



**US Army Corps  
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New England District

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# **Final 2005 ANNUAL REPORT**

## **WETLAND & UPLAND HABITAT RESTORATION AND LONG TERM ADAPTIVE MONITORING AND MAINTENANCE PROGRAM**

### **AREA OF CONTAMINATION (AOC) 57 DEVENS, MASSACHUSETTS**

**January 2007**

PREPARED BY:

DEPARTMENT OF ARMY  
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS  
CONCORD, MASSACHUSETTS 01742

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# **2005 ANNUAL REPORT**

## **AREA OF CONTAMINATION (AOC) 57**

### **WETLAND & UPLAND HABITAT RESTORATION AND LONG TERM ADAPTIVE MONITORING AND MAINTENANCE PROGRAM**

#### **1.0 OBJECTIVES**

The objectives of the Area of Contamination (AOC) 57 Wetlands and Upland Habitat Restoration and Long Term Adaptive Monitoring and Maintenance Plan (i.e. the Habitat LTMP) are to evaluate the restoration measures implemented in AOC 57 - Areas 2 and 3 during the first three or more growing seasons after site remediation and restoration activities to ensure success and to identify and implement needed corrective actions based on the periodic monitoring (USACE 2007a). The Record of Decision (ROD) requires monitoring for a period of five years after wetland restoration. The locations of the two restoration sites are provided in Figure 1. The remediation and restoration were completed in October 2003 in accordance with the January 2002 Work Plan (Conti 2002) and 2003 Work Plan Amendment for Additional Soil Removal (Conti 2003), as reported in the Final Interim Remedial Action Completion Report (Conti 2004). Consequently the long term monitoring began in 2004 with annual monitoring inspections scheduled twice a year in the Late Spring/Early Summer and Late Summer/Early Fall time frames. The Habitat LTMP summarized the restoration approach and construction measures for the restoration of impacted wetland/upland habitat, provided the subsequent long term adaptive monitoring and maintenance plan approach that was developed concurrently during implementation of the 2004 program, and defined the relevant performance standards to evaluate the implemented restoration measures. Results of the 2004 program are summarized in the first annual habitat long term monitoring plan report (USACE 2007b).

As the second annual habitat long term monitoring and maintenance program report, this report summarizes the results of our 2005 periodic monitoring field observations of restored wetland/upland habitat relative to the performance standards with recommendations, if any, for future corrective actions. A copy of the field data/inspection report for each site visit to Areas 2 and 3 is provided in Appendix A with representative photographs provided in Appendix B.

#### **2.0 AOC 57 AREAS 2 AND 3**

**2.1 Area 2:** The wetland boundary, 2002 and 2003 final soil removal excavation limits, and the limit of wetland restoration are shown in Figure 2. Details of the restoration approach and construction measures for the restoration of impacted wetland and upland habitat are provided in the Habitat LTMP (USACE 2007a). Approximately 1,744 square feet of wetlands was restored at Area 2 as shown in Figure 3.

**2.2 Area 3:** The wetland boundary, planned/final excavation limit and approximate limit of site restoration are shown in Figure 2. Details of the restoration approach and construction measures for the restoration of impacted upland habitat are provided in the Habitat LTMP (USACE 2007a). Since cleanup objectives were attained within the planned/final excavation limits, no wetland resource areas were disturbed during remediation of Area 3. The silt fence and hay bales installed immediately downgradient at the edge of the planned/final excavation limit and approximate limit of site restoration may have intruded slightly into the wetland. Since removal of the silt fence may have disturbed the edge of the Area 3 wetland, this wetland edge was monitored as part of the Habitat LTMP.

### **3.0 MONITORING PLAN PERFORMANCE STANDARDS & CONTROL OF INVASIVE/EXOTIC PLANTS**

This section provides the relevant performance standards for evaluation of the wetland and upland habitats and the protocol of controlling invasive/exotic plants as discussed in the Habitat LTMP (USACE 2007a).

#### **3.1 Long Term Adaptive Monitoring Plan Performance Standards**

The objectives of the Devens AOC57 Habitat Long Term Adaptive Monitoring and Maintenance Program are:

1. Measurement of the success of the restoration relative to attainment of the Performance Standards in the restored areas to identify and implement needed corrective actions; and
2. Monitoring of the invasive/exotic weeds (the three species of concern are purple loosestrife (*Lythrum salicaria*), common reed (*Phragmites australis*) and Japanese knotweed (*Polygonum cuspidatum*)) in the restored upland and wetland areas. If present the exotics will be removed by approved methods described below.

The Performance Standards for AOC 57, consistent with those established in the Devens Consolidated Landfill (DCL) Wetland and Upland Habitat Restoration Plan (WUHRP) (Stone & Webster 2002), for wetland areas are:

1. Seeded areas for wetlands shall have an average 75% perennial native obligate/facultative vegetative cover; and
2. Contain no non-vegetated (bare) areas more than 250 square feet.

Performance standards were also established in the WUHRP for uplands. They were based on whether they were considered level or steep slope uplands. The difference between these standards is the single criterion of slope stability.

The standards for level uplands are:

1. Seeded areas shall have an average of 75% perennial native vegetative cover; and
2. Contain no non-vegetated (bare) areas more than 500 square feet.

The standards for steep slope uplands are:

1. Shall be stabilized slope with 75% perennial native vegetative cover; and
2. Contain no non-vegetated bare areas more than 500 square feet.

However, due to the relatively small overall size of the two AOC57 restored sites in comparison to the larger DCL restored sites, the second performance standard will not be used as a measure of success.

The entire restored wetland, upland and ecotone transition areas are systematically observed via the meandering survey methodology coupled with the concept of adaptive monitoring. The meandering survey involves the members of the Team, usually 2-3 individuals, traverse the restored area several times observing and recording the vegetation within about 10 feet of either side of their path. Species are noted and identified according to their wetland status. This observational data is compared relative to the above applicable listed Performance Standards. Wetland status is assigned according to Cowardin's classification (Cowardin et al. 1969).

### **3.2 Control of Invasive/Exotic Plants**

The second objective the adaptive monitoring program is to check for the appearance of the three cited exotics: 1) purple loosestrife; 2) common reed (*Phragmites*); and 3) Japanese knotweed. If these specific varieties of plants were observed, they were removed from the site. The protocol for invasive/exotic plant removal follows.

1. Purple loosestrife is pulled from the ground and if the plant was not in flower or in seed, it is left onsite. If the plant is in flower or seed, it will be pulled, bagged and removed from the site. It is virtually impossible to eradicate purple loosestrife once it is established.
2. *Phragmites* is treated in July-August, later in the growing season, with 25% Rodeo by a licensed MA applicator. Each plant is cut a few inches from the ground between two nodes and 25% Rodeo is injected in the hollow stem. The superior segment of the stem is bagged and disposed in a dumpster offsite. The portion of the site where the *Phragmites* was removed is flagged for future examination to be certain there was no re-growth. Numbers of plants treated and removed are recorded to maintain qualitative/quantitative information to monitor and document the success of the eradication.
3. Depending on the area of the Japanese knotweed growth, the plants are either cut a few inches from the ground and a mist of 25% Rodeo applied if there is a large

plot of plants or 25% Rodeo is injected into the hollow stem if there are only a few plants. As with *Phragmites*, Rodeo is applied by a licensed MA applicator with the proper protective procedures. If the Japanese knotweed is in flower or seed the upper portion of the plant is bagged and removed from the site. Since Japanese knotweed growth habits differ from *Phragmites*, individual shoots are not counted but relative size of the patch is noted to monitor effectiveness of the herbicide treatment. The site of the infestation is flagged and checked during the periodic monitoring to ascertain the removal was successful.

#### **4.0 2005 MONITORING PROGRAM RESULTS AND RECOMMENDATIONS**

This section provides an overall annual summary based on several monitoring field inspections conducted by the USACE Habitat Team during the second monitoring year in 2005 in the Late Spring/Early Summer and Late Summer/Early Fall time frames following the remediation and wetland restoration at Areas 2 and 3 within Area of Concern (AOC) 57. Field inspections in 2005 were conducted at both Areas 2 and 3 on July 14, 2005 and September 22, 2005 with the MADEP and USEPA. Invasive/exotic control measures were performed during the July 14, 2005 inspection. An additional inspection was also conducted on November 1, 2005 at Area 2 only to check on upgradient erosion and sedimentation control corrective measures implemented by MassDevelopment. In addition, Area 2 was also briefly inspected during the May 23, 2005 Fort Devens Restoration Advisory Board (RAB) Meeting involving site tours of both the Devens Consolidated Landfill and Shepley's Hill Landfill.

A brief description of each of the primary sites, an evaluation of the wetland and adjacent upland relative to meeting performance standards, and recommendations for specific management activities such as exotic plant control and site-specific problems are provided. A copy of the field data/inspection report for each 2005 site visit is included in Appendix A along with the 2004 field notes. Representative photographs of Areas 2 and 3 from the 2005 inspections are provided in Attachment B along with the 2004 photographs.

#### **4.1 AOC57-Area 2**

##### **4.1.1 Performance Standards**

Area 2 consists of an upland site that slopes downward to the restored wetland. Thirty-four white and/or red oaks have survived on the upland slope along with the seven red maples at the base of the slope where the upland grades into the wetland. Ground cover on the slope consisted of rabbit's foot clover, cow thistle, coneflower, vetch, dog tick fleabane, sweet fern and other grasses, herbs and forbs. Plant wanderers and colonizers from off site were observed to be reseeding the area with tree species like red maple and black birch along with colonizing shrubs such as sweet fern. None of the three exotic/invasive plant species of concern were observed on the upland portion of Area 2.

Based on the results of the 2005 inspections (as in the 2004 inspections), the upland site met the Performance Standards albeit soil erosion and sedimentation was observed along the eastern side with sedimentation observed in the adjacent wetland. This was a direct result of failed upgradient erosion and sedimentation control measure (i.e. use of Flitrexx SiltSoxx, an erosion control tube that functions as a silt fence alternative) implemented by MassDevelopment as part of their Barnum Road Storm Water Improvement Project. MassDevelopment subsequently implemented several corrective measures during 2005 that may have mitigated this problem.

During the Fall 2004 observations, silt from the adjacent upgradient un-vegetated upland area from construction activities related to the storm water detention pond being constructed for MassDevelopment had started to top the silt barrier and flow down the restored slope. This uncontrolled erosion and sedimentation resulted in additional erosion within the drainage swale on the eastern side of Area 2 and deposition of fine silt within the wetland and covering of vegetation and was subsequently reported by the Habitat Team to the USACE/BEC. These effects are seen in the Appendix B photographs.

On May 19, 2005 the CENAE Groundwater LTMP Team observed an additional erosion onto the Area 2 upland as the erosion control tube apparently failed as observed by the undermining that occurred over the winter 2004-2005 (see Appendix B – Photos). They took immediately corrective action by filling the area that was undermined with nearby rock. This was confirmed during the May 23, 2005 RAB Meeting and the Army BEC consequently contacted MassDevelopment to correct this problem. MassDevelopment subsequently installed an unvegetated soil berm above the existing erosion control tube parallel to the Area 2 upland. However, the berm did not extend completely to the eastern Area 2 upland site boundary as observed during the July 14, 2005 field inspection. As a result the erosion and sedimentation continued to occur. There was a layer of silt covering the base of the wetland vegetation and the potential existed for further degradation as a result of a significant storm event since the erosion had formed a discernable discharge pathway along the upland slope to the base of the wetland. These concerns were again expressed during the September 22, 2005 regulator site visit and MassDevelopment subsequently installed a new erosion control tube immediately adjacent to the existing tube and extended and deepened the area in front of the berm that runs parallel to Area 2 to beyond the eastern site boundary. These corrective measures were checked on November 1, 2005 after a period of heavy rains and seemed to be functioning properly.

The wetland restoration exceeded the Performance Standards. Soft rush, broad-leaved cattail, burr reed, cotton grass, tussock sedge, silky dogwood and alder are a partial list of species identified during the several monitoring visits. Two small patches of *Phragmites* were treated on July 14, 2005; three shoots on the east side of the wetland, and 26 shoots on the west side of the wetland. Several clumps of purple loosestrife were hand pulled from the shallow wetland pools and along with the *Phragmites* bagged for offsite disposal. No additional *Phragmites* growth was noticed during the September 22, 2005 site visit. Amphibian and/or reptile activities such as turtle egg-nesting sites on the upland



slope and green/bull frogs in the small pools at the edge of the wetland were observed during the inspections.

#### **4.1.2 Recommendations**

It is imperative that the uncontrolled drainage and resulting erosion and sedimentation from the upland area (up gradient of AOC57) from construction activities related to the storm water detention pond be completely diverted from flowing onto the AOC 57 Area 2. If this continues, the wetland will eventually be filled with the fine silt, negatively impacting the vegetation along with compromising restored wetland values and functions. Albeit the existing wetland vegetation is growing well, a layer of silt effectively covering the roots may interfere with nutrient uptake and eventually kill the established wetland vegetation. A determination of the long term effectiveness of the corrective erosion control measures implemented by MassDevelopment will be made during the 2006 field inspections.

Any residual *Phragmites* observed in the Late Spring/Early Summer 2006 field inspection will be treated systemically with herbicide. Any purple loosestrife encountered along will be hand-pulled and left on-site if not in seed and if in seed it will be removed from site for disposal.

The white and/or red oaks growing on the upland slope and red maples at the wetland/upland interface are demonstrating limited negative effects of deer browse and vole damage. If this condition continues then wire cages will be constructed and installed to prevent deer browse damage and plastic vole shields will be installed to prevent girdling at the base of the tree. The wire cages can remain for several years and be removed when the trees can survive the browsing. The vole protectors are made of degradable plastic.

#### **4.2 AOC57-Area 3**

##### **4.2.1 Performance Standards**

Area 3 consists of an upland site that slopes downward to the edge of the existing wetland. Based on the 2005 inspections (as in the 2004 inspections) the upland site met the Performance Standards. Thirteen white and/or red oaks have survived on the upland slope. The upland plant cover, ground and tree cover, is similar to AOC 57 Area 2. White and/or red oak and red maple seedlings were observed on the slope with ground cover such as herbs, forbs, dog tick fleabane, rabbit's foot clover with colonizing shrubs as sweet fern. These plant volunteers/colonizers, assisted by adequate rainfall, have re-vegetated many of the small bare areas that were observed in 2004. Several small under vegetated areas still remain. None of the three exotic/invasive plant species of concern were observed on the upland portion of Area 2.

No wetland resource area was restored during remediation of Area 3 but since removal of the silt fence may have disturbed the edge of the Area 3 wetland, this wetland edge is being monitored in accordance with the Habitat LTMP (USACE 2007a).

The wetland transition area also contains similar wetland vegetation as Area 2 and exceeds the Performance Standards. As of September 22, 2005, there was no evidence of erosion from the adjacent upland onto Area 2.

#### **4.2.2 Recommendations**

As in Area 2, the white and/or red oaks growing on the upland slope are demonstrating limited negative effects of deer browse and vole damage. If this condition continues then wire cages will be constructed and installed to prevent deer browse damage and plastic vole shields will be installed to prevent girdling at the base of the tree. The wire cages can remain for several years and be removed when the trees can survive the browsing. The vole protectors are made of degradable plastic.

#### **5.0 REFERENCES**

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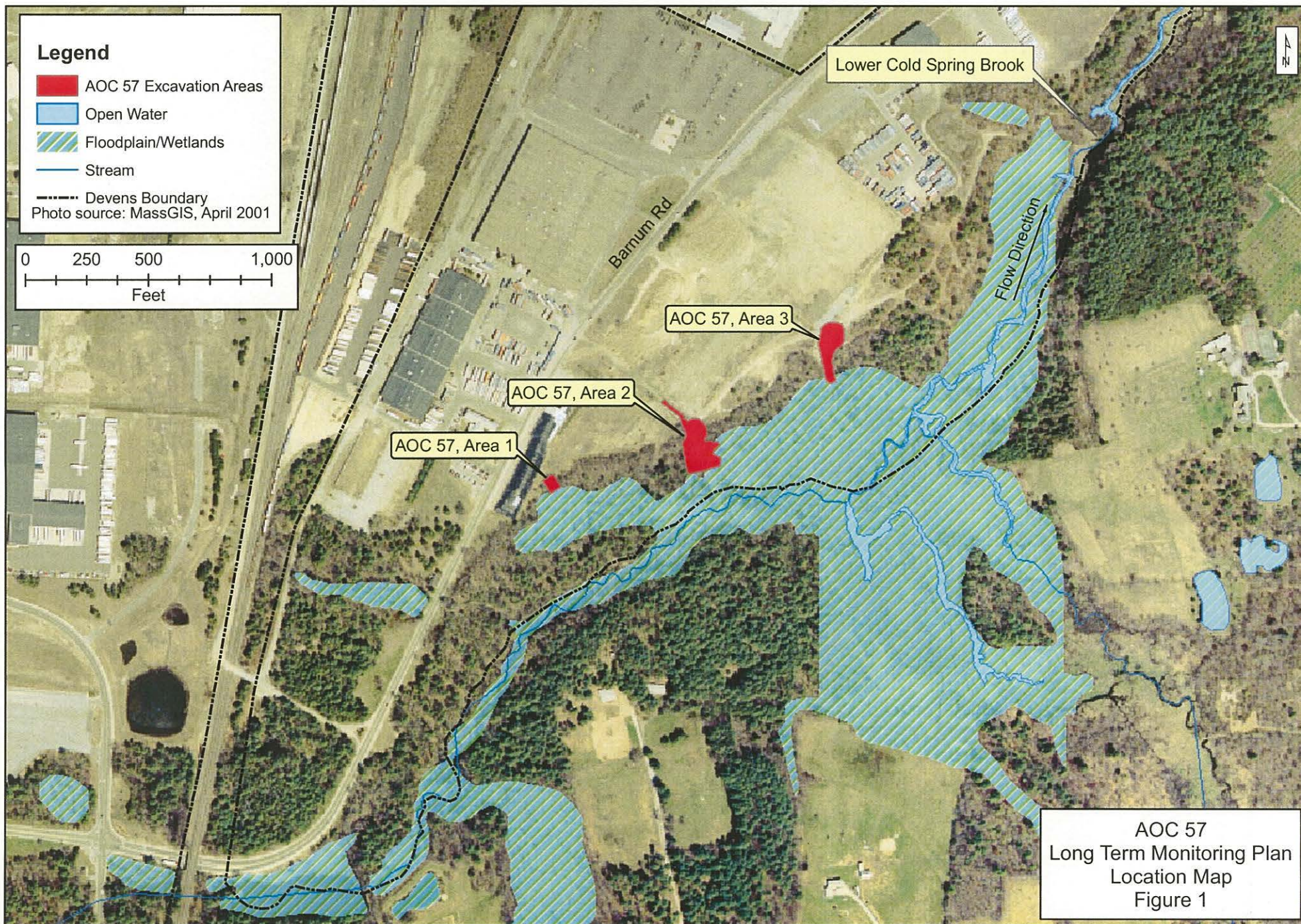
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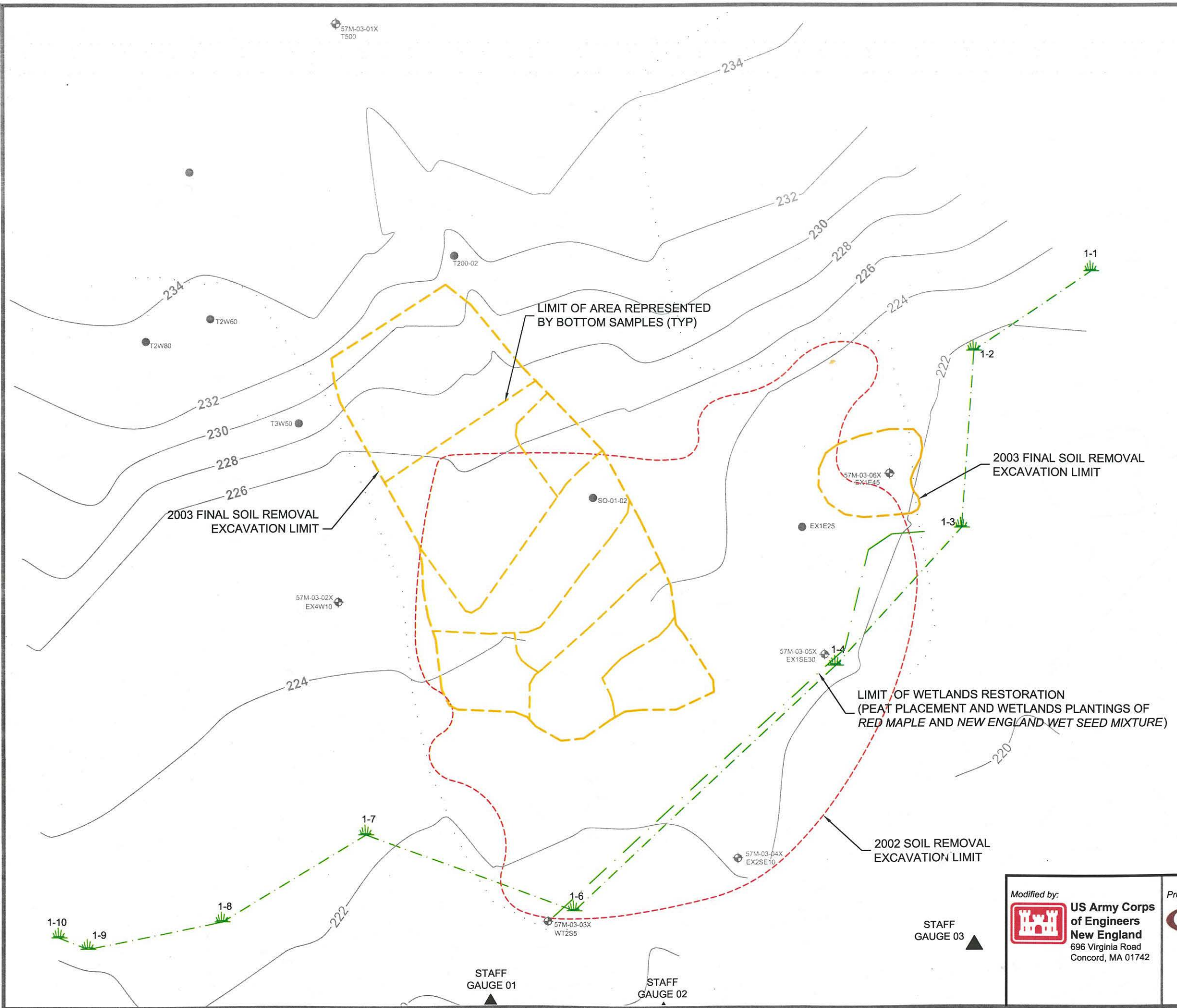
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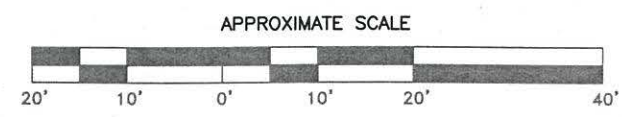






**LEGEND**

- SPOT ELEVATION (FINAL GRADE DEC 2003)
- FINAL EXCAVATION LIMIT (2003)
- APPROXIMATE DEPTH OF EXCAVATION FROM ORIGINAL GRADE (FT) (2002 & 2003)
- ▲ WETLAND STAFF GAUGE INSTALLED DEC. 2003 (ZERO=220 FT. MSL)
- ▲ 12-INCH CMP SUMP INSTALLED DEC 2003
- ~ SIDEWALL COMPOSITE SAMPLE TREE LINE
- ⊕ WT3 GEOPROBE BORING LOCATION
- ⊕ 12-IN. CORRUGATED METAL PIPE SUMP
- 1-1 WETLAND FLAG ID
- 228 SURFACE CONTOURS (PRE-EXCAVATION)
- GEOPROBE/HOLLOW STEM AUGER SOIL BORING
- SO-01-02
- ⊕ 57M-03-06X EX1E45 NEW MONITORING WELL MONITORING WELL No. IS 57M-XX-XXX SOIL BORING No. EX1E45
- LIMIT OF CONTI EXCAVATION (2002)
- LIMIT OF FLAGGED WETLANDS



**NOTES**

1. THIS SITE PLAN WAS DEVELOPED FROM A SITE PLAN COMPLETED BY HOWE SURVEYING ASSOCIATES, Inc. AND A SURVEY PERFORMED BY CONTI ENVIRONMENTAL, Inc.
2. CONTI ENVIRONMENTAL Inc. TAPE-MEASURED THE GEOPROBE EXPLORATION LOCATIONS, SUMP LOCATIONS, AND APPROXIMATE EXISTING OPEN EXCAVATION, USING ESTABLISHED WETLAND FLAG LOCATIONS 1-7 AND 1-2 AS BASE POINTS.
3. SPOT AS-BUILT ELEVATIONS AND STAFF GAUGES SURVEYED BY CONTI DECEMBER 2003 (ELEVATIONS IN FT MSL).

<b>FIGURE 2</b> <b>MONITORING WELLS AND SITE RESTORATION LIMITS</b> A.O.C. #57 AREA 2 BARNUM ROAD DEVENS, MASSACHUSETTS		
Modified by:  <b>US Army Corps of Engineers New England</b> 696 Virginia Road Concord, MA 01742	Prepared by:  <b>Conti Environmental &amp; Infrastructure</b> One Concord Farms 490 Virginia Road Concord, MA 01742 978.318.9095 Fax: 978.318.9055	MARCH 2004



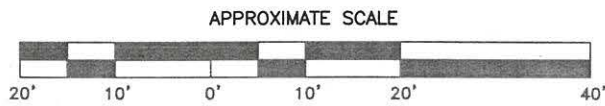






# LEGEND

- APPROXIMATE DEPTH OF EXCAVATION FROM ORIGINAL GRADE (FT) (2002 & 2003)
- WETLAND FLAG ID
- SURFACE CONTOURS (PRE-EXCAVATION)
- LIMIT OF FLAGGED WETLANDS
- CONFIRMATION SAMPLE LOCATION



## NOTES

- THIS DRAWING WAS DEVELOPED FROM A SITE PLAN COMPLETED BY HOWE SURVEYING ASSOCIATES, Inc. AND FIELD MEASUREMENTS PERFORMED BY CONTI ENVIRONMENTAL, Inc.

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FIGURE 4  
 MONITORING WELLS AND SITE  
 RESTORATION LIMITS  
 A.O.C. #57 AREA 3  
 BARNUM ROAD  
 DEVENS, MASSACHUSETTS

MARCH 2004

**APPENDIX A**  
***Area of Contamination 57 (AOC) Field Inspection Notes***  
***In Chronological Order (2005 & 2004)***

**Description of Wetland Vegetation Designation Used in Field Notes**

There is no single, correct, indisputable, sound ecological definition of wetlands since wetlands exist as a continuum between wet and dry environments (Cowardin et al. 1979). One of the three attributes of a wetland is the particular type of vegetation this wetland is able to support. Plants that are found in the wetland areas where the roots are submerged and the plants can grow are called hydrophytes. The U.S. Fish and Wildlife Service have published a list of more than 2500 species of vascular plants that occur in wetlands, in this case from Maine through Virginia and west to Ohio and Kentucky (Reed 1988). These plants are listed using their scientific name followed by their common name and published in a *National List of Scientific Plant Names*. Each plant is given a regional indicator status along with information on the plant habit, where it lives, and general distribution. This system provides four categories to determine this plant's ability to live in a wetland. These categories according to Tiner (1988) are:

1. Obligate (OBL) greater than 99% occurrence in wetlands;
2. Facultative Wetland (FACW) 66-99% occurrence in wetlands;
3. Facultative (FAC), 33-66% occurrence in wetlands; and
4. Facultative Upland (FACU), 1-33% occurrence in wetlands.

This is the classification system and these are the symbols used in this report to describe the vegetation found in the wetland and upland areas at the various restored wetland and upland sites at Devens. It is the frequency of the presence of these plants that is used to measure whether the wetland and the upland restoration has attained the stated Performance Standards. Obligate and Facultative Wetland plants are almost always found in wetlands and are therefore the best vegetative indicators of wetlands. In addition to the above classification and to better characterize the facultative categories, a positive sign (+) is placed after the FACW to indicate a plant on the wetter side of FACW, and a negative sign (-) for a plant on the drier side of FACW. As a relevant example, wool grass, *Scirpus cyperinus*, a common floral constituent of Devens wetlands is classified as a FACW+, indicating it should be found in a slightly wetter habitat than umbrella sedge, *Cyperus strigosus*, that is classified as FACW. This describes the terminology used to characterize habitat as wetland or upland based on their percent vegetative cover.

*Citations are provided in Section 5.0 References.*



# **2005**

AOC 57

## **Field Notes – Monitoring of Devens Habitat Restoration Sites**

14 July 2005

*CENAE Crew: Bob Davis, Pete Trincherro, Mike Penko, and Ben Loyd*

### **AREA 2**

**Site Description** Wetland and upland portions; site restoration has been degraded since 2004 due to erosion from offsite upgradient upland haul road, shallow wetland-upland slope interface is choked with silt (see photos), erosion, silt deposition east side of upland slope

### **General Description of Upland**

**Substrate (organic/cultural debris, erosion, etc)-** little organic material on slope, erosion on east side, west side more stable, sandy silt. Runoff from construction offsite has eroded and deposited silt along the eastern border of the upland restoration.

**Plant Community to be Established** – red maple and white and/or red oaks planted, slope stabilized with herbs, forbs and ground cover.

**Plant Community Recorded at Meandering Survey-** red maple at base of slope, white, red oak on slope, herbs, forbs as ground cover, coneflower, vetch, dog tick fleabane, rabbit's foot clover, sweet fern, red maple seedlings, other wanderers self seeded from surrounding area

**Invasive/Noxious Plant Species (Presence/Absence/Control)-**Absent

**Evidence of Animal Community-** deer browse present on oaks/red maple; turtle nests observed, probably snapping or painted, nests raided by skunk and/or raccoon.

**Upland plant Cover** – portions of east slope does not meet 75% cover criterion, west side of upland meets criterion

**Suggestion upland improvement-** restore soil/reseed areas devoid of groundcover, provide protection from deer predation with wire cages placed around trees. Deploy vole protectors for the planted tree seedlings.

**General Description of Wetland** - shallow wetland pools at base of slope becoming clogged with silt, pools on east side of restored wetland most impacted, west side has greater growth of wetland vegetation.

**Standing Water (Presence/Absence/Description)** standing water 3-4" deep, silted in pools on east side with at least 3 inches of fine silt covering roots

**Classification of Wetland Type- Cowardin Classification-** emergent, shrub/scrub

**Plant Community Recorded at Meandering Survey-**red maple seedlings, willow, silky dogwood, jewel weed, sensitive/cinnamon fern more toward west side, tussock sedge

**Exotic/Noxious Plant Species -Presence/Absence/Control-** *Phragmites* treated by the injection technique with Rodeo according to protocol. Two small areas with *Phragmites* were discovered, 3 shoots treated on east side of wetland, most likely remnants of a clump of *Phragmites* treated in Fall 2004. On the west side of the wetland in the vicinity of the well cover 26 shoots of *Phragmites* were cut and treated. Several clumps of purple loosestrife were hand pulled from the shallow wetland pools and bagged for offsite disposal. There is extensive purple loosestrife cover in adjacent wetland areas making it difficult to control in AOC 57.

**Indigenous Wetland Plants Cover on at Least 75% Area: Yes/No-** Yes, but....

**Description:** There are several inches of finely divided silt covering the roots of wetland plants (*Typha*, *Glyceria*, *Carex*) in the east facing pools at the upland/wetland interface. Whether these plants survive and or the silt deposition continues will determine continued successful compliance in the wetland area of the restoration. The greater the distance from the east portion of the restoration, the greater degree of wetland plant cover.

**Evidence of Animal Community** A few aquatic insect larvae visible in shallow pools, green frog adults observed, bullfrog vocalizations, with no larvae observed. No animals were visible in the more highly silted pools.

#### **Problems within Mitigation Area**

Continued silt migration with surface runoff from the construction activity associated with the building of the silt basin. An inadequate effort at the creation of a soil berm to divert surface flow was attempted, but flows bypassed the berm and undercut the straw-filled coir fascia.

#### **Suggested Corrective Measures**

Surface runoff flows around and under the coir fascia, proceeding down the east side of the wetland. The only corrective action taken as of July 14, 2005 since this problem was originally reported in October 2004 was the placement of a few front-end loader buckets of fill in front of the inadequate silt barrier, which ultimately adds to the erosion. To correct this serious problem, the slope must be changed so runoff is not directed toward AOC 57 Area 2 but to the silt basin created by MassDevelopment to contain the runoff from the upland. The bare substrate in the area in front of AOC 57 should be covered with biodegradable cotton or jute matting and vegetated.

\*\*\*\*\*

**AOC 57**  
**Field Notes - Monitoring of Devens Habitat Restoration Sites**  
**14 July 2005**

*CENAE Crew: Bob Davis, Pete Trincherro, Mike Penko, and Ben Loyd*

**AREA 3**

**Site Description** Restored site area consisted of all upland habitat that slopes downward and adjacent to an existing bordering vegetated wetland as in Area 2. Albeit no wetland restoration was required at Area 3, the transition zone between the upland and wetland is also being monitored.

**General Description of Upland**

**Substrate (organic/cultural debris, erosion, etc)-** little organic material on slope, sandy loam, small area of erosion on east side of the upland site. Because of the lack of construction activity by MassDevelopment in the upland immediately north of the restoration site, no direct erosion or sedimentation was observed onto Area 3. The straw filled erosion control tube remains across the upland limit of the site and was observed to be functioning properly.

**Plant Community to be Established –** red maple and red and/or white oak seedlings planted, slope seeded with upland mix and stabilized with herbs, forbs.

**Plant Community Recorded at Meandering Survey-** red maple at bottom of slope, White and/or red oak on slope, herbs, forbs as ground cover such as dog tick fleabane, rabbit's foot clover, sweet fern, red maple seedlings as volunteers from surrounding forest are present over the entire slope, other volunteers. Volunteers, assisted by adequate rainfall, have re-vegetated many of the small bare areas that were observed in 2004. Several small under vegetated areas remain.

**Invasive/Noxious Plant Species (Presence/Absence/Control)-**None observed.

**Evidence of Animal Community-** deer browse on oaks/red maple,

**Attain performance Standards-** yes, with at least 75% cover

**Suggestions for Improvement-** reseed bare areas, wire cages around planted trees to limit deer browse, vole protectors for planted maple/oaks.

**General Description of Wetland** - shallow wetland pools at the base of the upland slope that extend for a short distance to a slight vegetated berm that merges to the extensive existing shrub/scrub that is continuous with AOC 57, Site 2. The wetland area being monitored is limited to this narrow wetland at the base of the slope.

**Standing Water (Presence/Absence/Description)** standing water 2-3" deep at the base of the upland slope

**Classification of Wetland Type- Cowardin Classification-** emergent, shrub/scrub

**Plant Community Recorded at Meandering Survey-** a healthy assemblage of typical wetland plants with no evidence of silt deposition from upland. This assemblage includes wool grass, tussock sedge, soft bulrush, planted/volunteer alder and a few clumps of broad-leaved *Typha*.

**Exotic/Noxious Plant Species -Presence/Absence/Control:** a few clumps of purple loosestrife were pulled, bagged, and disposed offsite. Purple loosestrife control, although required in the original scope of work for AOC 57, is futile since the surrounding pre-existing wetland that borders AOC 57 Site 2 and 3, has extensive loosestrife cover and seeding from this large reservoir is inevitable.

**Indigenous Wetland Plants Cover on at Least 75% Area:** Yes/No Yes  
**Description-** well covered, more than exceeds the criterion

**Evidence of Animal Community** Deer browse

**Problems within Mitigation Area** -No obvious problem

**Suggested Corrective Measures** -None required at the time of this inspection.

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## **AOC 57**

### **Field Notes – Monitoring of Devens Habitat Restoration Sites**

**22 September 2005**

*CENAE Crew: Bob Davis, Pete Trinchero, Mike Penko and Ben Loyd with Dave Macdonald (USEPA)*

#### **AREA 2**

**Site Description** Wetland, upland; site restoration has been degraded since 2004 due to erosion from offsite upland haul road, shallow wetland-upland slope interface is choked with silt (see photos), erosion, silt deposition east side of upland slope

#### **General Description of Upland -**

**Substrate (organic/cultural debris, erosion, etc)-** little organic material on slope, erosion on east side, west side more stable, sandy silt. Runoff from construction offsite has eroded and deposited silt along the eastern border of the upland restoration. Rivulets are running around the berm, under the silt fence, and down the slope into the wetland.

**Plant Community to be Established** – red maple and white/red oaks planted, slope stabilized with herbs, forbs and ground cover.

**Plant Community Recorded at Meandering Survey-** a lot of upland growth since last year, native species are re-establishing, alder, willow, autumn olive, red oak, chickweed, vetch, queen anne's lace, sweet fern, boneset, cypress, clovers, birch, aster reed canary grass

**Invasive/Noxious Plant Species (Presence/Absence/Control)** purple loosestrife, black locust. suggested control measures might include eradication of loosestrife next year, but might not be worth the effort because the area will be shaded out within ten years

**Evidence of Animal Community-** deer browse

**Upland plant Cover** – portions of east slope do not meet 75% cover criterion, west side of upland meets criterion

**General Description of Wetland-** shallow wetland pools at base of slope clogged with silt, pools on east side of restored wetland most impacted, west side has greater growth of wetland vegetation.

**Standing Water (Presence/Absence/Description)-** standing water 3-4" deep, silted in pools on east side with at least 3 inches of fine silt covering roots

**Classification of Wetland Type- Cowardin Classification-** emergent, shrub/scrub

**Plant Community Recorded at Meandering Survey-** red maple seedlings, willow, silky dogwood, jewel weed, sensitive/cinnamon fern more toward west side, tussock sedge

**Exotic/Noxious Plant Species -Presence/Absence/Control-** purple loosestrife fringing wetland

**Indigenous Wetland Plants Cover on at Least 75% Area: Yes/No-** Yes, but....

**Description-** There are several inches of finely divided silt covering the roots of wetland plants (*Typha*, *Glyceria*, *Carex*) in the east facing pools at the upland/wetland interface. Whether these plants survive and or the silt deposition continues will determine continued successful compliance in the wetland area of the restoration. The greater the distance from the east portion of the restoration, the greater degree of wetland plant cover.

**Evidence of Animal Community-** A few aquatic insects visible in shallow pools, green frog adults observed. No animals were visible in the more highly silted pools.

**Problems within Mitigation Area-** Continued silt migration with surface runoff from the construction activity associated with the building of the silt basin. A feeble effort at the creation of a soil berm to divert surface flow was attempted, but flows bypassed the berm and undercut the straw-filled coir fascia.

**Suggested Corrective Measures-** Surface runoff flows around and under the coir fascia, proceeding down the east side of the wetland. The only corrective action taken since this problem was originally reported in October 2004 was the placement of a few front-end loader buckets of fill in front of the inadequate silt barrier, which ultimately adds to the erosion. To correct this serious problem, the slope must be changed so runoff is not directed toward AOC 57, Site 2 but to the silt basin created to contain the runoff from the upland. The bare substrate in the area in front of AOC 57 should be covered with cotton matting and vegetated. The irony is less than 50 yard to the west is a magnificent silt basin built by the organization responsible for the silt in the wetland.

Suggested corrective measures include restoration of soil/reseeding in areas devoid of groundcover, placement of wire cages around the base of trees to provide protection from deer browsing, and deployment of vole protectors for the planted tree seedlings.

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### **AOC 57**

#### **Field Notes - Biological Monitoring Devens Habitat Restoration Sites**

**22 September 2005**

CENAE Crew: Bob Davis, Pete Trinchero, Mike Penko and Ben Loyd with Dave Macdonald (USEPA)

### **AREA 3**

**Site Description** -Restored site consists of wetland and upland. Most of the restored site consists of upland with a small area of wetland restoration at the base of the upland slope. As with AOC 57, Site 2, the upland restoration ends to the north at a disturbed construction site and the wetland merges to the south with an extensive palustrine wetland.

### **General Description of Upland**

**Substrate (organic/cultural debris, erosion, etc)-** little organic material on slope, sandy loam, small area of erosion on east side of the upland site. Just north of the restoration site, there has been historic construction activity but because of the slope there has not been the drainage from the upland that has degraded AOC 57, Site 2. Although there is no large amount of erosion from the upland, there are small areas that have exposed sandy substrate. These areas do not affect the performance standards. A functioning straw filled coir fascia remains across the upland limit of the site.

**Plant Community to be Established** – red maple/oak seedlings planted, slope seeded with upland mix and stabilized with herbs, forbs.

**Plant Community Recorded at Meandering Survey-** red maple at bottom of slope, white and red oak on slope planted as part of the restoration continue to grow well on the upland. Herbs, forbs such as dog tick fleabane, rabbit's foot clover, sweet fern exist as

ground cover, with many red maple, birch, autumn olive and poplar seedlings growing as volunteers from surrounding forest are present over the entire slope. Volunteers, assisted by adequate rainfall, have re-vegetated many of the small bare areas that were observed in 2004. Several small under vegetated areas remain as mentioned above.

**Invasive/Noxious Plant Species (Presence/Absence/Control)**-None observed.

**Evidence of Animal Community**- deer browse on oaks/red maple.

**Attain performance Standards**- yes, with at least 75% cover

**Suggestions for Improvement**- reseed bare areas, wire cages to be placed around planted trees to limit deer browse, vole protectors for planted maple/oaks to prevent girdling at the base of the trees.

**General Description of Wetland** - shallow wetland pools at the base of the upland slope that extend for a short distance to a slight vegetated berm that merges to the extensive existing shrub/scrub, palustrine emergent wetland that is continuous with the wetland that connects to AOC 57, Site 2. The wetland restoration is limited to this narrow wetland at the base of the slope. There has been a single large( 3 ft diameter) red maple that was uprooted at the berm where the restoration merged with the existing wetland.

**Standing Water (Presence/Absence/Description)**- standing water 2-3" deep at the base of the upland slope

**Classification of Wetland Type- Cowardin Classification**- palustrine emergent, shrub/scrub

**Plant Community Recorded at Meandering Survey**- a healthy assemblage of typical wetland plants with no evidence of silt deposition from upland. This assemblage includes wool grass, tussock sedge, soft bulrush, luxuriant jewelweedplanted/volunteer alder and a few clumps of broad-leaved *Typha*.

**Exotic/Noxious Plant Species -Presence/Absence/Control**- a few clumps of purple loosestrife were pulled, bagged, and disposed offsite. Purple loosestrife control, although required in the original scope of work for AOC 57, is probably futile since the surrounding pre-existing wetland that borders AOC 57 Site 2 and 3, has extensive loosestrife cover and seeding from this large reservoir for purple loosestrife invasion is inevitable. No Phragmites observed.

**Indigenous Wetland Plants Cover on at Least 75% Area: Yes/No** Yes  
**Description**- well covered, more than exceeds the criterion

**Evidence of Animal Community**- Deer browse

**Problems within Mitigation Area**- No obvious problem

**Suggested Corrective Measures-** None required at the time of this inspection.

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**AOC 57**

**Field Notes – Monitoring of Devens Habitat Restoration Sites**

**1 November 2005**

*CENAE Crew: Bob Davis, Pete Trincherro and Ben Loyd*

**AREA 2**

**Site Description-** restored level upland habitats and adjacent wetlands to the south of the roadway leading to the water treatment plant.

**General Description of Upland**

**Substrate (organic/cultural debris, erosion, etc)-** a berm of sand/gravel was created with a new silt barrier installed behind, old silt barrier broken up and left in place, previously eroded rivulets filled with rock, previously eroding slope graded and reseeded

**Plant Community to be Established-** no change

**Plant Community Recorded at Meandering Survey-** no change

**Invasive/Noxious Plant Species (Presence/Absence/Control)-** purple lustrife

**Evidence of Animal Community-** deer tracks

**General Description of Wetland-** site visit did not include wetland area

**Problems within Mitigation Area-**

**Suggested Corrective Measures-**

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**2004**  
**Field Notes - Monitoring of Devens Habitat Restoration Sites**  
**16 June 2004**

*CENAE Crew: Bob Davis, Peter Trinchero, Mike Penko, with John McDowell*

**AREA 2**

**UPLAND-** seeded, 75% well covered with grass/herbs, 20% spotty cover, 5% bare/eroded; 34 red oak leafed out, about 1.5 " diameter stem, several with stump growth. Animal evidence- snapping turtle egg nest on slope raided by raccoon

**Wetland**

Water level has dropped, small ponded area at edge, exceeds 75% indigenous wetland cover criterion.

Species observed:

Tussock sedge obl  
Lurid sedge obl  
Umbrella sedge obl  
Wool grass Facwet+  
Broad-leaved cattail obl  
Soft-stemmed Bullrush obl  
Bristle-backed sedge Facwet+  
Jewelweed Facwet  
Cinnamon fern facwet  
Sensitive fern facwet  
Phragmites facwet – treated chemically  
Purple Loosestrife facwet+ two stems pulled  
Honeysuckle fac-  
Red maple 7 saplings  
Alder seedlings obl

Animal evidence- heard bullfrog, snapping turtle egg, racoon

**Actions**

Monitor exotics, small area of erosion between rock lined drain chute and wetland, will be scarified/reseeded in the fall. Before winter stakes and silt screen will be removed. The site will be monitored for exotics/invasives, loosestrife and common reed, and removal/herbicide action taken. Phragmites cut at node, stem injected with 25% Rodeo and upper end of the stem, upper end of stem removed and destroyed off site. Pesticide treatment by MA licensed applicator.

**AREA 3** = Not Inspected on 16 June 2004.

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## **Field Notes - Monitoring of Devens Habitat Restoration Sites**

**23 June 2004**

*CENAE Crew: Bob Davis, Peter Trincherro, with Debbie Acone et al. (see Devens Wetlands Inspection Sign-in Sheet for all present at end of field notes)*

### **AREA 2**

**Upland-** No change since 16 June 2004.

**Wetland-** Monitored the several herbicide treated stems of Phragmites. Plants are brown and brittle, at this point 100 % effective treatment. One additional new shoot of Phragmites was observed adjacent to the treated stems.

Animal evidence- 3 additional snapping turtle nests were exposed and raided. A leopard frog was observed.

#### **Actions**

Additional herbicide treatment required. Silt fence remains and requires removal. Reseeding of bare and mildly eroded areas to be completed in the fall.

### **AREA 3**

This is an area that was overlooked during the previous monitoring. It is about 100 yards east of AOC /2. The site decontamination did not intrude as extensively into the wetland as AOC/2 but the intrusion was more than indicated on the site drawings. Upon examination, it was determined there was sufficient intrusion to include this as a monitoring site. The monitoring indicated this limited wetland area is a successful wetland mitigation by having more than 75 % of the cover native wetland plants.

#### **Upland**

There is potential for minor erosion from the adjacent un-vegetated upland area. A small area was observed with several dry rivulets, with the fine material at the bottom of the slope at the wetland edge with the coarse material remaining on the slope. Thirteen of the red oaks that were planted on the upland slope have leafed out. Some shrubs, autumn olive, have reseeded at the upland edge of the mitigated area from plantings just off the site.

#### **Wetland**

Personal communication with the Project Engineer indicated the removal activities extended several feet farther into the wetland than originally expected. The silt screen was placed too far into the wetland resulting in a small amount of silt deposited into the wetland proper. A shallow pool area recently dried and was in the process of being vegetated with jewelweed. A narrow swath of wetland vegetation developed in front of the silt screen, at the base of the mitigation. The narrow wetland area possesses more than 75% of the area with native wetland cover, which satisfies the performance standard.

Jewelweed facwet  
Species Observed:  
 Cinnamon fern facwet  
 Blue flag obl  
 Silky willow obl  
 Soft rush facwet+

**Action** - No exotics visible.

The silt screen will be removed and may be removed anytime since it is no longer needed. Monitoring for exotics will continue. The erosion, although not serious, should be controlled with a fall hydro seeding. A layer of organic material should be applied with the seed to hold sufficient moisture for not only germination but also growth.

**ATTENDANCE SHEET-DEVENS WETLANDS INSPECTION**

**23 June, 2004**

<u>Name</u>	<u>Organization</u>	<u>Phone</u>
Debbie Acone	USACE	978-318-8130
Julie Paquette	DEC	978-772-8831
Peter Lowitt	DEC	978-772-8831
Takasmi Tada	BRAC	978-796-2036
Becky DaSilva	MADEP	978-767-2707
Brian Duval	MADEP	508-849-4051
David Salvadore	MADEP	508-767-2842
Ron Ostrowski	MADEV	978-772-6340
John McDowell	USACE	978-772-0159
Lynne Welsh	MADEP	508-849-4007
Pete Trinchero	USACE	978-318-8004
Bob Davis	USACE	978-318-8236
Bart Hoskins	USEPA	617-918-8375
Christine Johnson	USACE	978-318-8125

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**Field Notes - Monitoring and Eradication of Exotic/Invasive Plants**  
**24 August 2004**

CENAE Wetland Monitoring Team: Robert Davis, Mike Penko and Peter Trincherro  
As stated in the AOC 57 Monitoring Plan and in the Post Remediation Inspection Plan, Phragmites australis (common reed), Lythrum (purple loosestrife), and Polygonum (Japanese knotweed) were monitored and eradicated. Herbicide application was by Mike Penko, a MA licensed applicator, according to the procedure described in the monitoring plan. The purple loosestrife was pulled and disposed onsite. Purple loosestrife was not completely removed from all sites because the level of effort required for this removal would exceed the time allotted for Phragmites/Japanese knotweed eradication.

**AREA 2**

**Upland-** Because of the relatively wet summer conditions, several of the bare areas of the slope have been vegetated since the last inspection with smartweed, rabbit's foot and red clover. Toward the upper portion of the slope there are several areas that remain not vegetated and that should be scarified, reseeded and covered in the fall. There are a few small areas of erosion that should be treated in a similar manner. The numbers of live, planted maples and oaks remain the same and they were pruned to remove dead growth. Wanderer birch seedlings have seeded from the periphery.

**Wetland-** Seasonal succession of the established and healthy wetland continues with Joe-Pie-Weed and narrow leaved and rough leaved goldenrod in bloom. The grasses, sedges and cattail are beginning to seed. Shallow pools of standing water remain at the base of the slope. The dead remains of the treated Phragmites are present. No additional Phragmites is present. Several bunches of purple loosestrife were pulled but extensive stands of purple loosestrife were present in adjacent wetlands making future eradication efforts at AOC 57 probably futile. The silt fence remains to be removed at the fall monitoring visit.

**AREA 3**

**Upland-** As with Area 2, most of the bare patches have grown in with clover and smartweed. Several small areas remain which should be reseeded and covered to prevent future erosion. The planted trees were pruned.

**Wetland-** No Phragmites observed and several clumps of purple loosestrife were pulled. As with Area 2, the purple loosestrife removal may be a futile effort since there were major infestations in surrounding areas. Shallow pools of standing water are present in the wetland with well established wetland vegetation. The silt fence remains to be removed during the fall monitoring visit.

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**Field Notes - DEVENS HABITAT LONG TERM MONITORING**  
**30 September 2004**

The CENAE Habitat Long Term Monitoring Team of Robert Davis and Peter Trincherro visited the Devens wetland/upland restoration sites on September 30, 2004. As with the

spring and summer 2004 visits, goals were to record the progress of the restoration efforts, to monitor the success of the eradication of exotics on previous visits, and to remove silt barriers/fencing that remained on some of the sites. It is important existing silt fence be removed to eliminate barriers to wildlife between upland and wetland habitats, where these animals will find refuge for the winter. Where possible, minor habitat improvements such as erosion control, were noted and planned for implementation at a future visit. Because of the wet late summer/early fall pre-freeze conditions, plant cover was luxuriant.

### **AOC 57 Area 2**

**Upland-** There has been a degradation of the upland restoration site due to current construction activity north and west of AOC57 immediately adjacent to Area 2. A large silt basin is in the final stages of construction upland/up-gradient of AOC 57. The activity of heavy equipment modifying the topography and spilling of materials such as clay liner, has directed the flow of surface water toward the straw filled conical silt barrier. AOC57 Area 2 is vulnerable because of the topography. The recent heavy and frequent rain has overtopped the silt barrier and eroded the upper end of the site. About six inches of substrate has been eroded down the slope into the wetland area. A thin layer of recently deposited silt was observed within the wetland. This erosion is limited to the eastern portion of the site.

This problem must be corrected prior to the winter freeze to avoid any additional erosion into the wetland, especially by spring runoff. The off-site road will require regrading to channel surface water from AOC 57. The eroded areas should be refilled and seeded.

The steep-sloped upland areas comply with the performance standards of 75% native vegetation cover with no bare areas exceeding 500 square feet. The ground cover is dominated by rabbit foot clover (*Trifolium arvense*), common on arid soils with low nutrient content. The next most dominant ground cover is a variety of smartweed (*Polygonum*). The 34 red oak remain, although a couple of the trees were recently browsed by deer. The growth at the base of the trees was cut back to encourage growth. Recent wanderers to the slope include sweetfern (*Comptonia perigrina*), birch seedlings, white pine (*Pinus strobus*) and red maple (*Acer rubrum*).

There are small areas on the slope, less than 10 feet in diameter, that are bare and need of cover. Hand broadcast hydro seed mix will prevent additional erosion from these sites.

**Wetland-** The wetland continues to more than comply with the performance standards of 75% native wetland cover. This restoration is an attractive site, with many of the flora in bloom. At the transition between upland and wetland is a 20 ft swath of yellow Devil's Beggar-ticks in bloom. This monoculture grades into a healthy wetland with amphibian inhabited shallow pools. No additional *Phragmites* remains subsequent to the herbicide treatment. Many clumps of purple loosestrife remain but they remain equally distributed in the restoration. Much loosestrife is present offsite. The majority of the silt fence was removed. Unfortunately there are several areas where the barrier failed. These areas had

a second layer of fabric applied above the partially buried lower level. The top application was totally removed but in a few areas the lower buried areas will require removal with a shovel and pick. All support stakes were removed to prevent the barrier from interfering with wildlife migration. The buried fabric will be removed at a subsequent visit. The rolls of discarded silt fence fabric were placed at the edge of the site for removal and disposal (to be arranged with NCRO).

The six red maples planted at the edge of the restoration continue to thrive. In addition to the purple loosestrife, wanderers from the surrounding wetland such as honeysuckle, red maple/birch seedlings and willow continue to appear.

A list of dominant wetland vegetation observed follows.

Common Name	Genus/Species	Wetland Status
Devil's Beggar-ticks	<i>Bidens frondosa</i>	FACW
Wool Grass	<i>Scirpus cyprinus</i>	FACW+
Umbrella Sedge	<i>Cyperus strigosus</i>	FACW
Tussock Sedge	<i>Carex stricta</i>	OBL
Soft-stemmed Bulrush	<i>Scirpus validus</i>	OBL
Marsh Purslane	<i>Ludwigia palustris</i>	OBL
Cinnamon Fern	<i>Osmunda cinnamomea</i>	FACW
Sensitive Fern	<i>Onoclea sensibilis</i>	FACW
Broad-leaved Cattail	<i>Typha latifolia</i>	OBL
Purple Loosestrife	<i>Lythrum salicaria</i>	FACW
Speckled Alder	<i>Alnus rugosa</i>	FACW+
Japanese Honeysuckle	<i>Lonicera japonica</i>	FAC-
Red Maple	<i>Acer rubrum</i>	FAC
Joe-Pie-Weed	<i>Eupatorium fistulosus</i>	FACW

Fauna observed consisted of many adult amphibians in the pools. A 12-inch snake of unknown variety was observed in the silt barrier and released.

### **AOC 57 Area 3**

**Upland-** This area was not impacted by the upland/offsite construction activity. The 13 red oaks were in fine condition. Annual plant growth at the base of the trees was cut. As with Area 2, Area 3 fully complies with 75% native vegetation cover on the upland slope with no areas of 500 square feet without vegetative cover. There are small areas lacking vegetation that could be scarified and manually hydro seeded. Wanderers from the surrounding upland forest are scattered throughout the slope such as white pine, birch and sweet fern. As with Area 2, this is secondary succession in progress. The current dominant vegetation on this upland slope consists of smartweed, rabbit foot clover, various grasses and sedges.

**Wetland-** The wetland restoration complies with the requirement of 75% native wetland cover, with only miniscule areas of the wetland lacking cover. No *Phragmites* was recorded at this site, although clumps of purple loosestrife are scattered throughout the restoration area and the existing, surrounding wetland. All the silt fencing and stakes were removed from the site, gathered for removal and disposal (to be arranged with NCRO).

The dominant vegetation observed at the site was similar to that at Area 2 with the following additional flora recorded:

Common Name	Scientific Name	Wetland Status
Nodding Bur Marigold	<i>Bidens cornuta</i>	OBL
Common Burdock	<i>Arctium minus</i>	UP
Rough-leaved Goldenrod	<i>Solidago patula</i>	OBL
Multiflora Rose	<i>Rosa multiflora</i>	FACU
Jewelweed	<i>Impatiens capensis</i>	FACW
Small White Aster	<i>Aster vimineus</i>	FAC
New York Aster	<i>Aster novi-belgi</i>	FACW+

Many amphibians were observed in the wetland pools.

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**Field Notes - Devens Wetland Restoration Sites**  
**October 13, 2004**

On October 13, 2004, the wetland monitoring team consisting of Team Leader Robert Davis, Ben Loyd and Peter Trincherro spent about 4 hours visiting the several Devens wetland restoration sites to remove silt fence, evaluate ongoing exotic plant eradication efforts and to monitor the condition of the restored wetlands. It was critical the silt fence is removed prior to winter since it may act as a barrier to animals accessing winter cover in the wetland.

**AOC 57 - Area 2**

Silt fence was removed from the edge of the wetland. There were a few areas where the silt fence was buried. Removal of the silt fence in these areas would have disrupted the wetland so the support poles were broken and the fencing was cut at the surface of the ground. Fence was collected and placed at the top of the site for off-site removal. This restoration also more than satisfies the 75% criterion. A small clump of *Phragmites* was noted just east of the second monitoring well from the east. Purple loosestrife was observed but not removed due to time restraints. Plant cover for both the wetland and the upland was similar to Site 3. There was significant erosion onto Site 2 as a result of construction activity above the site. This construction was associated with the building of a large silt basin just west and upland of the wetland restoration. The access road created to construct this structure diverts amounts of upland drainage onto the upland slope of AOC 57, Site 2. Although there was a small amount of erosion visible at previous

monitoring visits from this upland area, there was erosion under the silt blanket. This increased runoff due to the construction activity resulted in much greater erosion from the upland especially on the east side of the site. The continuation of the erosion, especially during the winter and spring conditions, may impact the wetland vegetation with silt. In addition, the overflow from the newly constructed runoff basin directly flows into the wetland associated with Site 2. The impact of the new runoff basin on the two reconstructed wetlands in AOC 57 is unknown. It may act to prevent silt from entering the wetland, but it may also concentrate nutrients resulting in additional eutrophication of the wetland.

**AOC 57 - Area 3**

Silt fence was removed from the upland/wetland interface, and placed at the top of the site for off-site disposal. The water level in the wetland area exceeded the levels of the previous visit in August. The wetland restoration remains successful exceeding the 75% wetland plant cover. Fall conditions prevailed with much of the above ground vegetation in seed, dying back or with leaves in fall color. No Phragmites was observed, but several clumps of purple loosestrife were observed and pulled from the ground. Soft rush, broad-leaved cattail, burr reed, cotton grass, tussock sedge, blue vervain, silky dogwood and alder dominated the wetland area. The upland area was well stabilized with no evidence of erosion on the slopes. Red maple and white pine wanderers had colonized the edges of the upland slopes. Ground cover on the upland slopes consisted of rabbit foot clover, cow and bull thistle with many other unidentified grasses and weeds. The conservation mix provided to stabilize the slope is being replaced by colonizing species. There was no loss of red maple and oak saplings planted on the upland.

The wetland team leader subsequently reported these conditions concerning the observed erosion and sedimentation onto AOC57 Area 2 to the USCAE Project Manager for corrective action.

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**APPENDIX B**

***Area of Contamination 57 (AOC) - Photo Log Areas 2 and 3- 2005***



AOC 57 Area 2: Bordering Vegetated Wetland at base of upland slope (July 14, 2005).



AOC 57 Area 2: Overview of Area 2 from top of restored upland slope (July 14, 2005).



APPENDIX B

Area of Contamination 57 (AOC) - Photo Log Areas 2 and 3 - 2005



AOC 57 Area 2: Stand of invasive common reed, *Phragmites*, prior to treatment (July 14, 2005).



AOC 57 Area 2: Close-up of vegetation in Bordering Vegetated Wetland (July 14, 2005).



**APPENDIX B**

***Area of Contamination 57 (AOC) - Photo Log Areas 2 and 3 - 2005***



AOC 57 Area 2: Erosion of upgradient stockpiled soils onto the restored upland as a result of the failed erosion control tube as observed by the Groundwater LTM Team (May 19, 2005).



AOC 57 Area 2: Immediate corrective action taken by the Groundwater LTM Team to block the undermining by filling with nearby rock (May 19, 2005).



**APPENDIX B**

***Area of Contamination 57 (AOC) - Photo Log Areas 2 and 3 - 2005***



AOC 57 Area 2: Site inspection of the failed erosion control measures at the top of Area 2 by the Restoration Advisory Board (May 23, 2005).



AOC 57 Area 2: Close-up showing the failed section of the erosion control tube and sedimentation from upgradient soil stockpiles (May 23, 2005).



**APPENDIX B**  
***Area of Contamination 57 (AOC) - Photo Log Areas 2 and 3 - 2005***



AOC 57 Area 2: Degraded upland area at top of restored slope immediately downgradient of the existing erosion control tube with the newly erected unvegetated berm by MassDevelopment in the background with the soil stockpiles in the far background.



AOC 57 Area 2: Close-up of newly constructed unvegetated berm installed parallel to the erosion control tube that only extended to the eastern edge of the site (July 14, 2005).



**APPENDIX B**

***Area of Contamination 57 (AOC) - Photo Log Areas 2 and 3 - 2005***



AOC 57 Area 2: Area immediately below the drainage channel established to protect the slope from erosion and armored with rip rap stone on the east side of the slope showing indications of erosion and sedimentation (July 14, 2005).



AOC 57 Area 2: Close-up of base of established drainage channel to protect upland slope and adjacent wetland from erosion and sedimentation showing indications of erosion and sedimentation (July 14, 2005).



APPENDIX B

*Area of Contamination 57 (AOC) - Photo Log Areas 2 and 3 - 2005*



AOC 57 Area 2: Observed eroded drainage channel pathway (left to right) from base of the established rip rap drainage channel resulting in observed siltation to the existing bordering vegetated



AOC 57 Area 2: Close-up of a finger scoop of wetland sediment showing the underlying hydric soil (darker color) covered by a layer of fine silt (lighter brown color) as a result of erosion from



**APPENDIX B**  
***Area of Contamination 57 (AOC) - Photo Log Areas 2 and 3 - 2005***



AOC 57 Area 2: Extension of the unvegetated berm installed parallel to the erosion control tube to well beyond the eastern edge of the site (November 1, 2005).



AOC 57 Area 2: Close-up of the newly installed erosion control tube (red & black stripes) to replace the degraded erosion control tube (orange & black stripes) (November 1, 2005).



**APPENDIX B**  
***Area of Contamination 57 (AOC) - Photo Log Areas 2 and 3 - 2005***



AOC 57 Area 2: Upgradient view of unvegetated berm after heavy rains (November 1, 2005).



AOC 57 Area 2: Revegetation of upland slope impacted by erosion and sedimentation.



**APPENDIX B**

***Area of Contamination 57 (AOC) - Photo Log Areas 2 and 3 - 2005***



AOC 57 Area 3: Overview of restored upland slope adjacent to Bordering Vegetated Wetland in the background (July 14, 2005).



AOC 57 Area 3: Restored upland slope vegetation and coverage (July 14, 2005).



**APPENDIX B**  
***Area of Contamination 57 (AOC) - Photo Log Areas 2 and 3 - 2005***



AOC 57 Area 3: Close-up of vegetation in Bordering Vegetated Wetland (July 14, 2005).



AOC 57 Area 3: Close-up of standing water in Bordering Vegetated Wetland (July 14, 2005).



**APPENDIX B**  
***Area of Contamination 57 (AOC) - Photo Log Areas 2 and 3 - 2004***



AOC 57 – Area 2: Restoration Work – Silt Fence Removal (July 2004)

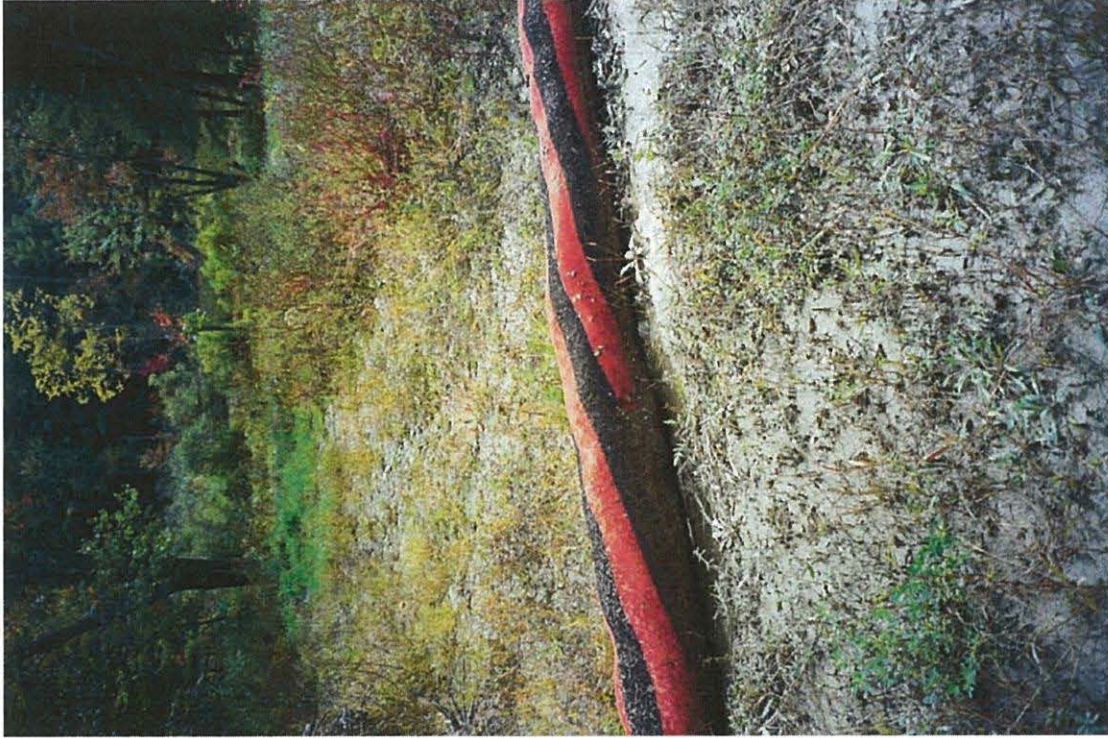


AOC 57 – Area 2: Edge of Wetland With Layer of Fine Silt (July 2004)



**APPENDIX B**

***Area of Contamination 57 (AOC) - Photo Log Areas 2 and 3 - 2004***



AOC 57 – Area 2: Silt Barrier/ Siltation (July 2004)



AOC 57 – Area 2: Siltation on Upland Slope (July 2004)



APPENDIX B  
*Area of Contamination 57 (AOC) - Photo Log Areas 2 and 3 - 2004*



AOC 57 – Area 3: Wetland Vegetation (July 2004)



AOC 57 – Area 3: Wetland Vegetation (July 2004)



**APPENDIX B**

***Area of Contamination 57 (AOC) - Photo Log Areas 2 and 3 - 2004***



**AOC 57 – Area 3: Restoration Work, Silt Fence Removal (July 2004)**



**AOC 57 – Area 3: Wetland Transition Area (July 2004)**



**APPENDIX B**

***Area of Contamination 57 (AOC) - Photo Log Areas 2 and 3 - 2004***



AOC 57 – Area 2: Silt Barrier/ Siltation on Upland Slope (July 2004)