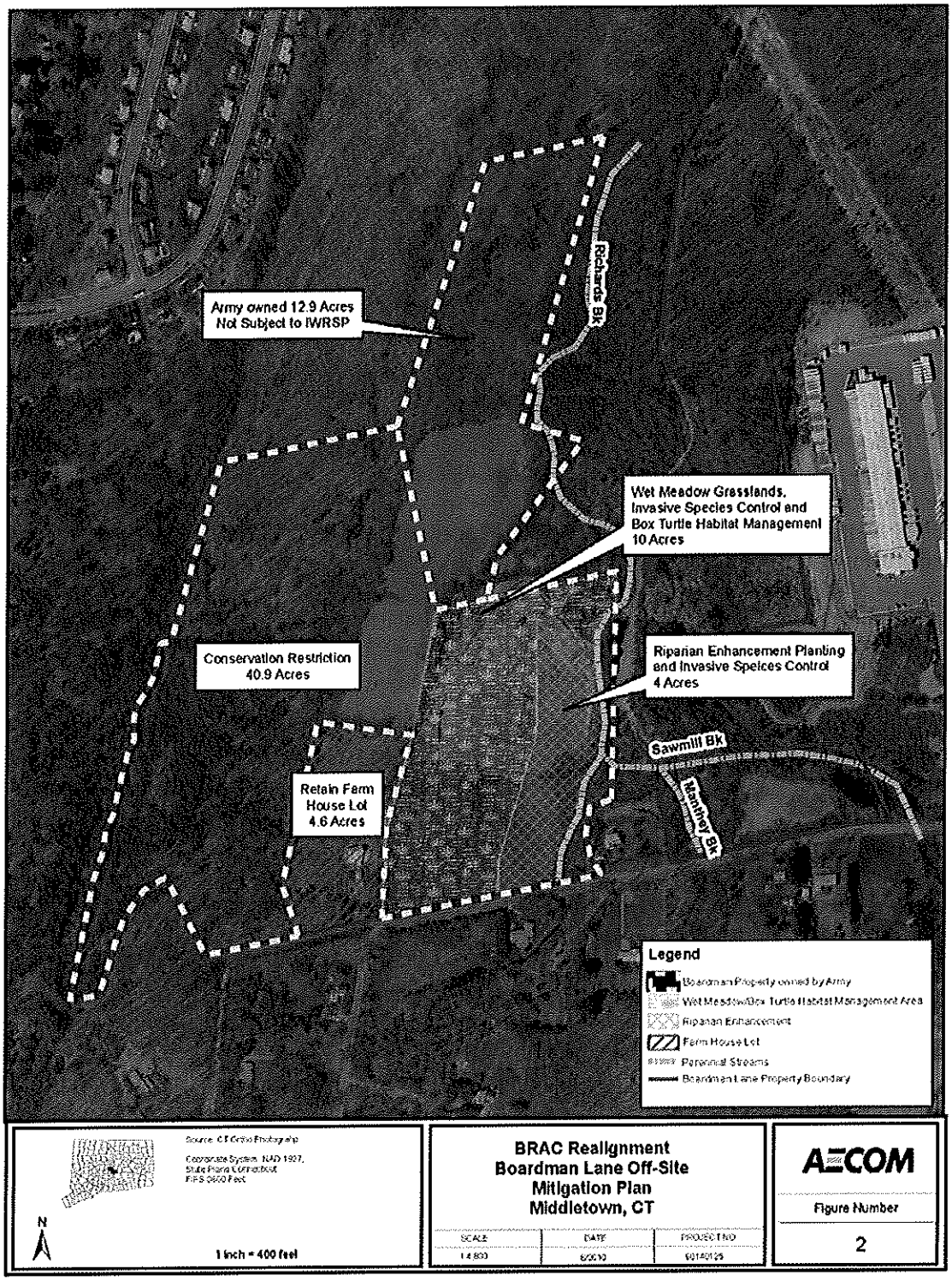
The need for the real estate acquisition and long-term management of the Boardman Lane parcel is to compensate for the loss of about 1.5 acres of wetlands (functions and habitat values) in the Sawmill Brook watershed from the construction of the Middletown AFRC, as determined and required in the USACE New England District Regulatory Division's CWA Permit No. NAE-2008-2372 (March 2010). The U.S. Army would be in violation of the Clean Water Act Section 404 permit conditions if unable to acquire an adequate site for off-site compensatory mitigation.

The purpose, need, and environmental impacts associated with the Middletown AFRC are documented in the Environmental Assessment and Finding of No Significant Impact, and are incorporated into this EA by reference. The purpose and need for mitigation for the direct loss of 1.5 acres of inland wetlands and waters of the U.S. is documented in the Corps of Engineers Clean Water Act permit, and is incorporated into this EA by reference.

### 2.3 Authority

This EA evaluates the environmental aspects of implementing the Proposed Action in accordance with the National Environmental Policy Act (NEPA) of 1969, Section 102(2)(C); the Council on Environmental Quality "Regulations for Implementing the Procedural Provisions of NEPA," 40 Code of Federal Regulations (CFR) Parts 1500 through 1508; and 32 CFR Part 651, "Environmental Analysis of Army Actions, " and the Clean Water Act of 1977 (Federal Water Pollution Control Act Amendments of 1972) 33 U.S.C. 1251 et seq.


Mitigation Site
Boardman Lane
Project Site
Cucia Park
Source: USGS Quadrangle Middletown CT
Coordinate System: NAD 1983,
State Plane Connecticut
FIPS 0600 Feet
N
1 inch = 2,000 feet
Site Locus
BRAC Realignment
Middletown, CT
AECOM
Figure Number
1
SCALE
1/3,600
DATE
12/09
PROJECT NO.
60140125


Army owned 12.9 Acres
Not Subject to IWRSP
Richards Bk
Wet Meadow Grasslands,
Invasive Species Control and
Box Turtle Habitat Management
10 Acres
Conservation Restriction
40.9 Acres
Riparian Enhancement Planting
and Invasive Speices Control
4 Acres
Sawmill Bk
Retain Farm
House Lot
4.6 Acres
Rapallo Bk
Legend
Boardman Property owned by Army
Wet Meadow/Box Turtle Habitat Management Area
Riparian Enhancement
Farm House Lot
Perennial Streams
Boardman Lane Property Boundary
N
1 inch = 400 feet
BRAC Realignment
Boardman Lane Off-Site
Mitigation Plan
Middletown, CT
SCALE
DATE
PROJECT NO
AECOM
Figure Number
2

## 2.4 Public Involvement

The EA and draft FNSI are available for review and comment for 30 days from publication of a Notice of Availability (NOA). NOAs have been published in the ***Hartford Courant*** and ***Middletown Press*** on June 30, 2010. The EA and Draft FNSI can be accessed on the World Wide Web at: http://www.hqda.army.mil/acsim/brac/env_ea_review.htm. Copies of the EA and draft FNSI can be obtained by contacting: Ms. Laura Dell'Olio, 99th Regional Support Command, c/o Innovar Environmental Inc., 5231 South Scott Plaza, Fort Dix, NJ, 08640 or by e-mail requests to laura.dellolio@usar.army.mil. Copies of the EA can also be viewed at the following local library: Russell Library, 123 Broad Street, Middletown, CT 06457.

Comments on the EA and Draft FNSI should be submitted during the 30-day public comment period via mail, fax, or electronic mail to Ms. Laura Dell'Olio at the addresses above.

# 3.0 PROPOSED ACTION

The Proposed Action is the acquisition and long-term habitat management of a 53.8- acre parcel from the 89-acre parcel at 218 Boardman Lane, Middletown, Connecticut (Boardman Lane parcel). The acquisition of this parcel of land is specified as off-site compensatory mitigation in the Clean Water Act Section 404(b)(1) Permit No. NAE-2008-2372 issued for the construction and operation of the Middletown Armed Forces Reserve Center (AFRC) in Middletown that resulted in the direct loss of about 1.5 acres of jurisdictional wetlands. The Proposed Action satisfies one component of the permit's required mitigation. The permit was required after the selection of the 42-acre parcel on Smith Street (formerly Cucia Park) for the Middletown AFRC under the 2005 BRAC Commission's recommendations (Public Law 101-510).

The USACE New England District Regulatory Division and U.S. EPA, in consultation with the USACE Louisville District concluded that the Boardman Lane parcel offers the conditions for providing compensatory mitigation that would directly offset the unavoidable functional impacts to wetlands from development of the AFRC at the Smith Street location. The off-site compensatory wetland mitigation location on Boardman Lane (latitude 41.578646 and longitude -72.726567) is less than 1 mile from the AFRC construction site and was selected consistent with a 'watershed approach in accordance with the April 10, 2008 regulation governing compensatory wetland mitigation of the Department of Defense, Department of the Army, Corps of, Engineers (33 CFR Parts 325 and 332) and the EPA (40 CFR Part 230) entitled *Compensatory Mitigation for Losses of Aquatic Resources; Final Rule.* The acquisition of the Boardman Lane parcel satisfies the permit conditions listed in the Clean Water Act Section 404(b)(1) permit and requires 40-acres to be purchased as the minimum standard to meet the off-compensatory mitigation requirements. An additional 12.9 acres is proposed to be purchased because Federal purchasing regulations require the government to offer to purchase a remnant that is determined to be an uneconomic remnant.

Off-site compensatory mitigation includes about 17 acres of wetland and 23 acres of upland (40.9 acres total). Following acquisition, the 40.9-acres will be managed using an Integrated Wetland Resources Stewardship Plan (IWRSP) for long-term habitat management. The proposed IWRSP would include management of a 14-acre area grazed wet meadow enhanced through grassland management (10 acres) designed to protect the Eastern box turtle's use of the site, and reestablishing native riparian vegetation by plantings that will occur through a 4-acre area adjacent to Richards Brook. The intent is for improving the resource habitat value and maximizing the ability of this area to protect the water

quality of the watershed and Sawmill Brook. Invasive species plant control, management, and reporting will also occur for a minimum of 10 years.

The IWRSP will prohibit incompatible uses that would jeopardize the objectives of the parcel being set aside for conservation management and ecological protection. The entirety of the off-site mitigation measures are expected to aid in the replacement of the lost functions and services from the direct loss of wetlands in the Sawmill Brook watershed by protection of the resource from future loss and commercial development. This protection gives permanent preservation and enhancement of wetland and upland habitats, wet meadow enhancement and long-term habitat management.

The preservation of 40 acres of land at the Boardman Lane parcel provides a compensation ratio of over 26: 1. Additionally, the Army would have to acquire an uneconomic remnant (12.9 acres), bringing the total land acquisition to 53.8 acres. Based on the results of the evaluation of alternatives sites, with the combination of unsuitable siting and engineering constraints, and the geographical constraints affecting the viability of other off-site parcels sufficient to meet the CWA Section 404(b)(1) permit conditions, no additional realistic, distinct, or feasible alternatives to the Proposed Action are included in this EA (see section 4.0, Alternatives).

**Real Estate Land Acquisition Strategies**

Three strategies for real estate acquisition are considered for the purchase of the 53.8-acre Boardman Lane parcel. For the purposes of considering the environmental effects of the proposed action in the Federal decision-making process use of any of the 3 strategies will incur the same negligible environmental impacts in complying with the CWA Section 404(b)(1) requirements. These options:

- Strategy 1 - Third-party Acquisition (Preferred Acquisition Strategy)
- Strategy 2 - Direct Acquisition by the Army with a subsequent transfer to a Third-Party Owner
- Strategy 3 - Direct Acquisition by the Army

The preferred strategy is through Third-party acquisition. The Army would enter into a cooperative agreement with a private entity to perform the mitigation - acquisition and implementation of the enhancement and long-term stewardship. Under the agreement, the Army would provide funds to the Third-party to acquire the property at Boardman Lane and manage the property in perpetuity in accordance with the terms and conditions of the Clean Water Act Section 404(b)(1) permit.

Though the environmental consequences are identical for each, the Third-party acquisition is preferred because the acquisition of property that serves no military purpose solely for the purpose of wetlands mitigation diverts resources from manpower and training and detracts from mission accomplishment. 10 USC 2684a provides authorization for the Army to enter into an agreement with an eligible entity to limit development and use of real property in the vicinity of a military installation for the purpose of relieving environmental restrictions that might otherwise impede current or anticipated military training or operations on an installation.

The Army will be responsible to the regulator for the accomplishment of the required wetlands mitigation. Acquisition of the Boardman Lane parcel by the Army and the implementing the Mitigation Plan and management does not degrade an environment that will remain close to its natural conditions. The enhancement and management measures implemented will result in a net benefit to the resources.

## 4.0 ALTERNATIVES

### 4.1 No Action Alternative

Inclusion of the No Action Alternative is prescribed by the Council on Environmental Quality regulations and serves as a benchmark against which federal actions can be evaluated. The No Action Alternative does not fulfill the requirements of the Clean Water Act Section 404(b)(1) permit No. NAE-2008-2372 that requires the acquisition of a parcel of land to fulfill the off-site compensatory mitigation requirements. If no action is taken, the Army would be subject to a non-compliance determination and the violation could require stop-work. The AFRC would be significantly delayed or not constructed and the BRAC project's purpose and need could not be completed. It is not possible to implement the No Action Alternative because the Clean Water Action Section 404 permit mandates off-site compensatory mitigation for the authorization to fill waters and wetlands of the U.S.

### 4.2 Alternatives Eliminated from Detailed Analysis

The CWA Section 404(b)(1) process determined that a combination of on-site and off-site mitigation measures would provide greater potential for successful mitigation due to the Middletown AFRC project footprint and size requirements and the site limitations at the Smith Street parcel. This EA addresses the impact of the Federal Government's real estate acquisition of the proposed site for off-site compensatory mitigation. It does not address on-site mitigation requirements at the AFRC construction site. This section summarizes how other site alternatives for off-site compensatory mitigation were eliminated from further consideration. It provides clarity on the sites considered and evaluated for meeting the mitigation requirements. The full spectrum of sites considered are in the Clean Water Act Section 404(b)(1) permit and decision document, which incorporates the *Clean Water Act Section 404 Wetland Mitigation Plan for the Armed Forces Reserve Center, Middletown, CT*, dated February 18, 2010, completed by AECOM Environmental, Inc. for the Louisville District, USACE.

Nine sites, including the Boardman Lane parcel (Proposed Action) were identified as reasonable off-site compensatory mitigation locations because of their potential to provide the area needed for off-site compensatory mitigation. The identification of alternatives for mitigation followed a systematic process in assessing potential alternative sites that could be considered to provide compensatory mitigation, in addition to the measures incorporated into the on-site mitigation plans. Contacts were made with local and regional environmental agencies to obtain information on watershed conditions and potential compensatory mitigation opportunities, including:

- City of Middletown Planning and Inland Wetlands Agency Staff
- Middlesex Land Trust
- Connecticut River Watershed Council
- Rivers Alliance of Connecticut
- The Nature Conservancy of Connecticut
- Mattabesset River Watershed Association

The preference for off-site compensatory location was given to sites within the Sawmill Brook and Mattabesset River watersheds. From a watershed perspective, emphasis was placed first on the direct watershed of Sawmill Brook that flows through the Middletown AFRC project site in the Smith Street area. Secondarily, consideration was preferentially given to mitigation opportunities in the Mattabesset River watershed, which Sawmill Brook flows into north of the AFRC site. The Mattabesset River flows easterly along the Cromwell/ Middletown corporate boundary to the Connecticut River. Consideration was also given to sites within the Connecticut River watershed within the Middletown area.

Table 4.2-1 lists the parcels reviewed for potential mitigation sites, a description of the site, and the reasons for rejection. These areas were considered and rejected by the New England District Regulatory Division and U.S. EPA during the CWA Section 404(b)(1) permitting process.

**Table 4.2-1 a/**
**Potential Mitigation Sites, Description, and the Reasons for Rejection**

| | Parcel | Description | Decision Considerations |
|---|---|---|---|
| 1. | Lawrence School/ Mile Lane/ Kaplan Drive | West of Lawrence School is an open field area that borders shrub-dominated habitat along West Swamp Brook. The field area is currently used in part for model airplane activities and other activities. The site presents an opportunity for minor earth work to lower the grades of the field area to create or enhance wetland conditions. | The City of Middletown expressed reservations on the use of the site for wetland mitigation due at least in part to current and potential future uses. |
| 2. | Middletown High School/ Route 3 | The existing Middletown High School site is along East Swamp Brook just west of Route 3. The site has been the wetland mitigation area for Clean Water Act Section 404 permitting in the recent past. Consideration has been given to whether additional wetland mitigation areas are possible in this vicinity. | The preliminary review showed that there did not appear to be any viable sites for additional wetland. Some consideration of invasive species control may be warranted within existing wetlands along East Swamp Brook. |
| 3. | Tuttle Place | This site abuts the south side of the Mattabesset River in northeast Middletown and contains a small pond surrounded by woodlands. | The presence of forested cover and the floodplain of the river through this area likely preclude significant area of wetland creation at this site. |
| 4. | Smith Park | This site is located along Fall Brook to the southeast of Cucia Park. Areas along the brook were reviewed for potential wetland mitigation, streambank restoration, and other aquatic habitat improvements. Much of the land area which is in a proper setting for wetland creation already provides good habitat of forest, shrub, and some scattered emergent cover, and is protected as public parkland. The stream course through the area appears in good condition, with only minor erosion areas along the streambank | The preliminary review did not identify the site as an area where any substantial wetland or water resource improvements would be possible. |
| 5. | Soccer Fields South of Smith Park | These new soccer fields have resulted in erosion issues toward Fall Brook to the west. | The steep, wooded grades to the west of the fields and down to the brook are not conducive for wetland creation or enhancement. |
| 6. | "Bysiewicz Site" | On this commercial site development, the western portion along Richards Brook that flows south to Sawmill Brook, was reviewed for potential wetland mitigation options. | The combination of forested cover and glacial till hillside conditions make this area generally unsuitable for creation of wetland mitigation areas. |

| | | |
|---|---|---|
| **7. Boardman Lane** | **The southeast portion of this site consists of open agricultural field that border Sawmill Brook at its confluence with Richard's Brook and Manthay Brook. A majority of the field contains hydric soils, and most of it is within the floodplain of these 2 waterbodies. Wetland enhancement, rehabilitation, or restoration in these open fields represents a viable wetland mitigation opportunity that can directly contribute to the watershed functions of Sawmill Brook in proximity to the impacts proposed at Smith Street (Cucia Park). The site provides habitat for the Eastern box turtle and Squarrose sedge, State Species of Special Concern.** | **Preferred Site** |
| 8. Wilcox Site | This area to the west of Boardman Lane is a city-owned parcel with active recreational trails and used by ATV traffic. While much of this site is upland forest, a significant area is dominated by red pine which is typically considered undesirable wildlife habitat. Portions of the red pine forest are situated within the buffer of a flooded forested wetland. Consideration of habitat improvements within this buffer by removing the red pine may provide some watershed function improvements to mitigate on-site impacts. | Developing compensation on this site would require removal of existing mature trees which may not be considered beneficial or an improvement to the site's existing conditions. |
| **9. Manthay Site** | **The 33-acre parcel on the west side of Middle Street and south of Boardman Lane contains a stream that flows north through the site as a headwater stream enroute to Sawmill Brook. An agricultural field occurs along the east side of Manthay Book that offers potential wetland enhancement or creation opportunities of less than 1 acre. Much of the remaining portions of the site are forested with steep slopes.** | **The forested cover and glacial till hillside conditions make this site unsuitable for creation of wetland mitigation or enhancement areas.** |

**a/ The search for suitable offsite wetland mitigation locations is more specifically discussed within AECOM Environmental's report *Clean Water Act Section 404 Wetland Mitigation Plan for the Armed Forces Reserve Center, Middletown, CT* (dated February 18, 2010).**

## 5.0 ENVIRONMENTAL RESOURCES AFFECTED

### 5.1 General

This section describes the existing environment that could be affected by the proposed action and No Action Alternative. The U.S. Army Reserve used information and data gather from site visits, technical analysis, interviews, documentation received, and contacts with Federal, state, local, and tribal agencies to characterize the existing environment and consider the environmental consequences. The environmental impacts and proposed mitigations from the construction and operation of the Middletown AFRC have been considered in 3 primary environmental impact reviews.

1) Clean Water Act Section 404(b)(1) permit No. NAE-2008-2372, and the *Permit Evaluation and Decision Document*;
2) *Clean Water Act Section 404 Wetland Mitigation Plan for the Armed Forces Reserve Center, Middletown, CT* (Mitigation Plan), dated February 18, 2010, completed by AECOM Environmental; and

3) *Final Finding of No Significant Impact and Environmental Assessment, Construction of an Armed Forces Reserve Center and Implementation of BRAC 05 Realignment Actions at Middletown, CT*

The preferred site (Boardman Lane parcel) is a total of about 89-acres of undeveloped land consisting of forested uplands and wetlands, perennial streams and associated riparian areas. The parcel is located in the same watershed as the Middletown AFRC and directly borders Sawmill Brook just upstream of the proposed development area. The site includes degraded wet meadow areas that directly border the stream systems of Richards Brook and Sawmill Brook, and the bordering upland areas are considered to be currently under risk of development. In acquiring the parcel the Army will implement a long-term protection and management plan for this mitigation area, in perpetuity. The management plan, an Integrated Wetland Resources Stewardship Plan, will prohibit incompatible uses that would jeopardize the objectives of the parcel being set aside for conservation management and ecological protection. This formal plan requires that within the required 40-acre management/restoration area, an existing 14-acre grazed wet meadow will be enhanced through establishment of a plan for grassland management (10 acres) designed to protect the Eastern box turtle's use of the site, and reestablishing native riparian vegetation by plantings that will occur through a 4 acre area adjacent to Richards Brook. The plantings have the intent of improving the resource habitat value and maximizing the ability of this area to protect the water quality of the watershed and Sawmill Brook. In addition, invasive species plant control, environmental management, and restoration success monitoring and reporting will occur for a minimum of 10 years.

## 5.2 Environmental Resources Eliminated from Further Consideration

Army NEPA Regulations (32 CFR § 651.14) states the NEPA analysis should reduce or eliminate discussion of minor issues to help focus analyses. This approach minimizes unnecessary analysis and discussion during the NEPA process and in analysis documents. The Council on Environmental Quality Regulations for implementing NEPA (40 CFR § 1500.4(g)) emphasizes the use of the scoping process, not only to identify significant environmental issues deserving of study, but also to deemphasize insignificant issues, narrowing the scope of the environmental assessment/environmental impact statement process.

The Clean Water Act Section 404(b)(1) permit requires the off-site compensatory mitigation at the Boardman Lane parcel to maintain the wetlands and adjacent uplands in their existing state, modified only by enhancement and restoration, and supplemented by monitoring. In this capacity, the acquisition of the Boardman Lane parcel aids in replacement of the lost functions and services of 1.5-acres of wetlands in the Sawmill Brook watershed and provides protection that gives permanent preservation and enhancement of wetland and upland habitats, wet meadow enhancement and long-term habitat management. The site provides an opportunity for in-kind preservation and long term protection of slope wetland resources of a similar nature to those that will be directly lost at the Middletown AFRC site.

The Proposed Action will have little, if any, effect on the environmental conditions on-site in 8 environmental resource categories. As a result, any environmental impact on these resources from the Proposed Action or the No Action Alternative would be negligible. Since impacts to these resources would not individually or cumulatively have a significant effect on the human environment, they are not evaluated in this EA. These resource areas include: Geology and Soils, Aesthetic and Visual Resources, Socioeconomic, Environmental Justice, Transportation, Utilities, and Hazardous and Toxic Substances.

## 5.3 Site Specific Impacts and Consequences

This section discusses the affected environment and environmental consequences of acquisition and long-term stewardship of the Boardman Lane parcel. For each resource, the affected environment is described first followed by the Army's determination of the potential environmental consequences. Implementing the site-specific mitigation requirements required in the CWA permit and the IWRSP (see Appendices B and C) the Proposed Action will result in benefits to the wetland and upland resources at the site. The final conditions of the site may incur minor short-term adverse impacts associated with the plantings during implementation of the IWRSP, but the overall result will be a net long-term benefit to the Sawmill Brook watershed and the surrounding environments.

Impacts to environmental resources are typically direct, indirect, and cumulative in nature. A direct impact is an effect on the human and natural environment caused by the action and occurring at the same time and place. Indirect effects are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. A cumulative impact results from the incremental or collective impact to the environment by the proposed action or project when combined with other past, present, and reasonably foreseeable actions, regardless of what agency or person undertakes those other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over time. These effects (direct, indirect, and cumulative) of the Proposed Action on the environment and human health are considered to be equivalent in nature since the intent of the land acquisition is preservation and ensuring the long-term protection of the Boardman Lane parcel from development and to act as the source of off-site compensatory mitigation. Negative adverse impacts are not expected to occur. The consequences from implementing the Proposed Action are the same regardless of the real estate acquisition strategy used to acquire the parcel.

Eight environmental resource areas were determined to potentially be affected by the proposed action or require review of the potential impacts: Land Use (section 5.3.1), Air Quality (section 5.3.2); Noise (section 5.3.3); Biological Resources (section 5.3.4); Threatened and Endangered Species (section 5.3.5); Wetlands and Waterways (5.3.6), and Cultural Resources (section 5.3.7).

Under the No Action Alternative, there would be no impacts to these resources.

### 5.3.1 Land Use

The City of Middletown's zoning designation of the Boardman Lane parcel is IT – Interstate Trade. The IT designation is for development of certain industrial and business uses in close proximity to the Interstate Highway. In its current condition, the 89-acre Boardman Lane parcel is undeveloped rural land consisting of grazed agricultural areas, forested uplands, forested wetlands and a riparian floodplain wetland corridor along Richards Brook. Forested uplands are located to the west while developed commercial property is to the east. Residential property is located to the south bordering Boardman Lane.

There are no adverse impacts that will occur to the current undeveloped land use of the Boardman Lane parcel. The parcel will remain zoned IT with development rights restricted by the Army (Warner, 2010). With the acquisition and proposed Integrated Wetland Resources Stewardship Plan the mitigation area will be protected from future development by the related deed restriction, and protect

the existing habitats and supporting landscapes, in perpetuity. This provides for the long-term connectivity of the surrounding open space areas.

The proposed Federal action provides a net beneficial change in the future land use of the 218 Boardman Lane parcel. Under the No Action Alternative, the land would be available for commercial or light industrial development where negative adverse impacts could occur to the watershed and habitat areas.

### 5.3.2 Air Quality

Middletown is located in Middlesex County, Connecticut. The U.S. EPA classifies the New York – New Jersey – Long Island, NY-NJ-CT area, which includes Middlesex County, a moderate non-attainment area for ozone and in non-attainment for PM2.5 6. The state of Connecticut is also part of the Ozone Transport Region (OTR). The OTR is a collection of East coast states from Virginia to Maine that experience higher levels of ground-level ozone. Ground-level ozone regional problem in the northeastern United States, with frequent exceedences of the 8-hour ozone standard. To address the regional problem, the OTR imposes stricter regulations on ozone precursors.

Air quality impacts associated from the Federal action to construct and operate the Middletown AFRC were addressed in *Final Finding of No Significant Impact and Environmental Assessment, Construction of an Armed Forces Reserve Center and Implementation of BRAC 05 Realignment Actions at Middletown, CT.* A Record of Non-Applicability was signed for that Federal action. For this proposed real estate acquisition and long-term protection strategy, the only concern for production of air pollutants is from the direct emissions related to the short-term activities associated with construction equipment and personal vehicles of employees for completing the riparian plantings. Use of a tractor for long-term mowing as part of the grassland management plan is also a direct emission. There will be no development at this site and there are no concerns for further direct or indirect emissions as part of the long-term preservation of the parcel.

The impacts to air quality resulting from implementing the proposed action have been considered. These impacts will be minor and will not exceed *de minimus* levels of direct emissions of the criteria pollutants. U.S. Army policy requires conformity reviews to be documented formerly to ensure that a proper review takes place, and to tangibly demonstrate the Army's compliance with the general conformity rule. Appendix A contains the Record of Non-Applicability for the Proposed Action.

### 5.3.3 Noise

Noise is generally defined as unwanted sound. Sound, in general, becomes noise when it interferes with normal activities such as speech, concentration, or sleep. At the project site, ambient noise (the existing background noise environment) will exist from several noise sources, including mobile sources, such as airplanes, automobiles, trucks, and trains traveling on nearby roadways; and stationary sources within the Industrially-zoned area such as construction sites, machinery, or industrial operations. There is an existing and variable level of natural ambient noise from sources such as wind, streams and rivers, wildlife and other sources.

Noise from construction equipment and vehicle uses associated with the riparian zone plantings will be heard during the timeline for the planting of the 4-acres of riparian vegetation designed to improve the habitat values and maximizing the capacity of this parcel to protect the adjacent Richards

Brook and Sawmill Brook. The noise associated with these activities is similar to the noise produced during excavation and tractor uses at farms and other small construction sites. The duration at any specific area would be relatively brief, and short-lived. The City of Middletown has noise regulations that will not be exceeded during the work effort. These noise-related impacts will be temporary and not expected to be significant. No significant noise impacts would be associated with the enhancement/restoration activities.

### 5.3.4 Biological Resources

Wildlife species and vegetation within the Boardman Lane parcel are typical of agricultural grasslands, open fields, wetlands, and riparian habitats in Connecticut. The area is diverse with wet meadows, wetlands, marsh and pond habitats. The site's generally rural setting among commercial and residential properties contributes to a valuable habitat setting in the immediate area. The parcel supports a diversity of flora and an extensive area for wildlife use. Typical wildlife that can be found at the site includes, but not limited to: salamanders, grey squirrel, eastern cottontail rabbit, eastern chipmunk, white-tailed deer, wild turkey, red fox, woodchuck, opossum, red-tailed hawk, and songbirds such as American robin, northern cardinal, eastern bluebird, sparrows, and woodpeckers. Two state-listed Species of Special concern, the Eastern box turtle and squarrose sedge, exists on the site and were identified during the review of the site for the Middletown AFRC.

The Proposed Action will result in a minor short-term adverse impacts to wildlife and vegetation associated with the construction activities for riparian plantings and grassland management. It will result in long-term net benefit to wildlife and vegetation species and will improve habitat for state-listed species, while maximizing the capacity of the Boardman Lane parcel to protect the ecological function and water quality of the adjacent Richards and Sawmill Brooks. The short-term, temporary impacts that may occur during the enhancement actions include one-time light tilling and seeding with a native meadow seed mixture and mowing. The activity will be similar to the regular tilling and planting of the existing field for agricultural cultivation. Within the 40-acre area, strategies for wildlife habitat protection and vegetation enhancement will involve managing an existing 14-acre grazed wet meadow by implementing a 10-acre grassland management plan designed to protect the Eastern box turtle's use of the site, reestablishing native riparian plantings will occur in a 4-acre area adjacent to Richards Brook with the overall intent of improving the resource habitat value and maximizing the ability of this area to protect the water quality of this system and Sawmill Brook, just downstream. Invasive species plant control and management will also be implemented for a minimum of 10 years. Horse grazing, which currently occurs on the Boardman Lane parcel, will no longer be allowed.

### 5.3.5 Threatened and Endangered Species

The U.S. Fish and Wildlife Service stated there are no Federal listed species at the site (Chapman, 2009). The site provides known habitat for 2 State Species of Special Concern: the Eastern box turtle (*Terrapene c. carolina*) and squarrose sedge (*Carex squarrosa*).

There is no impact to Federally-listed resources. There will be no adverse impacts to state-listed species resulting from the Federal land acquisition. For the 2 state-listed species, the open wet meadow in the lower portion of the Boardman Lane parcel offers the potential for enhanced grassland habitat that will aid in the support and protection of Eastern box turtle and Squarrose sedge, along with providing improved grassland habitat for other species. Outlined in the IWSMP, efforts to enhance habitat conditions for these state-listed species will target 3 areas: a grassland management plan

involving a mowing program to improve habitat conditions for the Eastern box turtle and to minimize impacts to this species and others from the actual physical mowing program; invasive species control to minimize the potential for native plants to be dominated by undesirable species that reduce habitat value; and a riparian-zone planting plan to improve conditions along the watercourses in the eastern sections of the wet meadow for habitat and as water quality treatment. Implementing these strategies will result in a long-term benefit for state-listed species habitats.

### 5.3.6 Wetlands and Waterways

The Boardman Lane parcel borders Sawmill Brook, a sub-watershed to the Mattabesset River and is located in the larger Lower Connecticut River Watershed. This watershed is the largest watershed in Middlesex County, Connecticut. The wetland impact is in the Sawmill Brook watershed, a tributary of the Mattabessett River.

The 53.8-acre area within 218 Boardman Lane that is proposed for acquisition and management is an area bordered by Richards Brook (a perennial stream), along the eastern property boundary. Richards Brook flows north to south to the confluence of Sawmill Brook at the southeast corner of the site. Richards Brook is situated at the lowest elevation of the site, 92 feet. Base flood elevation is between 93 and 95 feet. The site consists of forested, scrub/shrub, and emergent wetlands and upland areas of mixed hardwood/coniferous forests, hardwood forests, scrub/shrub areas, old fields, pasturelands, and barnyard areas (see Appendix C, Clean Water Act Section 404 Wetland Mitigation Plan for the Armed Forces Reserve Center, Middletown, CT, February 18, 2010)

The wetland complex in the area proposed for acquisition is the headwater (origination point) for Richards Brook. Emergent wetlands, forested wetlands and scrub/shrub wetlands are hydrologically contiguous with Richards Brook and Sawmill Brook within the property boundary. A few seasonally flooded forested wetlands occur in depressional areas surrounded by upland forests along the site's western portions and are influenced by a shallow seasonally perched water table. The wetland complex is considered to be an outstanding wetland and is ranked in the listing of the City of Middletown's top wetland areas. Hillside (slope) uplands with shallow groundwater and sheet surface water, and down slope wetland discharges occur along the western edge of the site's wet meadow (currently grazed) and along the western border of the site. These areas drain easterly to the wetlands bordering Sawmill Brook and Richards Brook.

In the proposed 40-acre intensive management area, an existing 14-acre grazed wet meadow would be enhanced via grassland management (10 acres) and riparian zone plantings (4 acres) to improve the habitat value and maximize the capacity of this area to protect the adjacent Richards Brook and Sawmill Brook.

The proposed off-site mitigation measures would have minor, beneficial, long-term impacts to the wetland complex and associated riparian habitats. These measures are designed and located to replace the lost functions and values of the impacted wetlands at the AFRC on Smith Street by providing permanent preservation and enhancement of wetland and upland habitat, wet meadow enhancement and habitat management. The preservation of land at the Boardman site provides a compensation ratio of about 26:1. The location of the currently degraded wet meadow along Sawmill Brook provides a direct nexus to the functional impact at the AFRC construction site on Smith Street. The enhancement, rehabilitation, and permanent protection of this area will directly off-set habitat and water quality impacts, and is expected to provide long-term protection of the wetlands and adjacent waterways.

Floodplain impacts have been considered in project planning and the project will not result in the loss of floodplain. There are no long-term adverse impacts associated with the restoration and enhancement activities to the floodplains of Sawmill Brook and Richards Brook.

### 5.3.7 Cultural Resources

To comply with section 106 of the National Historic Preservation Act (NHPA) of 1966 as amended, and the implementing regulations located at 36 CFR 800, the potential effects of the proposed action on *historic properties* must be considered. *Historic properties* under NHPA are defined as properties that are eligible for or listed on the National Register of Historic Places (NRHP). A first step in the process is determination by the lead Federal agency as to whether the action is the "type of activity that has the potential to cause effects on historic properties".

The proposed action, purchase of land for mitigation easement, is not normally considered an action with the potential to affect *historic properties*. Rather, purchase of land by a Federal agency with the intent for in-perpetuity preservation would afford potential *historic properties* maximum protection under the law. In addition, the Boardman Lane property has been previously surveyed for cultural resources. The Phase 1 cultural resources survey entitled "Cultural Resources Survey of the Proposed Middletown Army Reserve Center" found no *historic properties* within the 53.8 acres targeted for acquisition.

The Noah Bacon House (218 Boardman Lane) is a Center-Chimney Colonial farmhouse that dates to the mid-eighteenth century and is located near the property. The house was recommended eligible by the consultants during the survey of Boardman Lane property. The Connecticut State Historic Preservation Officer (SHPO), however, recommended the property as ineligible for listing on the NRHP. The Noah Bacon House will not be part of the purchase and will not be affected by the proposed action. Also nearby is the Old Westfield Cemetery, which is just east of 169 Boardman Lane. The cemetery dates to the mid-eighteenth century as well. Although most cemeteries are not considered eligible for the NRHP, the SHPO has recommended this property as significant. The Old Westfield Cemetery will not be affected by the proposed land purchase.

Based on the limited nature of the action and previous inventory work on the Boardman Lane property, it is the determination of this analysis that the proposed action has "no potential to cause effects" to *historic properties* as per 36 CFR 800.3(a)(1). As such, the agency has no further obligations under section 106 of the NHPA.

## 6.0 CONCLUSION ABOUT THE IMPACT OF THE PROPOSED ACTION

This EA reports the Army's evaluation of the environmental impacts of the Proposed Action on the environment and human health.

The Proposed Action is required mitigation identified in the Army's compliance with the Clean Water Act for the loss of inland wetlands associated with the construction of the Middletown AFRC. The 53.8 acres acquired for off-site mitigation measures have been designed and located specifically with the intent to replace the estimated lost functions and services of the 1.5 acres of impacted wetlands by providing permanent preservation and enhancement of wetland and upland habitats, wet meadow enhancement and long-term habitat management. The location of the currently degraded wet meadow within the Boardman Lane Parcel along Sawmill Brook provides a direct nexus to the functional impact at the AFRC site. The enhancement, rehabilitation, and permanent protection of this area will directly off-set habitat and water quality impacts attributed to the AFRC project development along Smith Street (formerly Cucia Park).

The Proposed Action would result in preservation, restoration, and enhancements of a 40.9-acre parcel of land outlined in the Clean Water Act permit. The preservation of this land at the Boardman Lane parcel provides a compensation ratio of over 26: 1. Additionally, the Army would have to acquire an uneconomic remnant (12.9 acres), bringing the total land acquisition to 53.8 acres.

The environmental impacts from implementing the land acquisition and follow-on mitigation efforts guided by the Integrated Wetland Resources Stewardship Plan will result in minor direct, indirect, and cumulative beneficial environmental effects associated with the Proposed Action. This EA supports selecting the Proposed Action (Preferred Alternative) to implement the CWA Section 404(b)(1) off-site compensatory mitigation requirements, and a draft Finding of No Significant Impact has been prepared for the action.

## 7.0 LIST OF PREPARERS

Bargerhuff, Kirk E. – Biologist, B.S. Wildlife Management, 1988 (Purdue University)

## 8.0 DISTRIBUTION LIST

This Environmental Assessment and Draft Finding of No Significant Impact has been distributed for public review and comment to the following agencies and individuals:

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## 9.0 REFERENCES


AECOM Environmental, Inc. 2010. *Clean Water Act Section 404 Wetland Mitigation Plan for the Armed Forces Reserve Center, Middletown, CT (Mitigation Plan).* February 18.

City of Middletown, Connecticut. 2010. E-mail communication on June 2, between W. Warner (Department of Planning, Conservation and Development) and K. Bargerhuff (U.S. Army Corps of Engineers).

Collins, Henry Hill. 1959. Harper and Row's Complete Field Guide to North American Wildlife. Harper and Row Publishers, New York (1981 reproduction).

Connecticut Commission on Culture & Tourism, Historic Preservation and Museum Division. 2009. Letter dated 16 January, from D. Bahlman (Deputy State Historic Preservation Officer) to D. Pugh (U.S. Army Corps of Engineers).

U.S. Army Reserves. 2009. *Final Finding of No Significant Impact and Environmental Assessment, Construction of an Armed Forces Reserve Center and Implementation of BRAC 05 Realignment Actions at Middletown, CT.*

U.S. Army Corps of Engineers. 2010. Clean Water Act Section 404(b)(1) permit No. NAE-2008-2372, and Permit Evaluation and Decision Document.

## 10.0 COORDINATION and PERSONS CONSULTED

This section lists the agencies and persons consulted with during the preparation of this EA. The individuals act as main points of contact for distribution and reception of comments on the proposed Federal action from within their respective agencies. Appendix E contains the consultation letters mailed and consultation letters received in the preparation of this Environmental Assessment.

**Correspondence**

1. Mr. Curt Spalding, Regional Administrator, U.S. Environmental Protection Agency New England, Region 1.
2. Mr. Tom Chapman, Supervisor, New England Field Office, U.S. Fish and Wildlife Service.
3. Ms. Amey Marrella, Commissioner, Connecticut Department of Environmental Protection.
4. Ms. Sheila Stoane, Chair, City of Middletown Conservation Commission.

**Correspondence Received (see also Appendix E).**

1. Ms. Tatiana Abreu, Connecticut Department of Environmental Protection, Office of Planning & Program Development.
2. Ms. Amy Amey W. Marrella, Connecticut Department of Environmental Protection.

**Telephone and E-mail Coordination**

1. Mr. David Fox, Sr. Environmental Analyst, Connecticut Department of Environmental Protection, Office of Environmental Review.
2. Mr. Matt Dodge, Environmental Planner, Department of Planning, Conservation and Development, City of Middletown, Connecticut.
3. Mr. Bill Warner, Director, Department of Planning, Conservation and Development, City of Middletown, Connecticut.

# APPENDICES

# APPENDIX A
# Clean Air Act
# Record of Non-Applicability

# GENERAL CONFORMITY - RECORD OF NON-APPLICABILITY

| | |
|---|---|
| **Project Name:** | **BRAC 2005 U.S. Army Reserve**<br>**Land Acquisition of 53.8 acres at 218 Boardman Lane, Middletown, Connecticut**<br>**Off-Site Compensatory Mitigation** |

General Conformity under the Clean Air Act, Section 176 has been evaluated for the proposed Federal action according to the requirements of 40 CFR 93, Subpart B. The General Conformity Rule applies to federal actions occurring in regions designated as being in non-attainment for the NAAQS or attainment areas subject to maintenance plans (maintenance areas). Threshold (*de minimis*) rates of emissions have been established for federal actions with the potential to have significant air quality impacts. If an action located in an area designated as non-attainment exceeds these *de mimimis* levels, a general conformity analysis is required. Middlesex County, Connecticut is designated as a moderate ozone (8-hour) non-attainment area in an ozone transport region, and a nonattainment area for particulate mater (2.5 microns) thus the $NO_x$, VOC, $PM_{2.5}$, and $SO_2$ thresholds apply.

A General Conformity Analysis of this Federal action is not required because maximum annual direct and indirect emissions from this are below the *de minimis* levels established in 40 CFR 93.153 (b) of $NO_x$: 100 tons; VOC: 50 tons; $PM_{2.5}$: 100 tons; $SO_2$: 100 tons

The project/action is not considered regionally significant under 40 CFR 93.153 (i). Middlesex County is in attainment for criteria pollutants $NO_x$, $SO_2$, $PM_{10}$, CO, and Pb and therefore these pollutants are not subject to conformity review.

The Supporting documentation and emissions estimates are consummate with the
( ) ATTACHED
(X) INCLUDED IN PREVIOUS NEPA DOCUMENTATION (Final Finding of No Significant Impact and Environmental Assessment, Construction of an Armed Forces Reserve Center and Implementation of BRAC 05 Realignment Actions at Middletown, CT
( ) OTHER

JEFFREY M. HRZIC
Chief, Environmental Division

# APPENDIX B
# Clean Water Act Section 404(b)(1) Permit Conditions/Mitigation

## CLEAN WATER ACT SECTION 404 (b)(1) PERMIT CONDITIONS/MITIGATION

This Appendix summarizes the on and off-site mitigation requirements that were issued by the U.S. Army Corps of Engineers, New England District Regulatory Division in the Clean Water Act Section 404 (b)(1) permit no NAE-2008-2372, dated 25 March 2010. Appendix C, Section C.1, taken from the CWA Section 404(b)(1) permit decision document, best summaries the site-specific mitigation requirements to be implemented at the Boardman Lane parcel. Appendix B, Section B.2 outlines the permit conditions for on- and off-site mitigation, which integrate the site-specific mitigation of Section B.1.

### B.1 Site Specific Mitigation Plan Summary

**Grassland Management.** Open areas in the upland field and meadow will be maintained according to mowing practices and recommended strategies outlined in *Mowing Advisory Guidelines in Rare Turtle Habitat: Pastures, Successional Fields, and Hayfields* (NHESP 2009b). The plan includes specific requirements for clearing and mowing in the open field and meadows within the mitigation area and its surroundings and specifies a timeframe for the occurrence of seasonal management (prior to April 1 or after October 31) to avoid accidental injury to Eastern box turtles. An annual monitoring component ofmaintenance site shall be included in the approved Operation and Management Plan for this parcel.

**Invasive Species Control.** Removal of invasive species within the boundary of the off-site mitigation area is proposed to be conducted for a 10 year period to address potential problems with invasive species. The program will incorporate both manual and chemical means, as necessary, to control and eradicate any invasive species found within the enhanced wetlands or upland areas immediately adjacent to them. The control of pervasive non-native shrubs in the wetlands and habitat upland enhancement areas will use physical and mechanical cutting measures and/or hand pulling to remove seedlings and small plants with shallow root systems. The control of invasive shrubs may require repeated cuttings to control new stem growth, especially if the control method is limited to physical and mechanical measures. Herbicide applications are will be used to treat heavy infestations. In these cases, the application of a systemic herbicide to the cut stumps win be used in conjunction with the cutting treatment for optimum results. Native plant communities with wildlife habitat benefits will be maintained in the wetland and upland enhancement areas.

**Offsite Riparian Enhancement.** This aspect of the mitigation is designed to replace wildlife habitat values that cannot be replaced on-site at Cucia Park and will improve habitat for listed species and maximize the capacity of the Boardman Lane parcel to protect the ecological function and water quality of the adjacent Richards and Sawmill Brooks. The enhancement will involve one-time light tilling and seeding with a native meadow seed mixture and mowing. The activity will be similar to the regular tilling and planting of the field for agricultural cultivation. Appropriate erosion and sedimentation control measures for work in buffer areas will be included in the project erosion control plan. Enhancement of the wetlands at the site as depicted on Attachment 36 will include vegetation establishment with the species identified below:

| Cover Type | Scientific Name | Common Name | Size |
|---|---|---|---|
| **Shrub** | *Viburnum dentatum* | Arrowood | 18 |
| | *Clethra alnifolia* | Sweet pepperbush | |
| | *Vaccinium corymbosum* | High bush blueberry | |

| | | | |
|---|---|---|---|
| | *Cornus amomum* | Silky dogwood | |
| | *Salix discolor* | Pussy willow | |
| | *Alnus rugrosa* | Speckled alder | |
| | *Sambucus canadensis* | Elderberry | |
| **Tree** | *Quercus palustris* | Pin oak | 2' – 4' |
| | *Acer rubrum* | Red maple | |
| | *Populus deltoides* | Cottonwood | |
| | *Acer saccharinum* | Silver maple | |
| | *Quercus bicolor* | Swamp white oak | |

**Stewardship/Long-term Protection.** The proposed wetland mitigation and enhancement areas are positioned in the landscape and within permanently protected land in a manner that maximizes the potential for it to be sustained in perpetuity. The location of the Boardman Lane mitigation site, as well as the enactment of the 40-acre conservation restriction area, will help create a large, contiguous protected area as it links with additional wetlands to the north and east, as well as East Bradley Brook to the west. This will ensure long-term preservation and minimal effects from nearby development. The location of the enhancement area situated within existing floodplains and wet meadows will also provide optimal benefits and increase probability for long-term success.

## B.2 Permit Conditions

The permit conditions are included in their entirety. The mitigation standards in this section that apply to the on-site areas and the off-site parcel to be acquired at Boardman Lane are the required standards that ensure Clean Water Act compliance as determined by the New England District Regulatory Division. The "permittee" in the permit conditions refers to the District Engineer at the Louisville District, Corps of Engineers.

On-site compensatory mitigation will include 0.75 acres of wetland buffer enhancement, as well as, invasive plant management and control, monitoring of 5 years of the control and enhancement, and long-term stewardship of approximately 20 acres neighboring Sawmill Brook.

Off-site compensatory wetland mitigation shall include the acquisition of approximately 17 acres of wetland and 23 acres of upland at a parcel owned by Middle Boardman Associates on Boardman Lane. It will be purchased by the USACE LRL and deeded or otherwise formally protected by the USACE LRL or the anticipated occupant, the U.S. Army 99th Regional Support Command (ARSC). Management of the site will occur in compliance with a formal plan for operation and management. Within the 40-acre area, an existing 14-acre grazed wet meadow will be enhanced through establishment of a plan for grassland management (10 acres) designed to protect the Eastern box turtle's use of the site. Reestablishment of native riparian plantings will occur throughout a 4 acre area adjacent to Richards Brook with the overall intent of improving the resource habitat value and maximizing the ability of this area to protect the water quality of this system and Sawmill Brook, just downstream. In addition to monitoring of the wetland enhancement area at the Boardman Lane site, invasive species plant control will also be implemented for 10 years.

### Special Conditions

On-site compensatory mitigation will include 0.75 acres of wetland buffer enhancement, as well as, invasive plant management and control, monitoring of 5 years of the control and enhancement, and long-term stewardship of approximately 20 acres neighboring Sawmill Brook.

Off-site compensatory wetland mitigation shall include the acquisition of approximately 17 acres of wetland and 23 acres of upland at a parcel owned by Middle Boardman Associates on Boardman Lane. It will be purchased by the USACE LRL, and deeded or otherwise formally protected by the future occupant, believed to be ARSC. Management of the site will occur in compliance with a formal plan for operation and management. Within the 40-acre area, an existing 14-acre grazed wet meadow will be enhanced through establishment of a plan for grassland management (10 acres) designed to protect the Eastern box turtle's use of the site.

Reestablishment of native riparian plantings will occur throughout a 4 acre area adjacent to Richards Brook with the overall intent of improving the resource habitat value and maximizing the ability of this area to protect the water quality of this system and Sawmill Brook, just downstream. In addition to monitoring of the wetland enhancement area at the Boardman Lane site, invasive species plant control will also be implemented for 10 years.

Special Conditions

1.0 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. 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 contractor or subcontractor 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. The permittee shall complete and return the enclosed Compliance Certification Form within one month following the completion of the authorized work.

3. Off-site mitigation shall consist of 40 acres of invasive species control, habitat management and preservation and enhancement of riparian areas, including forested wetlands and uplands, herbaceous vegetated wetlands and uplands at a location identified herein as "Boardman Lane parcel" in the City of Middletown, Connecticut. On-site mitigation shall consist of approximately 20 acres of invasive species control, 0.75 acre of wetland buffer enhancement and long-term stewardship of forested wetlands and uplands at a parcel identified herein as "Cucia Park" in the City of Middletown, Connecticut. All mitigation shall be performed in accordance with the attached Mitigation Plan entitled, "CWA Section 404 Wetland Mitigation Plan, Armed Forces Reserve Center, Middletown, CT" and dated "February 18, 2010," except where modified below by Special Conditions of this permit.

4. The responsibility for planning, accomplishing and maintaining each aspect of the project for both the on-site and the off-site mitigation areas remain with the permittee USACE LRL or the future occupant (ARSC). The names and contact information of all individuals legally responsible for ensuring that the requirements for both the onsite and off-site mitigation areas, including long-term stewardship,

are accomplished in accordance with this authorization shall be submitted to the NAE Regulatory Division before work in wetlands at Cucia Park can occur.

Submit to: U.S. Army Corps of Engineers
NAE Regulatory Division
Permits & Enforcement
Attn: Cori M. Rose
696 Virginia Road
Concord MA 01742

5. Before work in wetlands can occur, the permittee shall specifically identify the name of the qualified wetland scientist(s) who will assume the responsibility for on-site and off-site identification of plant materials to ensure that: the stock will not consist of species on the list of invasive or noxious plants; the individual plants installed do not include nursery-bred cultivars of native plants; the necessary hydrologic regimes are achieved for the various plant types, and that the planting plan will maximize the benefits of the proposed enhancement plan.

6. Only plant materials native and indigenous to the region shall be used. Species not specified in the approved mitigation plan shall not be used without prior written approval of NAE Regulatory Division.

7. Your responsibility to complete the required compensatory mitigation as set forth in Special Condition 3 will not be considered fulfilled until you have demonstrated mitigation success and have received written verification from the Corps of Engineers. The term "mitigation success" means success as defined in the mitigation plan that this permit requires you to implement, except modified under Condition 8 below. Demonstration of success under this permit shall consist of meeting the NAE Regional performance standards listed in Special Condition #9, plus the required mitigation monitoring, corrective measures, submittal of mitigation monitoring reports, and a final wetland assessment. Should the mitigation not meet the performance standards below by the end of the monitoring period, you will be required to provide alternative compensation for the impacts authorized with this permit.

8. Mitigation success will be measured by the following standards:

- Each mitigation site has at least 80% areal cover, excluding planned open water areas or planned bare soil areas (such as for turtle nesting), by native species

- Planned emergent areas on each mitigation site have at least 80% cover by non-invasive hydrophytes.

- The proposed vegetation diversity and/or density goals for woody plants from the plan are met. Unless otherwise specified in the mitigation plans, this should be at least 500 trees and shrubs per acre, of which at least 350 per acre are trees for proposed forested cover types, that are healthy and vigorous and are at least 18" tall in 75% of each planned woody zone AND at least the following number of non-exotic species including planted and volunteer species. Volunteer species should support functions consistent with the design goals. To count a species, it should be well represented on the site (e.g., at least 50 individuals of that species per acre).

| # species planted (volunteer and planted) | minimum # species required |
|---|---|

| | |
|---|---|
| 2 | 2 ---------- |
| 3 | 3 ---------- |
| 3 | 4 ---------- |
| 4 | 5 ---------- |
| 4 | 6 ---------- |
| 5 | 7 ---------- |
| 5 | 8 ---------- |
| 6 | 9 or more --------- |

- Planned scrub-shrub and forested cover types have at least 60% cover by non-invasive hydrophytes, of which at least 15% are woody species. For the purpose of this performance standard, invasive species of hydrophytes are:
  Cattails (*Typha latifolia, Typha angustifolia, Typha glauca*)
  Common Reed (*Phragmites australis*)
  Purple Loosestrife (*Lythrum salicaria*)
  Reed Canary Grass (*Phalaris arundinacea*)
  Glossy Buckthorn - (*Frangula alnus =Rhamnus frangula*)

- There are at least 100 volunteer native trees and/or shrubs at least 3 feet in height per acre.

- The fifth year monitoring report (Year 5 - Cucia Park & Boardman Lane) and tenth year (Year 10 - Boardman Lane only) shall contain documentation that all vegetation within the buffer areas is healthy and thriving and the average tree height of all established and surviving trees is at least 5 feet in height.
- Until canopy coverage exceeds 30%, the average height ofa11 woody stems of tree species including volunteers in each site, must increase by not less than an average of 10% per year by the fifth (Year 5 following construction - Cucia Park & Boardman lane) and tenth (Year 10 following construction - Boardman Lane only) monitoring years.

- The following plants are being controlled at the site. For this standard, small patches must be eliminated during the entire monitoring period. Large patches must be aggressively treated and the treatment documented.
  Common reed (*Phragmites australis*)
  Purple loosestrife (*Lythrum salicaria*)
  Smooth and Common buckthorns (*Frangula alnus, Rhamnus cathartica*)
  Russian and Autumn olives (*Elaeagnus angustifolia and E. umbellata*)
  Multiflora rose (*Rosa multiflora*)
  Reed canary-grass (*Phalaris arundinacea*)
  Japanese knotweed (*Fallopia japonica*)

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

9. Wetland areas where permanent disturbance is not authorized (i.e. temporary wetland impact areas) shall be restored to their original condition and elevation, which under no circumstances shall be higher than the pre-construction elevation. Original condition means careful protection and/or removal of existing soil and vegetation, and replacement back to the original location such that the original soil layering and vegetation schemes are approximately the same, unless otherwise authorized.

BOARDMAN LANE

10. Within 60 days of ground-breaking at the Cucia Park site (Middletown AFRC), the permittee shall provide a draft Integrated Wetland Resources Stewardship Plan (IWRSP) for the off-site parcel at Boardman Lane that will address the long-term protection and management of this mitigation area, in perpetuity. The plan shall prohibit incompatible uses that would jeopardize the objectives of the land set aside for conservation management and ecological protection purposes and it must be approved by the NAE Regulatory Division, in writing, before it can be implemented. Upon its approval the IWRSP will become a legally binding special condition of this authorization.

Submit to:

U.S. Army Corps of Engineers
NAE Regulatory Division
Permits & Enforcement
Attn: Cori M. Rose
696 Virginia Road
Concord MA 01742

At a minimum the IWRSP for Boardman Lane shall:

- Identify a schedule for implementation of the off-site wetland and upland enhancement work which shall commence promptly following execution of the purchase option for the Boardman Lane parcel.

- Identify the source of funding (budget allocation, line item etc.) and the responsible party (assumed to be the current project proponent USACE LRL /temporary holder of the title, then the ARSC training facility commander or his official designee upon transfer) for long-term protection and management of the Boardman Lane parcel, in perpetuity.

- Include a detailed outline of habitat management measures and specific implementation requirements (including annual scheduling) for the parcel as it relates to the Eastern box turtle and the squarrose sedge.

- Contain a provision requiring 60-day advance notification to the NAE Regulatory before any action is taken to void or modify the protection instrument, including transfer for title to or establishment of other legal claims to the site(s).

- Identify the site stabilization measures that will implemented to correct ongoing erosion and transport of suspended sediment off-site.

- Prohibit all other filling, clearing, agricultural use (tilling, grazing, livestock management, vehicle access) and other disturbances on this site except for those activities explicitly authorized by the Corps of Engineers in these approved documents.

- Expressly allow for the creation, restoration, remediation and monitoring activities explicitly authorized by the Corps of Engineers in these approved documents.

11. Mowing of the 10-acre meadow and grassland off site enhancement area (Boardman Lane parcel) shall not occur during the months that the Eastern box turtle is expected to be active (April 1st through October 31st). All management and maintenance of the site shall be conducted in accordance with all of the applicable mowing practices and recommended strategies outlined in the Mowing Advisory Guidelines in Rare Turtle Habitat: Pastures, Successional Fields, and Hayfields (NHESP 2009b), including, but not limited to, the minimum height of the mowing bar above the ground surface, lowest gear and slowest speed, and directional mowing application for field or meadow habitats that border upland forest or a freshwater stream.

12. The permittee will monitor the off-site forested/shrub enhancement area and undertake the approved invasive species management and control measures at the Boardman Lane parcel for a period often years. On-site monitoring will occur the next growing season after plant establishment during years 1, 2, 3, 5, 7, and 10. Monitoring observations will occur at least two times during the growing season - in late spring/early summer and again in late summer/early fall. Annual monitoring reports will be completed and shall be submitted to the NAE Regulatory Division Policy Analysis and Technical Support Branch no later than December 15 of the year being monitored (i.e. 1, 2, 5, 7 and 10). Failure to perform the monitoring and submit the monitoring reports constitutes permit non-compliance. A self-certification form will be completed, and signed as the transmittal coversheet for each annual monitoring report and it will indicate the permit number and the report number.

Submit to:

U.S. Army Corps of Engineers
NAE Regulatory Division
Policy Analysis and Technical Support Branch
696 Virginia Road
Concord MA 01742

13. Wetland enhancement remedial measures will be implemented, if they are necessary, at least two years prior to the completion of the monitoring period to attain the success standards described within the approved mitigation plan. Should such remedial measures be required within two years of the end of the monitoring period, the monitoring period will be extended to as necessary to ensure two full years of monitoring after the remedial work is completed. Measures requiring earth movement or changes in hydrology will not be implemented without written approval from the Corps.

CUCIA PARK (MIDDLETOWN AFRC)

14. The stormwater drainage system shall be designed, installed and maintained such that the discharge will not result in greater than minimal change to the pre-existing condition runoff patterns where peak flows off of the site for events up to and including the 100-year storm do not exceed the predevelopment condition and the system is capable of detaining and attenuating the volume of the 100-year storm event.

15. Within 60 days of ground-breaking at the Cucia Park site, the permittee shall submit a draft Stormwater Operation & Maintenance Plan (SOMP) and Integrated Wetland Resources Stewardship Plan (IWRSP). The SOMP will address the annual monitoring and maintenance requirements of the training center's stormwater facilities and the IWRSP will outline the long-term protection and stewardship of the remaining undeveloped areas on the Cucia Park. These plans must be approved by the NAE Regulatory Division, in writing, before their implementation, and upon their approval they will become legally binding special conditions of the permit.

Submit to: U.S. Army Corps of Engineers
NAE Regulatory Division
Permits & Enforcement
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696 Virginia Road
Concord MA 01742

16. The IWRSP shall expressly allow for the creation, restoration, remediation and monitoring activities required by this permit on the site and it shall prohibit all other filling, clearing, and other disturbances (including vehicle access) in these areas except for activities explicitly authorized by the Corps of Engineers in these approved documents. The plan shall prohibit incompatible uses that would jeopardize the objectives of the undeveloped land set aside for conservation management and ecological protection purposes.

The Cucia Park IWRSP shall:

- Identify the source of funding (budget allocation, line item etc.) and the responsible party assumed to be the current project proponent USACE LRL/temporary holder of the title, then the ARSC training facility commander or his official designee upon transfer) for long-term protection and management of the undeveloped portions (approximately 20 acres outside of building area) of the Cucia Park parcel, in perpetuity.

- Identify those specific exceptions (e.g. power line right-of-way and utility easements) with allowable disturbance within the boundary of the protected area and specify the best management practices for construction with which these disturbances will be required to adhere and the standard of restoration or remediation of any temporary impact areas.

- Contain a provision requiring 60-day advance notification to the NAE Regulatory before any action is taken to void or modify the protection instrument, including transfer for title to or establishment of other legal claims to the site(s).

17. At a minimum the SOMP for stormwater facilities at the site should identity:

- The specific party or parties responsible for operation and maintenance of the individual stormwater facilities

- The source(s) of funding for continued operation and maintenance of the stormwater facilities

- A schedule for routine inspection and maintenance

- All maintenance tasks, including routine and infrequent maintenance, to include how and when the work is to be performed.

18. At a minimum the SOMP should outline routine and long-term maintenance tasks and an implementation timeline/proposed schedule which includes the measures identified below:

- The bio-basin infiltration system should be inspected for slope integrity, soil stability, soil erosion, ponding and sedimentation frequently for the first three months following construction

or the first three major precipitation events (whichever comes first), to ensure proper stabilization and function. Thereafter, the basin should be inspected at least twice a year. Conduct the inspections after large storms to check for surface ponding at the inlet that may indicate clogging. Water levels in the observation well should be recorded over several days after the storm to ensure that the system drains within 72 hours after filling. Inlet and outlet pipes should be checked for clogging during routine inspections. Unplugging and/or occasional flushing may be required. Accumulated sediment should be manually removed from the system at least annually with rakes, rather than heavy construction equipment, to avoid compaction of the gravel wetland surface. Bare spots or eroded areas should be repaired and/or re-seeded. Replacement of some, or all, of the coarse aggregate filter medium may be necessary if clogging occurs (anticipated frequency 10 to 15 years). In the event of sediment and debris accumulation, contributing drainage areas shall be inspected to determine appropriate measures necessary to eliminate sources of the sediment and debris.

- The catch basins (hooded and deep sump) should be inspected 4 times per year and after major storms, and accumulated sediment and debris within the sump should be removed a minimum of 2 times per year (early spring and late winter) or when the level of sediment reaches 113 of the capacity of the chamber. Trash of debris which is located immediately in front of the catch basin opening or is blocking inletting capacity of the basin should be removed during routine inspections.

- Sediment traps or forebays associated with the system should be inspected 4 times per year for signs of erosion and the accumulated sediment should be removed 2 times per year or when the material exceeds 12 inches or 10% of the forebay capacity. Following installation, this level will be permanently demarcated or gaged at the location to identify when removal is required.

- Bio-swales should be inspected for slope integrity, soil moisture, vegetative health, soil stability, soil compaction, soil erosion, ponding and sedimentation frequently for the first three months following construction or the first three major precipitation events (whichever comes first), to ensure proper stabilization and function. Thereafter, they should be inspected 2 times per year and sediment and debris should be removed manually, at least once per year. Trees should be manually removed. Long term management may require surface modification and periodic reseeding to maintain dense growth of preferable vegetation if nuisance vegetation becomes overabundant. The filter layer can be replaced or cleaned when it becomes clogged. Care should be taken to protect the swales from snow removal/disposal or other activities that will affect its capacity and water handling function. If standing water remains in the swale between storms, the cause of poor drainage should be evaluated and repaired.

- For stormwater galleries and other proprietary stormwater handling devices a schedule of inspection and maintenance should be developed and implemented per Manufacturers' recommendations for the inlet, treatment chamber(s) and outlet or as identified below (whichever is more frequent). Inspection should occur prior to demobilizing equipment from the site to ensure installation is per manufacturer specification. The contractor should be required to provide certification of proper installation. For the first year, inspection should occur 4 times per year. Thereafter, 2 times per year except as modified by manufacturer requirements. In general, remove all sediment and debris from the storage area when the depth of the accumulated material exceeds 10% of the height of the storage area for 112 length of the vault or whenever accumulated depth of sediment/debris exceeds 15% of the tank, at any point.

(Example: 72 inch diameter storage tank would require cleaning when sediment reaches depth of seven inches for more than 112 length of tank or whenever accumulation exceeds 10.5" inches at some point within the chamber).

- Riprap discharge dissipaters will be checked 4 times per year and after major storm events for proper function and sign of erosion. If there is missing riprap or only one layer of rock exists above native soil in area five square feet or larger, or there is sign of any exposure of native soil or indicators of erosion, replace riprap to design standards, repair erosion and permanently stabilize the area around pad.

- The level spreader should be inspected for integrity, soil erosion, ponding and sedimentation frequently for the first three months following its construction, or the first three major precipitation events (whichever comes first), to ensure proper stabilization and that flows are spread evenly over the entire swale width. Thereafter it should be inspected 4 times per year. Removal of accumulated sediment and debris shall occur at least once annually (more frequently if conditions require). The plan shall include provision for reconstruction of the level spreader and revegetation of any eroded areas within the vegetated buffer of the level spreader, if it is adversely impacted by post-construction flow discharges or settlement occurs (no longer a flat surface/0% grade). Long term management may require replacement of the filter layer when it becomes clogged or the selective replacement of riprap.

- Individual infiltration and flow attenuation units systems at the site shall be rehabilitated or replaced if its performance is degraded to the point that applicable stormwater standards or design criteria are not met.

- All of the enclosed infiltration BMPs identified above should have observation wells installed to determine their performance and access points to allow for the removal of accumulated sediment must be included in their design. Dry wells or infiltration basins must have staff gauges, marked rods, or similar instrumentation to measure the accumulation of sediment and determine how quickly the system drains after a storm. The maintenance plan must indicate the expected rate of drainage of the infiltration system and provide for removal of sediment.

19. For the first 3 years following the construction of the infiltration BMPs or until a determination is provided by NAE Regulatory that all establishment criteria have been meet for the given BMP, the permittee or its authorized and qualified representative will provide the NAE Regulatory with a written summary report (in electronic format) on an annual basis summarizing the monitoring and any scheduled and corrective maintenance for the stormwater management facilities. The report will detail any problems or concerns and the measures taken, or are planned to be taken, to correct the problems or concerns.

Submit to:

U.S. Army Corps of Engineers
NAE Regulatory Division
Permits & Enforcement
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696 Virginia Road
Concord MA 01742

20. Within 60 days of ground-breaking at the Cucia Park site, the permittee shall submit a supplemental planting plan that incorporates a plan detail and species list for the establishment of native shrubs into the landscaping design for the proposed riprap pads and wing wall outlets at the existing Cucia Park pond. The purpose of this plan is to ensure that the view point of the resource from Smith Street is not substantially degraded by the installation of the new stormwater discharge outlets.

21. All construction-related development at the Cucia Park site will adhere to the following requirements to ensure that adverse impact to the Eastern box turtle and its habitat is minimized to the greatest extent practicable:

- A silt fence enclosure will be installed around the work area prior to the onset of initial construction.
- Prior to the initiation of daily construction at the site, a qualified individual knowledgeable in the identification of the species will investigate the construction site for the presence of turtles.
- Work conducted during early morning and evening hours shall occur with special care so as not to harm basking or foraging individuals.
- Species identification information and the contact information for a local or regional wildlife rehabilitation specialist shall be clearly posted at a central location on the work site.
- Construction crews shall be educated to identify the species and what measures can be taken to avoid impact to the turtle during site development.
- Eastern box turtles that are discovered shall be moved, unharmed, to an area immediately outside of the fenced or construction area in the same direction that it was walking.
- The CT DDP Wildlife Division Biologist (Julie Victoria) and the Middletown Conservation Commission Wetland Agent will be notified seven days prior to beginning of construction activities at the site.
- All silt fencing shall be removed after soils are stable so that reptile and amphibian movement between upland and wetland habitats can occur unimpeded.

22. For each of the first 5 full growing seasons following establishment of the on-site enhancement area at Cucia Park, invasive species control will be undertaken, the site will be monitored and annual monitoring reports submitted. Observations will occur at least two times during the growing season - in late spring/early summer and again in late summer/early fall. Annual monitoring reports will be completed and shall be submitted to the NAE Regulatory Division Policy Analysis and Technical Support Branch no later than December 15 of the year being monitored. Failure to perform the monitoring and submit the monitoring reports constitutes permit non-compliance. A self-certification form will be completed, and signed as the transmittal coversheet for each annual monitoring report and it will indicate the permit number and the report number.

23. Wetland enhancement remedial measures will be implemented, if they are necessary, at least two years prior to the completion of the monitoring period to attain the success standards described

within the approved mitigation plan. Should such remedial measures be required within two years of the end of the monitoring period, the monitoring period will be extended as necessary to ensure two full years of monitoring after the remedial work is completed. Measures requiring earth movement or changes in hydrology will not be implemented without written approval from the Corps.

24. Upon completion of the temporary construction, all disturbed wetland areas (the disturbance of these areas must be authorized) shall be properly stabilized. Any seed mix shall contain only plant species native to New England and shall not contain any species listed on the enclosed "Invasive and Other Unacceptable Plant Species"

25. Operating heavy equipment within wetlands shall be minimized, and such equipment shall not be stored, maintained or repaired in wetlands, to the maximum extent practicable. Where construction requires heavy equipment operation in wetlands that are not proposed to be permanently modified by this authorization, the equipment shall either have low ground pressure (typically <3 psi), or it shall be placed on swamp, construction or timber mats (construction mats) that are adequate to support the equipment in such a way as to minimize disturbance of wetland soil and vegetation. Construction mats are to be placed in the wetland from the upland or from equipment positioned on swamp mats if working within a wetland. Dragging construction mats into position is prohibited. Other support structures that are capable of safely supporting equipment may be used with written Corps authorization. Similarly, the permittee may request written authorization from the Corps to waive use of mats during frozen or dry conditions. An adequate supply of spill containment equipment shall be maintained on site.

26. In areas of authorized temporary disturbance, if trees are cut they shall be cut at ground level and not uprooted in order to prevent disruption to the wetland soil structure and to allow stump sprouts to revegetate the work area, unless otherwise authorized.

27. All construction work at the site shall be conducted in accordance with the approved Sediment and Erosion Control Plan. Such measures shall include, but not be limited to, adequate sedimentation and erosion control management measures, practices and devices, such as phased construction, vegetated filter strips, temporary sediment ponds constructed in uplands, geotextile silt fences, hay bales or other devices, and they shall be installed and properly maintained to reduce erosion and retain sediment on-site during and after construction. They shall be capable of preventing erosion, of collecting sediment, suspended and floating materials, and of filtering fine sediment. These temporary devices shall be removed upon completion of work and the disturbed areas shall be stabilized. The sediment collected by these devices shall be removed and placed at an upland location, in a manner that will prevent its later erosion into a waterway or wetland. All exposed soil and other fills shall be permanently stabilized at the earliest practicable date.

28. All activities involving any discharge of pollutants into waters of the U.S., including wetlands under this authorization shall be consistent with the State of Connecticut's Surface Water Quality Standards and Storm Water Management Guidelines.

29. The permittee shall allow the NAE Regulatory Division to make periodic inspections at any time deemed necessary in order to ensure that the work is being or has been performed in accordance with the terms and conditions of this permit. The Corps may also require post-construction engineering drawings for completed work.

30. The SOMP shall include provisions for the inspection, maintenance, and, if necessary, reconstruction or redesign of the level spreader if post-construction observation indicates that the feature is functioning as a focal source of erosion or point-source discharge of sediment to the Wetland. Any plan for modification of the design will need to be coordinated with NAE Regulatory, and shall not be implemented until it is approved by NAE Regulatory in writing.

# APPENDIX C

## Clean Water Act Section 404 Wetland Mitigation Plan for the Armed Forces Reserve Center, Middletown, CT, February 18, 2010

by AECOM Environmental, Inc. for
U.S. Army Corps of Engineers, Louisville District

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AECOM Environment

Prepared for:
U.S. Army Corps of Engineers
Louisville District Office

Submitted by:
AECOM
Westford, MA
60140125
[December 18, 2009]

# CWA Section 404 Wetland Mitigation Plan
# Armed Forces Reserve Center
# Middletown, CT

February 18, 2010

# Contents

## List of Appendices

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# A. General Information and Project Description

This Wetland Mitigation Plan (WMP) has been developed by AECOM Environment on behalf of the United States Army (U.S. Army) for the proposed construction of a new Armed Forces Reserve Center (AFRC) and accompanying support facilities as part of the Defense Base Closure and Realignment Act of 1990 (Public Law 101-510) and the ("BRAC Commission") recommendations. To implement the BRAC Commission's recommendations, the U.S. Army proposes to provide necessary facilities to support the changes in force structure and the consolidation of reserve units. The U.S. Army proposes to construct the new facility on the 42-acre Cucia Park property located on Smith Street in Middletown, Connecticut (Figure 1). Middletown is located along I-91 in Middlesex County approximately 20 miles south of Hartford and 25 miles northeast of New Haven, Connecticut within the Lower Connecticut River Watershed. I-91 borders the east side of the site, while the western side of the site consists of Sawmill Brook and its bordering wetlands and floodplains.

The proposed AFRC will provide a five-story, approximately 164,000 square foot (sf) training facility. Associated support facilities include a 34,979 sf (approximate) Organizational Maintenance Shop (OMS) and a 3,886 sf (approximate) storage building. Together, these facilities will support approximately 900 personnel, both reservists and civilians. The relocation and realignment of reserve units to the proposed AFRC would bring approximately 219 unit vehicles, equipment, and materials to the facility. Within the new facility there will be approximately 8.76 acres of paved areas including approximately 3.80 acres of military equipment parking areas and approximately 4.96 acres of privately-owned vehicle parking areas, walkways, and access roads. Under the BRAC law, the U.S. Army must complete all realignments not later than September 15, 2011. Implementation of the Proposed Action would occur over a span of approximately two years with completion of construction occurring sometime in the latter half of 2011.

As a means of avoiding and minimizing the total amount of wetland impacts that would result from the development, numerous steps were taken. The proposed AFRC building was redesigned as a five-story structure instead of a single-story facility in order to reduce the buildings footprint while still providing the space required to meet the U.S. Army's needs. Additionally, the development footprint was pushed as far east towards the Interstate highway and away from Sawmill Brook and its abutting wetland areas as the required Anti-terrorism/Force Protection Requirements allow. The incorporation of retaining walls instead of sloped embankments along the western and southern margins of the Project allowed the development footprint much less encroachment into wetland areas. This alternative site design resulted in wetland impacts reduced from approximately 4 acres to approximately 1.5 acres.

As stated above, the proposed wetland impacts have been avoided to the greatest extent practicable and steps have been taken to ensure that the unavoidable impacts have been minimized. Based upon the site selection process, and the final efforts at wetland impact avoidance and minimization, the New England District Army Corps of Engineers Regulatory Division (Corps Regulatory), as well as the USEPA Region 1, have determined that the proposed development of the Project at the Cucia Park site represents the Least Environmentally Damaging Practicable Alternative (LEDPA). Project construction will result in the unavoidable loss of approximately 1.5 acres of wetlands and mitigation is required for this loss. A combination of measures, both occurring on-site and off-site, has been chosen to provide this mitigation.

The on-site mitigation will include native plantings in close proximity to the wetlands and invasive species management throughout the Project site (Figure 2) area as well as improvements to existing stormwater drainage features. While proposed off-site mitigation will include wetland habitat enhancement, endangered species management and invasive species control, as well as wetland and upland habitat preservation with the implementation of a conservation restriction on the off-site parcel (Figure 3). The off-site location (Boardman Lane Site) was selected based on a watershed approach as depicted in the April 10, 2008 ruling (EPA 40 CFR Part 230) and is located on Boardman Lane in Middletown, CT (latitude 41.578646 and longitude -72.726567), less than 1 mile from the Project site. This property is an 89-acre parcel that includes farm land, forested uplands and wetlands, perennial streams and associated riparian areas. The Army

proposes the acquisition of 40-acres of the Boardman Lane property; the remaining 49-acres will be retained by the current owner. This 40-acre parcel is located along Sawmill Brook just upstream of the Project site (Cucia Park), and is also within the Lower Connecticut River Watershed (USGS hydrologic unit code 01080205). The WMP contains figures showing the locations and design of the mitigation areas. Attached to this plan are 11 by 17" Project and mitigation plans (Appendix C).

### A.1 On-site Stormwater Management System

In addition to on-site proposed enhancements plantings and invasive species management significant improvements are proposed to existing stormwater drainage management features at the Project site (Cucia Park) as well as the implementation of state-of-the-art stormwater management measures to control the rate and quality of stormwater runoff from the developed site. The proposed stormwater treatment system is designed to comply with the Energy Independence and Security Act (EISA) of 2007 which dictates the use of Low Impact Development (LID) practices. LID is a stormwater management strategy concerned with maintaining or restoring the natural hydrologic functions of a site. In addition, EPA issued guidance for Green Infrastructure/Low Impact Development (GI/LID) management approaches that should be used when feasible to meet the requirements of EISA. The proposed design incorporates best management practices (BMP's) which enable the project to comply with EISA and where feasible integrate the GI/LID approaches and include:

a. Surface stormwater management basins incorporate best management practices design features pursuant to the Connecticut Stormwater Quality Manual. The three basins include forebays and are sized to detain the 1-inch rainfall event and slowly discharge that volume via low-capacity bottom outlets;

b. The stormwater management system is designed so that the hydrologic characteristics of post-development run-off from the site will mimic pre-development patterns and intensities for a variety of storm events.

c. A de-centralized stormwater management system design concept with four discharge locations is designed to maintain flows to adjacent wetlands areas.

d. Oil-water separators for pavement areas draining to underground detention system.

e. The main parking area is designed to sheet flow to a water quality-type swale to increase flow times (to reduce detention sizing requirements). This also reduces catchbasin and pipeline installation, and promotes infiltration.

f. A new and relocated outlet for a State drainage system is provided to address a current and on-going erosion problem caused by that outlet.

g. The efficient design of the parking driveway near the building entrance provides for a convenient turn-around area without excessive addition of pavement surface.

h. A vegetated (green) roof on a portion of the Training Center will naturally reduce runoff and air conditioning loads.

i. A 40kW photovoltaic (PV) electric generation installation is provided in the Privately Owned Vehicle (POV) parking lot. In addition to providing on-site generation to satisfy a portion of the electric demand of the project, the PV panel array provides shade for the pavement and cars parked below it.

j. A domestic solar hot-water system is provided on the Training Center roof to provide a portion of the hot-water supplied for the building occupants.

k. Landscape material selection includes native species that do not require irrigation.

l. Floor trench drains at the overhead doors for the maintenance shop which discharge to the sanitary sewer.

m. A vehicle wash bay which discharges to the sanitary sewer

The GI/LID management approaches and design elements incorporated into the Project to increase the Project compliance with the spirit and intent of the EISA and include:

a. Rain gardens, bio-retention, and infiltration planters
b. Porous pavements
c. Vegetated swales and bio-swales
d. Green roofs
e. Trees and tree boxes
f. Pocket wetlands
g. Reforestation/revegetation using native plants
h. Protection and enhancement of riparian buffers and floodplains
i. Rainwater harvesting for use (e.g. irrigation, HVAC make-up, non-potable indoor uses)

Additional GI/LID management approaches and design elements were incorporated into the project, and those BMP's initially proposed were enhanced. This was done in order to increase project compliance with the spirit and intent of the EISA. The benefits of these design changes include:

- Cleaner stormwater run-off from the site
- Helping to maintain clean and adequate water supplies
- Source water protection
- Cleaner air
- Help to moderate the impacts of climate change
- Increases in energy efficiency
- General and overall community benefits

The recommended GI/LID management approaches mentioned above, and how they are incorporated into the project, or why they were not, are discussed in detail below:

a. *Rain gardens, bio-retention, and infiltration planters:*

The design criteria for the stormwater management system was increased and the surface basins will now be constructed as bio-retention basins. The surface systems will be constructed so that the post-development peak runoff rates do not differ significantly from pre-development conditions for the 2, 10, 25, and for the extent practical, for the 100-year storm events at the design points. Due to site constraints, the two underground detention systems were designed to attenuate the 2, 10 and 25-year storms, but not the 100-year storm. The stormwater management systems are designed to be in compliance with the intent of the recently authorized Executive Order No. 13514, the Energy Independence and Security Act, in that 95th percentile rainfall event are retained on-site and not directly discharged. This is accomplished by installing refills with controlled permeability under the three surface bio-basins and the two underground detention galleries, and discharging water percolating into these soils via underdrains to adjacent ground surfaces. It is expected that water will also infiltrate into underlying natural soils; however given the fine-grained and

relatively impermeably characteristics of these soils, they cannot be relied on to dewater the stormwater management systems in a timely period so that overall performance of the systems to attenuate peak flow rates from storm events can be expected, hence the addition of the underdrains to the design.

*b. Porous pavements*

Porous pavements were deemed infeasible because the under-lying site soils are fine-grained and generally impermeable.

*c. Vegetated swales and bio-swales*

In addition to the swale incorporated into the POV parking lot drainage system, the discharge from the main bio-retention basin from larger storm events flow from the basin over a concrete weir to a 'cascade channel' which runs parallel to a site sidewalk, then to a pipe system for discharge via a level spreader to an upland area adjacent to the northerly existing site pond. While the cascade channel cannot be grass-lined due to erosion concerns, it will promote infiltration and increase flow times for stormwater thereby reducing detention/retention basin sizing requirements. An additional grass swale was incorporated in lieu of a pipeline section to convey a portion of the roof run-off and western loading dock runoff overland thereby increasing flow times and promoting infiltration and recharge of groundwater.

*d. Green roofs*

The run-off from the Training Center roof, including that from the green roof, and the main bio-retention basin dewatering/underdrain system discharge to the wetland associated with the southerly existing site pond. This discharge scheme was added to help maintain the water balance to this wetland/pond area closer to existing conditions. It is specifically noted that only water from the roof and underdrain is discharged to this wetland area; no runoff that has flowed across pavement surfaces is discharged directly to any site wetland or watercourse.

*e. Trees and tree boxes*

The landscape plan includes a generous number of deciduous and coniferous trees, increasing the amount provided in the original design. It is also noted that trees were added along Smith Street to provide an enhanced general and overall community benefit.

*f. Pocket wetlands*

Pocket wetlands were deemed infeasible due to the site constraints of steep slopes, extensive adjacent wetlands and the irreducible project requirements.

*g. Reforestation/revegetation using native plants*

The landscape plant material list was developed to contain native plants and cultivars exclusively; no invasive species are included.

*h. Protection and enhancement of riparian buffers and floodplains*

The area along the east side of Sawmill Brook will be selectively cleared of invasive plants and select areas will be replanted with native wetland plants. In addition, a 40-arce parcel along the same brook south of the site will be purchased and permanently maintained as open space.

*i. Rainwater harvesting*

Water harvesting and use are not practical because the volume of water used for toilet flushing is not significant enough to warrant the design and use of water harvesting and use systems. High-efficiency sensor-operated urinals are provided in the project to reduce over-all water use. No landscape irrigation is proposed.

In summary, the designers are aware of the water and environmental quality issues and are implementing GI/LID strategies and practices in an effort to provide a more sustainable and responsible project.

# B. Wetland Impact Area

The proposed Project is located on a 42-acre parcel known as Cucia Park and situated west of I-91 on Smith Street in Middletown, Connecticut. The Project site includes approximately 12 acres of federally jurisdictional wetlands within the area subject to construction, as identified in Table 1 below.

**Table 1: Summary of Site Wetlands**

| Wetland Area | Approximate Wetland Size (within property boundary) | Wetland Type |
|---|---|---|
| Wetland System 1 | 7 Acres | Palustrine Forested |
| A | 3 Acres | Palustrine Forested |
| E | 2 Acres | Palustrine Forested/Palustrine Scrub-Shrub |
| G | 0.16 Acres | Palustrine Forested |

The site consists of two distinct landforms: a large floodplain wetland bordering a perennial watercourse (Sawmill Brook) in the western part, and a glacial till hillside in the eastern portion with I-91 bordering the eastern boundary of the site. The floodplain (Wetland System 1) borders Sawmill Brook which flows north through the western portion of the site. Wetland impacts are confined to the poorly drained hillside portions of the site that have been subjected to historical earthwork and other activities known to have occurred in the 1800's. The wetlands associated with these landforms include System 1, a 7 acre Palustrine Forested Wetland (PFO) located in the floodplain of Sawmill Brook, Wetland A, a 2.9-acre PFO located in the southern third of the site just north of the power line, Wetland E, a 2.0-acre PFO exhibiting some areas of open standing water located in the north and north central portions of the site, and Wetland G an isolated PFO centrally located on the site between the old trolley line berm and the sewer main that bisects the western portion of the site from north to south.

As previously described in Section A, measures have been taken to avoid and minimize the wetland impacts that will occur as a result of the Project. The proposed Project will permanently alter six separate areas of freshwater wetland (identified as areas A through H) and the total amount of alteration will be approximately 1.5-acres. In addition, the Project will temporarily impact one wetland area associated with the sewer connection within Wetland E that totals 270-sq. This temporary impact area is not identified with

an Impact Area Location label on the project plans. Table 2 below provides a summary of the impact areas and amounts. The two largest unavoidable wetland impact areas are to occur near the southern end of the Project footprint (impact areas D and G) where the OMS and MEP will be located. Together these two impact areas account for approximately 84 percent of the total amount of wetland impact. The nature of the wetland alteration will be the removal of vegetation and placement of fill in the wetlands in order to construct the proposed access roadways, retaining walls, certain structures, embankments, and utilities.

A summary of impact areas within the wetlands/waters of the United States for the Project is provided in Table 2 below.

**Table 2: Summary of Wetland Impacts**

| Impact Area Location | Wetland ID | Impact quantity (sf) | Temporary Impact quantity (sf) | Wetland Type | Type of Impact | Project Element Resulting in Impact |
|---|---|---|---|---|---|---|
| A | E | 2,607 | 200 | Palustrine Forested | Permanent - clear and fill | Grading/roadway construction adjacent to infiltration basin; temporary impact for stormwater plunge pool |
| C | E | 712 | | Palustrine Forested | Permanent - clear and fill | Retaining wall and roadway construction adjacent to personnel parking area |
| D | E | 24,808 | | Palustrine Forested | Permanent - clear and fill | OMS and military equipment parking area |
| E | E | 3,232 | 270 | Palustrine Forested / Palustrine Scrub-Shrub | Permanent and temporary - clear and fill | Retaining wall at margin of OMS, military equipment parking area and sewer line connection |
| F | G | 860 | | Palustrine Forested | Permanent - clear and fill | Retaining wall at margin of OMS and military equipment parking area |
| G | A | 32,166 | | Palustrine Forested | Permanent - clear and fill | OMS and military equipment parking area |
| H | A | 789 | | Palustrine Forested | Permanent - clear and fill | Retaining wall at margin of OMS and military equipment parking area |
| **Total:** | | **65,174 sf (1.5 acres)** | **470 sf** | | | |

As described above wetland impacts will be compensated for by a combination of on-site and off-site mitigation to include permanent preservation of wetlands and uplands via a Conservation Restriction, listed species habitat enhancement and maintenance, invasive vegetation management, riparian enhancement and wet meadow grassland management, as well as on-site wetland enhancement planting that will include the installation of native plantings and invasive species management.

In the spring of 2009, wetland functional assessments were performed on the Cucia Park site using the USACE "Highway Methodology" *(Wetland Functions and Values: A Descriptive Approach* – USACE, 1999), which is appropriate for projects such as this. During the assessments, wetlands were identified within the proposed construction area of the site and evaluated for specific functions and values that each wetland potentially provides. Most of the wetlands identified on the site have been historically affected (and in some cases, created) by previous earth work and soil compaction associated with sewer line installation, trolley line use and a utility line right-of-way. Generally, most of the wetlands surveyed appear to provide low to moderate functions and values while the primary floodplain wetland, Wetland System 1, provides moderate to high functions of the following:

- Groundwater recharge/discharge;
- Flood control;
- Groundwater;
- Water quality;
- Shoreline stabilization;
- Visual quality; and
- Wildlife habitat.

The three primary functions that the wetlands to be impacted are likely to provide include wildlife habitat, groundwater discharge, and water quality treatment. Generally, the functions and values of the wetland areas that are to be impacted are relatively minor in the context of the overall Sawmill Brook and Mattabesset River watersheds. Nevertheless, the localized functions and the cumulative role these play in the overall ecological integrity of these watersheds warrants the development of a mitigation plan with the goal of offsetting the functional impacts from the unavoidable wetland losses. The consideration of wetland mitigation options has followed the guidance provided in the Final Rule for Compensating Mitigation for Losses of Aquatic Resources (USACOE and USEPA, April 10, 2008) as wells as the New England District ACOE Guidance on Compensatory Mitigation (December 18, 2007).

Wetland functions and values reports in Appendix E provide additional information for each impact area.

## C. Mitigation Areas

To fully mitigate for impacts to the watershed functionality caused by the wetland impacts associated with the AFRC Project, the U.S. Army proposes on-site vegetation restoration and invasive species control, however the primary mitigation is focused on the off-site land preservation and riparian enhancement. As shown in Section B above, the AFRC will result in 1.5 acres of permanent impacts to forested wetlands as a result of construction of the new facility in Middletown, CT.

## C.1 Mitigation Site Selection and Alternatives

U. S. Army considered the development of compensatory mitigation located within Middletown, CT Project site; however, due to Project requirements and site limitations, a combination of on-site and off-site mitigation measures was determined to provide greater potential for successful mitigation. A systematic process has been followed in the assessment of potential alternative sites that could be considered to provide compensatory mitigation in addition to the measures incorporated into the on-site mitigation plans. Contacts were made with local and regional environmental agencies to obtain information on watershed conditions and potential compensatory mitigation opportunities. Included in these contacts were the following:

- City of Middletown Planning and Inland Wetlands Agency Staff
- Connecticut River Watershed Council
- Rivers Alliance of Connecticut
- The Nature Conservancy of Connecticut
- Mattabesset River Watershed Association

From a watershed perspective, emphasis was placed first on the direct watershed of Sawmill Brook which flows through the Project site. Secondarily, consideration was preferentially given to mitigation opportunities within the Mattabesset River watershed, which Sawmill Brook flows into north of the Project site. The Mattabesset River flows easterly along the Cromwell/Middletown corporate boundary to the Connecticut River; accordingly, consideration was also given to sites within the Connecticut River watershed within the Middletown area.

Figure 4 indicates the range of sites that have been considered for off-site mitigation that are situated within these watersheds; additional sites beyond those shown on this figure include those that were also considered and reviewed for the actual Project site. Roughly one-half of the sites are within the watershed of Sawmill Brook that flows northerly through the site, while the others are in the watershed of Swamp Brook which flows north to the Mattabesset River in the eastern portion of Middletown, or in more localized subwatersheds that drain to the Connecticut River. A summary of some of these sites and the potential they offer for mitigation is provided briefly below. It should be emphasized that this review has been conducted largely on the basis of technical considerations for wetland compensation, such as hydrologic setting, habitat conditions, and grading/soil conditions; the availability of any of these sites for such uses pertaining to mitigation were not necessarily fully ascertained, however some reference to such aspects have been provided for some sites.

- Lawrence School/Mile Lane/Kaplan Drive: west of Lawrence School is an open field area that borders shrub-dominated habitat along West Swamp Brook. The field area is currently used in part for model airplane activities and other activities. The site presents an opportunity for minor earth work to lower the grades of the field area to create or enhance wetland conditions. The City of Middletown expressed reservations on the use of the site for wetland mitigation due at least in part to current and potential future uses.

- Middletown High School/Route 3: the existing Middletown High School site is located along East Swamp Brook just west of Route 3. The site has addressed wetland mitigation needs under Section 404 permitting in the recent past, and continues to review mitigation areas under this permit. Consideration has been given to whether additional wetland mitigation areas are possible in this vicinity. Based upon preliminary review, there did not appear to be any viable sites for additional wetland, although some consideration of invasive species control may be warranted within existing wetlands along East Swamp Brook.

- Tuttle Place: this site abuts the south side of the Mattabesset River in northeast Middletown. A small pond occurs there surrounded by woods. The presence of forested cover and the floodplain of the river through this area likely precludes significant area of wetland creation at this site.

- Smith Park: this site is located along Fall Brook to the southeast of Cucia Park. Areas along the brook were reviewed for potential wetland mitigation, streambank restoration, and other aquatic habitat improvements. Much of the land area which is in a proper setting for wetland creation already provides good habitat of forest, shrub, and some scattered emergent cover, and is protected as public parkland. The stream course through the area appears in good condition, with only minor erosional areas along the streambank. Accordingly, on a preliminary basis it does not appear that any substantial area of wetland or water resource improvements is possible at this site.

- Soccer Fields south of Smith Park: these new soccer fields have resulted in some erosion issues toward Fall Brook to the west. However, the steep, wooded grades to the west of the fields and down to the brook are not conducive for wetland creation or enhancement.

- Bysiewicz Site: the western portion of this site along Richard's Brook (which flows south to Sawmill Brook) was reviewed for potential wetland mitigation options. The combination of forested cover and glacial till hillside conditions make this area generally unsuitable for creation of wetland mitigation areas.

- Boardman Lane Site: The southeast portion of this site consists of open fields in active agricultural use that border Sawmill Brook at its confluence with Richard's Brook and Manthay Brook. Much of the fields contain hydric soils, and most of it is within the floodplain of these brooks. Wetland enhancement, rehabilitation, or restoration in these open fields represents a viable wetland mitigation option that would directly contribute to the watershed functions of Sawmill Brook in proximity to the impacts proposed at Cucia Park. The site also provides known habitat for the Eastern Box Turtle (*Terrapene c. carolina*) and Squarose Sedge (*Carex squarrosa*), State Species of Special Concern, and contains potential vernal pools.

- Wilcox Site: this area to the west of Boardman Lane is a City-owned parcel with active recreational trails, apparently used commonly by ATV traffic. While much of this site is upland forest, a significant area is dominated by red pine which is typically considered undesirable wildlife habitat. Portions of the red pine forest are situated within the buffer of a flooded forested wetland. Consideration of habitat improvements within this buffer by removing the red pine may provide some watershed function improvements to mitigate on-site impacts. However, developing compensation on this site would require removal of existing mature trees which may not be considered beneficial or an improvement to the site's existing conditions.

- Manthay Site: this site is a 33-acre parcel on the west side of Middle Street and south of Boardman Lane. Manthay Brook flows north through the site as a headwater stream enroute to Sawmill Brook. An agricultural field occurs along the east side of Manthay Book, which could offer wetland enhancement or creation opportunities of less than one acre. Much of the remaining portions of the site are forested with steep slopes. The forested cover and glacial till hillside conditions make much of this site unsuitable for creation of wetland mitigation or enhancement areas.

**Conclusion on Alternative Mitigation Sites**

Based upon a review of the available information, including limited site reviews, the Boardman Lane site appears to offer the most preferred conditions for providing compensatory mitigation that would directly offset the unavoidable functional impacts to wetlands from development of the Project at the Cucia Park site. The site is located within the same watershed as the Project site, and directly borders Sawmill Brook just upstream of the Project site. The site includes degraded wet meadow areas that directly border the stream system of Richards Brook and Sawmill Brook, which would benefit from enhancement and permanent protection. Two State-Listed Species of Special Concern, the Eastern Box Turtle and Squarrose Sedge, are documented to occur on the site and would also benefit from such protection. Sufficient acreage occurs on the site to achieve mitigation ratios in accordance with Corps guidance. Slope wetland conditions occur along the western edge of the grazed wet meadow that would be included in the mitigation plan. Upland conditions occur along the west side of the site that drain easterly to the wetlands bordering Sawmill Brook and Richards Brook; permanent protection of these uplands will ensure long-term protection and enhancement of the drainage from these uplands, contributing to the ecological integrity of the wet meadow floodplain and the bordering brook system.

## C.2 On-Site Mitigation Area

### C.2.1 Existing Wildlife Use

The Project site, Cucia Park, provides woodland habitat used by typical wildlife species. The U.S. Fish and Wildlife Service (USFWS) reported in January, 2009, that no federally-listed or proposed endangered or threatened species were known to occur on or in the vicinity of the site. Construction and operation at Cucia Park would permanently alter approximately 28 acres of woodland habitat, which would be removed to accommodate the AFRC facilities. Wildlife species occurring on the site are those commonly found in forested tracks in suburban areas of Connecticut. Wildlife species expected to occur include grey squirrel (*Sciurus carolinensis*), eastern cottontail (*Sylvilagus floridanus*), eastern chipmunk (*Tamius striatus*), white-tailed deer (*Odocoileus virginianus*), eastern bluebird (*Sialia sialis*), and woodpeckers (*Picoides* spp).

### C.2.2 Existing Soils

The United States Department of Agriculture (USDA) Natural Resources Conservation Services (NRCS, formerly the Soil Conservation Service) published the Soil Survey of Middlesex County as well as GIS soil data layers (NRCS, 2009). The soil survey, as well as digital data and site-specific investigations, identify the following three soil mapping units found in the vicinity of the site:

**Table 3: Existing Soil Types**

| Wetland Soils | Upland Soils |
|---|---|
| 6: Wilbraham and Menlo | 40B: Ludlow |
| | 87B, 87C, 88C: Wethersfield |
| | 306: Udorthents-Urban land Complex |

*Wilbraham and Menlo*: These series are nearly level to gently sloping soils in drainage ways or low-lying positions of till hills. They consist of poorly to very poorly drained loamy soils formed in subglacial till. This series is a hydric component of the other mapped units on the site.

*Ludlow silt loam 3 to 8 percent slopes*: This soil series can go from nearly level to strongly sloping soils on till plains, hills and drumlins. This is moderately well drained soils formed in loamy lodgment till. They are very deep to bedrock and moderately deep to densic contact.

*Wethersfield 0 to 35 percent slopes*: This series consists of very deep, well drained loamy soils formed in dense glacial till on uplands. The soils are moderately deep to dense basal till. They are nearly level to steep soils on till plains, low ridges, and drumlins. Permeability is moderately rapid or moderate in the solum and slow or very slow in the dense substratum.

*Udorthents-Urban land complex* (Ud): This complex consists of excessively drained to moderately well-drained soils that have been disturbed by cutting or filling, and areas that are covered by buildings or pavement. Slopes range from 0 to 15 percent. This is not a hydric or state inland wetland soil.

The soil series that describe each of the mapping units contain soil that formed from red parent material (RPM), thus the entire study area is considered a potential Problem Area for delineating federally-defined wetlands. Problem Areas are present when certain conditions exist that may make the application of wetland indicators of one or more of the parameters difficult to apply. RPM soils in the Central Lowlands formed from the Triassic-Jurassic sediments in the Connecticut River Valley. They are considered a potential Problem Area because the oxidized iron in RPM soils does not reduce in the same time frame as non-RPM soils under similar pH and Eh conditions, thus it takes longer for low chroma matrix colors ($\leq 2$) to form. To address this problem the National Technical Committee on Hydric Soils adopted the following guideline for determining if RPM soils are hydric: "In parent material with hue of 7.5YR or redder, a layer at least 10 cm (4 inches) thick with a matrix value and chroma of 4 or less and 2 percent or more redox depletions and/or redox concentrations occurring as soft masses and/or pore linings. The layer is entirely within 30 cm (12 inches) of the soil surface. The minimum thickness requirement is 5 cm (2 inches) if the layer is the mineral surface layer" (NRCS, 2006). This guideline was used in performing the investigation for wetlands within Cucia Park.

### C.2.3 Existing Vegetation

Upland habitats consist largely of woodlands, characterized by mixed-age deciduous trees with a relatively sparse understory of shrubs. The upland plant community consists mainly of red maple (*Acer rubrum*), sugar maple (*Acer saccharum*), red oak (*Quercus rubra*), sycamore (*Platanus occidentalis*), American beech (*Fagus grandifolia*), black oak (*Quercus velutina*), white oak (*Quercus alba*), black birch (*Betula lenta*), black cherry (*Prunus serotina*), musclelwood (*Carpinus caroliniana*), and red cedar (*Juniperus virginiana*) in the tree canopy. Witch hazel (*Hamamelis virginiana*), highbush blueberry (*Vaccinium corymbosum*) and hop hornbeam (*Ostrya virginiana*) are found in the shrub layer, and species including Virginia creeper (*Parthenocissus quinquefolia*), poison ivy (*Toxicodendron radicans*), goldenrod (*Solidago spp.*), and partridgeberry (*Mitchella repens*) were observed in the herbaceous layer.

### C.2.4 Surrounding Land Use

The on-site mitigation area is located in mixed land use and includes commercial and industrial business, and agriculture farm land as well as residential properties. Cucia Park is a 42-acre park land situated next to Interstate 91 on Smith Street and is zoned as industrial property and bordered by commercial development

### C.2.5 USFWS and/or NOAA Clearance Letter or Biological Opinion

Pursuant to U.S. Fish & Wildlife Coordination Act (16 U.S.C. §§ 661-667e, as amended) and Section 7 of the federal Endangered Species Act (ESA) (16 U.S.C §§ 1531-1544, as amended), the U.S. Fish and Wildlife Service (USFWS) reported in January, 2009, that no federally-listed or proposed endangered or threatened species were know to occur on or in the vicinity of the site.

### C.2.6 SHPO Cultural Resource Clearance Letter

The Cucia Park site is formerly the site of the MacDonnell Brick Company, closed in the 1960's. In 2008 the site was surveyed for cultural resources that revealed no artifacts and only the dumping of modern

trash and debris associated with the recent use of the park or with MacDonnell Brick (Environmental Assessment, April 2009).

## C.3 Off-Site Mitigation Area – Boardman Lane

### C.3.1 Existing Wildlife Use

The Boardman Lane site is used by a diverse mix of wildlife typical to upland forest, forested wetlands and agricultural fields in Connecticut, and similar to those listed in section C.2.1. In addition, the site provides habitat for two species listed as Species of Special Concern by the Connecticut Department of Environmental Protection (CDEP). During a Special Species Survey conducted on the site the Eastern Box Turtle and Squarrose Sedge were found and documented. Upland habitats on the site are composed of mixed hardwood/coniferous forests, hardwood forests, scrub/shrub areas, old agriculture fields, pastureland, and barnyard area.

### C.3.2 Existing Soils

Boardman Lane site includes Richards and Sawmill Brooks and their bordering floodplain wetlands; which contain soils generally identified as Wilbraham or Menlo silt loams and muck deposits. These floodplain wetlands extend over much of the eastern portion of the site, while an elevated landform rises over the western portion of the site, much of which is upland. The largest extent of the eastern portion of the property exhibited a soil profile consistent with the Wilbraham silt loam complex, a drainage or depression soil formed from basalt and/or sandstone and shale till:

- Stratum I: 0-5cm very dark gray (10YR 3/1) loamy humus (O Horizon)
- Stratum II: 5-25 cm dark grayish brown (10YR 4/2) silty loam (A Horizon)
- Strum III: 25+ cm reddish brown (5YR 5/4) silty loam with gravel (B Horizon)

Although this eastern half of the property is classified as wetlands, much of it (approximately 15 ac around the Noah Bacon Homestead) is only seasonally flooded and currently used as a horse pasture.

Soils to the west are more consistent with the Cheshire-Holyoke complex, 3 to 15 percent slopes, very rocky. Specifically, soils are closer in kind to Holyoke soils, loamy eolian ridge top deposits laid atop melt-out till derived from basalt and/or sandstone and shale (USDA 2008):

- Stratum I: -15 cm very dark gray (10YR 3/1) loamy humus (O Horizon).
- Stratum II: 15-25 cm light yellowish brown (10YR 6/4) silty loam (A Horizon) over sandstone bedrock.

Soils in the western half of the site were found to be excessively eroded and while bedrock was encountered at 30 cm below ground surface in some test borings on the gradual eastern ridge slope; it was often found exposed on the surface or directly under the humus throughout the ridge tops. Surfaces along these ridge tops were strewn with weathered sandstone cobbles as well as trap rock. In the course of the survey, two isolated finds (IF) were identified:

- Stratum I: 0-15 cm light yellowish brown (10YR 6/4) sandy loam and gravel (A Horizon)
- Stratum II: 15+ cm light brown (7.5YR 6/4) sandy loam with gravel and cobbles (B Horizon)

### C.3.3 Existing Vegetation

The Boardman Lane site consists of forested, scrub/shrub, and emergent wetlands and upland areas of mixed hardwood/coniferous forests, hardwood forests, scrub/shrub areas, old fields, pasturelands, and barnyard areas. Forested areas contain species including American beech, white oak (*Quercus alba*), northern red oak (*Q. rubra*), tulip poplar (*Liriodendron tulipifera*), sugar maple (*Acer saccharum*), green ash *(Fraxinus pennsylvanica)*, American elm *(Ulmus americana),* eastern hemlock (*Tsuga canadensis*), red maple *(Acer rubrum)*, swamp white oak (*Q. bicolor*), and pin oak (*Q. palustris*) in the canopy. Understory trees include hop hornbeam (*Ostrya virginiana*), red maple, and black birch (*Betula lenta*). Common shrubs are arrow-wood (*Viburnum dentatum*), speckled alder (*Alnus incana*), honeysuckle (*Lonicera* sp.), silky dogwood *(Cornus amomum)*, gray dogwood (*Cornus racemosa),* spicebush (*Lindera benzoin*), and common winterberry (*Ilex verticillata*). The Squarrose Sedge is present in forested areas along the site's western border as well as in forested areas adjacent to Richards Brook to the east. Vegetation management has historically occurred in much of the low-lying floodplain area and pasture land centrally located on the site (e.g., tree and brush removal).

### C.3.4 Surrounding Land Use

The proposed off-site mitigation area is located on a parcel of agricultural land within a continuum of open space and undevelopable land to the north. Forested uplands are located to the west while developed commercial property is located to the east. Residential property is located to the south bordering Boardman lane. Portions of this property, as well as properties to the north, are mapped in the Natural Diversity Data Base and provide essential habitat for the two Species of Special Concern. The proposed mitigation area will be protected from future development through a conservation easement or deed restriction, thereby protecting the habitats and supporting landscapes and providing for the long-term connectivity of the surrounding open space areas.

### C.3.5 USFWS and/or NOAA Clearance Letter or Biological Opinion

As mentioned above the Boardman Lane site provides habitat for listed species of Special Concern and has been identified by CDEP and mapped as Natural Diversity Data Base habitat. A Special Species Survey conducted in October 2008 and confirmed the presence of the Eastern Box Turtle and the *Squarrose Sedge*. The proposed preservation and conservation restrictions for the site mitigation area will provide species protection. Therefore, no detrimental impact to this habitat is expected to result from the proposed wetland mitigation plan.

### C.3.6 SHPO Cultural Resource Clearance Letter

A Cultural Resources Survey, conducted at the Boardman Lane site, found the site contains an architectural resource within its boundaries and also two resources within its viewshed. The Bacon Homestead (218 Boardman Lane) is a circa 1735-1770 Center-Chimney Colonial farmhouse. There are also two historic barns on the property, constructed at a later date. According to the associated Connecticut Historic Resources Inventory Form, the house has "retained its original usage and relationship to its property" for over two centuries. The two cultural resources within the immediate viewshed of the Boardman Lane site include a circa 1890 Gable-Front house located at 19 Bell Street, and the Old Westfield Cemetery. The Old Westfield Cemetery was not found to have any exceptional historical or architectural significance (Environmental Assessment, April 2009). Appendix G provides copies of letters from the Connecticut Commission on Culture and Tourism's SHPO. The proposed land preservation for compensatory mitigation will not include any historic features.

## C.4 Proposed Mitigation

This WMP provides on-site and off-site mitigation measures as compensation for the 1.5 acres of wetland fill. These proposed mitigation measures have been designed and sited to replace the lost functions and values of the impacted wetlands. On-site mitigation will include buffer plantings between the Project and the adjacent wetlands to help screen wetlands areas from the proposed training facility, as well as control of invasive plants over the undeveloped portions of the site. Off-site mitigation will include the permanent protection of 40-acres of the Boardman Lane site, including enhancement of a 14-acre grazed wet meadow, invasive species control, and grassland management in a manner designed to protect the Eastern Box Turtle use of the site (Appendix C).

### C.4.1 On-Site Mitigation

#### C.4.1.1 Size and Type of Mitigation

On-site mitigation will include 0.75 acres of wetland and upland buffer enhancement plantings adjacent to the proposed impact areas and 22 acres of invasive vegetation species control and management. In addition, stormwater from I-91 that currently is shed over the Cucia Park site in an erosive manner will be treated in a new conveyance system to minimize this erosion. Finally, stormwater management for the proposed development will include a number of best management practices and Low Impact Development measures to minimize the effects of the Project on the adjacent wetlands and watercourses.

#### C.4.1.2 Functions and Values Replaced

As previously described, a majority of the wetlands to be impacted on the site have been identified as historically affected (and in some cases, created) by previous earth work and soil compaction associated with the previous brick manufacturing company, sewer line construction and installation, trolley line use and a maintained utility line right-of-way. Wetland impacts on the site will primarily affect wildlife habitat, groundwater discharge, and water quality functions. Proposed on-site measures of buffer plantings and invasive species control are intended to mitigate for the habitat functional impacts. Stormwater management and project sitting and design measures are intended to mitigate the impacts to water quality treatment and groundwater discharge to the extent practicable.

### C.4.2 Off-Site Mitigation – Boardman Lane

#### C.4.2.1 Size and Type of Mitigation

The compensatory mitigation measures at the Boardman Lane site include the permanent preservation of a 40-acre area consisting of approximately 17 acres of wetland and 23 acres of upland. The Army is purchasing this 40-acre area and will ensure it is permanently protected.

Within the 40-acre area, an existing 14-acre grazed wet meadow would be enhanced via grassland management (10 acres) and riparian zone plantings (4 acres) to improve the habitat value and maximize the capacity of this area to protect the adjacent Richards Brook and Sawmill Brook. Invasive species control will also be implemented for a five-year period over this area.

#### C.4.2.2 Functions and Values Replaced

These proposed off-site mitigation measures have been designed and located to replace the lost functions and values of the impacted wetlands by providing permanent preservation and enhancement of wetland and upland habitat, wet meadow enhancement and habitat management. The preservation of land at the Boardman site alone provides a compensation ratio of over 26:1. The location of the currently degraded wet meadow along Sawmill Brook provides a direct nexus to the functional impact at the Cucia Park site; enhancement, rehabilitation, and permanent protection of this area will directly off-set habitat and water quality impacts attributed to the Project development at Cucia Park.

### C.4.3 Construction Oversight and Timing

A wetland scientist will be on-site to monitor construction, invasive species control, and planting activities of both the on-site and off-site wetland mitigation areas to ensure compliance with the mitigation plan and to make adjustments when appropriate to meet mitigation goals.

Compensatory mitigation will be initiated not later than 90 days after project initiation and completed no later than one year after the permitted wetland impacts occur unless the USACE-approved mitigation plan specifically states otherwise and compensation for the temporal impacts are appropriate. If the impact will occur before the mitigation is constructed, the mitigation plan will address temporal losses. In either of the above situations, the permittee will work with the USACE to develop financial assurances for the mitigation construction and monitoring, including remedial actions.

The necessary work would involve mowing, one-time light tilling and seeding with a native meadow seed mixture. Such activities would be similar to the regular tilling and planting of the field for agricultural cultivation, and are also similar to certain plantings of native species. Appropriate erosion and sedimentation control measures for the work in buffer areas will be included in the Project erosion control plan.

### C.4.4 Responsible Parties

The U.S. Army will be designated as the official responsible party, and a party acceptable to the Corps Regulatory Division will be responsible for planning, accomplishing, and maintaining each aspect of the Project for both the on-site and off-site mitigation areas.

### C.4.5 Appropriate Financial Assurances

The proposed Project and mitigation will be funded by the U.S. Government. Due to the nature of the Project, it is assumed that no specific financial assurance is required.

### C.4.6 Potential to Attract Waterfowl and other Bird Species that Might Pose a Threat to Aircraft

All proposed mitigation is to occur in areas that are currently heavily vegetated. There is no potential to attract additional waterfowl and other bird species that might pose a threat to aircraft. The remediation area is not an airport or of concern to the Federal Aviation Administration.

# D. Hydrology

Both the Cucia Park and Boardman lane sites border Sawmill Brook, a sub-watershed to the Mattabesset River. From a broader perspective, both sites are located within the Lower Connecticut River Watershed. This watershed is the largest watershed in Middlesex County, covering almost the entire county.

***On-site Mitigation Area Hydrology***

Cucia Park is bordered by Sawmill Brook on the western side. Sawmill Brook is three miles long and flows in a northerly direction. In 2008 the Brook was listed as impaired in the Connecticut Integrated Water Quality Report due to violations of Escherichia coli from an unknown source (CTDEP, 2008e). Sawmill Brook is a wooded lowland brook with deep pools and riffles with a considerable aesthetic quality. This waterway is tributary to the Mattabessett River. A shallow water-table is evident at mid-slope where groundwater seeps up to the soil surface along most of the site's central areas. These seeps provide hydrology to pools, wetlands, and a man-made pond found in this region.

***Off-site Mitigation Area Hydrology***

Boardman Lane site is bordered by Richards Brook, a perennial stream, along the eastern property boundary. Richards Brook flows north to south to the confluence of Sawmill Brook at the southeast corner of the site. Richards Brook is situated at the lowest elevation of the site, 92 feet. Base flood elevation is between 93 and 95 feet (NAVD88). Emergent wetlands, forested wetlands and scrub/shrub wetlands are hydrologically contiguous with Richards Brook and Sawmill Brook within the property boundary. In addition, a few seasonally flooded forested wetlands occur in depressional areas surrounded by upland forests along the site's western portions. These wetlands are influenced by a shallow seasonally perched water table.

## E. Grading Plan

Grading of the undisturbed soils at the proposed on-site mitigation area is expected to be minimal. A majority of the plants to be installed will be planted within undisturbed wetland or upland areas adjacent to impact areas. Any areas that are disturbed will be graded to match the existing grades of the adjoining areas.

No grading will occur at the Boardman Lane site.

## F. Topsoil

The off-site mitigation area will not require additional topsoil. It is not anticipated that on-site enhancement plantings will require additional topsoil and it is unlikely the plantings will generate an excessive amount of topsoil that will require storage. However; in the event that additional topsoil is required for either on-site or off-site mitigation areas these soils will be stockpiled separately and either used for final grading and planting or disposed within an upland outside of any wetland buffer zone. As suggested by the USACE's *Guidance of the New England District Mitigation Checklist*, the following measures will be implemented by the contractor when stockpiling topsoil:

- Prior to stockpiling topsoil material contractors will seek approval from property owners or site engineer for appropriate locations within uplands to store and stockpile materials;
- Avoid stockpiling compost organics in piles over 4 feet in height;
- Protect stockpiles from surface water flow and contain them with haybales and/or siltfence;
- Cover stockpiles with a material that prevents erosion (tarps, erosion control mat, or straw and temporary seed, depending on the size and duration of storage);
- Inspect and repair protection measures listed above regularly (weekly), as well as prior to (to the extent possible) and after storm events; and
- Maintain moisture in the soils during droughty periods.

The control of invasive species seeds and rootstock that may be present within topsoil is discussed in Section J of this report.

# G. Planting Plan

On-site planting plan includes a variety of plantings and seed mixes to stabilize disturbed and/or exposed soil in a timely fashion and to direct and ensure the establishment a variety of wetland and upland plant communities within the buffer enhancement area described on Figure 3 in Appendix A and Mitigation Plans in Appendix C. It is the goal of this on-site mitigation effort to achieve at least 75 percent coverage of the surface of the disturbed area within two growing seasons. If at the time of final grading soil temperature and site conditions are not appropriate for transplantation and seed germination, the mitigation area will be stabilized with 2 to 4 inches of straw mulch and subsequently planted at an appropriate time.

At the off-site Boardman Lane location, the planting plan includes a variety of woody species plants over a 4-acre portion of the overgrazed agriculture fields. Trees and shrubs proposed for the area were selected based on current hydrologic regime and existing plant communities of the adjacent woodlands and meadows and are described in Section C.3.3. Similar to the on-site plan, it is the goal of this off-site mitigation effort to achieve at least 75 percent coverage of the surface of the planting area within two growing seasons. Plantings will occur when site conditions are appropriate for transplantation.

Plantings will be accomplished through the use of plant stocks chosen for their compatibility with the local environment as well as the various hydrologic regimes within each mitigation area. Commercially available plants and seeds will be utilized to accomplish this goal. The planting plans have been designed to provide a variety of wetland and upland plant species to promote species richness, enhance wildlife edge habitat, and improve the aesthetics of the on-site wetland system.

The table at the end of this section provides the composition of the proposed wetland seed mix that is to be applied within the proposed mitigation area at the on-site location, Cucia Park. Only plant materials native and indigenous to the region will be used. Species not specified in the mitigation plan will not be used without written approval from the Corps. No cultivars of native species shall be used. The following notes further clarify the proposed planting programs:

***On-site Mitigation Area (Cucia Park Site)***

1. A wetland seed mix will be hand broadcast or hydro-seeded at appropriate rates throughout appropriate areas of the wetland and upland buffer enhancement areas to create an herbaceous groundcover. A conservation grass seed mix will be distributed along the upland areas of the mitigation area, where the slopes grade into the natural surroundings. Acceptable wetland seed mixes include New England Wet Mix as shown in following Table 3, and an upland seed mix, New England Conservation Wildlife Mix as shown in following Table 4, can be provided by New England Wetland Plants, Amherst, MA. Comparable alternative sources may be approved by the wetland scientist. Following seeding, mulch will be evenly dispersed over the graded areas as a loose layer of straw approximately 2 inches in thickness.

2. In addition to herbaceous seeding referenced above, woody plantings are proposed within the wetland and upland buffer enhancement areas. Mulch will be used around woody plantings in an 18" diameter

circle approximately 2" deep. These plantings are shown on the attached tables and planting plans in Appendix C.

3. The contractor will be required to maintain adequate moisture in the wetland mitigation area for the first two growing seasons following planting to support the plantings (>75% survival is required).

***Off-site Mitigation Area (Boardman Site)***

1. Only woody plantings are proposed within the mitigation areas (riparian enhancement). Mulch will be used around woody plantings in an 18" diameter circle approximately 2" deep. These plantings are shown on the attached tables and planting plans.

2. The contractor will be required to maintain adequate moisture in the wetland mitigation area for the first two growing seasons following planting to support the plantings (>75% survival is required).

To ensure the success of the proposed enhancement and mitigation plan, a qualified wetland scientist would make certain that the necessary hydrologic regimes are achieved, and that the benefits of the proposed plan are maximized. During planting, a qualified professional may relocate up to 50 percent of the plantings if as-built conditions would pose an unreasonable threat to the survival of plantings installed according to the mitigation plan. The plantings will be relocated to locations with suitable hydrology and soils and where appropriate structural context with other planting cells can be maintained.

To reduce the immediate threat and minimize the long-term potential of degradation, the species included on the "Invasive and Other Unacceptable Plant Species" list in Table 4 of the New England District Mitigation Plan Guidance shall not be included as planting stock in the overall Project (United States Army Corps of Engineers – New England District, January 2007). Only plant materials native and indigenous to the region shall be used. Species not specified in the mitigation plan shall not be used without prior written approval from the Corps.

**Table 3.**
**2009 New England Wetmix (wetland seed mix)**

| Botanical Name | Common Name | Ind. |
|---|---|---|
| *Alisma plantago-aquatica* | Mud Plantain | OBL |
| *Asclepias incarnata* | Swamp Milkweed | OBL |
| *Aster novi-belgii* | New York Aster | FACW+ |
| *Bidens cernua* | Nodding Bur Marigold | OBL |
| *Carex comosa* | Bristly/Cosmos Sedge | OBL |
| *Carex crinita* | Fringed Sedge (Nodding) | OBL |
| *Carex lupulina* | Hop Sedge | OBL |
| *Carex lurida* | Lurid Sedge (Shallow) | OBL |
| *Carex scoparia* | Blunt Broom Sedge | FACW |
| *Carex vulpinoidea* | Fox Sedge | OBL |
| *Eupatorium maculatum* | Spotted Joe Pye Weed | FACW |
| *Eupatorium perfoliatum* | Boneset | FACW |
| *Glyceria Canadensis* | Rattlesnake Grass | OBL |
| *Glyceria striata* | Fowl Mannagrass | OBL |
| *Juncus effuses* | Soft Rush | FACW+ |
| *Mimulus ringens* | Square Stemmed Monkey Flower | OBL |
| *Onoclea sensibilis* | Sensitive Fern | FACW |
| *Scirpus atrovirens* | Green Bulrush | OBL |
| *Scirpus cyperinus* | Wool Grass | FACW |
| *Scirpus validus* | Soft Stem Bulrush | OBL |
| *Verbena hastate* | Blue Vervain | FACW |

**Table 4.**
**2009- New England Conservation/Wildlife Mix**

| Botanical Name | Common Name | Ind. |
|---|---|---|
| Andropogon gerardii | Big Bluestem | FAC |
| Asclepias syriaca | Common Milkweed | FACU- |
| Aster novae-angliae | New England Aster | FACW- |
| Chamaecrista fasciculata (Cassia f.) | Partridge Pea | FACU |
| Desmodium canadense | Showy Tick Trefoil | FAC |
| Elymus virginicus | Virginia Wild Rye | FACW- |
| Eupatorium maculatum | Spotted Joe Pye Weed | FACW |
| Euthamia graminifolia (Solidago g.) | Grass Leaved Goldenrod | FAC |
| Festuca rubra | Creeping Red Fescue | FACU |
| Heliopsis helianthoides | Ox Eye Sunflower | UPL |
| Panicum clandestinum | Deer Tongue | FAC+ |
| Panicum virgatum | Switch Grass | FAC |
| Rudbeckia laciniata | Tall/Green Headed Coneflower | FACW |
| Schizachyrium scoparium | Little Bluestem | FACU |
| Solidago juncea | Early Goldenrod | |
| Sorghastrum nutans | Indian Grass | UPL |

# H. Coarse Woody Debris and Other Features

If directed by the Corps Regulatory Division, a supply of dead and dying woody debris shall cover at least 4% of the ground throughout the mitigation sites and along the banks of the existing Brooks. The intended habitat of the Boardman Lane wet meadow as grassland that will be periodically mowed may preclude the use of coarse woody debris. These materials shall not include any invasive species as listed by the Corps. The proposed development will require the clearing and cutting of mature trees, logs and stumps, and other woody debris at different stages of decomposition throughout the development area.

# I. Erosion Control

Implementation of erosion control measures will be initiated in compliance with the construction mitigation measures. During the construction process the erosion control barriers will be maintained on a regular basis and remain in place until the disturbed area is stabilized. Erosion control barriers will also be installed along wetland enhancement boundaries until the grading and plantings within the areas are complete. Extra erosion control materials will be kept on-site to be used for any maintenance of the installed erosion control barriers.

Temporary devices and structures to control erosion and sedimentation in and around enhancement sites will be properly maintained at all times. These devices and structures will be disassembled and properly disposed of as soon as the site is stable but no later than November 1 three full growing seasons after the planting. Sediment collected by these devices will be removed and placed upland in a manner that prevents its erosion and transport to a waterway or wetland.

# J. Invasive and Noxious Species

### J.1 Management of Potential Invasive Species

It is acknowledged that soils and sediments disturbed by projects are very susceptible to infiltration by undesirable species. Because of the nature of the Project, there is a higher risk of invasive and noxious species infiltration. Invasive species such as phragmites already inhabit the areas at the Cucia Park site, and was noted growing along the sewer main that traverses the site. In addition to those species located at Cucia Park, other invasive species included on the "Invasive and Other Unacceptable Plant Species" list in Table 4 of the New England District Mitigation Plan Guidance have been detected along Richards Brook, located in the eastern portion of the Boardman Lane site, and the adjoining wetlands include, but are not limited to:

- Common reed (*Phragmites australis*)
- Purple Loosestrife (*Lythrum salicaria*)
- Autumn olive (*Elaeagnus* spp.)
- Oriental Bittersweet (*Celastrus orbiculatus*)
- Honeysuckle (*Lonicera tataria* and *L. morrowii*),
- Multiflora Rose (*Rosa multiflora*),

To manage the threat of these species, and potentially other invasive plants, establishing themselves within the restored/enhanced wetlands, an invasive species monitoring and control plan will be implemented. There are no known constraints that influence the control plan. The monitoring and control program will incorporate, as necessary, both manual and chemical means to control and eradicate any species found within the restored/enhanced wetlands or areas immediately adjacent to them.

A qualified wetland scientist will inspect the mitigation area for invasive species for at least five years. If invasive species are found, the necessary control measures will be developed and implemented. For instance, a treatment of Rodeo (or similar product) would likely be used to eradicate any communities of phragmites, which may spread to the disturbed and/or enhancement areas. Purple loosestrife could be removed by physical means. Regardless, an effective treatment plan will be tailored to address problems identified during the inspections and implemented.

### J.2 Long Term Management of Existing Invasive Species

Removal of invasive species in the wetland areas and habitat enhancement areas shall be performed to address potential problems with invasive species. Native plant communities with wildlife habitat benefits shall be maintained in the wetlands and enhancement areas. Invasive species were identified based on information prepared by the CT DEP and the Massachusetts Invasive Plant Advisory Group (MIPAG 2005). Control methods will involve the use of physical and mechanical control methods and chemical or biological controls where appropriate. Chemical control methods will be used to deal with heavy infestations of invasive species. Herbicide applications shall be used according to state and federal guidelines. All herbicide treatments shall be applied by a licensed applicator.

#### a. Shrubs

Removal of non-native shrubs, including exotic bush honeysuckles, multiflora rose, and autumn olive from the wetlands and habitat enhancement areas shall be performed by a licensed landscape professional in agreement with accepted vegetation control practices. Stands of glossy buckthorn (*Frangula alnus* = *Rhamnus frangula*) will also be treated should this non-native, invasive shrub to small tree be found on the sites.

Dense thickets of multiflora rose shade out more desirable native species in the ground layer and reduce species diversity. Infestation of the non-native bush honeysuckles reduce species diversity due to shading influences and the release of allelopathic root toxins which inhibit the growth of other more desirable species. The control of non-native shrubs in the wetlands and habitat enhancement areas will use physical and mechanical cutting measures and/or hand pulling to remove seedlings and small plants with shallow root systems. An effective method for controlling exotic honeysuckles, multiflora rose, autumn olive, and possibly glossy buckthorn is hand pulling young plants (TNC 2005a, TNC 2005b, and IPSAWG 2006a). These treatments are most effective in the spring when the soil is loose and moist and the infestation is light.

The long-term control of invasive shrubs may require repeated cuttings to control new stem growth if the control methods are limited to physical and mechanical measures. Herbicide applications are proposed to treat heavy infestations. The application of a systemic herbicide to the cut stumps is recommended in conjunction with the cutting treatment for optimum results. Glyphosate solutions applied directly to the leaves or freshly cut stumps and stems are effective in controlling the spread of the non-native shrubs (TNC 2005a, PAC 2005a). Herbicide treatments shall be applied by a state licensed applicator.

Informational fact sheets for the control of non-native, invasive shrubs (multiflora rose, exotic bush honeysuckles, Russian and Autumn olive, and glossy buckthorn) are included in the Appendix D

### b. Vines

Infestations of Oriental bittersweet (*Celastrus orbiculatus)* degrade natural plant communities and reduce species diversity. If Oriental bittersweet vines are found in the habitat enhancement areas or invasive species control areas removal methods includes a combination of cutting the stems at ground level and hand pulling. Young vines may be hand pulled and the collected material placed in plastic bags for removal to a landfill for disposed. All root material must be removed for this method to be effective. Cutting treatments for controlling the spread of Oriental bittersweet vines are most effective in the spring and late summer and/or the early fall, but repeated cuttings are necessary because the plants will sprout back from the base. Physical controls in combination with herbicide applications are required for the eradication of this invasive vine.

The application of a systemic herbicide directly to the cut stem is an effective treatment in the control of Oriental bittersweet vines (PAC 2005c, IPSAWG 2006). A 25% glyphosate solution mixed with water is generally effective when the application is done when the temperature is above 50° F for numerous days. The application treatment will be performed under the direction of a licensed applicator. Controlling the spread of Oriental bittersweet vines is proposed to promote the development of native species in the open field and meadow habitats. Informational fact sheets with recommended methods for the control of Oriental bittersweet are included in the Appendix D.

### c. Invasive Herbaceous Species

The control of non-native, invasive herbaceous species will be implemented under the Plan to foster the development of native species. Target species currently include purple loosestrife and common reed. Light infestations of purple loosestrife may be removed by hand pulling or grubbing early in the season. This treatment should be done before the plants flower and set seeds. Heavy infestations of purple loosestrife may be controlled by chemical methods using a glyphosate herbicide application applied late in the season when the plants are preparing for dormancy. Rodeo® is an approved herbicide recommended for use in wetland habitats and in areas near to open water. Biological controls using the imported beetles (*Galerucella* sp) have been effective as a control agent for purple loosestrife and may be appropriate for use at the site.

Control methods for common reed will include physical controls and chemical controls where such treatments would be effective. Annual cuttings before the plants flower in the end of July are reportedly effective in controlling the spread of common reed (IPSAWG 2007). Cutting operations may be required over an extended period of years for this practice to be effective if herbicide applications are not used. A glyphosate herbicide treatment in conjunction with numerous years of mowing was found to be effective in controlling the spread of common reed (CT DEP 2007).

The enhancement areas will be monitored for "Invasive and Other Unacceptable Plant Species as referenced in the USCOE (2007a) guidance document for mitigation plans in New England. Invasive species in the compensatory wetland mitigation area will be addressed under an invasive species management plan. Native trees, shrubs, and herbaceous species selected for the riparian enhancement area shall be selected from a list of species found commonly in vegetated wetlands in the region. Control methods for removing invasive herbaceous species will use accepted treatments.

## K. Off-Road Vehicle Use

It is not anticipated that the mitigation and enhancement sites will be subjected to incidences of off-road vehicle use. The sites will maintain operation/maintenance plans to ensure such activities do not occur.

# L. Preservation

The proposed mitigation plan includes the implementation of a 40-acre conservation restriction to permanently protect from future development areas of forested wetlands, emergent marsh, stream banks and forested uplands found on the property. In addition, the mitigation plan includes a management plan for mowing in a manner compatible with box turtle use. Within 90 days of the issuance of the Corps' authorization of the proposed Project activities, the permittee shall submit to the Corps a draft of the conservation restriction or deed restriction. Within 30 days of the date the Corps approves this draft document in writing, the permittee shall execute and record the aforementioned document with the Registry of Deeds for the City of Middletown and the State of Connecticut. A copy of the executed and recorded document will be sent to the Corps within 90 days of the date it is recorded. The conservation restriction or deed restriction shall enable the area to be protected in perpetuity from any future development.

# M. Monitoring Plan

***On-site Monitoring (Cucia Park)***

The applicant will monitor the on-site enhancement area for a period of five years. For each of the first five full growing seasons following establishment of the on-site enhancement area the site will be monitored and annual monitoring reports submitted. Observations will occur at least two times during the growing season - in late spring/early summer and again in late summer/early fall. Annual reports will be completed and shall be submitted to the New England District Regulatory Division Policy Analysis and Technical Support Branch no later than December 15 of the year being monitored. Failure to perform the monitoring and submit the monitoring reports constitutes permit non-compliance. A self-certification form will be completed, and signed as the transmittal coversheet for each annual monitoring report and it will indicate the permit number and the report number (transmittal forms are provided in Appendix H).

The yearly reports will follow the same protocol as described in Off-site Monitoring (Boardman Site) below.

***Off-site Monitoring (Boardman Site)***

The applicant will monitor the off-site forested/shrub riparian enhancement area for a period of five to ten years. For the growing season of years 1, 2, 3, 5, 7, and 10 following plantings of the enhancement area, the site shall be monitored. Observations will occur at least two times during the growing season – in late spring/early summer and again in late summer/early fall. Annual monitoring reports will be completed and shall be submitted electronically New England District Regulatory Division Policy Analysis and Technical Support Branch no later than December 15 of the year being monitored. Each report coversheet shall indicate the permit number and the report number. Observations will occur at least two times during the growing season in late spring/early summer and again in late summer/early fall.

The reports will answer the following success-standard questions and shall address in narrative format the items listed after the questions. The reports shall also include the monitoring-report appendices listed below. The first year of monitoring shall be the first year that the site has been through a full growing season after completion of construction and planting. For these special conditions, a growing season starts no later than May 31.

The reports shall be submitted in Portable Document Format (e.g. Adobe PDF) and will be concise and effectively provide the information necessary to assess the status of the compensatory mitigation Project. The report will follow a 10-page maximum report format per site, with a self-certification form transmittal provided in Appendix H. The report will provide information framed within the following format.

1. Project Overview (1 page).
2. Requirements (1 page): a list of monitoring requirements and performance and/or success standards, as specified in the approved mitigation plan and special conditions of the permit, and evaluated whether the compensatory mitigation project site is successfully achieving the approved performance and/or success standards or trending toward success.
3. Summary Data (maximum of 4 pages): summary data will be provided to substantiate the success and/or potential challenges associated with the compensatory mitigation project. Photo documentation will be provided to support the findings and recommendations, and placed in Appendix.
4. Maps: maps will be provided and show the location of the compensatory mitigation site relative to other landscape features, habitat types, locations of photographic reference points, transect, sampling data points, and/or other features pertinent to the mitigation plan. In addition, the submitted maps will clearly delineate the mitigation site boundaries to assist in proper locations for subsequent site visits. Each map or diagram will fit on a standard 81/2 x 11 sheet of paper and include a legend and the location of any photos submitted for review.
5. Conclusion (1 page): a general statement describing the conditions of the compensatory mitigation project will be included. If performance or success standards are not being met, a brief discussion of the difficulties and potential remedial actions proposed, including a timetable will be provided.

The following language will be included in the narrative portion of the mitigation plan:

**Notification of Construction Completion**

Within 60 days of completing the mitigation project (riparian enhancement) the applicant will submit a signed letter to the Corps, Policy Analysis and Technical Support Branch, specifying the date of completion of the enhancement work. If the mitigation work is initiated in, or continues throughout the year, but is not completed by December 31 of any given year, the permittee will provide the Corps, Policy Analysis and Technical Support Branch, a letter providing the date mitigation work began and the work completed as of December 31. The letter will be sent no later than January 31 of the next year. The letter will include the Corps permit number.

**Monitoring Report Guidance**

For each of the first full growing seasons following construction of the mitigation site, the site will be monitored and annual reports submitted. Observations will occur at least two times during the growing season in late spring/early summer and again in late summer/early fall. Each annual monitoring report will be submitted to the Corps, Regulatory Division, Policy Analysis and Technical Support Branch, no later than December 15 of the year being monitored. Failure to perform the monitoring and submit monitoring reports constitutes permit non-compliance. A self-certification from will be completed and signed as the transmittal coversheet for each annual monitoring report and will indicate the permit number and the report number (Monitoring Report 1 of 5 for example). The reports will address the following success standards in the summary data section and will address the additional items noted in the monitoring report requirements, in the appropriate section. The reports will also include the monitoring-report appendices listed below.

The first year of monitoring will be the first year that the site has been through a full growing season after completion of planting. A growing season starts no later than May 31. However, if there are problems that need to be addressed and if the measures to correct them require prior approval from the Corps, the permittee will contact the Corps by phone (1-800-343-4789 in CT) or letter as soon as the need for corrective action is discovered.

Remedial measures will be implemented – at least two years prior to the completion of the monitoring period – to attain the success standards described below within two growing seasons after completions of construction of the mitigation site. Should measures be required within two years of the end of the monitoring period, the monitoring period will be extended to ensure two years of monitoring after the remedial work is completed without written approval from the Corps.

At least one reference site adjacent to or near each enhancement area will be described and shown on the locus map.

**Success Standards**

Success shall be measured as follows:

1. Does the site have the hydrology to support the enhancement plantings and design? What percentage of the site is meeting project hydrology levels? Areas that are too wet or too dry will be identified along with suggested corrective measures.
2. Are the proposed vegetation diversity and/or density goals for woody plants from the plan are met?
3. a) Do the enhancement areas have at least 80% areal cover by noninvasive species (See Table 4 in Appendix H)?
   b) Planned scrub-shrub and forested cover types have at least 60% cover by noninvasive hydrophytes, of which at least 15% are woody species?

For the purpose of this success standard, invasive species of hydrophytes are:

Cattails -- *Typha latifolia, Typha angustifolia, Typha glauca*;
Common Reed -- *Phragmites australis*;
Purple Loosestrife -- *Lythrum salicaria*;
Reed Canary Grass -- *Phalaris arundinacea*; and
Buckthorn – *Rhamnus frangula*.

4. Common reed, purple loosestrife, Russian and Autumn olive, buckthorn, Japanese knotweed and multiflora rose plants at the mitigation/enhancement sites are being controlled.
5. Area soils, substrate and enhancement features within and adjacent to the mitigation/enhancement sites are stable?

**Monitoring Report Narrative Requirements**

The following Items shall be addressed in narrative discussion:

- Highlighted summary of problems which need immediate attention (e.g., severe invasive species problem, serious erosion, major losses from herbivory, etc.). This should be at the beginning of the report and highlighted in the project overview and in the self-certification form provided in Appendix H.

- A copy of the permit mitigation special conditions and summary of the mitigation goals.

- Address success standards achievement and/or measure to attain the standards.

- Dates work began and ended.

- Describe the monitoring inspections that occurred since the last report.

- Soils data, commensurate with the requirements of the soils portion of the 1987 Corps Delineation Manual (Technical Report Y-87-1) New England District data form, should be collected after construction and every alternate year throughout the monitoring period. If monitoring wells or gauges were installed as part of the project, this hydrology data should be submitted annually.

- Concisely describe remedial actions done during the monitoring year to meet the five success standards – actions such as removing debris, replanting, controlling invasive plant species (with biological, herbicidal, or mechanical methods), applying additional topsoil or soil amendments, adjusting site hydrology, etc. Also describe any other remedial actions done at each site.

- Report the status of all erosion control measures on the compensation site(s). Are they in place and functioning? If temporary measures are no longer needed, have they been removed?

- Give visual estimates of (1) percent vegetative cover for each site and (2) percent cover of the invasive species listed under Success Standard No. 2, above, at each site.

- What fish and wildlife use the site(s) and what do they use it for (nesting, feeding, shelter, etc.)?

- By species planted, describe the general health and vigor of the surviving plants, the prognosis for their future survival and a diagnosis of the cause(s) of morbidity or mortality.

- What remedial measures are recommended to achieve or maintain achievement of the four success standards and otherwise improve the extent to which the enhancement site(s) replace the functions and values lost because of project impacts?

**Monitoring Report Appendices**

Appendix A - An as-built plan showing topography to 1-foot contours, inlet/outlet structures and the locations and extent of the design plant community types (e.g. forested/shrub-scrub). Within each community type the plan shall show the species planted, but not necessary to illustrate the precise location of each individual plant. There should be a soil profile description and the actual measure organic content of the topsoil to be included in the first monitoring report.

Appendix B - A vegetation species list of volunteers in each plant community type. The volunteer species list will include those that cover at least 5% of their vegetation layer.

Appendix C - Representative photos of each mitigation/enhancement site take from the same locations for each monitoring event. Photos will be dated and clearly labeled with the direction from which the photo was taken. The photo sites will be indentified on the appropriate maps.

## M.1 Wet Meadow Grassland and Eastern Box Turtle Management

The Boardman Lane site is documented to support the Eastern Box Turtle and the Squarrose Sedge, two Connecticut Listed Species of Special Concern. In addition, the open wet meadow in the lower portion of the site offers the potential for enhanced grassland habitat that could aid in the support of these two state-listed species as well as offer ideal grassland habitat for other species.

Eastern Box Turtles inhabit a variety of habitats including old fields, wet and dry meadows, deciduous woodlands and forest edges with dappled sunlight, thickets, marshes, and bogs (CT DEP 2008, Ernst et al. 1994, Klemens 1993). Power line corridors, logged-over woodlands, and well-drained forest bottomlands also offer highly favorable habitat for this state-listed reptile. Although generally terrestrial, Eastern Box Turtles are often found near vegetated wetlands and buffer zones to freshwater habitats including small streams and ponds (CT DEP 2008, Klemens 1993). The species is easily identified by the domed carapace (top shell) and hinged plastron (under shell). The carapace shows yellow or orange markings on a dark brown to black background. The intensity and pattern of the colors is highly variable within the species. Surveys of Boardman Lane conducted in 2008 identified three (3) individual box turtles on the site adjacent to and within forested and floodplain wetlands associated with Richards Brook. An informational fact sheet is included in the Appendix D.

Squarrose Sedge is a perennial species reported from wet meadows, swamps, emergent wetlands, and banks of streams in Connecticut. Site surveys conducted in 2008 identified two areas of the Squarrose Sedge within the Boardman Lane site, a depressional forested wetland area just northwest of the southwestern farm field and northeast of the lower eastern fields. An informational fact sheet is included in the Appendix D.

Efforts to enhance habitat conditions on the Boardman Lane site for these species will focus on three areas: a grassland management plan involving a mowing program to improve habitat conditions for the box turtle and to minimize impacts to this species and others from the actual physical mowing program; invasive species control to minimize the potential for native plants to be dominated by undesirable species that reduce habitat value; and a riparian-zone planting plant that will improve conditions along the watercourses in the eastern portion of the wet meadow for habitat as well as water quality treatment.

Open areas in the upland field and meadow habitats created under the mitigation plan will be maintained according to mowing practices outlined in *Mowing Advisory Guidelines in Rare Turtle Habitat: Pastures, Successional Fields, and Hayfields* (NHESP 2009b). Clearing and mowing operations in the open fields and meadows created in the mitigation areas shall occur prior to April 1$^{st}$ or after October 31$^{st}$ to avoid accidental injury to rare turtles that may use the fields and meadows. The mowing bar shall be held at 8" to 10" above the ground surface. Directional mowing is recommended in the grass dominated fields and meadows outside the active use areas. During the months when turtles are active, mowing shall start from the center of the field or meadow habitats with the mower working back and forth across the area in a linear manner. The mowing shall then expand out from the center of the field or meadow habitat in agreement with recommended conservation mowing practices (NHESP 2009b, Sample 1997). When the field or meadow habitats border upland forest or a freshwater stream, the mowing will start as far from the woodland or stream as possible and mow slowly toward the woodland or stream. The mower speed shall be held in low gear or at the slowest speed possible to prevent the accidental injury to rare turtles. Removal of invasive species in the wet meadow area shall be performed for a three-year period to address potential problems with invasive species. Native plant communities with wildlife habitat benefits shall be maintained in the enhancement areas. Invasive species recorded in the field surveys include exotic bush honeysuckles (*Lonicera* spp.), multiflora rose (*Rosa multiflora*), autumn olive (*Elaeagnus* spp.), Oriental bittersweet (*Celastrus orbiculatus*), purple loosestrife (*Lythrum salicaria*), and common reed (*Phragmites australis*) (Fact Sheets are provided in Appendix D). Invasive species will be removed using accepted vegetation management practices. Control methods will involve the use of physical and mechanical control methods and chemical or biological controls where appropriate.

Chemical control methods will be used to deal with heavy infestations of invasive species. Herbicide applications shall be used according to state and federal guidelines. All herbicide treatments shall be applied by a licensed applicator.

Recommended treatments for the control of invasive shrub, woody vines and herbaceous species in the mitigation and conservation restriction areas were developed based on a review of the literature and experience with wetland restoration projects throughout New England. The methods of treatment for the shrub, vine, and herbaceous species within the Eastern Box Turtle Habitat Management Area are identical to those listed in Section J.2

# N. Post Construction Assessment

A post-construction assessment of the condition of the mitigation site(s) shall be performed following the fifth growing season after completion of the mitigation site(s) construction, or by the end of the monitoring period, whichever is later. "Growing season" in this context begins no later than May 31st. To ensure objectivity, the person (s) who prepared the annual monitoring reports shall not perform this assessment within written approval from the Corps. The assessment report shall be submitted to the Corps by December 15 of the year the assessment is conducted; this will coincide with the year of the final monitoring report, so it is acceptable to include both the final monitoring report and assessment in the same document.

The post-construction assessment shall include the four assessment appendices listed below and shall:

- Summarize the original or modified enhancement/mitigation goals and discuss the level of attainment of these goals at each mitigation site.
- Describe significant problems and solutions during construction and maintenance (monitoring) of the enhancement/mitigation site(s).
- Identify agency procedures or policies that encumbered implementation of the mitigation plan. Specifically note procedures or policies that contributed to less success or less effectiveness than anticipated in the mitigation plan.
- Recommend measures to improve the efficiency, reduce the cost, or improve the effectiveness of similar projects in the future.

**ASSESSMENT APPENDICES:**

Appendix A -- Summary of the results of a functions and values assessment of the enhancement/mitigation site(s), using the same methodology used to determine the functions and values of the impacted wetlands.

Appendix B -- Calculation of the area of wetlands in each mitigation site using the 1987 Corps Wetlands Delineation Manual. Supporting documents shall include (1) a scaled drawing showing the wetland boundaries and representative transects and (2) datasheets for corresponding data points along each transect for the initial existing wetland data. The off-site riparian enhancement plan includes converting portions of wet-meadow habitat to forested wetland habitat, as such transect forms will focus primarily on

vegetation data and will include vegetation species, density and type of specified sample plots within the enhancement area.

Appendix C -- Comparison of the area and extent of vegetation within delineated wetlands (from Appendix B) with the area and extent of enhancement plantings and wetland vegetation cover proposed in the mitigation plan. This comparison shall be made on a scaled drawing or as an overlay on the as-built plan. This plan will show the major vegetation community types.

Appendix D -- Photos of each mitigation site or enhancement vegetation plots taken from the same locations as the monitoring photos, including photos of vernal pools, if applicable.

## O. Contingency

During the remediation process, events can occur that could cause the Project to deviate from the planned course of action. These events will result in contingency plans of varying magnitude and include the following:

- encountering bedrock within the planting zone;
- different groundwater conditions than anticipated based upon testing;
- unexpected subgrade textures that would affect the design and function of the mitigation/enhancement areas.

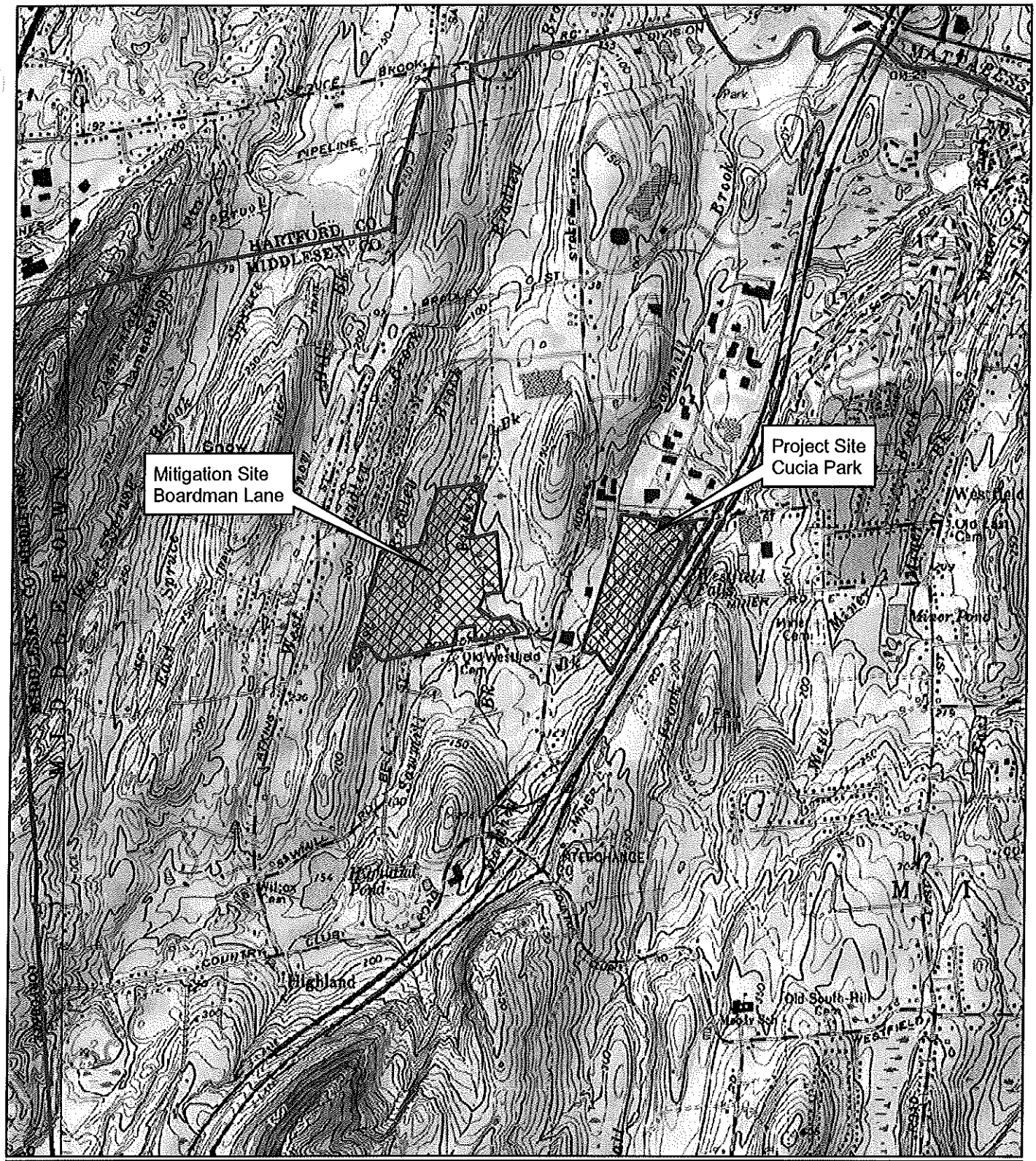
As noted previously, a wetland scientist will be on-site during the implementation of the mitigation/enhancement areas to ensure compliance with the plan and to make appropriate adjustments to meet mitigation goals. Under such circumstances, the wetland scientist will suspend the work and consult with the Project engineer and construction manager about the implications of the findings for carrying out the intended plan. Alternatives to addressing the issue will be developed, if necessary. Any substantial change in the design of the mitigation area will require the submission of revised plans to the Corps for review and approval prior to implementation.

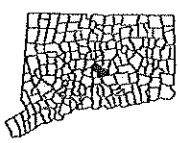
## P. Long Term Stewardship

As is shown on Figure 2 and Figure 3, the proposed wetland mitigation and enhancement areas are positioned in the landscape and within permanently protected land in a manner that maximizes the potential for it to be sustained in perpetuity. The location of the Boardman Lane mitigation site, as well as the enactment of the 40-acre conservation restriction area, will help create a large, contiguous protected area as it links with additional wetlands to the north and east, as well as East Bradley Brook to the west. This will ensure long-term preservation and minimal effects from nearby development. The location of the enhancement area situated within existing floodplains and wet meadows will also provide optimal benefits and increase probability for long-term success. Long term stewardship of the Cucia Park remaining undeveloped wetlands will be implemented; on-site operations will include measures to restrict activities within these wetlands to ensure protection of their ecological functions.

# Appendix A

# Figures



Source: USGS Quadrangle Middletown CT

Coordinate System: NAD 1983,
State Plane Connecticut
FIPS 0600 Feet

N

1 inch = 2,000 feet

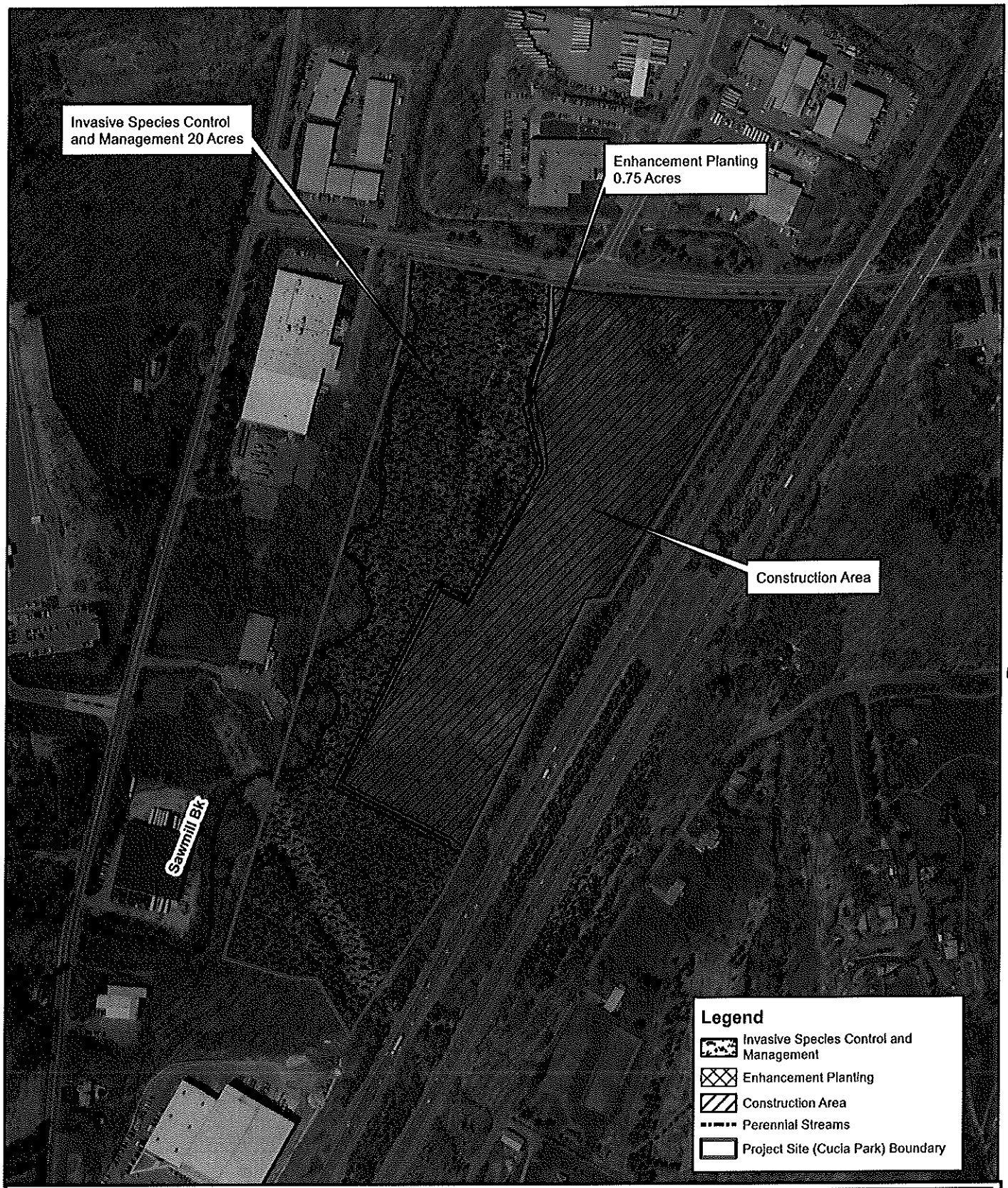
# Site Locus
# BRAC Realignment
# Middletown, CT

| SCALE | DATE | PROJECT NO. |
|---|---|---|
| 1:3,600 | 12/09 | 60140125 |

AECOM

Figure Number

1




Source: CT Ortho Photograhp

Coordinate System: NAD 1927, State Plane Connecticut FIPS 0600 Feet

N

1 inch = 400 feet

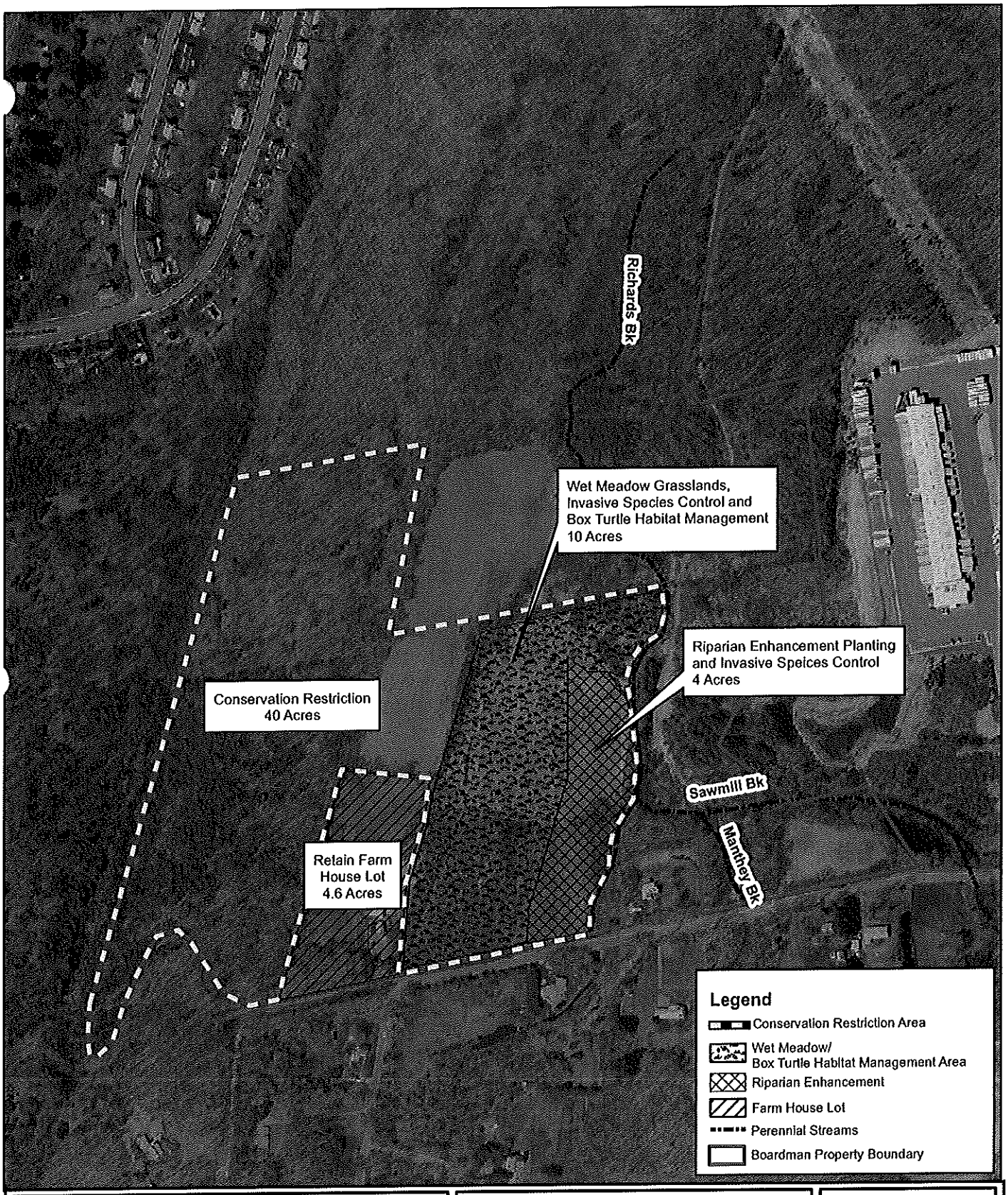
**BRAC Realignment**
**Project Site Cucia Park On-Site**
**Mitigation Plan**
**Middletown, CT**

| SCALE | DATE | PROJECT NO. |
|---|---|---|
| 1:4,800 | 12/09 | 60140125 |

AECOM

Figure Number

2




Source: CT Ortho Photograhp

Coordinate System: NAD 1927, State Plane Connecticut FIPS 0600 Feet

N

1 inch = 400 feet

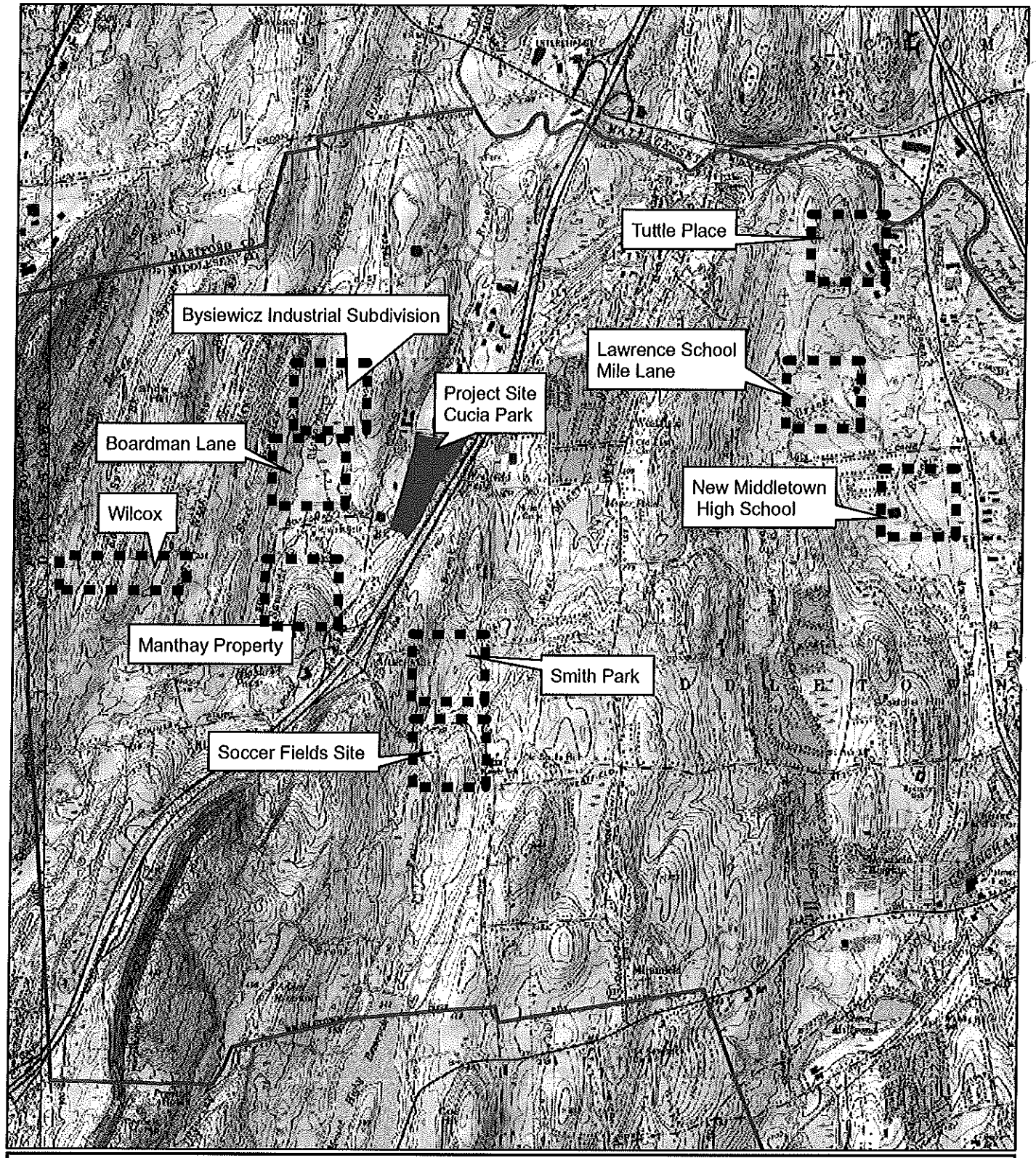
**BRAC Realignment**
**Boardman Lane Off-Site**
**Mitigation Plan**
**Middletown, CT**

| SCALE | DATE | PROJECT NO. |
|---|---|---|
| 1:4,800 | 12/09 | 60140125 |

AECOM

Figure Number

3




Source: USGS Quadrangle Middletown CT

Coordinate System: NAD 1983,
State Plane Connecticut
FIPS 0600 Feet

N

1 inch = 3,000 feet

# BRAC Realignment Project
# Alternative Mitigation Sites
# Middletown, CT

| SCALE | DATE | PROJECT NO. |
|---|---|---|
| 1:36,000 | 12/09 | 60140125 |

AECOM

Figure Number

4

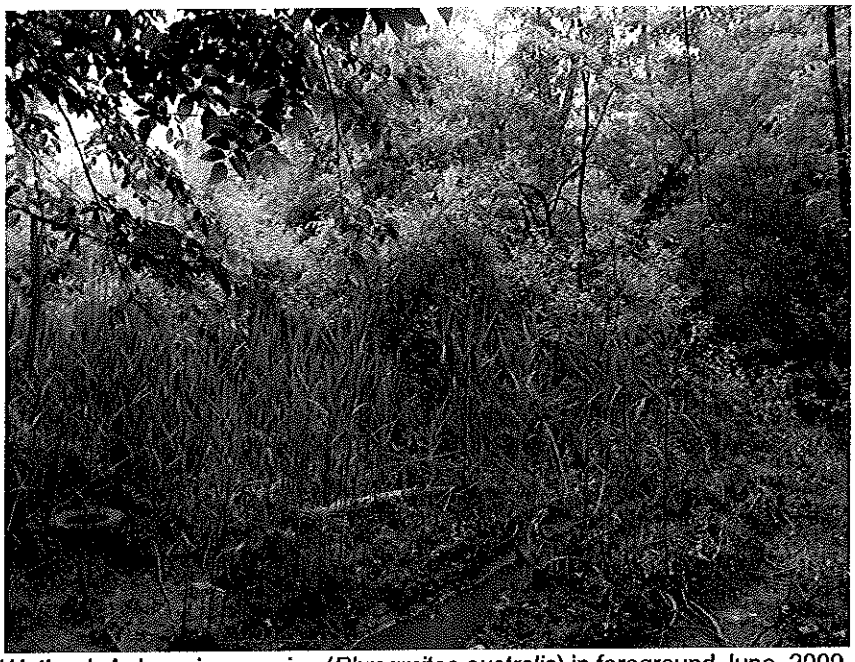
# Appendix B

# Photographs

## Cucia Park On-Site Wetlands

Wetland A June, 2009.

Wetland A/F June, 2009.



Wetland A, Invasive species (*Phragmites australis*) in foreground June, 2009.

Wetland A June, 2009.

Wetland A June, 2009.

Wetland A June, 2009.

Wetland E, proposed construction area, June, 2009.

Wetland E - proposed construction area, June, 2009.

Wetland E - proposed construction area, June, 2009.

Wetland E - proposed construction area, June, 2009.

Wetland E June, 2009.

Wetland E June, 2009.

Wetland E June, 21009.

Wetland E June, 2009.

Wetland G June, 2009.

Wetland G June, 2009.

Wetland G June, 2009.

## Boardman Lane Off-Site Mitigation Parcel

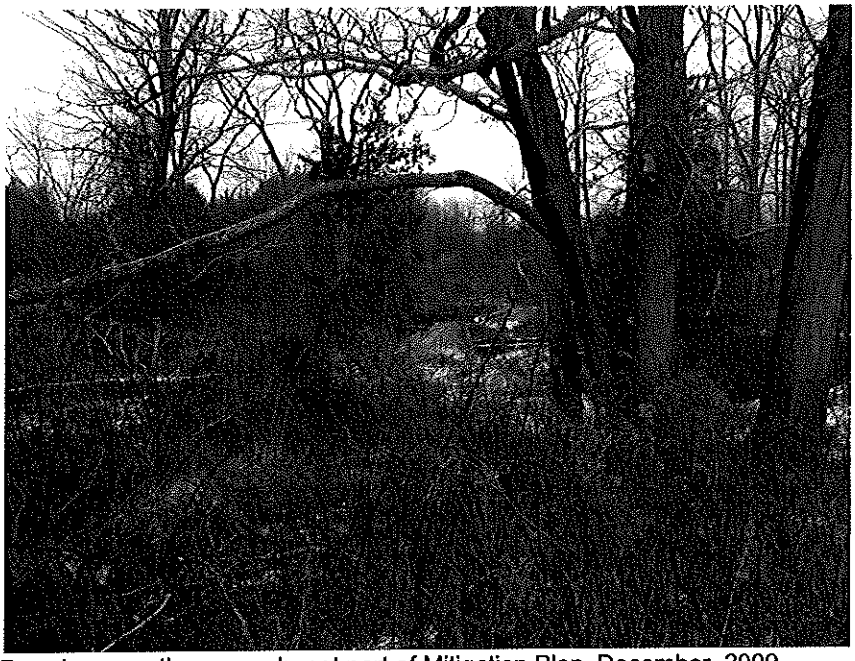
Lower First Field, Proposed Mitigation – Riparian Enhancement, Box Turtle Habitat and Invasive Species Management.

Lower First Field, Proposed Riparian Enhancement, Box Turtle Habitat and Invasive Species Management.

Lower Second Field, Proposed Wet Meadow Grasslands, Invasive Species and Box Turtle Habitat Management.

Lower Second Field, Proposed Wet Meadow Grasslands, Invasive Species and Box Turtle Habitat Management in background.

Lower Second Field, Proposed Riparian Enhancement, Invasive Species Management and Box Turtle Habitat Management.



Boardman northern marsh, not part of Mitigation Plan, December, 2009.

Lower Second Field, Proposed Riparian Enhancement, Invasive Species Management and Box Turtle Habitat Management, December, 2009.

Lower Second Field, Proposed Wet Meadow Grasslands, Invasive Species and Box Turtle Habitat Management, December, 2009. Purple loosestrife (*Lythrum salicaria*) along field edge.

Lower Second Field, Proposed Wet Meadow Grasslands, Invasive Species and Box Turtle Habitat Management, December, 2009.

Boardman Site, north of mitigation parcel Richards Brook culvert December, 2009.

Boardman Site, northern emergent marsh north of migration parcel, December, 2009.

Lower Second Field, Proposed Riparian Enhancement, Invasive Species Management and Box Turtle Habitat Management, December, 2009.

Lower Second Field, Proposed Riparian Enhancement, Invasive Species Management and Box Turtle Habitat Management, December, 2009.

Confluence of Richards Brook and Sawmill Brook, located east of Boardman Site, December, 2009.

Confluence of Richards Brook and Sawmill Brook, located east of Boardman Site, December, 2009.

Lower Second Field, Proposed Riparian Enhancement, Invasive Species Management and Box Turtle Habitat Management in foreground, Wet Meadow Grasslands, Invasive Species Management in center, and Conservation Restriction in upper field in background.

Lower Second Field, Proposed Invasive Species and Box Turtle Habitat Management, Purple loosestrife (*Lythrum salicaria*) in foreground and upper field Conservation Restriction.

Lower First Field, Proposed Riparian Enhancement, Invasive Species Management and Box Turtle Habitat Management in foreground and Wet Meadow Grasslands, Turtle Habitat and Invasive Species Management in background.

Lower First Field, Proposed Riparian Enhancement, Invasive Species and Box Turtle Habitat Management to the right, Wet Meadow Grasslands, Turtle Habitat and Invasive Species Management to the left.

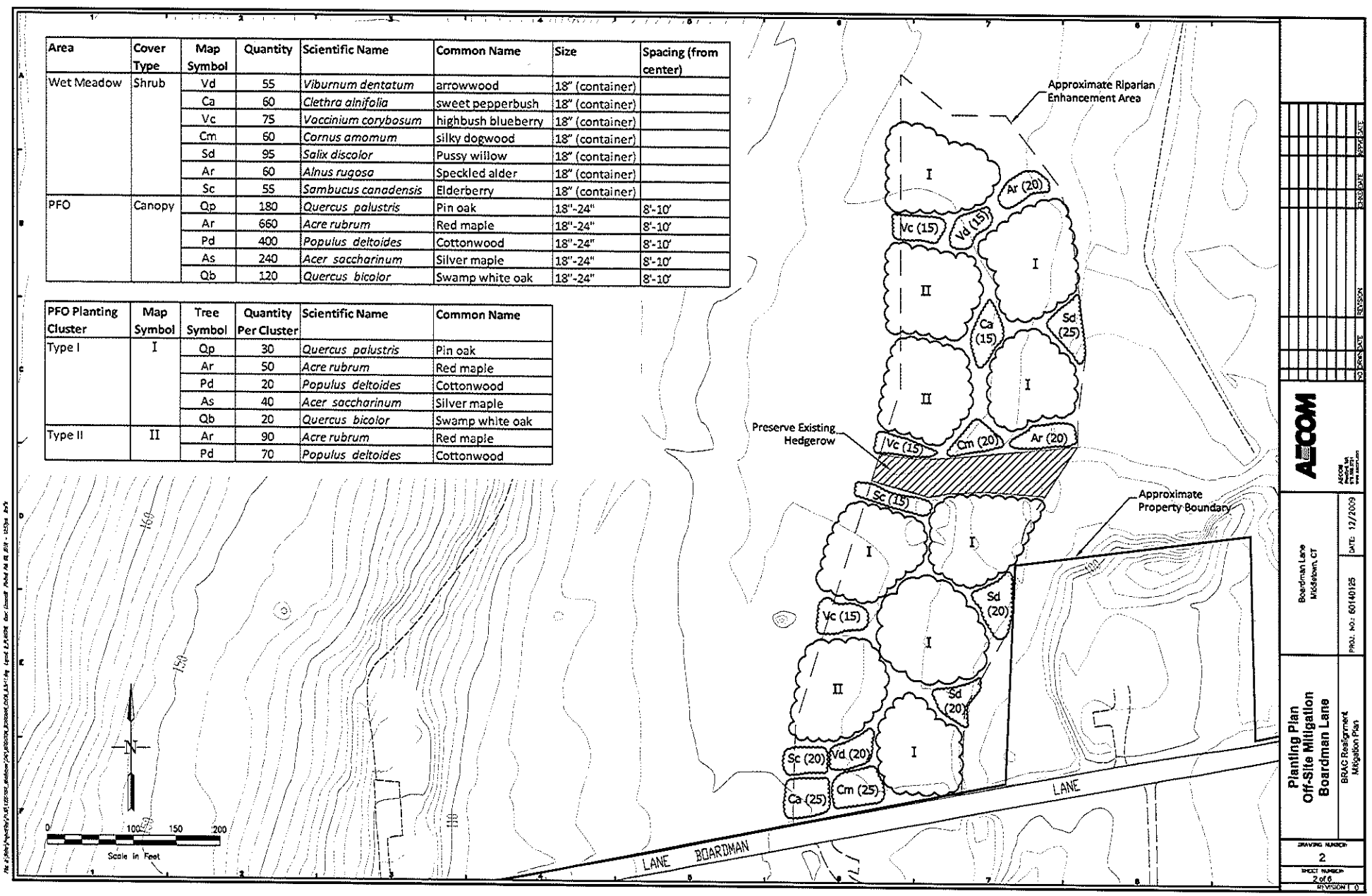
# Appendix C

# Mitigation Area Plans

Overview
Off-Site Mitigation
Boardman Lane
BRAC Realignment
Mitigation Plan
Boardman Lane
Middletown, CT
PROJ. NO.: 60140126
DATE: 12/2009
AECOM
Approximate Property Boundary
Wet Meadow Grasslands Invasive Species Control And Box Turtle Habitat Management (10 Acres)
See Sheet 2 For Planting Plan
Conservation Restriction Boundary (Typ.)
Conservation Restriction (40 Acres)
Riparian Enhancement Planting Woody Species And Invasive Species Control (4 Acres)
Scale in Feet
0
300
450
600

| Area | Cover Type | Map Symbol | Quantity | Scientific Name | Common Name | Size | Spacing (from center) |
|---|---|---|---|---|---|---|---|
| Wet Meadow | Shrub | Vd | 55 | *Viburnum dentatum* | arrowwood | 18" (container) | |
| | | Ca | 60 | *Clethra alnifolia* | sweet pepperbush | 18" (container) | |
| | | Vc | 75 | *Vaccinium corybosum* | highbush blueberry | 18" (container) | |
| | | Cm | 60 | *Cornus amomum* | silky dogwood | 18" (container) | |
| | | Sd | 95 | *Salix discolor* | Pussy willow | 18" (container) | |
| | | Ar | 60 | *Alnus rugosa* | Speckled alder | 18" (container) | |
| | | Sc | 55 | *Sambucus canadensis* | Elderberry | 18" (container) | |
| PFO | Canopy | Qp | 180 | *Quercus palustris* | Pin oak | 18"-24" | 8'-10' |
| | | Ar | 660 | *Acre rubrum* | Red maple | 18"-24" | 8'-10' |
| | | Pd | 400 | *Populus deltoides* | Cottonwood | 18"-24" | 8'-10' |
| | | As | 240 | *Acer saccharinum* | Silver maple | 18"-24" | 8'-10' |
| | | Qb | 120 | *Quercus bicolor* | Swamp white oak | 18"-24" | 8'-10' |

| PFO Planting Cluster | Map Symbol | Tree Symbol | Quantity Per Cluster | Scientific Name | Common Name |
|---|---|---|---|---|---|
| Type I | I | Qp | 30 | *Quercus palustris* | Pin oak |
| | | Ar | 50 | *Acre rubrum* | Red maple |
| | | Pd | 20 | *Populus deltoides* | Cottonwood |
| | | As | 40 | *Acer saccharinum* | Silver maple |
| | | Qb | 20 | *Quercus bicolor* | Swamp white oak |
| Type II | II | Ar | 90 | *Acre rubrum* | Red maple |
| | | Pd | 70 | *Populus deltoides* | Cottonwood |




AECOM

Boardman Lane
Middletown, CT

DATE: 12/2009

PROJ. NO.: 60140125

Planting Plan
Off-Site Mitigation
Boardman Lane

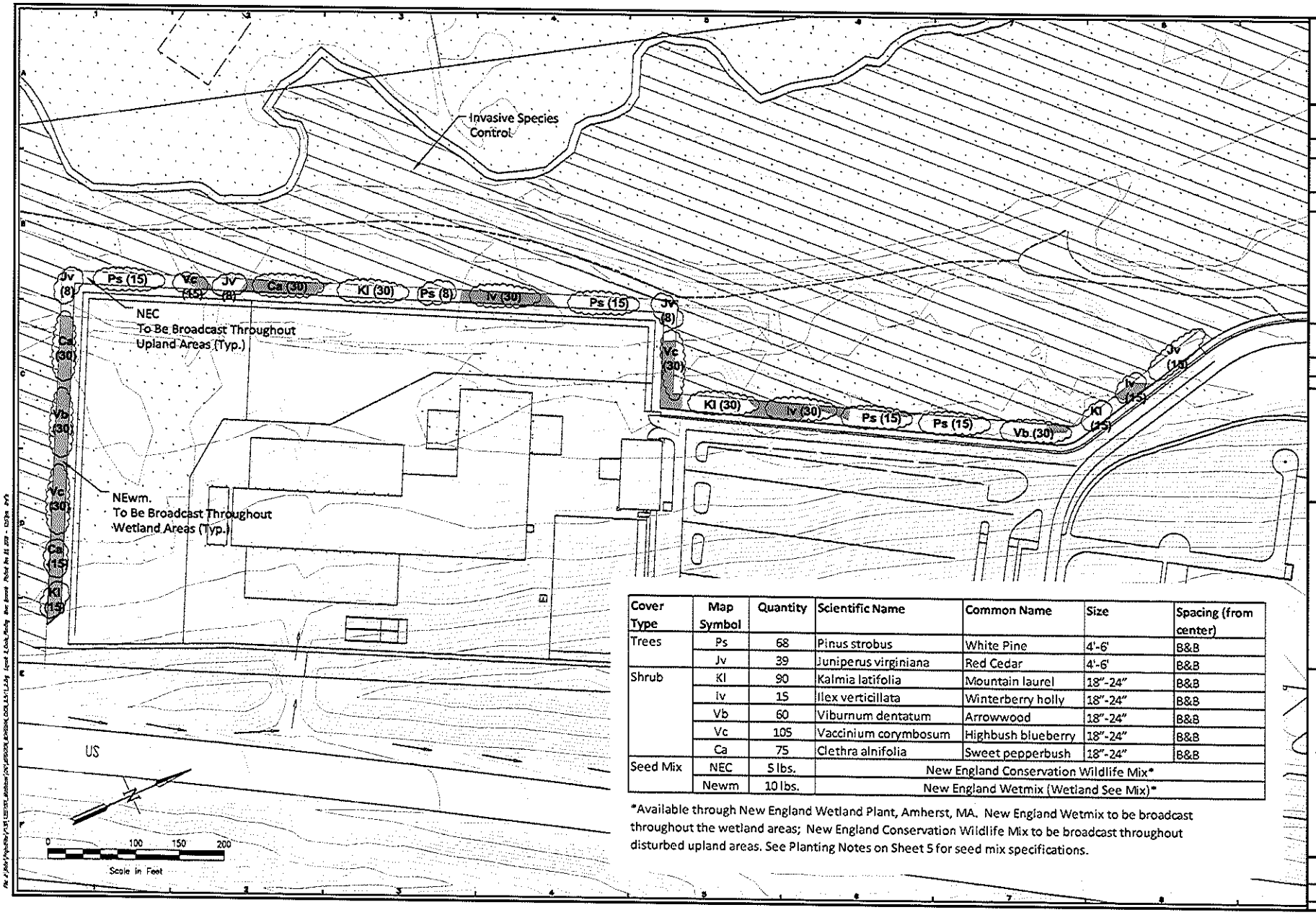
BRAC Realignment
Mitigation Plan

DRAWING NUMBER
2

SHEET NUMBER
2 of 6

REVISION
0

Overview
On-Site Mitigation
Cucia Park
BRAC Realignment
Mitigation Plan
Strain Street
Middletown, CT
PROJ. NO. 60140125
DATE: 12/2009
AECOM
DRAWING NUMBER
3
SHEET NUMBER
3 OF 6
REVISION
0
NO.
DRWN.
DATE
REVISION
DSGN.
DATE
APVD.
DATE
See Sheet 4 For On-Site Mitigation Planting Plan
Wetland (Typ.)
Property Boundary
Invasive Species Control
0
300
450
600
Scale: In Feet




| Cover Type | Map Symbol | Quantity | Scientific Name | Common Name | Size | Spacing (from center) |
|---|---|---|---|---|---|---|
| Trees | Ps | 68 | Pinus strobus | White Pine | 4'-6' | B&B |
| | Jv | 39 | Juniperus virginiana | Red Cedar | 4'-6' | B&B |
| Shrub | Kl | 90 | Kalmia latifolia | Mountain laurel | 18"-24" | B&B |
| | Iv | 15 | Ilex verticillata | Winterberry holly | 18"-24" | B&B |
| | Vb | 60 | Viburnum dentatum | Arrowwood | 18"-24" | B&B |
| | Vc | 105 | Vaccinium corymbosum | Highbush blueberry | 18"-24" | B&B |
| | Ca | 75 | Clethra alnifolia | Sweet pepperbush | 18"-24" | B&B |
| Seed Mix | NEC | 5 lbs. | New England Conservation Wildlife Mix* | | | |
| | Newm | 10 lbs. | New England Wetmix (Wetland See Mix)* | | | |

*Available through New England Wetland Plant, Amherst, MA. New England Wetmix to be broadcast throughout the wetland areas; New England Conservation Wildlife Mix to be broadcast throughout disturbed upland areas. See Planting Notes on Sheet 5 for seed mix specifications.

NO. DESCRIPTION | DRAWN DATE | CHECKED DATE | APPROVED DATE

AECOM

Smith Street
Middletown, CT

PROJ. NO.: 60140126 | DATE: 12/2009

Overview
On-Site Mitigation
Cucia Park

BRAC Realignment
Mitigation Plan

DRAWING NUMBER
4

SHEET NUMBER
4 of 6

REVISION 1

# Tree and Shrub Planting Notes

Site Preparation
The planting hole must be dug no deeper than the rootball as measured from the trunk flare to the bottom of the ball. Planting holes dug deeper than the rootball often result in the settling of the plant above the trunk flare and structural roots which can result in the rootball being planted too deep. Research shows that the fibrous or absorbing roots of most woody plants are usually found within the top 6 to 12 inches of soil, and since root development often extends beyond the canopy or dripline, it is now recommended that the planting area be loosened and aerated at least 3 to 5 times the diameter of the rootball.

Planting Hole Preparation
One of the most common errors in tree planting is that the rootball is either planted too deep or too high, both of which can cause serious problems.

To properly plant balled and burlapped (B&B) plant material, start by locating the point at which the trunk flare begins. In some cases, the trunk flare junction may be buried in the top of the rootball and it may be necessary to loosen the burlap at the top of the ball to properly locate the junction. Measuring from the trunk flare to the bottom of the ball will give the correct planting hole depth. (Alternatively, if the trunk flare is not well developed, the root ball can be probed for structural roots using a surveyor's chaining pin or similar tool. Generally the uppermost structural roots in the rootball should be planted within 1 - 3 inches of the soil surface, measured 2 - 5 inches from the trunk.

The integrity of the rootball should be maintained until it is secure in the hole. In the event that some of the soil falls away from the roots, proceed with the planting, taking care to ensure that the roots do not dry out from sun or wind. The planting hole size should be approximately 3 to 5 times the width of the ball and have sloping sides.

Setting the Plant
Carefully set the plant in the hole so that the trunk flare is at, or 1 to 2 inches above, the existing grade. Once the plant is properly placed, cut away and remove all visible rope and burlap. If the rootball appears in danger of completely collapsing, remove the rope and burlap from only the top one-third of the ball. Although still subject to debate, it is recommended that as much of the wire basket as possible, or at least the top 8 to 16 inches of the wire basket, be removed once the root ball is stable in the planting hole. Do not leave any protruding points of wire, which could cause injury.

Backfilling the Planting Hole
According to research, backfilling with soil dug from the planting hole is preferable to mixing the soil with large amounts of organic soil amendments such as peat moss, compost, etc. The addition of an organic soil amendment may be called for if the existing soil is of poor quality, such as excessively sandy or heavy clay soils or those consisting of undesirable fill material. Alternatively, quality topsoil, similar in texture to the existing soil, may be brought in and used for backfill.

While backfilling the hole, it has been customary to tamp the soil to avoid leaving large air pockets. However, this practice often results in the soil being packed so firmly as to drive out all the fine air spaces needed for a well-aerated soil. An alternative to tamping the soil would be to water the soil halfway through the backfill process and allow it to drain. When the water has drained away, resume backfilling and water again thoroughly. If the practice of tamping the soil is chosen, it should be done lightly so as to not compact the soil in the planting hole.

To complete the backfilling, smooth the surface soil and check to ensure that the trunk flare is completely exposed. (The structural roots should be within the top 3 inches of soil as measured 4 inches from the trunk.) Water the rootball and planting area immediately after backfilling.

Watering
Water is a critical factor to the successful establishment of landscape plants. Excessive or insufficient water will impede the formation and/or elongation of new roots. Immediately after planting, water the root ball and the planting area deeply. The root ball of newly planted trees must receive adequate water weekly during the entire first growing season, right up until dormancy in the fall, to become established. More frequent irrigation may be needed during the summer season or in times of extended drought. Rainfall alone may not provide the adequate, consistent moisture necessary for establishment. On larger caliper trees, weekly watering is necessary through the next several growing seasons. According to research, in the Northern part of the US, the establishment period, for recently transplanted trees, is approximately one year for each one inch of trunk caliper.

Fertilizing
Fertilization is not likely to be effective during the first growing season, as long as there is no nutrient deficiency. The addition of fertilizer and limestone should be made according to recommendations based on a soil test. Avoid placing water-soluble (quick-release) nitrogen fertilizer directly in the planting hole as this may cause injury to roots. If needed, a slow release or organic form of nitrogen could be mixed into the planting area or be applied on the soil surface around the tree basin.

Staking
While there are many opinions on the method and value of staking trees at planting time, most experts agree that staking is not necessary for all trees. Trunk strength, size of the canopy, wind direction and site traffic problems should all be considered before staking a tree. Research has shown that staked trees may develop a smaller root system and decreased trunk taper. If the rootball is stable in the soil, then it may not need to be staked. However, if the root ball is unstable and staking is required, try to attach stakes low on the trunk and allow some sway. In most instances, stakes should be removed after one growing season.

Mulching
Mulching is a cultural practice that can be of benefit in the landscape when done correctly. Mulching will reduce weeds, moderate soil temperatures, conserve soil moisture in the root zone, and add an aesthetic quality to the landscape. However, improper mulching can impair plant health and may lead to the decline of the plant material.

Organic mulch should be placed in a wide band around the plant, approximately 3 times the diameter of the rootball, over the root zone and no more than 2 to 4 inches deep, tapering to, but not touching, the trunk. Mulch piled up against the trunk may cause rotting of the bark and can create entry points for insects or disease organisms. Field mice may also inhabit deep mulch and feed on the bark. AVOID "VOLCANO MULCHING".

Pruning
After transplanting, prune only broken or damaged branches. Top pruning to compensate for root loss is no longer recommended. It is important to leave as much foliage on the tree as possible because carbohydrates and other products produced by photosynthesis in the leaves are necessary for root system regeneration and development.

(Planting Notes Continued on Sheet 6)

NO. DRAWN DATE | REVISION | CHECKED DATE | APPR. DATE

AECOM

Boardman Lane & Cook's Park
Middletown, CT

PROJ. NO.: 60140125 | DATE: 12/2009

Planting Notes
Mitigation Plan

BRAC Realignment
Mitigation Plan

DRAWING NUMBER
5

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REVISION 1.0

# Tree and Shrub Planting Notes (Cont.)

Tree Wrapping

The bark on a tree or shrub is as important as skin to an animal. It acts as a barrier to exclude insects and disease organisms from the vascular system, which lies directly under the bark. Some bark injuries may occur because of damage from the sun (sunscald) or temperature extremes (frost cracks). For many years, it has been a common practice to use tree wrap on newly planted or thin-barked trees in an effort to reduce sun or temperature damage to the bark.

Research has found that some tree wraps may not provide the protection that was originally intended. In experiments using plastic tree guards on dogwoods, large numbers of dogwood borers were found under the guards while few were found in trees without guards. In addition, some tree wraps were found to retain excess moisture beneath the wrap. This may encourage fungal or bacterial growth, especially if there were pre-existing wounds in the trunk.

If tree wrap is to be used, it is recommended that appropriate material be selected, checked frequently, and the wrap be removed during periods of active growth.

It is hoped that these guidelines, together with the selection of appropriate and healthy plant material, will be of help in promoting improved plant health in the landscape.

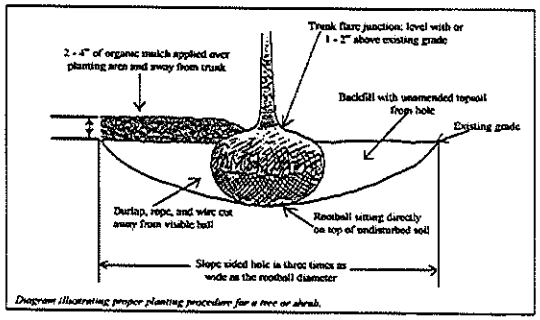

*Diagram illustrating proper planting procedure for a tree or shrub.*

2009 New England Conservation/Wildlife Mix*

| Botanical Name | Common Name | Ind. |
|---|---|---|
| *Andropogon gerardii* | Big Bluestem | FAC |
| *Asclepias syriaca* | Common Milkweed | FACU- |
| *Aster novae-angliae* | New England Aster | FACW- |
| *Chamaecrista fasciculata (Cassia f.)* | Partridge Pea | FACU |
| *Desmodium canadense* | Showy Tick Trefoil | FAC |
| *Elymus virginicus* | Virginia Wild Rye | FACW- |
| *Eupatorium maculatum* | Spotted Joe Pye Weed | FACW |
| *Euthamia graminifolia (Solidago g.)* | Grass Leaved Goldenrod | FAC |
| *Festuca rubra* | Creeping Red Fescue | FACU |
| *Heliopsis helianthoides* | Ox Eye Sunflower | UPL |
| *Panicum clandestinum* | Deer Tongue | FAC+ |
| *Panicum virgatum* | Switch Grass | FAC |
| *Rudbeckia laciniata* | Tall/Green Headed Coneflower | FACW |
| *Schizachyrium scoparium* | Little Bluestem | FACU |
| *Solidago juncea* | Early Goldenrod | |
| *Sorghastrum nutans* | Indian Grass | UPL |

New England Conservation/Wildlife Mix provides a permanent cover of native grasses, wildflowers and legumes to provide both erosion control and wildlife habitat. This mix is designed to be a no maintenance seeding, and it is appropriate to cut and fill slopes, detention basin slopes, and disturbed areas adjacent to commercial and residential projects. Always apply on clean bare soil. The mix may be applied by hydro-seeding, by mechanical spreader, or on small sites it can be spread by hand. Lightly rake, or roll to ensure proper soil-seed contact. Best results are obtained with a spring seeding. Late spring and summer seeding will benefit with a light mulching of weed-free straw to conserve moisture. If conditions are drier than usual, watering may be required. Late fall and winter dormant seeding require an increase in the seeding rate. Fertilization is not required unless the soils are particularly infertile. Preparation of a clean weed free soil surface is necessary for optimal results.

2009 New England Wetmix*

| Botanical Name | Common Name | Ind. |
|---|---|---|
| *Alisma plantago-aquatica* | Mud Plantain | OBL |
| *Asclepias incarnata* | Swamp Milkweed | OBL |
| *Aster novi-belgii* | New York Aster | FACW+ |
| *Bidens cernua* | Nodding Bur Marigold | OBL |
| *Carex comosa* | Bristly/Cosmos Sedge | OBL |
| *Carex crinita* | Fringed Sedge (Nodding) | OBL |
| *Carex lupulina* | Hop Sedge | OBL |
| *Carex lurida* | Lurid Sedge (Shallow) | OBL |
| *Carex scoparia* | Blunt Broom Sedge | FACW |
| *Carex vulpinoidea* | Fox Sedge | OBL |
| *Eupatorium maculatum* | Spotted Joe Pye Weed | FACW |
| *Eupatorium perfoliatum* | Boneset | FACW |
| *Glyceria canadensis* | Rattlesnake Grass | OBL |
| *Glyceria striata* | Fowl Mannagrass | OBL |
| *Juncus effusus* | Soft Rush | FACW+ |
| *Mimulus ringens* | Square Stemmed Monkey Flower | OBL |
| *Onoclea sensibilis* | Sensitive Fern | FACW |
| *Scirpus atrovirens* | Green Bulrush | OBL |
| *Scirpus cyperinus* | Wool Grass | FACW |
| *Scirpus validus* | Soft Stem Bulrush | OBL |
| *Verbena hastata* | Blue Vervain | FACW |

New England Wetmix (wetland seed mix) contains a wide variety of native seeds which are suitable for most wetland restoration sites that are not permanently inundated. All species are best suited to moist disturbed ground as found in most wet meadows, scrub shrub, or forested wetland restoration areas. This mix is well suited for detention basin borders, and the bottom of detention basins not generally under standing water. The seeds will not germinate under inundated conditions. If planted during the fall months, the seed mix will germinate the following spring. During the first season of growth, several species will produce seeds, while other species will produce seeds after the second growing season. Not all species will grow in all wetland situations. This mix is composed of the wetland species most likely to grow in created/restored wetlands and should produce more than 75% ground cover in two full growing seasons.

* From New England Wetland Plants, Amherst, MA 2009 Catalog.

| NO | ZONE/DATE | ISSUE/DATE | APPV'D/DATE |
|---|---|---|---|
| | | | |

AECOM

Boardman Lane & Cuda Park
Middletown, CT

DATE: 12/2009

PROJ. NO.: 60140125

Planting Notes (Cont.)
Mitigation Plan

BRAC Realignment
Mitigation Plan

DRAWING NUMBER
6

SHEET NUMBER
6 of 6

REVISION 0

# Appendix D

# Species Fact Sheets

# Connecticut Department of Environmental Protection

# Eastern Box Turtle

***Terrapene carolina carolina***

## State Species of Special Concern


### Description

The eastern box turtle is probably the most familiar of the 8 species of turtles found in Connecticut's landscape. It is known for its high-domed carapace (top shell). The carapace has irregular yellow or orange blotches on a brown to black background that mimic sunlight dappling on the forest floor. The plastron (under shell) may be brown or black and may have an irregular pattern of cream or yellow. The length of the carapace usually ranges from 4.5 to 6.5 inches, but can measure up to 8 inches long. The shell is made up of a combination of scales and bones, and it includes the ribs and much of the backbone.

Each individual turtle has distinctive head markings. Males usually have red eyes and a concave plastron, while females have brown eyes and a flat plastron. Box turtles also have a horny beak, stout limbs, and feet that are webbed at the base. This turtle gets its name from its ability to completely withdraw into its shell, closing itself in with a hinged plastron. Box turtles are the only Connecticut turtle with this ability.

### Range

Eastern box turtles are found throughout Connecticut, except at the highest elevations. They range from southeastern Maine to southeastern New York, west to central Illinois, and south to northern Florida.

### Habitat and Diet

In Connecticut, this terrestrial turtle inhabits a variety of habitats, including woodlands, field edges, thickets, marshes, bogs, and stream banks. Typically, however, box turtles are found in well-drained forest bottomlands and open deciduous forests. They will use wetland areas at various times during the season. During the hottest part of a summer day, they will wander to find springs and seepages where they can burrow into the moist soil. Activity is restricted to mornings and evenings during summer, with little to no nighttime activity, except for egg-laying females. Box turtles have a limited home range where they spend their entire life, ranging from 0.5 to 10 acres (usually less than 2 acres).

Box turtles are omnivorous and will feed on a variety of food items, including earthworms, slugs, snails, insects, frogs, toads, small snakes, carrion, leaves, grass, berries, fruits, and fungi.

**Life History**
From October to April, box turtles hibernate by burrowing into loose soil, decaying vegetation, and mud. They tend to hibernate in woodlands, on the edge of woodlands, and sometimes near closed canopy wetlands in the forest. Box turtles may return to the same place to hibernate year after year. As soon as they come out of hibernation, box turtles begin feeding and searching for mates.

The breeding season begins in April and may continue through fall. Box turtles usually do not breed until they are about 10 years old. This late maturity is a result of their long lifespan, which can range up to 50 to even over 100 years of age. The females do not have to mate every year to lay eggs as they can store sperm for up to 4 years. In mid-May to late June, the females will travel from a few feet to more than a mile within their home range to find a location to dig a nest and lay their eggs. The 3 to 8 eggs are covered with dirt and left to be warmed by the sun. During this vulnerable time, skunks, foxes, snakes, crows, and raccoons often raid nests. Sometimes, entire nests are destroyed. If the eggs survive, they will hatch in late summer to early fall (about 2 months after being laid). If they hatch in the fall, the young turtles may spend the winter in the nest and come out the following spring.

As soon as the young turtles hatch, they are on their own and receive no care from the adults. This is a dangerous time for young box turtles because they do not develop the hinge for closing into their shell until they are about 4 to 5 years old. Until then, they cannot entirely retreat into their shells. Raccoons, skunks, foxes, dogs, and some birds will prey on young turtles.

**Conservation Concerns**
The eastern box turtle was once common throughout the state, mostly in the central Connecticut lowlands. However, its distribution is now spotty, although where found, turtles may be locally abundant. Because of the population decline in Connecticut, the box turtle was added to the state's List of Endangered, Threatened, and Special Concern Species when it was revised in 1998. It is currently listed as a species of special concern. The box turtle also is protected from international trade by the 1994 CITES treaty. It is of conservation concern in all the states where it occurs at its northeastern range limit, which includes southern New England and southeastern New York.

Many states have laws that protect box turtles and prohibit their collection. In Connecticut, eastern box turtles cannot be collected from the wild (DEP regulations 26-66-14A). Another regulation (DEP regulations 26-55-3D) "grandfathers" those who have a box turtle collected before 1998. This regulation limits possession to a single turtle collected before 1998. These regulations provide some protection for the turtles, but not enough to combat some of the even bigger threats these animals face. The main threats in Connecticut (and other states) are loss and fragmentation of habitat due to deforestation and spreading suburban development; vehicle strikes on the busy roads that bisect the landscape; and indiscriminate (and now illegal) collection of individuals for pets.

Loss of habitat is probably the greatest threat to turtles. Some turtles may be killed directly by construction activities, but many more are lost when important habitat areas for shelter, feeding, hibernation, or nesting are destroyed. As remaining habitat is fragmented into smaller pieces, turtle populations can become small and isolated.

Adult box turtles are relatively free from predators due to their unique shells. The shell of a box turtle is extremely hard. However, the shell is not hard enough to survive being run over by a vehicle. Roads bisecting turtle habitat can seriously deplete the local population. Most vehicle fatalities are pregnant females searching for a nest site.

**How You Can Help**

- Leave turtles in the wild. They should never be kept as pets. Whether collected singly or for the pet trade, turtles that are removed from the wild are no longer able to be a reproducing member of a population. Every turtle removed reduces the ability of the population to maintain itself.
- Never release a captive turtle into the wild. It probably would not survive, may not be native to the area, and could introduce diseases to wild populations.
- Do not disturb turtles nesting in yards or gardens.
- As you drive, watch out for turtles crossing the road. Turtles found crossing roads in June and July are often pregnant females and they should be helped on their way and not collected. Without creating a traffic hazard or compromising safety, drivers are encouraged to avoid running over turtles that are crossing roads. Also, still keeping safety precautions in mind, you may elect to pick up turtles from the road and move them onto the side they are headed. Never relocate a turtle to another area that is far from where you found it.
- Learn more about turtles and their conservation concerns. Spread the word to others on how they can help Connecticut's box turtle population.

*The production of this Endangered and Threatened Species Fact Sheet Series is made possible by donations to the Endangered Species-Wildlife Income Tax Checkoff Fund.*
*(5/08)*

# FACT SHEET
## *Carex squarrosa* L.
## Squarrose Sedge

### Description

| | |
|---|---|
| Fruiting period | May to August. |
| Culm height | 30 - 80 cm. |
| Leaf | 3 - 6 mm wide. |
| Terminal spike | gynecandrous. |
| Lateral spike | N/A |
| Perigynium | planoconvex to biconvex in cross section. |
| Achene | trigonous in cross section. |
| Style | persistent. |

**Habitat**
Wet meadows, old fields, woodland edges.
**Quick description**
Unispicate culm; yellow/green in coloration.
**Similar species**
*Carex frankii*
**Author and publication information for name**
*Carex squarrosa* Linnaeus, Sp. Pl. 2: 973. 1753.
**Conservation and Wetland Status**

| State | Status |
|---|---|
| Connecticut | Special concern |

**Wetland Status:** Facultative Wetland
**Vernacular name:** Squarrose Sedge
**Section**
*Carex* sect. *Squarrosae*


**References:**
**Ball, P.W.** and **A.A. Reznicek**. 2002. *Carex* Pp. 254-572. *Flora of North America*, volume 23. Oxford University Press, New York and Oxford.
**U.S. Department of Agriculture.** PLANTS Database. http://plants.usda.gov/index.html Accessed primarily in August 2006.
**GBIF Data Portal** www.gbif.org
Missouri Botanical Garden, 03 records;
University of Alabama Herbarium, 06 records;
University Of Kansas Plant Collection, 01 records.
Accessed on Oct 11 2006.

## Tartarian Honeysuckle

*Lonicera tatarica*

**Habit:** Deciduous upright to spreading shrub growing to 3 m (9 ft) tall: shallow roots.
**Leaves:** Simple, opposite, oval to oblong, short, hairless, leaves with pointed tips: 3-6 cm long and 2-4 cm wide with smooth margins: dark green above and paler beneath: early leaf out, long growing season.
**Stems/Bark:** Twigs are slender, brown to reddish with brown pith: multiple stems: numerous arching branches: older branches often hollow: bark is light gray, somewhat exfoliating.
**Flowers:** Small, pink to white, tubular, fragrant, paired flowers on long (1.5-2.5 cm) stalks arising from the leaf axils: bloom May-June.
**Fruits/Seeds:** Abundant, red or orange paired berries.
**Habitat:** Sun and shade tolerant: occurs in a variety of soil and moisture conditions: commonly found along roadsides and on disturbed sites: invades forest, savannas and prairies.
**Reproduction:** By seeds: dispersed by birds.
**Similar Species:** Canada honeysuckle *(L. canadensis)*, American fly honeysuckle *(L. involucrata)*, fly honeysuckle *(L. oblongifolia)* and swamp fly honeysuckle *(L. villosa)*. Native honeysuckles are relatively short, sparse shrubs as compared to non-native species.
**Comments:** Invades woodlands and disturbed habitats: found near large urban areas and in rural areas where it was planted for wildlife food and cover: forms dense thickets in a forest under-story, shading out herbaceous plants, reducing tree and shrub regeneration and decreasing overall plant diversity.
**Monitoring & Rapid Response:** Monitor sunny, upland sites and open forests in spring as honeysuckle leafs out well before native species: begin control efforts in highest quality areas: target large, fruit-bearing plants: hand pull or dig seedlings or small plants in spring: foliar spraying may be effective for large populations where few natives are present: treat cut stumps with herbicide: basal bark treatment is also effective - spray bottom 18 inches of all stems.
**Current Known Distribution:**

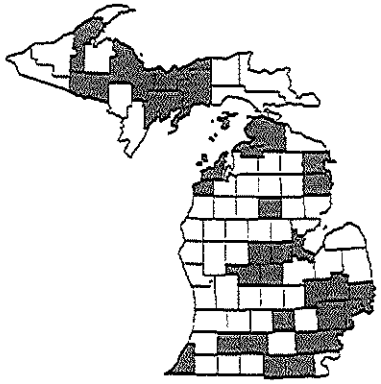


**Photo Credits:**
8. Patrick Breen, Oregon State University, www.forestryimages.org
18. Chris Evans, The University of Georgia, www.forestryimages.org.
20. Gary Fewless, University of Wisconsin, Green Bay
42. © John M. Randall/TNC, http://tncweeds.ucdavis.edu/photos.html

## Morrow's Honeysuckle

*Lonicera morrowii*

**Habit:** Deciduous upright to spreading shrub growing up to 1.8 m (6 ft) tall.; shallow roots.
**Leaves:** Simple, opposite, elliptical to oblong; short; gray-green, softly hairy beneath; 3-6 cm long; early leaf out, long growing season.
**Stems/Bark:** Multiple stems; numerous arching branches; older branches often hollow; bark is gray or tan, shaggy.
**Flowers:** Small, white, tubular, paired, hairy and fragrant; borne on hairy stalks (0.5-1.5 cm long) arising from the leaf axils; blooms May-June.
**Fruits/Seeds:** Berries are red and paired; dispersed by birds.
**Habitat:** Sun and shade tolerant; occurs in a variety of soil and moisture conditions; commonly found along roadsides and on disturbed sites; invades forest, savannas, and prairies.
**Reproduction:** By seed; dispersed by birds.
**Similar Species:** Canada honeysuckle *(L. canadensis)*, American fly honeysuckle *(L. involucrata)*, fly honeysuckle *(L. oblongifolia)* and swamp fly honeysuckle *(L. villosa)*. Native honeysuckles are relatively short, sparse shrubs as compared to non-native species.
**Comments:** Especially affects woodlands and disturbed habitats; usually distributed near large urban areas, but also occurs in rural areas where it was planted for wildlife food and cover; can form dense thickets in a forest under-story, shading out herbaceous plants, reducing tree and shrub regeneration, and decreasing overall plant diversity.
**Monitoring & Rapid Response:** Monitor sunny, upland sites and open forests in spring as honeysuckle leafs out well before native species; begin control efforts in highest quality areas; target large, fruit-bearing plants; hand pull or dig seedlings or small plants in spring; foliar spraying may be effective for large populations where few natives are present; treat cut stumps with herbicide; basal bark treatment is also effective - spray bottom 18 inches of all stems.
**Current Known Distribution:**

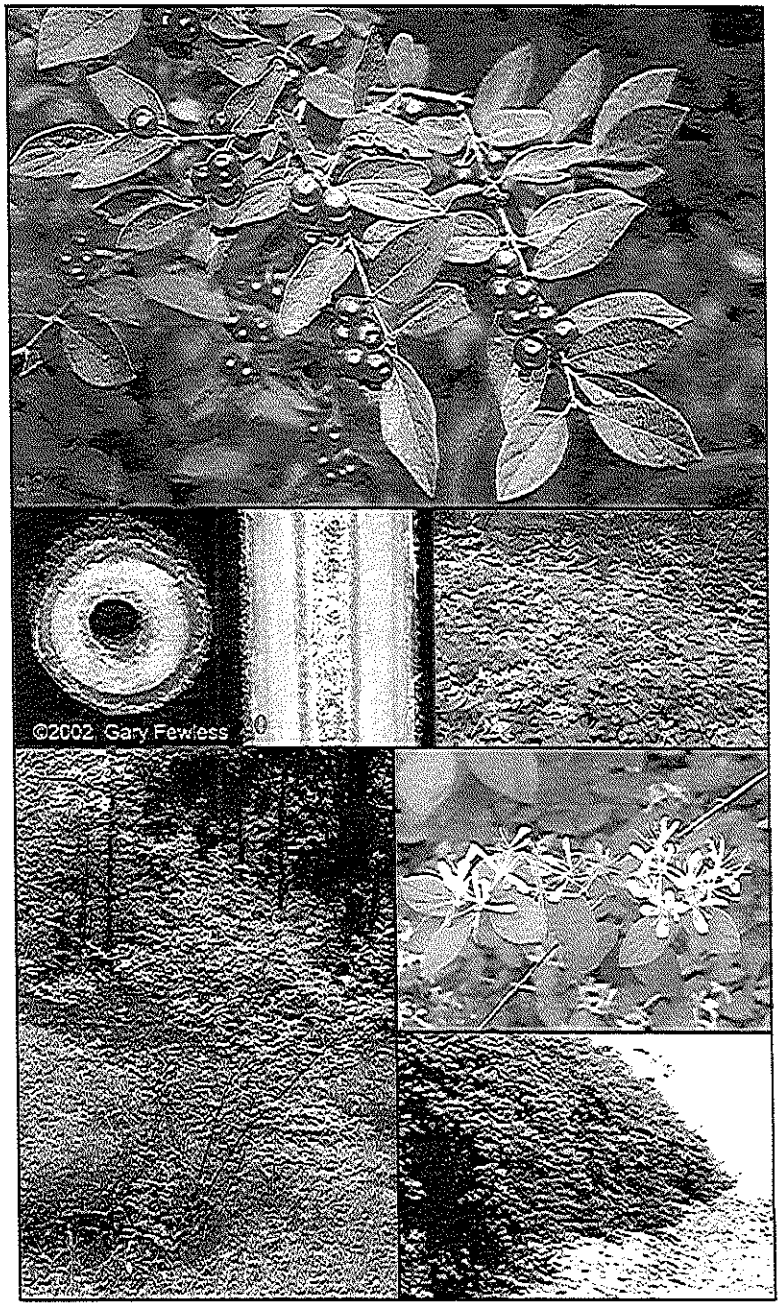


**Photo Credits:**
20. Gary Fewless, University of Wisconsin, Green Bay
33. Leslie J. Mehrhoff, University of Connecticut, www.forestryimages.org
42. © John M. Randall/The Nature Conservancy, http://tncweeds.ucdavis.edu/photos.html

Bulletin #2532

MAINE INVASIVE PLANTS

# Common Reed (Phragmites)

*Phragmites australis*
(Grass Family)

## Threats to Native Habitats

Common reed is a very aggressive, robust, densely growing member of the grass family. Its height and density allow it to form monocultures or near monocultures that outcompete and overrun most nonwoody native wetland plants. The buildup of litter from previous years of growth prevents other species from germinating or establishing. It is capable of occupying and degrading vast areas of important wetland habitat. It is tolerant of a wide variety of environmental conditions. Wetlands composed of mixes of native plants provide habitat for more wildlife species than do wetlands overrun by common reed. Common reed is problematic in both coastal and inland wetland types. In coastal situations, debris trapped within stands of common reed can increase the elevation of marsh surfaces, which can reduce the frequency of tidal inundation and ultimately alter the natural ecosystems.

*Common reed (photo by Don Cameron, Maine Natural Areas Program)*

## Description

Common reed is an upright perennial that ranges in height from five to 13 feet. Long, narrow leaves alternate on its tall stalks. Culms (flower-bearing stems) have smooth nodes and hollow internodes. Leaf blades are approximately one inch wide and are flat or rolled. Plants grow in dense, single-species or monocultural stands. Plume-like flower spikes six to 12 inches long form at the tops of the plants. Flowers are tiny with lots of silky hairs. Large purple flower heads turn gray and fluffy in late summer as they go to seed. They remain on the plant throughout the winter. The plant spreads through the growth of rhizomes or by seed. Aerial stems rise from joints in the rhizomes and aerial shoots that are knocked over can take root and produce new shoots at the nodes. The prostrate stalk sends out runners that generate new plants. Stout rootstalks, often exceeding 20 feet in length, interlock to form a dense network that can withstand fires, mowing and other forces that damage stalks and leaves. The underground network of rhizomes has an expansion rate of about three feet per year, but in nutrient-rich areas can spread up to 30 feet. Plants can spread by wind-blown or bird-deposited seeds, by movement of the rhizomes, by maintenance equipment in highway ditches, or by the action of tidal ice.

## Habitat

Common reed grows on wetland fringes, where salt marsh and freshwater wetlands meet. It is found at the upper edges of wetlands, commonly in brackish or fresh water and at the edges of saltwater marshes, or where there are lower marsh water levels and less salty conditions. It is also occurs in both acidic and alkaline freshwater marshes, where it may occupy the entire wetland. It is more common near cities than in rural areas. Use of road salt may be promoting common reed along roadsides in New England. It is common in marshes that are in poor health and thrives in environments that kill most marsh grasses. Opportunity for invasion is often linked to human-caused disturbance.

## Distribution

Common reed is a cosmopolitan species occurring throughout the world. It is thought to be the most widely distributed flowering plant. It lives in temperate zones, from the Sahara to the Arctic, as well as in tropical wetlands, with the exception of the Amazon Basin and central Africa. Common reed is a native of the Americas and Eurasia but the highly invasive form that is taking over U.S. wetlands originated in Europe. The invasive form is found in every state of the U.S. Examples of the native form are reputed to be less dense and generally smaller than the invasive European form.

## Control

Phragmites plants are susceptible to extended periods of flooding, wave action and changes in salinity. Strong wave or current action will break the stalks. Long term tidal flushing is beneficial in all these cases, minimizing the influence of fresh water and higher nitrate levels, both of which aid the plant. Herbicides are effective in the short term of four to five years; glyphosate, formulated for use in wetlands, should be applied after the plants form their fluffy flower clusters, when the plants are sending carbohydrates to the rhizomes. Combined cutting, burning, herbicide application and water management plans can help control the plant by removing old canes and allowing other vegetation to grow. Plant stands can actually increase when cut early in the season. For effective management, cut plants in late summer, in several successive years. Monitoring the spread of this plant is crucial because of its tendency to reinvade. Control techniques may need to be repeated indefinitely. Anyone planning a control project at a site infested with common reed should research the options carefully, paying particular attention to the unique conditions of the site. Use herbicides responsibly and follow manufacturer's directions. Contact the Maine Department of Agriculture for information on restrictions that apply to the use of herbicides. Consult a licensed herbicide applicator before applying herbicides over large areas.

SOUTHERN MAINE COMMUNITY COLLEGE

This fact sheet was researched and written by Virginia Howe-Theisin, a student in the Plant and Soil Technology Program at Southern Maine Community College. Additional editing by Don Cameron, Maine Natural Areas Program.

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"Scarborough Marsh's restoration potential assessed." *Habitat* (Autumn 1999) 9-10.

**For more information or for a more extensive list of references on invasive species contact:**

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*Materials developed by the Maine Natural Areas Program for use by University of Maine Cooperative Extension. This fact sheet was made possible by a gift from the Maine Outdoor Heritage Fund and New England Grows.*

1865 THE UNIVERSITY OF MAINE Cooperative Extension

DEPARTMENT OF CONSERVATION MAINE

*A Member of the University of Maine System*

# Autumn olive

*Elaeagnus umbellata* **Thunberg**

and

# Russian olive

*Elaeagnus angustifolia* **L.**

**Oleaster Family (Elaeagnaceae)**

*Russian olive in flower*

## DESCRIPTION

Autumn olive and Russian olive are deciduous, somewhat thorny shrubs or small trees, with smooth gray bark. Their most distinctive characteristic is the silvery scales that cover the young stems, leaves, flowers, and fruit. The two species are very similar in appearance; both are invasive, however autumn olive is more common in Pennsylvania.

**Height** - These plants are large, twiggy, multi-stemmed shrubs that may grow to a height of 20 feet. They occasionally occur in a single-stemmed, more tree-like form.

**Leaves** - Leaves are alternate, oval to lanceolate, with a smooth margin; they are 2–4 inches long and ¾–1½ inches wide. The leaves of autumn olive are dull green above and covered with silvery-white scales beneath. Russian olive leaves are grayish-green above and silvery-scaly beneath. Like many other non-native, invasive plants, these shrubs leaf out very early in the spring, before most native species.

*autumn olive in fruit*

**Flowers** - The small, fragrant, light-yellow flowers are borne along the twigs after the leaves have appeared in May.

**Fruit** - The juicy, round, edible fruits are about ⅓–½ inch in diameter; those of Autumn olive are deep red to pink. Russian olive fruits are yellow or orange. Both are dotted with silvery scales and produced in great quantity August–October. The fruits are a rich source of lycopene. Birds and other wildlife eat them and distribute the seeds widely.

**Roots** - The roots of Russian olive and autumn olive contain nitrogen-fixing symbionts, which enhance their ability to colonize dry, infertile soils.

## DISTRIBUTION AND HABITAT

Autumn olive was introduced to the United States from East Asia in the1830s. It was extensively planted in Pennsylvania and other states for revegetation of severely disturbed areas such as strip mines. The Pennsylvania Game Commission has also planted it for wildlife food and cover. Russian olive, native to Eurasia, was planted as an ornamental and for wildlife value. Both species have naturalized extensively in Pennsylvania, and in states from Maine south to Virginia, and west to Wisconsin. Russian olive is also a problem further west.

## EFFECTS OF INVASION

Both autumn olive and Russian olive are very troublesome invasive species; their nitrogen-fixing root nodules allow them to thrive in poor soils. Typical habitats are disturbed areas, roadsides, pastures, and successional fields in a wide range of soils. They are drought tolerant and often invade grasslands and sparse woodlands. Neither species does well in densely forested areas, but Russian olive can be found in moist soils, and does particularly well in sandy floodplains. Both species create heavy shade that suppresses shorter plants requiring direct sunlight.

## REPRODUCTION AND METHODS OF DISPERSAL

Autumn olive and Russian olive spread by seeds disseminated throughout the landscape by birds and other wildlife that consume the fruits. These shrubs grow rapidly, begin to produce fruit as early as 3 years of age, and have the ability to thrive in poor soil. They also resprout vigorously after cutting or burning.

## CONTROL

**Mechanical** - Seedlings and sprouts can be pulled by hand when the soil is moist enough to insure removal of the root system. On larger plants, cutting alone results in thicker, denser growth upon resprouting. Burning during the dormant season also results in vigorous production of new shoots.

**Chemical** - Glyphosate can be used to control larger plants. Foliar application has proven effective in controlling these species. Since glyphosate is nonselective and will affect all green vegetation, care should be taken to avoid impacting native plants. At sites where this is a concern, application of the herbicide to the freshly cut stumps of the invasive shrubs should achieve the desired results. This method minimizes damage to other plants.

**Biological** - No biological control options are currently known.

## LANDSCAPE ALTERNATIVES

The following native plants are suggested as alternatives to autumn olive or Russian olive in revegetation and wildlife habitat plantings: sweet-fern (*Comptonia peregrina*),

bayberry (*Myrica pensylvanica*), shining sumac (*Rhus copallina*), fragrant sumac (Rhus aromatica), staghorn sumac (*Rhus typhina*), black-haw (*Viburnum prunifolium*), shadbush (*Amelanchier arborea, A. laevis*), clammy locust (Robinia viscosa), redbud (*Cercis canadensis*), New Jersey tea (*Ceanothus americanus*).

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Fordham, Ingrid M., Beverly A. Clevidence, Eugene R. Wiley, and Richard H. Zimmerman. 2001. Fruit of autumn olive: a rich source of lycopene. HortScience 36(6): 1136-1137.

Rhoads, Ann Fowler and Timothy A. Block. 2000. The Plants of Pennsylvania: An Illustrated Manual. University of Pennsylvania Press, Philadelphia, PA.

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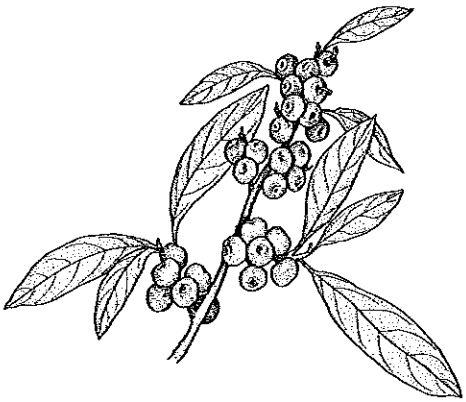
**Internet resources** - http://www.upenn.edu/paflora, http://www.invasivespecies.gov, http://tncweeds.ucdavis.edu

*autumn olive in fruit*


***Invasive species fact sheet prepared by:***
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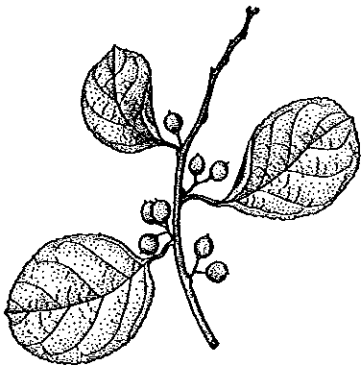
April 2002

# Oriental bittersweet

*Celastrus orbiculatus* Thunb.

**Staff-tree Family (Celastraceae)**



*Oriental bittersweet*

## DESCRIPTION

Oriental bittersweet is a woody, deciduous vine that twines around and drapes itself over other trees and shrubs in successional fields and along forest edges, often completely covering the supporting vegetation. In the shade it grows less vigorously, sometimes forming small trailing shrubs.

Oriental bittersweet is very similar to the native American bittersweet (*C. scandens*). The female flowers and fruits of oriental bittersweet are located in the leaf axils along the stem; American bittersweet, in contrast, blooms at the tips of the stems. The two species cannot reliably be distinguished in the absence of female flowers or fruits. Although American bittersweet has generally narrower leaves, this difference is not reliable.

**Height** - Bittersweet climbs to heights of 50 feet or more when large trees are available to provide support.

**Stem** - The twining stems may reach a diameter of 4 inches, they often deform and eventually girdle the trunks or branches of trees around which they have grown.

**Leaves** - Mature leaves of oriental bittersweet are usually broadly rounded to nearly orbicular; however on young shoots they can be much more narrow, leading to confusion with the native species. The leaves are arranged alternately on the stem, and are deciduous; they turn yellow in the fall.

*American bittersweet*

**Flowers** - Bittersweet flowers, which appear in May or June, are small and greenish. In general male and female flowers are produced on separate plants, however sometimes a few perfect flowers are also present.

**Fruit and seed** - The fruits are yellow or orange capsules that open to reveal 3 or 4 bright red seeds with their fleshy arils. The seeds are bird-dispersed. The fruiting branches are frequently used in the florist trade for autumn decorations, resulting in human dispersal of seeds. Pollen viability and seed germination are much higher in Oriental bittersweet than in the native species.

## DISTRIBUTION AND HABITAT

Oriental bittersweet is native to China, Korea, and Japan; it was introduced for ornamental use about 1870, and has become naturalized from Maine to Louisiana and west to the Great Plains. In Pennsylvania it occurs mainly in the southern half of the state. It festoons itself on trees and shrubs on roadsides, along forest edges, fencerows, and old fields.

## EFFECTS OF INVASION

Oriental bittersweet grows extremely vigorously in open and edge habitats; it covers and kills other vegetation and inhibits old-field succession. It also appears to be replacing the less vigorous native species, *Celastrus scandens*, which grows in similar habitats. American bittersweet is classified as a threatened species in Connecticut.

## REPRODUCTION AND METHODS OF DISPERSAL

Bittersweet reproduces prolifically by seed, which is dispersed by birds. It also spreads by stolons and rhizomes, modified horizontal stems that grow at (stolons) or below (rhizomes) the soil surface. Shoots may also develop from the roots.

## CONTROL

**Mechanical** - High growing vines can be cut; or small plants can be pulled out by hand. Fruiting stems should be bagged and removed from the site. Frequent monitoring is suggested for areas not yet infested, so that invading plants can be removed while they are still small.

**Chemical** - Cutting large stems and immediately treating the cut surface with glyphosate or triclopyr has been a successful control strategy.

**Biological** - No biological control options are currently known.

## NATIVE ALTERNATIVES FOR LANDSCAPE USE

American bittersweet (*Celastrus scandens*) should be planted instead of the invasive, non-native species. Other native vines that might be considered include trumpet-creeper (*Campsis radicans*), virgin's-bower (*Clematis virginiana*), and Dutchmen's-pipe (*Aristolochia macrophylla*).

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Fike, Jean and William A. Neiring. 1999. Four decades of old field vegetation development and the role of *Celastrus orbiculatus* in the northeastern United States. Journal of Vegetation Science 10: 483-492.

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Robertson, D. J., M. C. Robertson, and T. Tague. 1994. Colonization dynamics of four exotic plants in a northern piedmont natural area. Bulletin of the Torrey Botanical Club 121(2): 107-118.

**Internet resources** - http://www.upenn.edu/paflora, http://www.invasivespecies.gov, http://tncweeds.ucdavis.edu

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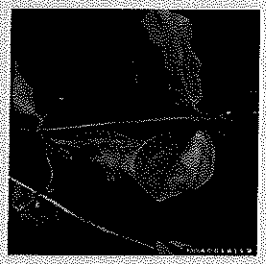
April 2002

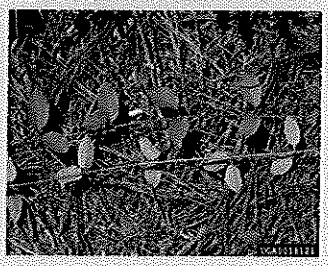
INVASIVE PLANT SPECIES FACT SHEET

IPSAWG
Invasive Plant Species Assessment Working Group

# Japanese Honeysuckle

## *Lonicera japonica*





Pictures By (From Top to Bottom): C. Bargeron, T. Bodner and J. H. Miller @ www.invasive.org.

***Invasive Plants are a Threat to:***

- **Forests and wetlands**
- **Native plants**
- **Perennial gardens**
- **Wildlife**
- **Lakes and rivers**
- **Human Health**
- **Farmland**

Date Updated: 10/06

## Description:

Japanese honeysuckle is a perennial woody vine of the honeysuckle family that spreads by seeds, underground rhizomes, and above ground runners. It has opposite oval leaves, 4-8 cm. long, that are semi-evergreen to evergreen. Older stems are hollow with brownish bark that peels in long strips. The flowers are fragrant, two-lipped, and are borne in pairs. The berries are black. It creates dense tangled thickets by a combination of stem branching, nodal rooting, and vegetative spread from rhizomes.

## Distribution:

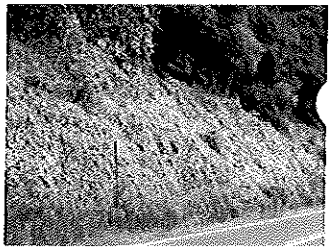
The species was introduced into the United States in 1806 on Long Island, NY. It now occurs throughout the eastern half of the United States, an area encompassing 26 states. Japanese honeysuckle's range is limited to the north by severe winter temperatures and to the west by insufficient precipitation and prolonged droughts. It is in all 92 Indiana counties, but is much more aggressive in Southern Indiana.

## Problem:

Japanese honeysuckle damages forest communities by out competing native vegetation for light, below-ground resources, and by changing forest structure. The vines overtop adjacent vegetation by twining about, and completely covering, small trees and shrubs. As it becomes established it forms a dense blanket that endangers most shrubs, herbs, and trees.

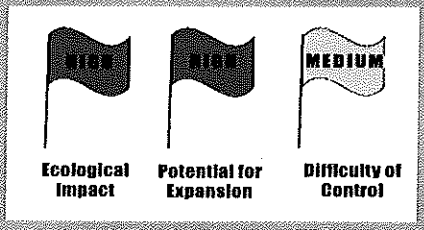
## Origin:

Japanese honeysuckle is native to East Asia, including Japan and Korea. It was introduced to the United States as an ornamental plant, for erosion control, and for wildlife forage and cover. However, there are many better plant choices for those uses (see back for good alternatives).



Picture By: The Nature Conservancy.

## IPSAWG Ranking:




## IPSAWG Recommendation:

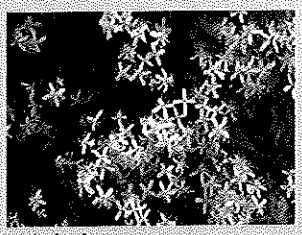
- Do not buy, sell or plant Japanese honeysuckle in Indiana.
- Help by eradicating Japanese honeysuckle on your property.

This ranking illustrates the results of an assessment conducted by the **Invasive Plant Species Assessment Working Group** (IPSAWG), which is made up of many organizations and agencies concerned about invasive plant species. IPSAWG's goal is to asses which plant species may threaten natural areas in Indiana and develop recommendations to reduce their use in the state.

For more information about IPSAWG and the assessment tool used to rank invasive species, visit their website:

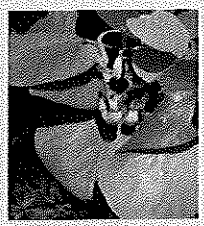
**www.invasivespecies.IN.gov**

## ALTERNATIVES to Japanese Honeysuckle:



Virgin's bower
(*Clematis virginiana*)

Trumpet Honeysuckle
(*Lonicera sempervirens*)



Woolly Dutchman's Pipe
(*Aristolochia tomentosa*)

Pictures By (Top to Bottom): D. Liebman, J. Lepore and S. Baskauf.

## Other Alternatives:

Virgina Creeper
(*Parthenocissus quinquefolia*)
Crossvine
(*Bignonia capreolata*)

## Not Recommended:

American bittersweet
(*Celastrus scandens*)
While American bittersweet is native and non-invasive, unfortunately, nurseries often mislabel Oriental bittersweet as American bittersweet. It is very difficult to find true American bittersweet for sale.

## Control Methods:

Small populations of Japanese honeysuckle can be controlled by careful hand-pulling and removal of vines. Mowing twice a year along fields and roadsides can slow the vegetative spread but stem density may increase. Prescribed burning can greatly decrease the abundance within a habitat and limit its spread for one to two growing seasons. Where other options are difficult, Japanese honeysuckle may be treated with a glyphosate herbicide. This is best applied at 5-8% with a spray applicator in late autumn when other vegetation is dormant but Japanese honeysuckle is still physiologically active. Be careful to follow label guidelines when using herbicide. Reapplication may be necessary to treat plants missed during the initial treatment. **Always read and follow pesticide label directions.**


Japanese honeysuckle completely covering adjacent vegetation. (Picture By: J. M. Swearingen @ www.invasive.org)

## Eight Easy Ways to Combat Invasive Plants

You can **help stop** the spread of **invasive plants** by following these **8 easy guidelines**:

1. Ask for only non-invasive species when you acquire plants. Request that nurseries and garden centers sell only non-invasive plants.
2. Seek information on invasive plants. Sources include botanical gardens, horticulturists, conservationists, and government agencies.
3. Scout your property for invasive species, and remove invasives before they become a problem. If plants can't be removed, at least prevent them from going to seed.
4. Clean your boots before and after visiting a natural area to prevent the spread of invasive plant seeds.
5. Don't release aquarium plants into the wild.
6. Volunteer at local parks and natural areas to assist ongoing efforts to diminish the threat of invasive plants.
7. Help educate your community through personal contacts and in such settings as garden clubs and civic groups.
8. Support public policies and programs to control invasive plants.

## For More Information:

On this assessment and IPSAWG:

**IPSAWG**
**www.invasivespecies.IN.gov**

On identification and control techniques:

**The Nature Conservancy's Wildland Weeds**
**www.tncweeds.ucdavis.edu**

On native plant alternatives and sources:

**Indiana Native Plant and Wildflower Society**
**www.inpaws.org**

This grant project made possible with United States Forest Service funds administered by the IDNR, Division of Forestry.

# Multiflora rose

***Rosa multiflora* Thunb.**

**Rose Family (Rosaceae)**

*multiflora rose in flower*

## DESCRIPTION

Multiflora rose is a vigorous, prickly shrub with green or reddish, arching branches. In late May–June it is covered with clusters of small white (or slightly pinkish) flowers. The fringed stipules at the base of the leaf stalk are the best characteristic to use to distinguish multiflora rose from other species. No other species that occur in our region have both an upright-arching growth form and fringed stipules.

**Height** - Vigorous plants can grow to 8–9 feet high and up to twice as wide.

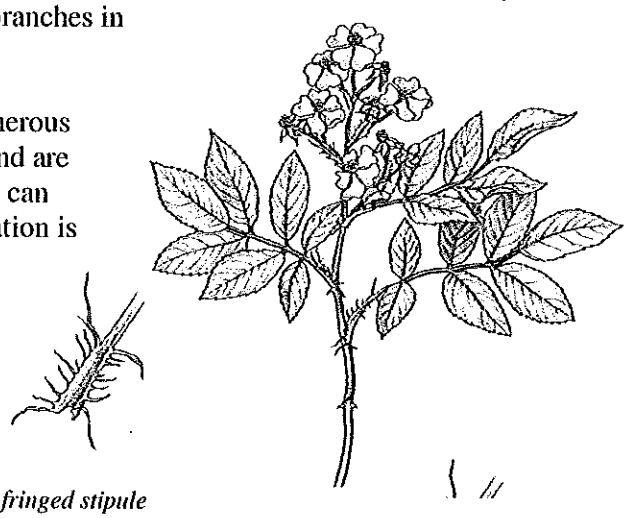
**Stem** - The stems are green or reddish and bear stout prickles that curve downward. In the open, stems often arch down to touch the ground, or they can extend even higher than 9 feet when supported by the branches of adjacent trees or shrubs.

**Leaves** - Leaves are pinnately compound with 5–11 toothed leaflets; they are alternate on the stem. The stipules, leaf-like strips along both sides of the leaf stalk near the base, are prominently fringed. The leaves begin to emerge very early in the spring, well before any native woody plants.

**Flowers** - Flowers are white, or slightly pinkish, individually they are ½–¾ inch wide. They appear in large, showy clusters at the ends of the branches in late May or early June.

**Fruit and seed** - The flowers are followed by numerous small red fruits (hips) that persist into the winter and are eaten by birds and small mammals. A single plant can produce as many as a million seeds. Seed germination is high; seeds can also remain viable in the soil for as long as 20 years.

**Roots** - Roots are wide-ranging and capable of resprouting. In addition, stem tips that contact the soil surface are capable of rooting, through a process known as layering, to form new plants.



*fringed stipule*

Extensive thickets are formed in this way.

## DISTRIBUTION AND HABITAT

Multiflora rose is native to Asia, it was brought to the United States originally in the 1800s for use as rootstock for grafted ornamental roses. In the 1930s through the 1950s it was promoted by the United States Department of Agriculture as a "living fence". Millions of seedlings were distributed to farmers and planted throughout the East and Midwest. Natural resource agencies such as the Pennsylvania Game Commission and the Pennsylvania Bureau of Forestry also included the plant in their revegetation and wildlife enhancement programs until the 1960s.

Multiflora quickly established itself as part of the naturalized flora. Today it is estimated to infest 45 million acres nationally, and is classified as a noxious weed by many states including Pennsylvania. It is found throughout the state in old fields, roadsides, pastures, open woods, forest edges, and riparian areas. While it grows most vigorously in full sun, it can grow in the shade too, and will persist for many years under a tree canopy although it may not flower or fruit very heavily.

## EFFECTS OF INVASION

Multiflora rose forms such dense stands that it can interfere with establishment of other woody species in old-field succession. It also replaces native vegetation in forest edges and riparian areas. However, once trees break through the dense thickets of rose and begin to shade it, the multiflora loses vigor.

## REPRODUCTION AND METHODS OF DISPERSAL

Most spread of multiflora rose is by seed, but there is also some vegetative spread through layering, to form large clumps or thickets. Multiflora rose is so common in many areas of Pennsylvania that any open habitat such as lawn, meadow, pasture, or prairie is vulnerable to infestation due to the constant "seed rain" from birds. Regular monitoring of such areas is recommended so invading plants can be pulled while they are still in the seedling stage.

## CONTROL

**Mechanical** - Seedlings can be pulled by hand. Small plants can be dug out or larger ones can be pulled using a chain or cable and a tractor, but care needs to be taken to remove roots also. Dense thickets may need to be attacked using a bulldozer. Repeated mowing for 2–4 years can be effective.

**Chemical** - Perhaps the most effective strategy is to cut the stems and immediately treat them with an herbicide such as glyphosate or triclopyr. The same chemicals can be employed as a foliar spray.

**Biological** - Rose rosette disease has been found in several areas of Pennsylvania, however it is not yet clear how much impact this virus disease, that was first reported in 1941, will have. The virus is spread naturally by a tiny mite. Plants affected by rose rosette disease develop witches'-brooms and small reddish leaves and shoots. The disease can kill plants in two years.

## NATIVE ALTERNATIVES FOR LANDSCAPE USE

The native rose species, pasture rose (*Rosa carolina*), wild rose (*R. virginiana*), and swamp rose (*R. palustris*) are preferred landscape alternatives.

## REFERENCES

Rhoads, Ann Fowler and Timothy A. Block. 2000. The Plants of Pennsylvania: An Illustrated Manual. University of Pennsylvania Press, Philadelphia, PA.

Rhoads, Ann Fowler and William McKinley Klein. 1993. The Vascular Flora of Pennsylvania: Annotated Checklist and Atlas. American Philosophical Society, Philadelphia, PA.

**Internet resources** - http://www.upenn.edu/paflora, http://www.invasivespecies.gov, http://tncweeds.ucdavis.edu

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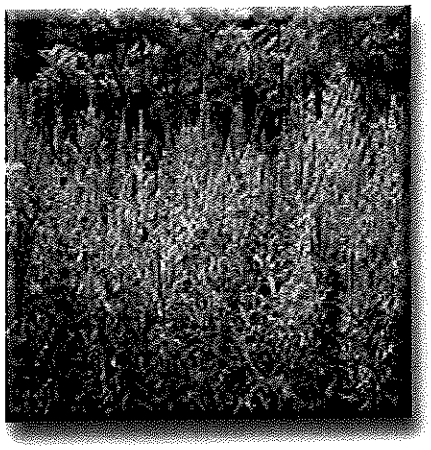
April 2002

## Invasive Plants Fact Sheet



### Purple Loosestrife Lythrum salicaria L. Loosestrife Family (Lythraceae)

**Status:** Common and invasive in Connecticut

**Description:** Purple loosestrife is a non-native herbaceous perennial with a stiff, four-sided stem and showy spikes of numerous magenta flowers. Individual flowers have five to seven petals, and are attached close to the stem. This attractive plant is usually under four feet in height, but can grow to 10 feet in nutrient-rich habitats. Mature plants can have from 30 to 50 stems rising from a common rootstock, forming a large bushy cluster. Preferred habitat: Purple loosestrife can be found in a variety of wetland habitats including freshwater tidal and non-tidal marshes, river banks, ditches, wet meadows, and edges of ponds and reservoirs. It prefers moist, highly organic soils in open areas, but can tolerate a wide range of substrate material, flooding depths, and partial shade.

**Seasonal Cycle:** This aggressive weed not only re-seeds prolifically, but also can spread vegetatively through fallen lateral stems that root. Purple loosestrife flowers in July and August in most of Connecticut. The seeds mature in August and September, and germinate the following season as long as the soil is not too wet, and soil surface temperatures are optimum. Dead stalks remain standing through winter.

**Distribution:** Originally a native of Europe, loosestrife was introduced to the northeastern United States and Canada in the 1800's and has since spread westward to Minnesota and southward to Virginia. Although not native, it can occur "naturally" in any freshwater wetland area, particularly in an area that has been disturbed. It is also sold commercially for perennial gardens. Two cultivated species widely available are Lythrum salicaria and Lythrum virgatum. Cultivars of these species are supposedly self-infertile, but can become quite fertile and widespread when crossed with wild purple loosestrife and should not be used for home gardens. Other points of interest: Purple loosestrife has a long history of use in herbal medicine. It has been used to stop both internal and external bleeding, and sap extracted from the leaves can be taken to control dysentery. Although it is now seldom used, L. salicaria was highly recommended in early herbals.

**Control:** In spite of its spectacular beauty, often covering acres of wetland areas, purple loosestrife is a particularly troublesome invasive species with low wildlife value. It can grow as dense monocultures, crowding out sedges, grasses, rushes, and other aquatic plants more valuable to wildlife. In Minnesota, where purple loosestrife has spread at an alarming rate, it is illegal to plant or sell either L. salicaria or L. virgatum. Purple loosestrife is listed as a noxious weed in 12 other states, where its importation and distribution is prohibited. Control techniques include early detection of purple loosestrife, hand-pulling of small infestations of one- to two-year-old plants before they set seed, and spot treatment of older plants with non-selective herbicides such as Rodeo¨ for aquatic communities or Roundup¨ on terrestrial sites. A DEP

permit is required for the use of Rodeo¨ in aquatic communities, however. If herbicides are used, they are most effective when sprayed in the late summer or early fall, but repeated use is costly, and the long-term effects on natural systems are not fully understood. Due to a strongly-developed tap root, removal by digging is not recommended since the disturbance may encourage proliferation. Biological control, in this case using insects from the plant's natural environment, is being studied by the U.S. Department of Agriculture. The species include a root-mining weevil, Hylobius transversovittatus, and two leaf-eating beetles, Galerucella calmariensis and Galerucella pusilla. Release of these insects occurred in 1992 in New York, Pennsylvania, Maryland, Virginia, Minnesota, Oregon and Washington state. Their impact should be noticeable by 1997. Additional information sources: A Field Guide to Coastal Wetland Plants of the Northeastern United States. Ralph W. Tiner, Jr. The University of Massachusetts Press, Amherst 1987. Wetlands -- Audubon Society Nature Guide. William A. Niering. Chanticleer Press, New York 1985. Diagnostic information: Flowers: July to September; small, purplish-pink with five to seven petals, clustered in the axils of reduced leaves, forming long dense terminal spikes (4-16 inches long). Leaves: sessile (without stalks), up to four inches long, lance-shaped, with heart-shaped bases, somewhat clasping stem, oppositely arranged, sometimes in whorls of three, turn red at the end of the growing season. Stems: four-angled, almost woody, glabrous to pubescent. Fruits: small capsule. This fact sheet has been prepared by The Nature Conservancy Connecticut Chapter in cooperation with The Natural Diversity Data Base of the Connecticut Department of Environmental Protection. 

The Nature Conservancy, Connecticut Chapter
55 High Street Middletown, CT 06457
Department of Environmental Protection Geological and Natural History Survey Natural Diversity Data Base
79 Elm Street Hartford, CT 06106

# Appendix E

# Wetland Functional Assessment

# Wetland Functional Assessment Cucia Park Site

As noted in the Connecticut "Method for the Evaluation of Inland Wetlands" (DEP Bulletin No. 9), "it is generally accepted that all wetlands possess some value and that the value of a particular wetland can be assessed in relation to other wetlands in a given area." The basic concept behind most wetland evaluation or assessment methods is that wetland characteristics contribute to give rise to wetland functions that have certain value to natural systems, including man. By assessing the relative importance of certain characteristics indicated by research or experience to contribute toward particular functions (e.g., the dominant vegetative class affects wildlife habitat value), and then weighting the various conditions which that characteristic may occur in wetlands (e.g., shallow marsh, wooded swamp, etc.), some picture of the relative significance a particular wetland may play in providing certain functions can be developed. This concept is fundamental to the wetland evaluation procedures that were drawn from to assess the functional values of the wetland areas on the site. These methods include:

- New England Division Corps of Engineers Highway Methodology. 1995. Wetland Functions and Values: A Descriptive Approach. NEDEP-360-1-30a (see Appendix C for forms).
- Golet, F.C. 1976. Wildlife Wetland Evaluation Model. pp. 13-34 in: J.S. Larson (ed), Models for Assessment of Freshwater Wetlands. Univ. of Mass. Water Resources Research Center Publ. No. 32.
- Ammann, A.P., R.W. Franzen, and J.L. Johnson. 1986. Method for the Evaluation of Inland Wetlands in Connecticut.CTDEP Bulletin 9.
- Hollands, G.G. and D.W. Magee. 1986. A Method for Assessing the Functions of Wetlands. pp. 108-118 in: J.A. Kusler and P. Riexinger (eds). National Wetland Assessment Symposium Proceedings.

In recent years there has been a general tendency to move away from numerical or quantitative evaluation procedures. However, the basic understanding of how physical characteristics, setting, and other factors affect functional significance has not changed appreciably. As stated in the Corps of Engineers' Descriptive Approach, "...we advocate an approach that includes a qualitative description of the physical characteristics of the wetlands, identifies the functions and values exhibited, and most importantly, the bases for the conclusions using 'best professional judgment'." Accordingly, rather than focus on model output results, the rationale encompassed in the evaluation procedures for determining functions and values are utilized in rating the relative significance of each wetland area for a range of functions.

The objective of the assessment process was to develop an understanding of the probable significance of these wetlands on a site-specific and watershed basis. The evaluation methods were used to provide the rationale for assessing how the site-specific characteristics of wetlands on the site affect the capacity of these wetlands to contribute to selected functional values. As recommended by the EPA (1989), an assessment was desired that would provide guidance on wetland functions that could be impacted under prospective development scenarios, the reliability with which the functional impacts can be mitigated, and the risks if they cannot be adequately replaced.

The following discussion attempts to summarize this qualitative assessment for several of the more important natural resource functions. For the purposes of this discussion, the focus of the evaluation is on the wetland conditions within the area comprising the proposed development area and immediately surrounding areas, although some specific references are made to other wetlands in the project vicinity.

### Groundwater Recharge / Discharge

The Connecticut method assesses the "groundwater use potential" of a wetland by considering wetland juxtaposition with existing or potential public water supplies, quality of associated ground and surface waters, and the shape of the associated water course. The Hollands and Magee method rates seven characteristics considered to influence groundwater functions, with the underlying surficial geology, hydrologic position (e.g., perched vs. water table condition), transmissivity of the associated aquifer, and wetland size the most important factors. The ACOE Descriptive Approach uses similar criteria.

Wetlands in the glaciated northeast occur in a wide variety of hydrogeological settings. The ground and surface water interactions within a wetland are strongly related to the properties of the soil and surficial geologic deposits underlying the wetland. In general, wetlands set in stratified sands and gravels are most likely to be associated with the regional groundwater system, and are most often areas of groundwater discharge although some recharge may occur at certain times of the year. Wetlands set in less permeable till or glaciolacustrine deposits typically have reduced ground and surface water interactions, and may be perched above the regional water table.

Wetlands on the site are set on poorly drained soils formed in dense glacial till deposits that limit vertical hydraulic conductivities and therefore are therefore not conducive to groundwater flow. Groundwater flow tends to be predominantly lateral, and accordingly the wetlands function primarily as groundwater discharge or seepage zones. While there may be some interflow (water moving laterally in the unsaturated zone) or shallow groundwater seepage into the wetlands on a seasonal basis, the potential for significant ground and surface water interactions is low for the site's wetlands.

### Flood Control (Floodflow Alteration)

The ACOE Descriptive Method cites eighteen (18) factors to consider in assessing the flood control function of a wetland area, including: the size of the wetland relative to its watershed; location of the wetland in its watershed; watershed characteristics; wetland association with watercourses; and outlet conditions. The Connecticut wetland evaluation method assesses three basic factors to evaluate wetland flood storage capacity and reduction of downstream peak flows and flooding. These are: (1) the estimated volume of storage during the 1% chance (100-year) flood; (2) the effectiveness of that storage in relation to the total runoff and other storage in the watershed; and (3) the existing flooding concerns downstream. The Hollands and Magee Assessment Method rates fourteen (14) characteristics considered to influence flood storage capacity, with size, vegetative density, hydrologic connection, and the rate of water movement through the wetland most important.

In general, wetlands within 100-year floodplains and having some form of a constricted outlet to enhance water impoundment, a low gradient and dense vegetation (preferably woody) to slow water velocity, and sizable enough to contain a significant volume of water (although cumulative volumes from several smaller units need to be considered) are most important in decreasing peak flood flows and lessening flooding downstream.

Considering these factors, the wetland resources on the site offer varying opportunity to store appreciable flood waters to affect flood flows and flood elevations in downstream watercourses. Wetland System 1 offers the greatest capacity to retain high volumes of water, receive and detain excessive flood water as well as provide depressional storage. In addition, the floodplain and pond in Wetland System 1 have the potential to provide peak rate control function which serves to attenuate flood peaks downstream. The topographic conditions of Wetland System 1, which are relatively flat wooded lowlands, contribute to flood storage. Wetland E provides a minor capacity to retain water, receive and detain flood water and provides depressional storage within its man-made 0.35-acre pond as well as borrow pits; however, the total volume of water stored in these small depressions is negligible relative to the flood flows in Sawmill Brook . When

Wetland E reaches capacity it flows to Wetland System 1 via constricted channels and culverts. Wetlands A and G provide little flood control. Neither provides depressional areas for potential flood storage and both are situated on hillside slopes that drain toward the western portion of the site that provides no capacity to retain flood storage.

**Wildlife Habitat / Fish and Shellfish Habitat**

Most of the evaluation methods employ similar criteria for assessing overall wildlife habitat or biological functions; the Golet wetland wildlife evaluation provides the standard which most of the subsequent methods were developed from, and uses ten criteria in determining wildlife habitat value. Wetland size, variety and interspersion of vegetative cover types, availability of open water, juxtaposition to other wetlands, and surrounding habitat are important variables.

By contrast, wetland areas of less value generally contain a lack of plant community diversity and/or a typically disturbed plant community, are often isolated hydrologically or functionally from other wetlands, are smaller sized, and have an unproductive water regime. Accordingly, they are considered of low habitat quality, whereas the wooded wetland areas offer moderate quality habitat.

The most significant wetland within the site in terms of overall diversity of wildlife habitat is clearly Wetland System 1. Wetland System 1 (Sawmill Brook Wetland System) is considered by the City of Middletown as one of its outstanding wetlands and it is ranked 19th of the top 25 wetlands in Middletown. It is a wooded lowland brook with deep pools and very high aesthetic quality which flows into the Mattabessett River. In addition, the small pond located in northern portion of the site is contiguous with the Brook and provides additional open water habitat for fish and shellfish. Species most commonly found within these types of habitat include waterfowl and other aquatic/riparian species such as fish, aquatic invertebrates, amphibians, and certain mammals such as raccoons, muskrats, otters, and mink. The most significant wildlife component of the site is related to the contiguous riparian corridor along Sawmill Brook in the western portion of the site (i.e., Wetland 1)

Wetland E includes a small area of (man-made) open water habitat for warm water fish and other aquatic species, as well as potential vernal pool habitat in a depression also created by historic earth removal on the site. Evidence of minor breeding activity by obligate vernal pool species (spotted salamander) has been observed in the flooded depressions located in the northern most portion of Wetland E. Based on the observed conditions, however, it is not anticipated that significant levels of such breeding vernal pool activity occur within these pools.

The wooded hillside wetland areas (Wetland A, Wetland E and G) and adjacent forested uplands in the eastern portion of the site provide habitat for nesting and foraging passerine birds, small mammals and some herpetofauna species.

**Sediment / Toxicant Retention**

This function reduces or prevents degradation of water quality. It relates to the effectiveness of the wetland to trap sediments, toxicants, or pathogens in runoff water from surrounding uplands or upstream eroding wetland areas. Wetland System 1 provides the most significant sediment and toxicant retention function on the site. As a floodplain wetland, Wetland 1 is associated with a perennial brook and provides floodwater storage. Its dense vegetation cover contributes to diffuse water flow and sediment trapping capability. Wetland E also provides a capacity to trap sediment, particularly within the pond where water is detained and settled. A drainage ditch, centrally located on the site, carries stormwater flow and sediments from Interstate 91 to the southern portion of Wetland E where it accumulates and flows north within the channelized portion of the wetland, adjacent to the old trolley line berm. Wetland A and G are primarily hillside seeps that provide little sediment or toxicant trapping qualities.

### Nutrient Removal / Water Quality

The Connecticut method assesses the value of a wetland at reducing levels of nutrients by examining characteristics of the upstream watershed (potential sources of contaminants), the size of the wetland relative to that watershed, the type of vegetation in the wetland, the presence of impoundments in the wetland, and flood storage capacity of the wetland. The Hollands and Magee method rates 11 characteristics as influencing water quality maintenance, the most important being the dominant wetland class, vegetative density, topographic configuration, wetland size, and the rate of water movement through the wetland. The Corps' Descriptive Approach considers similar characteristics in assessing the "sediment/toxicant/pathogen retention" and the "nutrient removal/retention/transformation" functions.

In general, wetlands most likely to appreciably reduce levels of contaminants in waters moving through them are those having low (flat) gradients, long detention times, and diffuse surface water flow through dense vegetation and organic soils. The conditions within Wetland System 1 are the most conducive on the site for promoting water quality functions, and the location of the wetland in the watershed of Sawmill Brook conveys an opportunity for this capacity to have significance for affecting surface water quality in the downstream watercourse. Wetland E has similar opportunity for buffering associated intermittent watercourses from water quality changes; however internal characteristics are not as optimal as those within Wetland System 1. Wetlands A and G are considered the least significant wetland for maintaining water quality due to the gradient, low vegetative density, and lack of hydric soils.

### Production Export

This function evaluates the effectiveness of wetlands to produce food or usable products for humans or other living organisms. Wetlands G and A provide little production export while Wetland System 1 and Wetland E provide evidence that some production export is available for wildlife use including aquatic food sources for wildlife development within their pools and ponds.

### Sediment / Shoreline Stabilization

This function considers the effectiveness of a wetland to stabilize stream banks and shorelines against erosion. Wetland System 1 is a broad densely vegetated system that moderates high velocity flood flows, and therefore provides bank stabilization and erosion control along Sawmill Brook. Portions of Wetland E, adjacent to the pond, may provide minimal bank stabilization functions. Wetlands A and G afford little opportunity to provide stabilization functions as they are not associated with water bodies on the project site.

### Recreation

Recreation value considers the suitability of the wetland and associated watercourses to provide recreational opportunities. Currently Cucia Park is an underutilized and outdated passive recreation area with overgrown ponds. The pond located in the northern portion of Wetland System I provides some recreational fishing, however the area is underutilized. The other wetlands provide no recreational potential and are difficult to access.

### Educational / Scientific Value

This value considers the suitability of wetlands as sites for outdoor classrooms or as a location for scientific study or research. With the exception of the northern portion of the site around Sawmill Brook and the man-made pond, the wetland systems on the site do not posses characteristics that would be considered useful for wetland/water-based educational or scientific purposes.

### Uniqueness / Heritage

This value pertains to the effectiveness of the wetlands or its associated water bodies to provide certain special values such as archaeological sites, critical habitat for endangered species, health, and

appearance of the ecological system, or relative importance as wetlands for the geographic location. As mentioned above, Wetland System 1 is considered by the City of Middletown as one of its outstanding wetlands with very high aesthetic qualities. The remaining wetlands do not possess distinct qualities relative to this value.

**Visual Quality / Aesthetics**

This value considers the visual and aesthetic quality or usefulness of the wetland. As mentioned above Wetland System 1 is considered as an outstanding wetland with high aesthetic quality. Wetland E also provides some aesthetic qualities around where the small pond is located, although this area is obscured and overgrown.

**Threatened and Endangered Species Habitat**

This value considers the suitability of the wetland to support threatened or endangered species. This site has been identified as potential habitat for the eastern box turtle, a State Species of Special Concern, although reviews for this species have not encountered an eastern box turtle specimen at Cucia Park.

**Other Functions**

There are a number of other functions and values that may be provided by wetlands and can be assessed using accepted criteria. In general, it is AECOM's experience that wetlands which are determined to be significant for functions such as wildlife habitat and water quality improvement are also likely to contribute to other functions such as recreation, educational/scientific, heritage, and visual/aesthetic. Conversely, wetlands that do not possess the characteristics that promote wildlife habitat and water quality improvement typically are also not likely to provide these other functions to a significant degree.

Table 3 provides a summary of the anticipated functional significance of the site's wetlands as discussed above. In summary, the floodplain wetland along the western border of the site has the greatest significance for flood storage, wildlife habitat, nutrient removal, and water quality functions. In general, wetland areas which are identified as having low value have the following characteristics:

- A low diversity of vegetative cover types with low habitat value or which are subject to disturbance (e.g., recent or past cutting).
- Limited flood storage capacity due to topographic setting or a lack of natural or man made control features to detain surface waters.
- Minimal surface water detention time or a lack of surface water during all portions of the year, as well as minimal input of surface water from upstream areas. These conditions infer a low potential for significant portions of the delineated wetland areas to interact with surface waters to positively influence the quality of the water and downstream resources.

The following table summarizes the functional assessment of the onsite wetlands.

**Table 3: Summary of Wetland Functional Assessment**

| Functions/Values | Wetland System 1 | Wetland A | Wetland E | Wetland G |
|---|---|---|---|---|
| **Flood Control** | High | Low | Moderate | Low |
| **Groundwater** | Moderate | Low | Low | Low |
| **Water Quality** | High | Low | Moderate | Low |
| **Shoreline Stabilization** | High | Low | Moderate | Low |
| **Wildlife Habitat** | High | Moderate | Moderate | Low |

| | | | | |
|---|---|---|---|---|
| **Recreation** | Moderate | Low | Low | Low |
| **Education** | Moderate | Low | Low | Low |
| **Uniqueness/Heritage** | Moderate | Low | Low | Low |
| **Visual Quality** | High | Low | Low | Low |
| **Endangered Species Habitat** | Moderate | Low | Low | Low |

## Boardman Lane Wetland Function and Value Assessment

The Boardman Lane site is an 89 acre parcel bounded to the east by the Yellow Freight property, Boardman Lane to the south and Bradley Brook to the west. The site extends north from Boardman Lane approximately 0.47 miles towards the Ken Dooley Drive site. Site boundaries on the south circumvent the properties at 132 Boardman Lane and 275 Boardman Lane, as well as a small pond on an industrial parcel between the Boardman Lane site and the Yellow Freight property. A sanitary sewer easement cuts across the eastern half of the property from the Bysiewicz Industrial Subdivision to the sewer system along Boardman Lane. Richards Brook crosses the center of the property from the northeast to the southwest and connects to Sawmill Brook behind a residential house located at 132 Boardman Lane. Approximately 35 acres of wetlands are located in the eastern portion of the site, bordering Richards Brook while 3.5 acres of isolated wetlands are located in the forested western portion of the site.

### Groundwater Recharge / Discharge

The Connecticut method assesses the "groundwater use potential" of a wetland by considering wetland juxtaposition with existing or potential public water supplies, quality of associated ground and surface waters, and the shape of the associated water course. The Hollands and Magee method rates seven characteristics considered to influence groundwater functions, with the underlying surficial geology, hydrologic position (e.g., perched vs. water table condition), transmissivity of the associated aquifer, and wetland size the most important factors. The ACOE Descriptive Approach uses similar criteria.

Wetlands in the glaciated northeast occur in a wide variety of hydrogeological settings. The ground and surface water interactions within a wetland are strongly related to the properties of the soil and surficial geologic deposits underlying the wetland. In general, wetlands set in stratified sands and gravels are most likely to be associated with the regional groundwater system, and are most often areas of groundwater discharge although some recharge may occur at certain times of the year. Wetlands set in less permeable till or glaciolacustrine deposits typically have reduced ground and surface water interactions, and may be perched above the regional water table.

The western portion of the Boardman Lane property consists of Yalesville and Cheshire-Holyoke complex, well drained coarse-loamy melt-out till soils derived from basalt and/or sandstone and shale. Wetlands situated in this area are function primarily as groundwater discharge or seepage zones. While there may be some interflow (water moving laterally in the unsaturated zone) or shallow groundwater seepage into the wetlands on a seasonal basis, the potential for significant ground and surface water interactions is low for the site's wetlands. The eastern portion of the property consists primarily of Wilbraham silt loam, a coarse-loamy lodgment till derived from basalt and/or sandstone and shale. The soil is poorly drained with a low available water capacity.

### Flood Control (Floodflow Alteration)

The ACOE Descriptive Method cites eighteen (18) factors to consider in assessing the flood control function of a wetland area, including: the size of the wetland relative to its watershed; location of the wetland in its watershed; watershed characteristics; wetland association with watercourses; and outlet conditions. The Connecticut wetland evaluation method assesses three basic factors to evaluate wetland flood storage capacity and reduction of downstream peak flows and flooding. These are: (1) the estimated volume of storage during the 1% chance (100-year) flood; (2) the effectiveness of that storage in relation to the total runoff and other storage in the watershed; and (3) the existing flooding concerns downstream. The Hollands and Magee Assessment Method rates fourteen (14) characteristics considered to influence flood storage capacity, with size, vegetative density, hydrologic connection, and the rate of water movement through the wetland most important.

In general, wetlands within 100-year floodplains and having some form of a constricted outlet to enhance water impoundment, a low gradient and dense vegetation (preferably woody) to slow water velocity, and sizable enough to contain a significant volume of water (although cumulative volumes from several smaller units need to be considered) are most important in decreasing peak flood flows and lessening flooding downstream.

Considering these factors, the eastern wetland resources on the site offer varying opportunity to store appreciable flood waters to affect flood flows and flood elevations in downstream watercourses. These wetlands have the capacity to retain high volumes of water, receive and detain excessive flood water as well as provide depressional storage. In addition, the floodplain and pond in this wetland system have the potential to provide peak rate control function which serves to attenuate flood peaks downstream. The topographic conditions, which are relatively flat shrub and emergent lowlands, contribute to flood storage. Although some of the wetland vegetation has been grazed and as such lost their capacity to slow water velocity, particularly the portion located southwest of Richards Brook in the southern portion of the site. The wetlands located in the western hilly portion of the site provide depressional areas that have some potential flood storage.

**Wildlife Habitat / Fish and Shellfish Habitat**

Most of the evaluation methods employ similar criteria for assessing overall wildlife habitat or biological functions; the Golet wetland wildlife evaluation provides the standard which most of the subsequent methods were developed from, and uses ten criteria in determining wildlife habitat value. Wetland size, variety and interspersion of vegetative cover types, availability of open water, juxtaposition to other wetlands, and surrounding habitat are important variables.

By contrast, wetland areas of less value generally contain a lack of plant community diversity and/or a typically disturbed plant community, are often isolated hydrologically or functionally from other wetlands, are smaller sized, and have an unproductive water regime. Accordingly, they are considered of low habitat quality, whereas the wooded wetland areas offer moderate quality habitat.

The most significant wetland within the site in terms of overall diversity of wildlife habitat is clearly the large wetland system associated Richards Brook, located in the eastern portion of the site. This wetland system (Richards Brook Wetland System) is considered by the City of Middletown as one of its outstanding wetlands and it is ranked 11th of the top 25 wetlands in Middletown. It provides wooded, shrub and emergent wetland habitat. In addition, the wetland system includes a lowland brook with deep pools and very high aesthetic quality which flows to the Mattabessett River via Sawmill Brook. In addition, the small pond located to the south east of the site is adjacent to the Brook and provides additional open water habitat for fish and shellfish. Species most commonly found within these types of habitat include waterfowl and other aquatic/riparian species such as fish, aquatic invertebrates, amphibians, and certain mammals such as raccoons, muskrats, otters, and mink. In addition, Eastern box turtle have been documented on the site. The most significant wildlife component of the site is related to the contiguous riparian corridor along Richards Brook in the eastern. The wooded hillside wetlands areas and adjacent forested uplands in the western portion of the site provide habitat for the Eastern box turtle as well as nesting and foraging passerine birds, deer, and other small mammals.

**Sediment / Toxicant Retention**

This function reduces or prevents degradation of water quality. It relates to the effectiveness of the wetland to trap sediments, toxicants, or pathogens in runoff water from surrounding uplands or upstream eroding wetland areas. The Richards Brook wetland system provides the most significant sediment and toxicant retention function on the site. As a floodplain wetland, this system is associated with a perennial brook and provides floodwater storage. In some areas its dense vegetation cover contributes to diffuse water flow and sediment trapping capability. The western wetland system is primarily hillside seeps that provide little sediment or toxicant trapping qualities.

### Nutrient Removal / Water Quality

The Connecticut method assesses the value of a wetland at reducing levels of nutrients by examining characteristics of the upstream watershed (potential sources of contaminants), the size of the wetland relative to that watershed, the type of vegetation in the wetland, the presence of impoundments in the wetland, and flood storage capacity of the wetland. The Hollands and Magee method rates 11 characteristics as influencing water quality maintenance, the most important being the dominant wetland class, vegetative density, topographic configuration, wetland size, and the rate of water movement through the wetland. The Corps' Descriptive Approach considers similar characteristics in assessing the "sediment/toxicant/pathogen retention" and the "nutrient removal/retention/transformation" functions.

In general, wetlands most likely to appreciably reduce levels of contaminants in waters moving through them are those having low (flat) gradients, long detention times, and diffuse surface water flow through dense vegetation and organic soils. The conditions within the Richards Brook system is the most conducive on the site for promoting water quality functions, and the location of the wetland in the watershed conveys an opportunity for this capacity to have significance for affecting surface water quality in the downstream watercourse. The western wetlands are considered the least significant wetlands for maintaining water quality due to the gradient, low vegetative density, and lack of hydric soils.

### Production Export

This function evaluates the effectiveness of wetlands to produce food or usable products for humans or other living organisms. The western wetlands provide little production export while Richards Brook wetland system provide evidence that production export is available for wildlife use including aquatic food sources for wildlife development within their pools and ponds. Much of this wetland system is situated on agriculture and pasturelands that are currently provide a food source to livestock.

### Sediment / Shoreline Stabilization

This function considers the effectiveness of a wetland to stabilize stream banks and shorelines against erosion. The eastern wetland system is a broad system, with areas of dense vegetation that moderates high velocity flood flows, and therefore provides bank stabilization and erosion control along Richards Brook. However those portions of the wetland situated in the pasturelands are degraded due to grazing and may not provide stabilization at this time. The western wetlands afford little opportunity to provide stabilization functions as they are not associated with water bodies on the project site.

### Recreation

Recreation value considers the suitability of the wetland and associated watercourses to provide recreational opportunities. Currently the Boardman Lane property is privately owned and not utilized for recreation, however the brook does provide potential recreation value. The pond located in the southeast provides potential recreational fishing, however the area is underutilized. The other wetlands provide no recreational potential and are difficult to access.

### Educational / Scientific Value

This value considers the suitability of wetlands as sites for outdoor classrooms or as a location for scientific study or research. The northern eastern portion of the wetland system associated with Richards Brook as well as the brook is not degraded and posses natural characteristics that would be considered useful for wetland/water-based education. The southern portion of the wetland system, although somewhat degraded, provides easy access and includes the pond which provides educational value.

### Uniqueness / Heritage

This value pertains to the effectiveness of the wetlands or its associated water bodies to provide certain special values such as archaeological sites, critical habitat for endangered species, health, and appearance of the ecological system, or relative importance as wetlands for the geographic location. As mentioned above, the Richards Brook wetland system is considered by the City of Middletown as one of its outstanding wetlands with very high aesthetic qualities. Bradley Brook, located beyond the western site boundary, provides a diverse environment, with wet meadows, swamp, and marsh and pond habitats and diverse flora as well as an extensive area for wildlife travel. This system is ranked 14th of the top 25 environments in the City. Although Bradley Brook and associated wetland system does not occur on the property it is in close proximity to the site and situated within the same track of forest as site's western wetland system.

### Visual Quality / Aesthetics

This value considers the visual and aesthetic quality or usefulness of the wetland. As mentioned above Richards Brook wetland system is considered an outstanding wetland with high aesthetic quality. The western wetlands and their location within the hillside forest provide some aesthetic qualities.

### Threatened and Endangered Species Habitat

This value considers the suitability of the wetland to support threatened or endangered species. This site has been identified as providing habitat for the eastern box turtle and the squarrose sedge, State Species of Special Concern. Both species have been documented within the site's borders.

### Other Functions

There are a number of other functions and values that may be provided by wetlands and can be assessed using accepted criteria. In general, it is AECOM's experience that wetlands which are determined to be significant for functions such as wildlife habitat and water quality improvement are also likely to contribute to other functions such as recreation, educational/scientific, heritage, and visual/aesthetic. Conversely, wetlands that do not possess the characteristics that promote wildlife habitat and water quality improvement typically are also not likely to provide these other functions to a significant degree.

Table 1 provides a summary of the anticipated functional significance of the site's wetlands as discussed above. In summary, the floodplain wetland along the eastern border of the site, Richards Brook wetland system, has the greatest significance for flood storage, wildlife habitat, nutrient removal, and water quality functions. In general, wetland areas which are identified as having low value have the following characteristics:

- A low diversity of vegetative cover types with low habitat value or which are subject to disturbance (e.g., recent or past cutting).
- Limited flood storage capacity due to topographic setting or a lack of natural or manmade control features to detain surface waters.
- Minimal surface water detention time or a lack of surface water during all portions of the year, as well as minimal input of surface water from upstream areas. These conditions infer a low potential for significant portions of the delineated wetland areas to interact with surface waters to positively influence the quality of the water and downstream resources.

The following table summarizes the functional assessment of the onsite wetlands.

**Table 1: Summary of Wetland Functional Assessment**

| Functions/Values | Richards Brook Wetland System | Western Wetlands |
|---|---|---|
| **Flood Control** | High | Low |
| **Groundwater** | Moderate | Low |
| **Water Quality** | High | Low |
| **Shoreline Stabilization** | High | Low |
| **Wildlife Habitat** | High | High |
| **Recreation** | Moderate | Low |
| **Education** | Moderate | Low |
| **Uniqueness/Heritage** | High | Low |
| **Visual Quality** | High | Low |
| **Endangered Species Habitat** | High | High |

# Appendix F

# Draft Conservation Restriction

# Appendix G

# SHPO Cultural Resources Clearance Letter & CT NDDB Clearance Letter

Connecticut Commission on Culture & Tourism

Historic Preservation
and Museum Division

One Constitution Plaza
Second Floor
Hartford, Connecticut
06103

860.256.2800
860.256.2763 (f)

January 16, 2009

Mr. David W. Pugh
Planning Division, Military Branch
USACE/SAM/PD-M
PO Box 2288
Mobile, AL 36628-0001

Subject: Army Reserve Center
Middletown, CT

Dear Mr. Pugh:

The State Historic Preservation Office has reviewed the cultural resources survey prepared by Brockington and Associates Inc. concerning the above-named project. In the opinion of the State Historic Preservation Office, the archival and archaeological methodologies employed by Brockington and Associates Inc. are consistent with our *Environmental Review Primer for Connecticut's Archaeological Resources*. This office concurs with Brockington and Associates Inc.'s assessment that no additional archaeological investigations appear warranted with respect to the proposed undertaking.

In the opinion of the State Historic Preservation Office, the Samuel Harris House (612 Middle Street) and the Old Westfield Cemetery (Boardman Lane) possesses historic and/or architectural significance and are eligible for the National Register of Historic Places. As such, the proposed new Army Reserve Center will effect the historic integrity of these important cultural resources. However, this office believes that the proposed undertaking will constitute no adverse effect upon the state's cultural heritage. This comment is conditional upon the professional implementation of the following mitigative measures:

- The U.S. Army Corps of Engineers, Mobile and Louisville District, shall document the Samuel Harris House (612 Middle Street) and the Old Westfield Cemetery (Boardman Lane) to the professional standards of the State Historic Preservation Office. Documentation shall consist of narrative text, photographs and/or digital images, an index to photographs, and a photographic site plan. Final documentation shall be provided to the State Historic Preservation Office for permanent archiving and public accessibility.

- The U.S. Army Corps of Engineers, Mobile and Louisville District, shall provide the State Historic Preservation Office an opportunity to review and comment upon preliminary design plans for the proposed Army Reserve Center regarding appropriate landscape design vis-à-vis the Samuel Harris House (612 Middle Street) and the Old Westfield Cemetery (Boardman Lane).

The State Historic Preservation Office believes that the Noah Bacon House (218 Boardman Lane), the MacDonald House (475 Middle Street), and 19 Bell Street lack architectural significance and/or historic integrity and are not eligible for the National Register of Historic Places.

This office appreciates the opportunity to have reviewed and commented upon the proposed undertaking.

We look forward to further coordination with the U.S. Army Corps of Engineers and all interested parties regarding the expeditious furtherance of the proposed undertaking as well as the professional management of Connecticut's cultural heritage.

For further assistance please contact Dr. David A. Poirier, Staff Archaeologist.

Sincerely,

David Bahlman
Deputy State Historic Preservation Officer

cc: Dr. Nicholas Bellantoni/OSA

# United States Department of the Interior

FISH AND WILDLIFE SERVICE
New England Field Office
70 Commercial Street, Suite 300
Concord, New Hampshire 03301-5087
http://www.fws.gov/northeast/newenglandfieldoffice

January 2, 2009

To Whom It May Concern:

This project was reviewed for the presence of federally-listed or proposed, threatened or endangered species or critical habitat per instructions provided on the U.S. Fish and Wildlife Service's New England Field Office website:

(http://www.fws.gov/northeast/newenglandfieldoffice/EndangeredSpec-Consultation.htm)

Based on the information currently available, no federally-listed or proposed, threatened or endangered species or critical habitat under the jurisdiction of the U.S. Fish and Wildlife Service (Service) are known to occur in the project area(s). Preparation of a Biological Assessment or further consultation with us under Section 7 of the Endangered Species Act is not required.

This concludes the review of listed species and critical habitat in the project location(s) and environs referenced above. No further Endangered Species Act coordination of this type is necessary for a period of one year from the date of this letter, unless additional information on listed or proposed species becomes available.

Thank you for your cooperation. Please contact Mr. Anthony Tur at 603-223-2541 if we can be of further assistance.

Sincerely yours,

Thomas R. Chapman
Supervisor
New England Field Office

# Appendix H

# Monitoring Forms and Invasive Species Table 4

Table 4
Invasive and other Unacceptable Plant Species[10]

a. Herbs:

| | |
|---|---|
| *Aegopodium podagraria* | Goutweed or Bishop's weed |
| *Aira caryophyllea* | Silver hairgrass |
| *Alliaria petiolata* | Garlic mustard |
| *Allium vineale* | Field garlic |
| *Ampelopsis brevipedunculata* | Porcelain berry |
| *Anthoxanthum odoratum* | Sweet vernal grass |
| *Anthriscus sylvestris* | Chervil |
| *Arctium minus* | Common burdock |
| *Asparagus officinalis* | Asparagus |
| *Barbarea vulgaris* | Yellow rocket |
| *Bromus tectorum* | Drooping brome-grass |
| *Butomus umbellatus* | Flowering rush |
| *Cabomba caroliniana* | Fanwort |
| *Callitriche stagnalis* | Water-starwort |
| *Calystegia sepium* | Japanese bindweed |
| *Cardamine impatiens* | Bushy rock-cress |
| *Cardamine pratensis* | Cuckoo-flower |
| *Carex kobomugi* | Japanese sedge |
| *Centaurea biebersteinii* | Spotted knapweed |
| *Chelidonium majus* | Celandine |
| *Cirsium arvense* | Canada-thistle |
| *Cirsium palustre* | Marsh thistle |
| *Commelina communis* | Asiatic day-flower |
| *Coronilla varia* | Crown vetch |
| *Cyperus esculentus* | Yellow nutsedge |
| *Dactylis glomerata* | Orchard-grass |
| *Datura stramonium* | Jimsonweed |
| *Echinochloa crusgalli* | Barnyard grass |
| *Egeria densa* | Giant waterweed |
| *Eichhornia crassipes* | Water hyacinth |
| *Eleusine indica* | Goosegrass |
| *Elsholtzia ciliata* | Elsholtzia |
| *Elytrigia repens* | Quack-grass |
| *Epilobium hirsutum* | Hairy willow-herb |
| *Euphorbia cyparissias* | Cypress spurge |
| *Euphorbia esula* | Leafy spurge |
| *Festuca filiformia* | Hair fescue |
| *Festuca ovina* | Sheep fescue |

[10] Scientific names are those used in Gleason, Henry and A. Cronquist, 1991, *Manual of Vascular Plants of Northeastern United States and Adjacent Canada*: Second Edition, The New York Botanical Garden: New York.

| | |
|---|---|
| *Froelichia gracilis* | Slender snake cotton |
| *Geranium nepalense (G. sibericum)* | Nepalese crane's-bill |
| *Geranium thunbergii* | Thunberg's geranium |
| *Glaucium flavum* | Sea- or horned poppy |
| *Glechoma hederacea* | Gill-over-the-ground |
| *Glyceria maxima* | Sweet reedgrass |
| *Hemerocallis fulva* | Tiger-lily |
| *Heracleum mantegazzianum* | Giant hogweed |
| *Hesperis matronalis* | Dame's rocket |
| *Hydrilla verticillata* | Hydrilla |
| *Hydrocharis morsus-ranae* | European frog-bit |
| *Hylotelephium telephium* (*Sedum telephium*) | Live-forever or Orpine |
| *Hypericum perforatum* | St. John's wort |
| *Impatiens glandulifera* | Ornamental jewelweed |
| *Iris pseudacorus* | Yellow iris |
| *Kochia scoparia* | Summer cypress |
| *Lamium* spp. (all) | Dead nettle |
| *Lepidium latifolium* | Tall pepperwort |
| *Lotus corniculatus* | Birdsfoot trefoil |
| *Lysimachia nummularia* | Moneywort |
| *Lysimachia vulgaris* | Garden loosestrife |
| *Lythrum salicaria* | Purple loosestrife |
| *Malva neglecta* | Cheeses or common malva |
| *Marsilea quadrifolia* | Water shamrock or Eu. water clover |
| *Mentha arvensis* | Field-mint |
| *Microstegium vimineum* | Japanese stilt-grass |
| *Miscanthus sinensis* | Eulalia |
| *Myosotis scorpioides* | True forget-me-not |
| *Myosoton aquaticum* | Giant chickweed |
| *Myriophyllum aquaticum* | Parrot feather |
| *Myriophyllum heterophyllum* | Variable water-milfoil |
| *Myriophyllum spicatum* | Eurasian water-milfoil |
| *Najas minor* | Lesser naiad |
| *Nymphoides peltata* | Yellow floating heart |
| *Ornithogalum umbellatum* | Star of Bethlehem |
| *Pastinaca sativa* | Wild parsnip |
| *Phalaris arundinacea* | Reed canary-grass |
| *Phragmites australis* | Reed grass, Phragmites |
| *Poa compressa* | Canada bluegrass |
| *Poa pratensis* | Kentucky bluegrass |
| *Poa trivialis* | Rough bluegrass |
| *Polygonum aubertii* | Silver lace-vine |
| *Polygonum cespitosum* | Cespitose knotweed |
| *Polygonum cuspidatum* | Japanese knotweed |
| *Polygonum perfoliatum* | Mile-a-minute vine |

| | |
|---|---|
| *Polygonum persicaria* | Lady's thumb |
| *Polygonum sachalinense* | Giant knotweed |
| *Potamogeton crispus* | Curly pondweed |
| *Puccinellia maritima* | Seaside alkali-grass |
| *Pueraria montana* | Kudzu |
| *Ranunculus ficaria* | Lesser celandine |
| *Ranunculus repens* | Creeping buttercup |
| *Rorippa microphylla* | One-row yellow cress |
| *Rorippa nasturtium-aquaticum* | Watercress |
| *Rorippa sylvestris* | Creeping yellow cress |
| *Rumex acetosella* | Sheep-sorrel |
| *Rumex obtusifolius* | Bitter dock |
| *Salvinia molesta* | Salvinia |
| *Senecio jacobaea* | Tansy ragwort |
| *Setaria pumila ( S.lutescens, S. glauca)* | Yellow foxtail or y. bristlegrass |
| *Silphium perfoliatum* | Cup plant |
| *Solanum dulcamara* | Bittersweet nightshade |
| *Stellaria graminea* | Common stitchwort |
| *Tanacetum vulgare* | Tansy |
| *Thymus pulegioides* | Wild thyme |
| *Trapa natans* | Water-chestnut |
| *Tussilago farfara* | Coltsfoot |
| *Typha latifolia*[11] | Common or Broad-leaved cattail |
| *Typha angustifolia*[4] | Narrow-leaved cattail |
| *Valeriana officinalis* | Garden heliotrope |
| *Verbascum thapsus* | Common mullein |
| *Veronica beccabunga* | European speedwell |
| *Vincetoxicum rossicum (V. nigrum)* | Black swallow-wort |
| *Xanthium strumarium* | Common cocklebur |

b. Woody Plants:

| | |
|---|---|
| *Acer ginnala* | Amur maple |
| *Acer platanoides* | Norway maple |
| *Acer pseudoplatanus* | Sycamore maple |
| *Actinidia arguta* | Kiwi vine |
| *Ailanthus altissima* | Tree-of-heaven |
| *Alnus glutinosa* | European alder |
| *Berberis thunbergii* | Japanese barberry |
| *Berberis vulgaris* | Common barberry |
| *Catalpa speciosa* | Western catalpa |

[11] *Typha* spp. are native species which provide good water quality renovation and other functions/values. However, they are aggressive colonizers which, given the opportunity, will preclude establishment of other native species. They are included in this list as species not to be planted, not because they are undesirable in an established wetland, but to provide opportunities for other species to become established. It is likely they will eventually move in without human assistance.

| | |
|---|---|
| *Celastrus orbiculatus* | Oriental bittersweet |
| *Cynanchum louiseae* | Black swallow-wort |
| *Cytisis scoparius* | Scotch broom |
| *Elaeagnus angustifolia* | Russian olive |
| *Elaeagnus umbellata* | Autumn olive |
| *Euonymus alata* | Winged euonymus |
| *Euonymus fortunei* | Climbing euonymus |
| *Humulus japonicus* | Japanese hops |
| *Hypericum prolificum* | Shrubby St. John's wort |
| *Ligustrum obtusifolium* | Japanese privet |
| *Ligustrum vulgare* | Common/hedge privet |
| *Lonicera japonica* | Japanese honeysuckle |
| *Lonicera maackii* | Amur honeysuckle |
| *Lonicera morrowii* | Morrow's honeysuckle |
| *Lonicera tartarica* | Tatarian honeysuckle |
| *Lonicera x bella* | Morrow's X Tatarian honeysuckle |
| *Lonicera xylosteum* | European fly-honeysuckle |
| *Morus alba* | White mulberry |
| *Paulownia tomentosa* | Princess tree or empress tree |
| *Phellodendron japonicum* | Corktree |
| *Populus alba* | Silver poplar |
| *Rhamnus cathartica* | Common buckthorn |
| *Rhamnus frangula* | European buckthorn |
| *Ribes sativum* | Garden red currant |
| *Robinia pseudoacacia* | Black locust |
| *Rosa multiflora* | Multiflora rose |
| *Rosa rugosa* | Rugosa rose |
| *Rubus phoenicolasius* | Wineberry |
| *Salix purpurea*[12] | Basket or purple-osier willow |
| *Sorbus aucuparia* | European mountain-ash |
| *Taxus cuspidata* | Japanese yew |
| *Ulmus pumila* | Siberian elm |
| *Wisteria floribunda* | Wisteria |

[12] This is not appropriate for use in wetland mitigation. In some circumstances it may be appropriate in stream bank stabilization.

ATTACHMENT 1

Project Overview Form

Corps Permit No.:
Mitigation Site Name(s):
Monitoring Report: _____ of _____
Name and Contact Information for Permittee and Agent:

Name of Party Responsible for Conducting the Monitoring:

Date(s) of Inspection(s):

Project Summary:

[include purpose of approved project, acreage and type of aquatic resources impacted, and mitigation acreage and type of aquatic resources authorized to compensate for the aquatic impacts]

Location of and Directions to Mitigation Site:

Start and Completion Dates for Mitigation:

Performance Standards **are/are not** being met:

[describe how]

Dates of Corrective or Maintenance Activities Conducted Since Last Report:

Recommendations for Additional Remedial Actions:

ATTACHMENT 2

# MITIGATION REPORT
# TRANSMITTAL AND SELF-CERTIFICATION

DEPARTMENT OF THE ARMY PERMIT NUMBER:
PROJECT TITLE:

PERMITTEE:
MAILING ADDRESS:

TELEPHONE:

AUTHORIZED AGENT:
MAILING ADDRESS:

TELEPHONE:

ATTACHED MITIGATION REPORT
TITLE:

PREPARERS:

DATE:

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

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

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

CERTIFIED: _____
(Signature of permittee) Date

# APPENDIX D

# COMPLIANCE WITH ENVIRONMENTAL FEDERAL STATUTES, EXECUTIVE ORDERS, AND EXECUTIVE MEMORANDUM

This Appendix summarizes in a concise format the U.S. Army Reserves compliance with applicable environmental laws, Federal Statutes, Executive Orders, and Executive Memorandum.

## D.1 FEDERAL STATUTES

**Archaeological Resources Protection Act of 1979, as amended, 16 USC 470 et seq.**

Compliance: Issuance of a permit from the Federal land manager to excavate or remove archaeological resources located on public or Indian lands signifies compliance.

**Preservation of Historic and Archeological Data Act of 1974, as amended, 16 U.S.C. 469 et seq.**

Compliance: The Project has been coordinated with the Connecticut State Historic Preservation Officer.

**American Indian Religious Freedom Act of 1978, 42 U.S.C. 1996.**

Compliance: Must ensure access by Native Americans to sacred sites, possession of sacred objects, and the freedom to worship through ceremonials and traditional rites. Letters were sent to Federally recognized Native American Tribes with interest and knowledge of the area. No sacred sites, objects or other issues have been identified. .

**Clean Air Act, as amended, 42 U.S.C. 7401 et seq.**

Compliance:. A Record of Non-Applicability is included in Appendix A to the Environmental Assessment.

**Clean Water Act of 1977 (Federal Water Pollution Control Act Amendments of 1972) 33 U.S.C. 1251 et seq.**

Compliance: A Clean Water Act Section 404(b)(1) Evaluation and Compliance permit no. NAE-2008-2372 was completed for the Middletown, CT AFRC. This EA is required to assess the mitigation requirements outlined in the permit conditions which call for the for the land acquisition of at least 40-acres of the Boardman Lane Parcel and management by an Integrated Wetland Resources Stewardship Plan.

**Coastal Zone Management Act of 1982, as amended, 16 U.S.C. 1451 et seq.**

Compliance: Not Applicable. The project does not occur in the State of Connecticut coastal zone.

**Endangered Species Act of 1973, as amended, 16 U.S.C. 1531 et seq.**

Compliance: Coordination with the U.S. Fish and Wildlife Service during the evaluation of the Boardman Lane parcel for the *Final Finding of No Significant Impact and Environmental Assessment, Construction of an Armed Forces Reserve Center and Implementation of BRAC 05 Realignment Actions at Middletown, CT* determined that no Federally listed species are known to be in the project area and formal consultation requirements pursuant to Section 7 of the Endangered Species Act have been met.

**Estuarine Areas Act, 16 U.S.C. 1221 et seq.**

Compliance: Not Applicable. This report is not being submitted to Congress.

**Federal Water Project Recreation Act, as amended, 16 U.S.C. 4601-12 et seq.**

Compliance: Public notice of availability of the project report to the National Park Service (NPS) and Office of Statewide Planning relative to the Federal and State comprehensive outdoor recreation plans signifies compliance with this Act.

**Fish and Wildlife Coordination Act, as amended, 16 U.S.C. 661 et seq.**

Compliance: Coordination and full consideration of any comments received from the U.S. Fish and Wildlife Service FWS and Connecticut Department of Environmental Protection signifies compliance with the Fish and Wildlife Coordination Act.

**Land and Water Conservation Fund Act of 1965, as amended, 16 U.S.C. 4601-4 et seq.**

Compliance: Public notice of the availability of this report to the National Park Service (NPS) and the Office of Statewide Planning relative to the Federal and State comprehensive outdoor recreation plans signifies compliance with this Act.

**Marine Protection, Research, and Sanctuaries Act of 1971, as amended, 33 U.S.C. 1401 et seq.**

Compliance: Not Applicable. The granting of a real estate easement or lease does not involve the transportation or disposal of dredged material in ocean waters pursuant to Sections 102 and 103 of the Act, respectively.

**National Historic Preservation Act of 1966, as amended, 16 U.S.C. 470 et seq.**

Compliance: Coordination with the Connecticut State Historic Preservation Office signifies compliance.

**Native American Graves Protection and Repatriation Act (NAGPRA), 25 U.S.C. 3000-3013, 18 U.S.C. 1170**

Compliance: Regulations implementing NAGPRA will be followed if discovery of human remains and/or funerary items occur during implementation of this project.

**National Environmental Policy Act of 1969, as amended, 42 U.S.C 4321 et seq.**

Compliance: Preparation of the Environmental Assessment signifies partial compliance with NEPA. Full compliance shall be noted at the time the Finding of No Significant Impact is signed by the Regional Engineer.

**Rivers and Harbors Act of 1899, as amended, 33 U.S.C. 401 et seq.**

Compliance: Not Applicable. The real estate acquisition and management will not affect waterbodies subject to authority of the Rivers and Harbors Act.

**Watershed Protection and Flood Prevention Act as amended, 16 U.S.C 1001 et seq.**

Compliance: Floodplain impacts have been considered in project planning. The project will not result in the loss of floodplain.

**Wild and Scenic Rivers Act, as amended, 16 U.S.C 1271 et seq.**

Compliance: Not applicable. The Proposed Action will not occur within a segment of river designated as a Wild and Scenic River.

**Magnuson-Stevens Act, as amended, 16 U.S.C. 1801 et seq.**

Compliance: Not Applicable. This project does not require coordination with the National Marine Fisheries Service.

Farmland Protection Policy Act, Public Law 97-98, 7 U.S.C. 4201

Compliance: Not applicable. The proposed Federal action will not result in the conversion of prime, unique, or farmland of state-wide or local importance to non-agricultural uses, nor contribute to the unnecessary and irreversible conversion of farmland to nonagricultural purposes.

## D.3 EXECUTIVE ORDERS

**Executive Order 11593, Protection and Enhancement of the Cultural Environment, 13 May 1971**

Compliance: Coordination with the Connecticut Massachusetts Historic Preservation Officer signifies compliance.

**Executive Order 11988, Floodplain Management, 24 May 1977 amended by Executive Order 12148, 20 July 1979.**

Compliance: Public notice of the availability of this report or public review fulfills the requirements of Executive Order 11988, Section 2(a) (2).

**Executive Order 11990, Protection of Wetlands, 24 May 1977.**

Compliance: Public notice of the availability if this report for public review fulfills the requirements of Executive Order 11990, Section 2 (b).

**Executive Order 12114, Environmental Effects Abroad of Major Federal Actions, 4 January 1979.**

Compliance: Not applicable to projects located in the United States geographical boundaries.

**Executive Order 12898, Environmental Justice, 11 February 1994.**

Compliance: The project will not have a significant impact on minority or low-income population, or any other population in the United States.

**Executive 13007, Accommodation of Sacred Sites, 24 May 1996**

Compliance: The activity will not occur on sacred sites.

**Executive Order 13045, Protection of Children from Environmental Health Risks and Safety Risks, 21 April, 1997.**

Compliance: The project would not create a disproportionate environmental health or safety risk for children.

**Executive Order 13061, and Amendments – Federal Support of Community Efforts Along American Heritage River**
Compliance: Not Applicable. The project is not within or along an American Heritage River.

**Executive Order 13175, Consultation and Coordination with Indian Tribal Governments, November 2000.**

Compliance: Consultation with Indian Tribal Governments, where applicable, and consistent with executive memoranda, DoD Indian policy, and USACE Tribal Policy Principles signifies compliance.

**Executive Order 13423, Strengthening Federal Environmental, Energy, and Transportation Management.**

Compliance: The proposed action will not require implementation of federal environmental goals identified under this order.

## 9.3 Executive Memorandum

**Analysis of Impacts on Prime or Unique Agricultural Lands in Implementing NEPA, 11 August 1980**

Compliance: There are no impacts to prime agricultural lands on the project.

**White House Memorandum, Government-to-Government Relations with Indian Tribes, 29 April 1994.**

Compliance: Consultation with Federally Recognized Indian Tribes, where appropriate, signifies compliance.

# APPENDIX E
# Coordination and Correspondence

# APPENDIX E
# Coordination and Correspondence

This Appendix contains the correspondence with agencies and persons consulted for the Environmental Assessment and draft Finding of No Significant Impact. It includes the names, titles, and contact information for persons consulted. This should include federal, state, local and tribal officials.

# STATE OF CONNECTICUT
## DEPARTMENT OF ENVIRONMENTAL PROTECTION

May 28, 2010

Robyn Mock
US Army Reserve 99th RSC
Robyn.Mock@usar.army.mil

Re: Acquisition of a parcel of land in Middletown

Dear Robyn Mock:

Thank you for your recent correspondence to Commissioner Marrella. The Commissioner truly appreciates the time you took to share your thoughts and concerns with her. She has asked the appropriate staff person to provide her with the information she needs and will reply to you as soon as possible.

Again, thank you for your letter and please feel free to contact the Agency in the future should the need arise.

Sincerely,

Tatiana Abreu

Tatiana Abreu
Secretary 2
Office of Planning & Program Development

# STATE OF CONNECTICUT
## DEPARTMENT OF ENVIRONMENTAL PROTECTION

June 7, 2010

Robyn Mock
U.S. Army Reserve
99th Regional Support Command
5231 South Scott Plaza
Fort Dix, New Jersey 08640-5000

Dear Ms. Mock:

I am responding to the letter from Jeffrey M. Hrzic dated May 12, 2010 regarding preparation of an Environmental Assessment for the U.S. Army Reserve's acquisition of a 52.4 acre parcel of land on Boardman Lane in Middletown as off-site compensatory mitigation for the wetland impacts associated with construction of the Armed Forces Reserve Center at Cucia Park in Middletown.

As noted in the letter, there are no adverse environmental impacts anticipated with the acquisition and management of the parcel. Two State-listed species of special concern have been found at the site: the Eastern box turtle (*Terrapene carolina*) and squarrose sedge (*Carex squarrosa*). I understand that the management plan for the property, which involves riparian enhancement planting, grassland management and invasive species control, is being forwarded for our information.

At this time, Department has no scoping comments but would be interested in receiving the Environmental Assessment when it is available. We will review it in conjunction with the management plan. Please forward a copy to David Fox of the Office of Environmental Review, who will coordinate the Department's review and comments.

Thank you for the opportunity to participate in the this NEPA process. If you have any further questions, please contact Mr. Fox at david.fox@ct.gov or 860-424-4111.

Yours truly,

Amey W. Marrella
Commissioner

AM:df

**DEPARTMENT OF THE ARMY**
HEADQUARTERS, 99TH REGIONAL SUPPORT COMMAND
5231 SOUTH SCOTT PLAZA
FORT DIX, NEW JERSEY 08640-5000



REPLY TO
ATTENTION OF

May 12, 2010

Mr. Curt Spalding, Regional Administrator
EPA New England, Region 1,
5 Post Office Square - Suite 100
Boston, MA 02109-3912

Dear Mr. Spalding:

The Assistant Chief of Staff for Installation Management-Army Reserve Division and the US Army Reserve (USAR) 99th Regional Support Command (RSC) are preparing an Environmental Assessment (EA) for the acquisition of a 52.4 ± acre parcel of land in Middletown, Connecticut. The proposed acquisition is to fulfill the Army's responsibilities under Section 404 of the Clean Water Act for off-site compensatory mitigation from the direct loss of about 1.5 acres of jurisdictional wetlands from the construction and operation of a U.S. Armed Forces Reserve Center (AFRC) on Smith Road (formally Cucia Park). This letter is to request your agency comments on the proposed action. Figures 1 and 2 provide location maps to aid you in your work.

The Army's preferred site, identified in Army permit No. NAE-2008-2372, is a parcel on Boardman Lane, Middletown, Connecticut. The permit requires a total of 40 acres of off-site compensatory mitigation, including 17 acres of wetland and 23 acres of upland. Due to Federal purchasing regulations that require the Government to offer to purchase a remnant that is determined to be an uneconomic remnant, an additional 12.4 acres is proposed to be purchased. Federal land acquisition regulations require compliance with the National Environmental Policy Act (NEPA) before property is purchased. An Environmental Assessment (EA) is being prepared to analyze the potential environmental impacts associated with the proposed action. The identification of Boardman Lane as the preferred mitigation site has been extensively vetted through the Clean Water Act Section 404 review process that evaluated multiple alternative sites.

To ensure compliance with the conditions of the permit, the Army is required to implement an Integrated Wetland Resources Stewardship Plan for the off-site mitigation parcel at Boardman Lane that addresses the protection and management of this mitigation area, in perpetuity. The plan will prohibit incompatible uses that would jeopardize the objectives for this land being set aside for conservation management and ecological protection purposes. Within the designated 40-acre area (see Figure 2), an existing 14-acre grazed wet meadow will be enhanced through a grassland management plan (10 acres) designed to protect the Eastern box turtle's habitat at the site. Reestablishment of native riparian plantings will occur throughout a 4-acre area adjacent to Richards Brook with the overall intent of improving the resource habitat value and maximizing the ability of this area to protect the water quality of this system and Sawmill Brook, just downstream. In addition to monitoring of the wetland enhancement areas at the Boardman Lane

site for 10 years, invasive species plant control will also be implemented for the same period. The habitat management and preservation efforts apply to forested wetlands and uplands, and herbaceous vegetated wetlands and uplands.

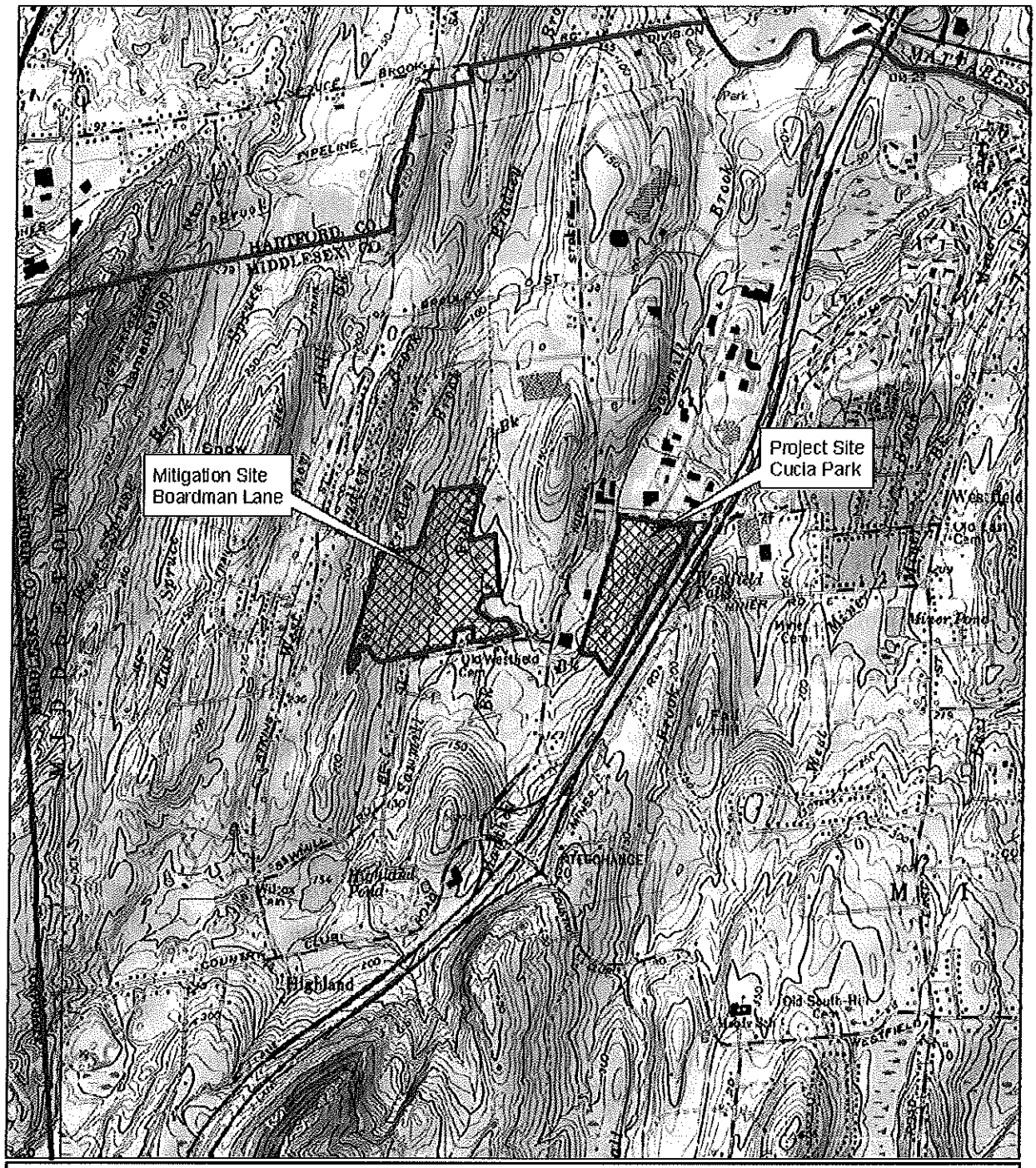
At this time there are no adverse negative impacts expected with the acquisition and future management of the property given the mandated protection and restoration of the habitats at the site. Long-term protection and enhancement of this parcel will ensure that the site continues to provide a sustainable contribution to the ecological integrity of the Richards Brook and Sawmill Brook tributary systems and their valuable contiguous wetland complexes. Two State-listed Species of Special Concern, the Eastern box turtle and squarrose sedge, have been identified to be present at this site during the NEPA process for the site selection of the AFRC. These species and habitat will receive long-term protection with the acquisition of the Boardman Lane parcel.

A Notice of Availability for the EA and draft Finding of No Significant Impact, if applicable, will be published when the EA is ready for 30-day public review and comment. To aid in the preparation of the EA, we would like to request your agency provide comments quickly to allow the Army to incorporate the comments and address any issues that your agency may have regarding the acquisition of the property and the long-term protection plans. Correspondence and other communication regarding this matter should be directed to Robyn Mock U.S. Army Reserve 99th RSC, at (609) 562-7662 or at Robyn.Mock@usar.army.mil.

Sincerely,

JEFFREY M HRZIC
Chief, Environmental Division

Enclosures:
Enclosure 1: Location Map of Boardman Lane, Middlesex County, Middletown, CT
Enclosure 2: Site Map of proposed Boardman Lane mitigation plan




Source: USGS Quadrangle Middletown CT

Coordinate System: NAD 1983, State Plane Connecticut FIPS 0600 Feet

N

1 inch = 2,000 feet

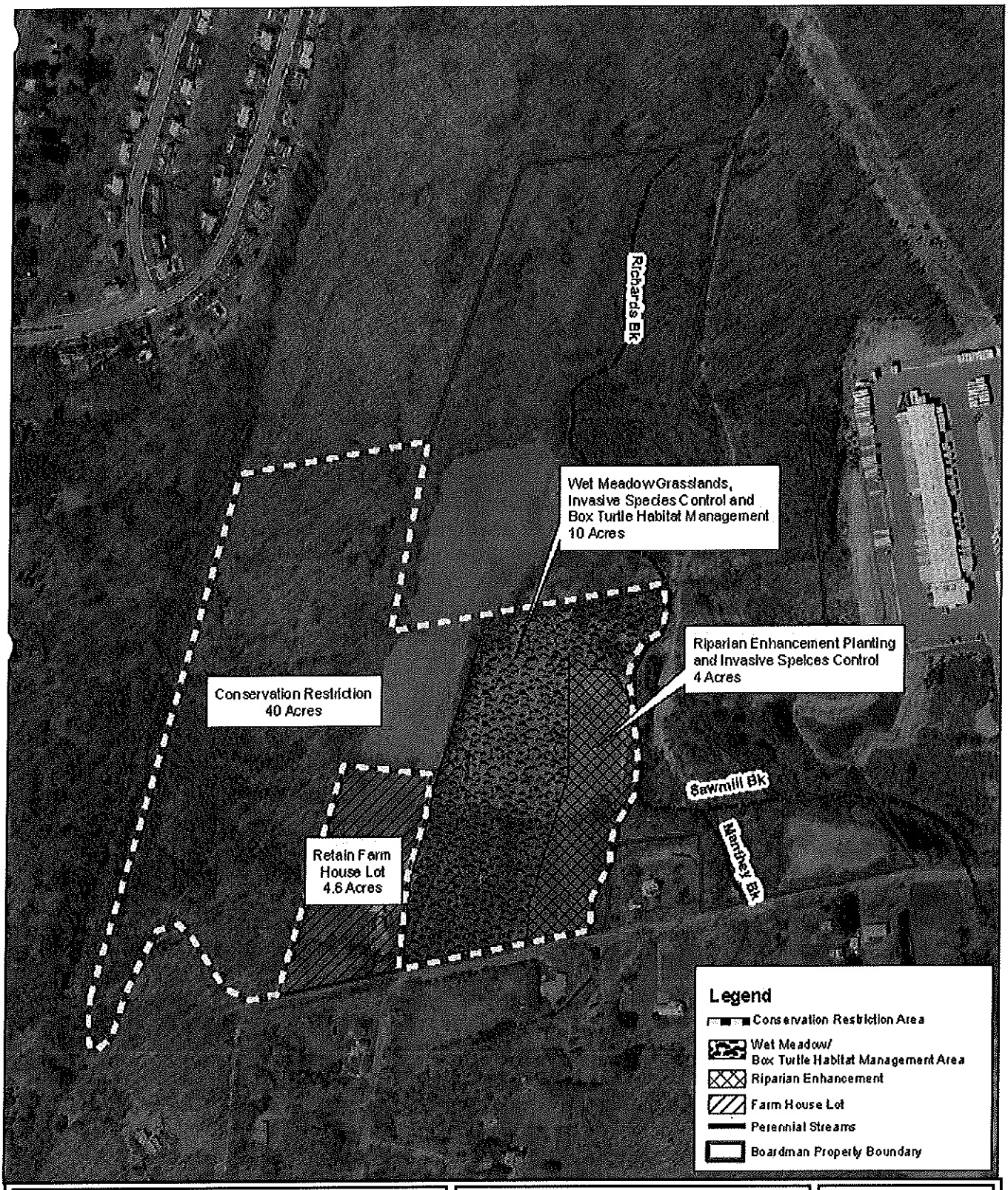
# Site Locus
# BRAC Realignment
# Middletown, CT

| SCALE | DATE | PROJECT NO. |
|---|---|---|
| 1:2,000 | 12/09 | 60110125 |

AECOM

Figure Number

1




Source: CTORthoPhotograp

Coordinate System: NAD 1927, State Plane Connecticut FIPS 0600 Feet

**BRAC Realignment**
**Boardman Lane Off-Site Mitigation Plan**
**Middletown, CT**

| SCALE | DATE | PROJECT NO. |
|---|---|---|
| 1:4800 | 0409 | 60140125 |

AECOM

Figure Number

2

**DEPARTMENT OF THE ARMY**
HEADQUARTERS, 99TH REGIONAL SUPPORT COMMAND
5231 SOUTH SCOTT PLAZA
FORT DIX, NEW JERSEY 08640-5000



REPLY TO
ATTENTION OF

May 12, 2010

Mr. Tom Chapman, Supervisor
U.S. Fish and Wildlife Service
New England Field Office
70 Commercial Street, Suite 300
Concord, NH 03301

Dear Mr. Chapman:

The Assistant Chief of Staff for Installation Management-Army Reserve Division and the US Army Reserve (USAR) 99th Regional Support Command (RSC) are preparing an Environmental Assessment (EA) for the acquisition of a 52.4 ± acre parcel of land in Middletown, Connecticut. The proposed acquisition is to fulfill the Army's responsibilities under Section 404 of the Clean Water Act for off-site compensatory mitigation from the direct loss of about 1.5 acres of jurisdictional wetlands from the construction and operation of a U.S. Armed Forces Reserve Center (AFRC) on Smith Road (formally Cucia Park). This letter is to request your agency comments on the proposed action pursuant to the Fish and Wildlife Coordination Act. Figures 1 and 2 provide location maps to aid you in your work.

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To ensure compliance with the conditions of the permit, the Army is required to implement an Integrated Wetland Resources Stewardship Plan for the off-site mitigation parcel at Boardman Lane that addresses the protection and management of this mitigation area, in perpetuity. The plan will prohibit incompatible uses that would jeopardize the objectives for this land being set aside for conservation management and ecological protection purposes. Within the designated 40-acre area (see Figure 2), an existing 14-acre grazed wet meadow will be enhanced through a grassland management plan (10 acres) designed to protect the Eastern box turtle's habitat at the site. Reestablishment of native riparian plantings will occur throughout a 4-acre area adjacent to Richards Brook with the overall intent of improving the resource habitat value and maximizing the ability of this area to protect the water quality of this system and Sawmill Brook, just

downstream. In addition to monitoring of the wetland enhancement areas at the Boardman Lane site for 10 years, invasive species plant control will also be implemented for the same period. The habitat management and preservation efforts apply to forested wetlands and uplands, and herbaceous vegetated wetlands and uplands.

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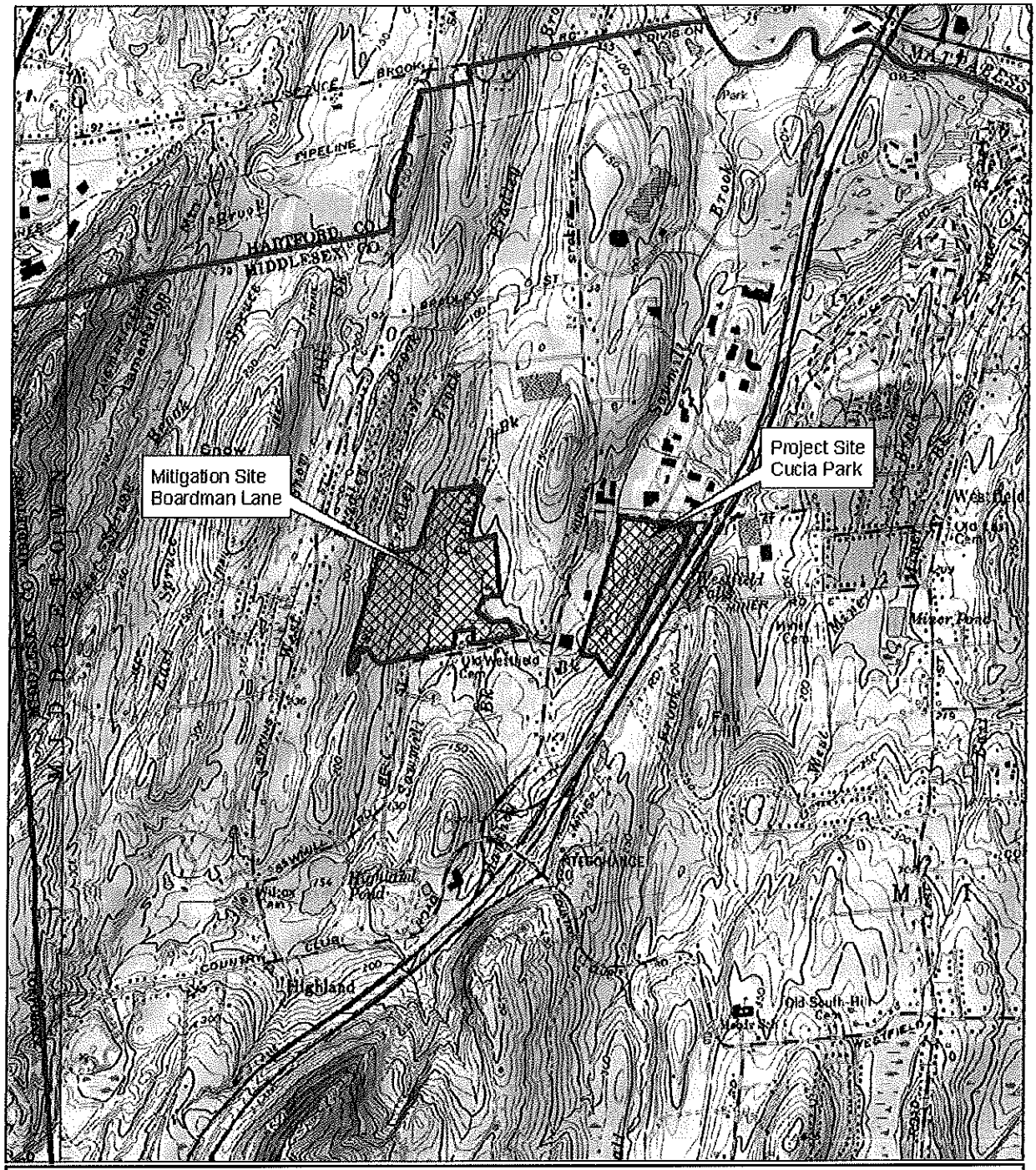
A Notice of Availability for the EA and draft Finding of No Significant Impact, if applicable, will be published when the EA is ready for 30-day public review and comment. To aid in the preparation of the EA, we would like to request your agency provide comments quickly to allow the Army to incorporate the comments and address any issues that your agency may have regarding the acquisition of the property and the long-term protection plans. . Correspondence and other communication regarding this matter should be directed to Robyn Mock U.S. Army Reserve 99th RSC, at (609) 562-7662 or at Robyn.Mock@usar.army.mil.

Sincerely,

JEFFREY M HRZIC
Chief, Environmental Division

Enclosures:
Enclosure 1: Location Map of Boardman Lane, Middlesex County, Middletown, CT
Enclosure 2: Site Map of proposed Boardman Lane mitigation plan




Source: USGS Quadrangle Middletown CT

Coordinate System: NAD 1983, State Plane Connecticut FIPS 0600 Feet

N

1 inch = 2,000 feet

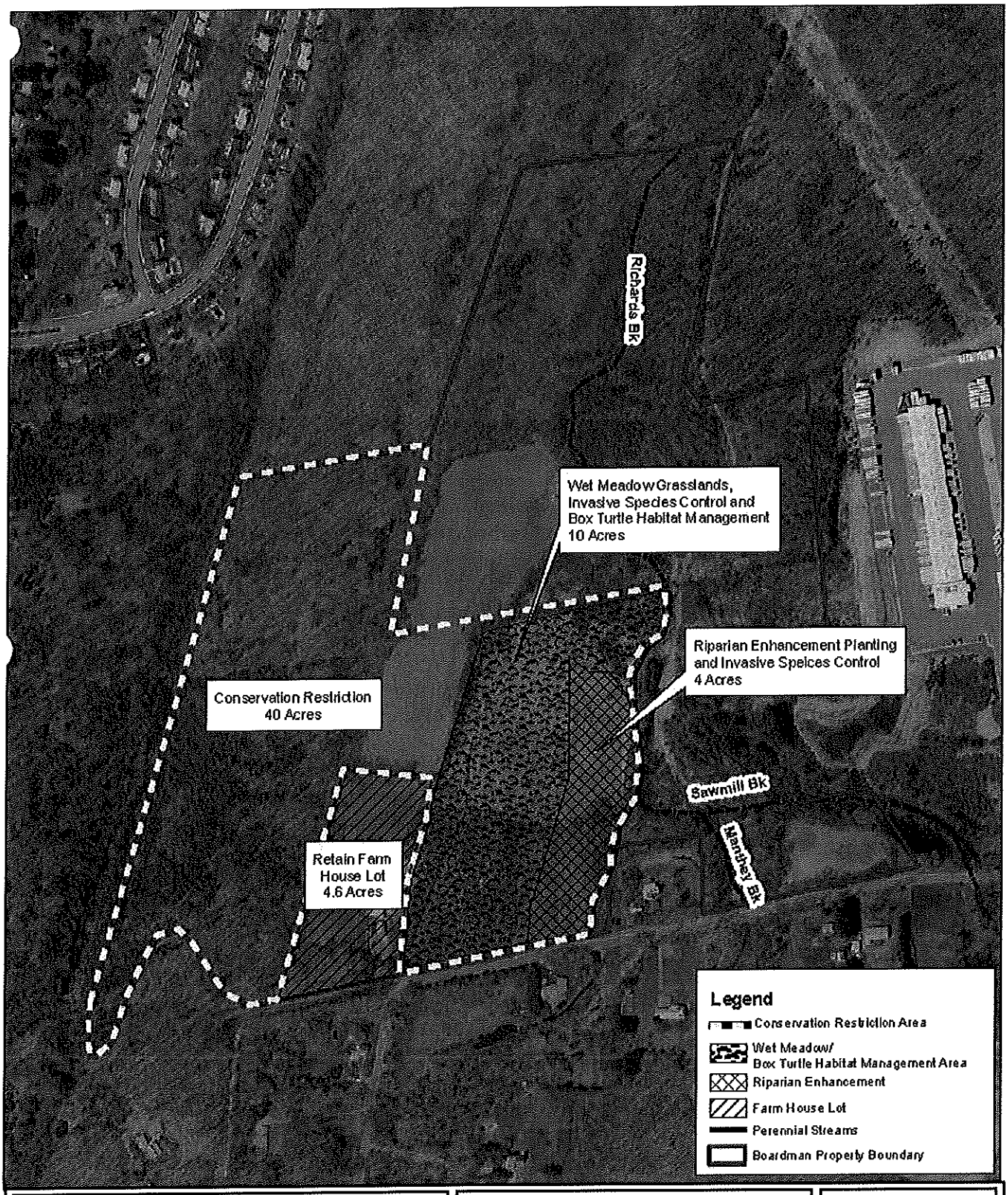
# Site Locus
# BRAC Realignment
# Middletown, CT

| SCALE | DATE | PROJECT NO. |
|---|---|---|
| 1:3,600 | 12/09 | 60140125 |

AECOM

Figure Number

1




Source: CT Ortho Photograph

Coordinate System: NAD 1927, State Plane Connecticut FIPS 0600 Feet

N

1 inch = 400 feet

**BRAC Realignment**
**Boardman Lane Off-Site Mitigation Plan**
**Middletown, CT**

| SCALE | DATE | PROJECT NO. |
|---|---|---|
| 1:4800 | 12/09 | 60140025 |

AECOM

Figure Number

2

**DEPARTMENT OF THE ARMY**
HEADQUARTERS, 99TH REGIONAL SUPPORT COMMAND
5231 SOUTH SCOTT PLAZA
FORT DIX, NEW JERSEY 08640-5000

REPLY TO
ATTENTION OF

May 12, 2010

Ms. Amey Marrella, Commissioner
Connecticut Department of Environmental Protection
79 Elm Street
Hartford, CT 06106-5127

Dear Commissioner Marrella:

The Assistant Chief of Staff for Installation Management-Army Reserve Division and the US Army Reserve (USAR) 99th Regional Support Command (RSC) are preparing an Environmental Assessment (EA) for the acquisition of a 52.4 ± acre parcel of land in Middletown, Connecticut. The proposed acquisition is to fulfill the Army's responsibilities under Section 404 of the Clean Water Act for off-site compensatory mitigation from the direct loss of about 1.5 acres of jurisdictional wetlands from the construction and operation of a U.S. Armed Forces Reserve Center (AFRC) on Smith Road (formally Cucia Park). This letter is to request your agency comments on the proposed action pursuant to the Fish and Wildlife Coordination Act. Figures 1 and 2 provide location maps to aid you in your work.

The Army's preferred site, identified in Army permit No. NAE-2008-2372, is a parcel on Boardman Lane, Middletown, Connecticut. The permit requires a total of 40 acres of off-site compensatory mitigation, including 17 acres of wetland and 23 acres of upland. Due to Federal purchasing regulations that require the Government to offer to purchase a remnant that is determined to be an uneconomic remnant, an additional 12.4 acres is proposed to be purchased. Federal land acquisition regulations require compliance with the National Environmental Policy Act (NEPA) before property is purchased. An Environmental Assessment (EA) is being prepared to analyze the potential environmental impacts associated with the proposed action. The identification of Boardman Lane as the preferred mitigation site has been extensively vetted through the Clean Water Act Section 404 review process that evaluated multiple alternative sites.

To ensure compliance with the conditions of the permit, the Army is required to implement an Integrated Wetland Resources Stewardship Plan for the off-site mitigation parcel at Boardman Lane that addresses the protection and management of this mitigation area, in perpetuity. The plan will prohibit incompatible uses that would jeopardize the objectives for this land being set aside for conservation management and ecological protection purposes. Within the designated 40-acre area (see Figure 2), an existing 14-acre grazed wet meadow will be enhanced through a grassland management plan (10 acres) designed to protect the Eastern box turtle's habitat at the site. Reestablishment of native riparian plantings will occur throughout a 4-acre area adjacent to Richards Brook with the overall intent of improving the resource habitat value and maximizing the ability of this area to protect the water quality of this system and Sawmill Brook, just

downstream. In addition to monitoring of the wetland enhancement areas at the Boardman Lane site for 10 years, invasive species plant control will also be implemented for the same period. The habitat management and preservation efforts apply to forested wetlands and uplands, and herbaceous vegetated wetlands and uplands.

At this time there are no adverse negative impacts expected with the acquisition and future management of the property given the mandated protection and restoration of the habitats at the site. Long-term protection and enhancement of this parcel will ensure that the site continues to provide a sustainable contribution to the ecological integrity of the Richards Brook and Sawmill Brook tributary systems and their valuable contiguous wetland complexes. Two State-listed Species of Special Concern, the Eastern box turtle and squarrose sedge, have been identified to be present at this site during the NEPA process for the site selection of the AFRC. These species and habitat will receive long-term protection with the acquisition of the Boardman Lane parcel.

A Notice of Availability for the EA and draft Finding of No Significant Impact, if applicable, will be published when the EA is ready for 30-day public review and comment. To aid in the preparation of the EA, we would like to request your agency provide comments quickly to allow the Army to incorporate the comments and address any issues that your agency may have regarding the acquisition of the property and the long-term protection plans. Correspondence and other communication regarding this matter should be directed to Robyn Mock U.S. Army Reserve 99th RSC, at (609) 562-7662 or at Robyn.Mock@usar.army.mil.

Sincerely,

JEFFREY M HRZIC
Chief, Environmental Division

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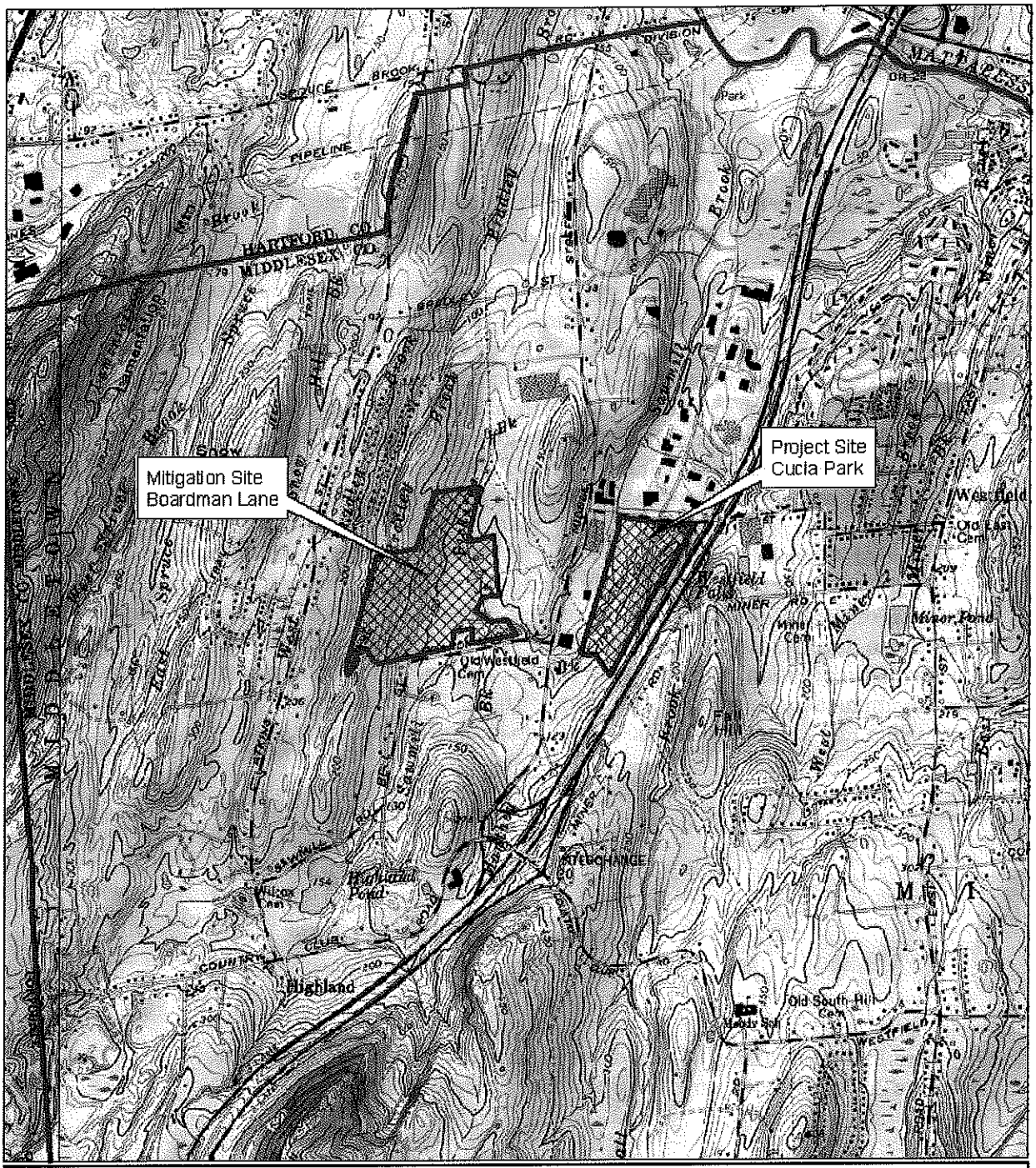


Source: USGS Quadrangle Middletown CT

Coordinate System: NAD 1983, State Plane Connecticut FIPS 0600 Feet

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# Site Locus
# BRAC Realignment
# Middletown, CT

| SCALE | DATE | PROJECT NO. |
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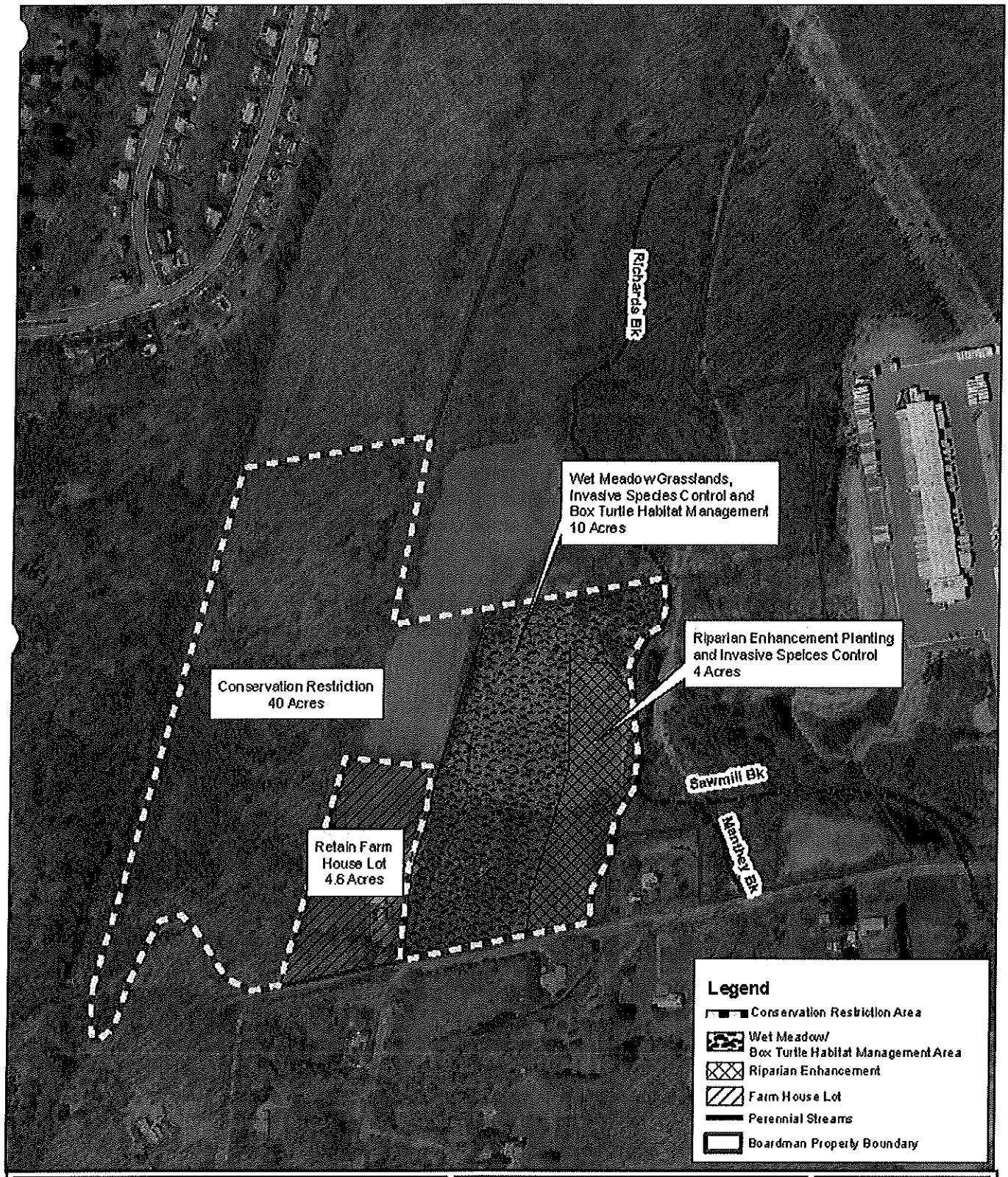
| 1:3,600 | 12/09 | 60140125 |

AECOM

Figure Number

1




Source: CTOrtho Photography

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**BRAC Realignment**
**Boardman Lane Off-Site**
**Mitigation Plan**
**Middletown, CT**

| SCALE | DATE | PROJECT NO. |
|---|---|---|
| 1:400 | 2009 | 60140125 |

AECOM

Figure Number

2

**DEPARTMENT OF THE ARMY**
HEADQUARTERS, 99TH REGIONAL SUPPORT COMMAND
5231 SOUTH SCOTT PLAZA
FORT DIX, NEW JERSEY 08640-5000



REPLY TO
ATTENTION OF

May 12, 2010

Ms. Sheila Stoane, Chair
City of Middletown Conservation Commission
Department of Planning, Conservation, and Development
245 deKoven Drive
Middletown, CT 06457

Dear Ms. Stoane:

The Assistant Chief of Staff for Installation Management-Army Reserve Division and the US Army Reserve (USAR) 99th Regional Support Command (RSC) are preparing an Environmental Assessment (EA) for the acquisition of a 52.4 ± acre parcel of land in Middletown, Connecticut. The proposed acquisition is to fulfill the Army's responsibilities under Section 404 of the Clean Water Act for off-site compensatory mitigation for the direct loss of about 1.5 acres of jurisdictional wetlands from the construction and operation of a U.S. Armed Forces Reserve Center (AFRC) on Smith Road (formally Cucia Park). This letter is to request your agency and the Middletown Inland Wetlands and Watercourses Agency comments on the proposed action. Figures 1 and 2 provide location maps to aid you in your work.

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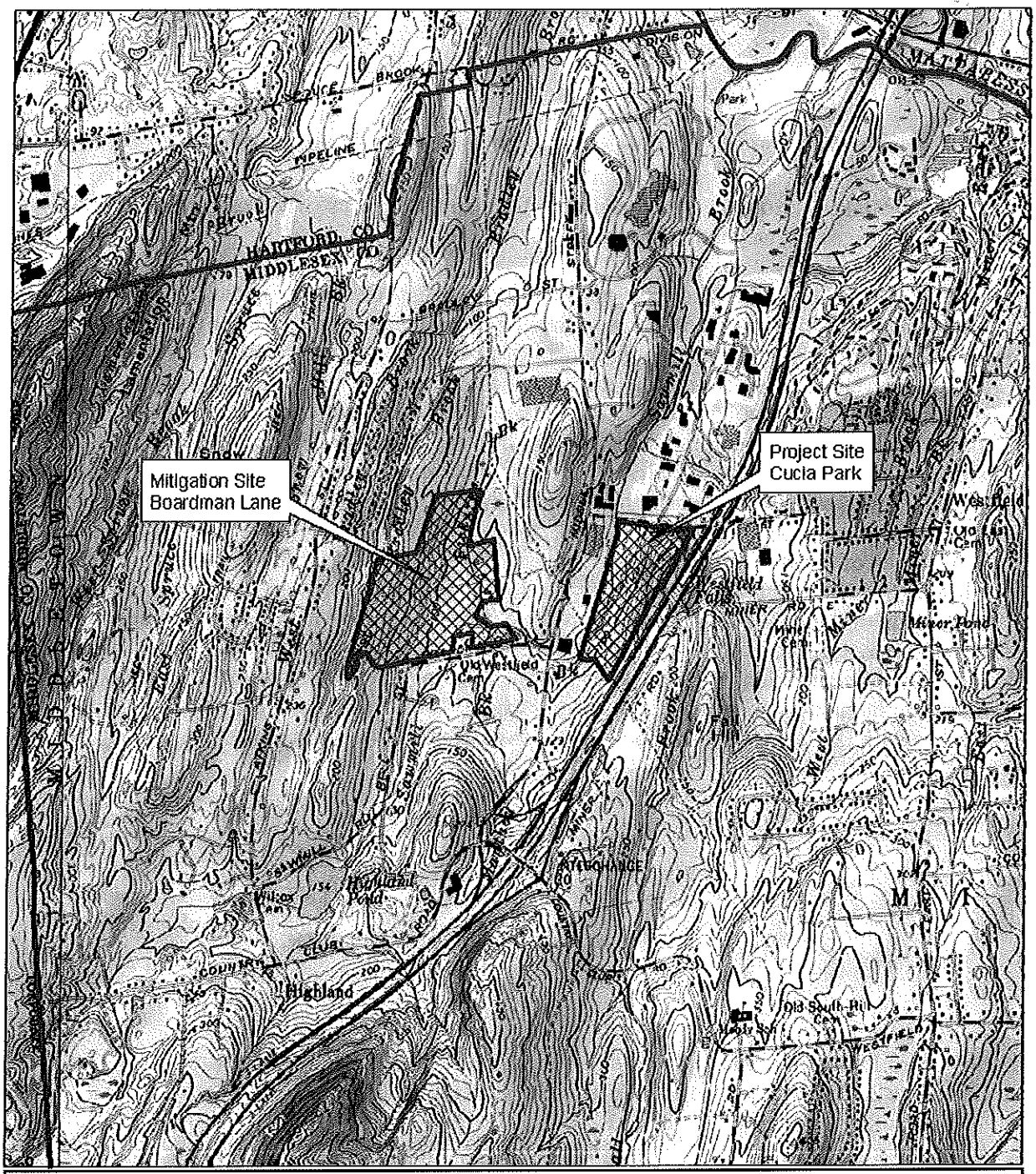


Source: USGS Quadrangle Middletown CT

Coordinate System: NAD 1983, State Plane Connecticut FIPS 0600 Feet

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# Site Locus
# BRAC Realignment
# Middletown, CT

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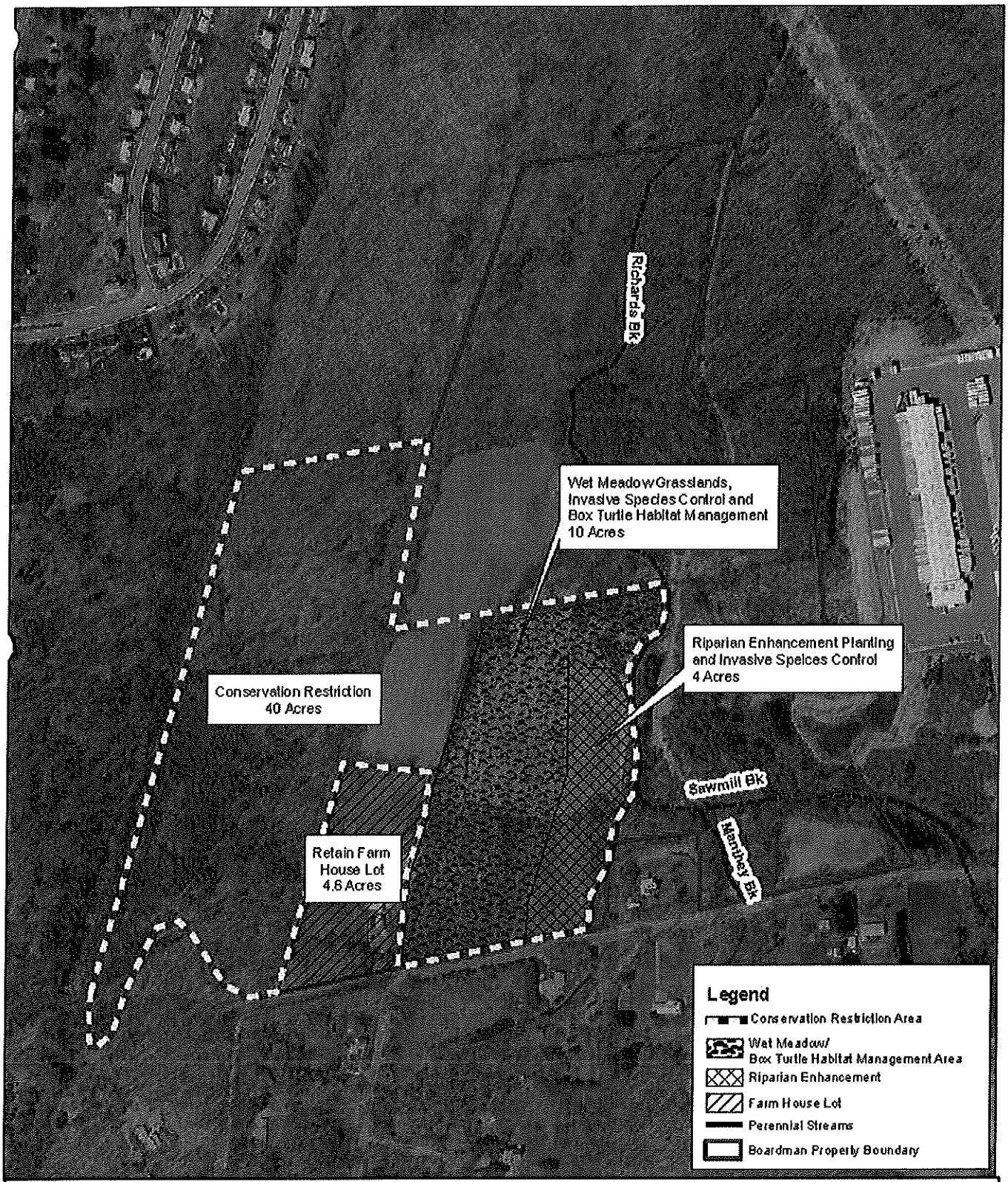
AECOM

Figure Number

1

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**BRAC Realignment**
**Boardman Lane Off-Site Mitigation Plan**
**Middletown, CT**

| SCALE | DATE | PROJECT NO. |
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Figure Number

2