Former Griffiss Air Force Base
Basewide Wetlands
Management Plan

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List of Abbreviations and Acronyms

AFB	Air Force Base
AFRPA	Air Force Real Property Agency
AOI	Area of Interest
BGS	below ground surface
BWMP	Basewide Wetlands Management Plan
C & D	construction and demolition
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CWA	Clean Water Act
DCE	dichloroethylene
DERP	Defense Environmental Restoration Program
DRMO	Defense Reutilization Marketing Office
E & E	Ecology and Environment, Inc.
EOD	Explosive Ordnance Disposal
EPA	United States Environmental Protection Agency
HWSA	hazardous waste storage area
MTBE	methyl tertiary butyl ether
µg/kg	micrograms per kilogram
NYSDEC	New York State Department of Environmental Conservation
PAH	polynuclear aromatic hydrocarbon
PCB	polychlorinated biphenyl
PCI 20	Panamerican Consultant, Inc., Site 20

List of Abbreviations and Acronyms (cont.)

SVOC	semivolatile organic compound
TCE	trichloroethylene
USACE	United States Army Corp of Engineers
UST	underground storage tank
VOC	volatile organic compound
WSA	weapons storage area

Executive Summary

A draft Basewide Wetland Management Plan (BWMP) for the former Griffiss Air Force Base (AFB) was submitted in March 2003. This updated BWMP provides the current status of wetland management at the former AFB following the completion of remediation and restoration activities at Three Mile Creek.

Remedial efforts at several sites at the former Griffiss AFB have resulted in impacts to on-base wetlands. Evaluations of remedial activities adjacent to wetland areas on base indicated that approximately 4.26 acres of wetlands have been temporarily impacted by remedial activities and an additional 0.82 acre had been impacted permanently. To meet the federally mandated "no net loss of wetlands" policy, mitigation was required to offset these wetland impacts. In coordination with the United States Army Corps of Engineers (USACE), and the New York State Department of Environmental Conservation (NYSDEC), mitigation to offset these wetland losses was completed within the Three Mile Creek floodplain in conjunction with remedial activities that were required within the creek channel and adjacent floodplain.

Mitigation within the Three Mile Creek floodplain was designed to take advantage of the existing wetland characteristics by removing historic spoil piles that impeded normal hydrology within the floodplain and to extend regular flooding to approximately the 460-foot contour line. Formal design activities were performed during the spring of 2003 and presented to the regulatory community for concurrence. The implementation of this plan was performed during remedial action activities at Three Mile Creek from July 2004 through September 2005. The mitigation efforts have resulted in restoration of approximately 5.49 acres of wetland within the Three Mile Creek floodplain, as well as secondary enhancement of adjacent acres within the floodplain due to increased hydrologic

connectivity and restoration of a more natural flooding regime. In addition, 0.21 acre of wetland has been reestablished in the vicinity of Landfill 2/3 and 0.79 acre has been created in the vicinity of Landfill 6. Therefore, a total of 6.49 acres of wetland were created by mitigation/restoration actions. Thus, the wetland losses that have occurred in conjunction with remedial activities at the former Griffiss AFB have been sufficiently offset by increasing wetland acreage and function in the area of the Three Mile Creek floodplain.

1 Objectives

Ecology and Environment, Inc. (E & E), under contract with the United States Army Corps of Engineers (USACE), Kansas City District, performed an analysis of potential wetland impacts at the former Griffiss Air Force Base (Griffiss AFB) in Rome, New York. Based on the results of this analysis, E & E developed a draft Basewide Wetlands Management Plan (BWMP) for the base in March 2003.

The objective of the draft BWMP was to assess both the status of wetlands at the former Griffiss AFB as well as the status of proposed remedial activities for the base. Based on the results of this assessment, a detailed mitigation plan was developed and implemented for the Three Mile Creek floodplain in 2003 and 2004. The goal of the mitigation effort was to create a forested floodplain wetland in the existing floodplain of Three Mile Creek. The wetland design utilized the existing landscape to the extent practicable to minimize the amount of earth-moving required during project implementation. The objective of this updated BWMP is to demonstrate that wetland losses that have occurred at the former Griffiss AFB in conjunction with remedial activities have been sufficiently offset by increasing wetland acreage and function in the area of the Three Mile Creek floodplain.

This BWMP summarizes past and potential future impacts on wetlands at the former Griffiss AFB resulting from remedial work pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). The BWMP also summarizes the framework used to implement wetland mitigation measures pursuant to Section 404 of the Clean Water Act (CWA) and Article 24 of the New York State Environmental Conservation Law (Freshwater Wetlands Program), which regulates the dis-

charge of fill to wetlands. Although remedial activities are not formally permitted, the Air Force Real Property Agency (AFRPA) must comply with the substantive requirements of the CWA for wetland impacts that have occurred, or will occur, as a result of activities undertaken pursuant to CERCLA as required by the United States Environmental Protection Agency (EPA) and New York State Department of Environmental Conservation (NYSDEC). The intent of the AFRPA in developing the BWMP was to consolidate mitigation requirements into a single remedial action. The development of a single, larger mitigation action is expected to have significantly more benefit than a series of smaller, isolated mitigation projects.

Presented within this plan are recent and future CERCLA-directed remedial actions in the vicinity of wetlands at the former Griffiss AFB and an estimate of actual and potential wetland impacts resulting from implementation of these remedial actions. With the completion of the remedial and restoration activities at Three Mile Creek, this BWMP also provides an assessment of wetland conditions during the Three Mile Creek floodplain post-remedial action and post-implementation of the mitigation plan.

This BWMP addresses CERCLA-related impacts not previously authorized under existing wetland permits. The mitigation framework was presented in the *Final Technical Memorandum No. 4* (E & E 2002a) and was based on an understanding of wetland impacts that is as complete and accurate as possible. Section 3 of this document provides the background information on wetland impacts used to develop the BWMP.

Section 4 presents the management actions and approvals that have taken place and their effect on the goals set forth by this BWMP. The resulting preferred mitigation actions in the Three Mile Creek floodplain are also presented as well as an evaluation of the contamination in Three Mile Creek and the Three Mile Creek floodplain. Issues regarding contamination levels were addressed before a final consensus was reached to implement the mitigation action in the Three Mile Creek floodplain. Section 4 also describes the restoration and mitigation activities and a summary of the status of Three Mile Creek one year after restoration. Section 5 presents a summary of the BWMP mitigation activities within the Three Mile Creek floodplain, and Section 6 presents report references.

2 Methodology for Evaluating Wetland Impacts

To evaluate wetlands impacts, a list of remedial action sites at the former Griffiss AFB that are in the vicinity of wetlands was developed in the project's work plan (E & E 2001a) and finalized by wetlands fieldwork (E & E 2001b). Additional wetland delineations were conducted by E & E in fall 2006 in proximity to specific sites where remedial actions had been undertaken since the issuance of the draft BWMP. In combination with the review of final remedial design documents, these additional delineations provided a description of wetland impacts due to basewide remedial actions, and the post-mitigation condition of Three Mile Creek and its surrounding wetlands.

Table 2-1 presents a summary of the remedial action sites that were evaluated for existing and future wetland impacts. The locations of the remedial action sites are included on Figure 2-1. A map of these sites and wetlands at the former Griffiss AFB is provided in Appendix A.

Development of requisite mitigation for the former Griffiss AFB was initiated following the evaluation of wetland areas and potential impacts of proposed remedial actions. Based on the designation of the Three Mile Creek floodplain as a wetland area, the floodplain was identified as an ideal location to implement a centralized mitigation program to offset the wetland losses that have occurred in other areas of the former Griffiss AFB. Specifically, the mitigation plan involved the reestablishment of more natural conditions within Three Mile Creek, the removal of historic spoil piles within the floodplain that impeded normal hydrology, and the expansion of the area that was flooded on a regu-

lar basis. In combination, these actions are expected to increase the functional value of the Three Mile Creek floodplain.

Table 2-1 Evaluation of Wetland Impacts at the Former Griffiss AFB, Rome, New York

Wetland Impact Areas Evaluated in Technical Memorandum No. 4
Landfill 1
Area of Interest 431 (bivouac dump area)
Hardfill 49B
Six Mile Creek
Explosive Ordnance Disposal Area
Area of Concern 9
Panamerican Consultants, Inc., Site 20
Building 817/Weapons Storage Area Groundwater
Landfill 7
Landfill 2/3
Pumphouse 5
Coal Storage Yard
Rainbow Creek
Building 35
Defense Reutilization Marketing Office
Three Mile Creek
Building 775/Landfill 6 Trichloroethylene Groundwater Plume
Landfill 5
Landfill 6
Hardfill 49D
Area of Interest 24
Electric Power Substation
Hardfill 49C

In order for this BWMP to be accepted, support and approval was needed from several agencies with contributing roles on this project, including NYSDEC, USACE, AFRPA, and EPA. Several meetings and site visits took place in 2001 and 2002 in order to gain consensus on the mitigation effort. In addition, supporting data was collected from Three Mile Creek and the floodplain area to provide information about any contaminants that may be of concern for wildlife that would inhabit the future wetland habitat (see Section 4 for data summary). Once this evaluation was completed, an agreement was reached by all agencies that the use of the Three Mile Creek floodplain for wetland mitigation was acceptable. This agreement led to the development of the former Griffis AFB draft BWMP.

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Figure 2-1
Remedial Action Sites at the Former Griffiss AFB

- Landfill Boundary
- Three Mile Creek Channel (October 19, 2006)
- Streams
- Base Boundary

LANDFILL 1
AOI 431 (Bivouac Dump Area)
HARDFILL 49A
EOD RANGE
SMALL ARMS RANGE
HARDFILL 49B
AOC 9
BUILDING 817/WSA GROUNDWATER
PCI 20
LANDFILL 7
LANDFILL 2/3
RAINBOW CREEK
DRMO
BUILDING 35
NOSEDOCKS/APRON 2 GROUNDWATER PLUME
PUMPHOUSE 5
ELECTRICAL POWER SUBSTATION
COAL STORAGE YARD
HARDFILL 49D
AOI 24
BUILDING 775/LANDFILL 6 TCE GROUNDWATER PLUME
SIX MILE CREEK
LANDFILL 5
THREE MILE CREEK
HARDFILL 49C
LANDFILL 6

N
0 0.25 0.5 1 Mile

Source-NYS GIS Clearinghouse Oneida County 30 cm Resolution Natural Color Orthoimagery

3 Areas of Wetland Impacts

3.1 Wetland Impact Areas

Landfill 1

Landfill 1 is a 19.5-acre, unlined refuse site located in the north-central part of the former Griffiss AFB (see Appendix A). Prior to remediation, the northeastern portion of the landfill was vegetated with grass and the remaining portions were forested with various evergreen and deciduous trees. Three portions of Landfill 1 (approximately 5.9 acres) were capped in the 1970s. These capping actions did not impact wetlands at the site. In 1998, debris and ash were excavated in an area adjacent to the Small Arms Range and placed in the low-lying south-central portion of Landfill 1 (USACE 1999). This action did not result in wetland impacts because the area that received the debris and ash was not in the vicinity of the wetlands located to the east and southwest of Landfill 1 (E & E 2001b).

Remedial actions that were completed in 2005 at Landfill 1 included consolidation of various waste areas; clearing, grubbing, and grading of the landfill; and construction of a new landfill cover (see Figure 3-1 for current topography). On the northeastern side of the landfill, cap construction required landfill consolidation. On the eastern side, ash and debris were removed from the wetland area. The cover installed in this area was pulled back away from the existing wetland area to minimize encroachment. Following the ash and debris removal, wetlands were to be restored as part of construction associated with the landfill capping activities (Conti 2005a). Based on a comparison of wetland delineations conducted before remediation of the landfill, changes to the edge of the wet-

land were evident, although minor in significance. For purposes of the BWMP, it was assumed that the approximately 0.2 acre of wetland was temporarily disturbed during remedial activities. On the western side of the landfill, cap construction required landfill consolidation away from Six Mile Creek because the edge of the landfill was within the 100-foot buffer zone of the wetland.

A leachate collection system was constructed along the landfill's western edge, outside of the rich sloping fen area identified during site visits conducted by NYSDEC in fall 2002. The collection line is part of a proposed leachate treatment facility that has not been built due to continued favorable groundwater quality analyses. The line is capped at both ends with no direct discharge into the adjacent Six Mile Creek.

The landfill cap and leachate collection system were designed to have minimal impacts on adjacent wetlands based on the results of the fall 2006 fieldwork. The impacts were limited to minor disturbances along the eastern edge of the landfill. No evidence of excess sedimentation was noted, indicating that best management practices were correctly installed and maintained during the course of the remedial work.

It should be noted that the remedial design for Landfill 1 was modified from the original design considered as part of the draft BWMP. As such, the leachate collection system was installed entirely outside the wetland and no permanent wetland impacts occurred. The draft BWMP assumed an impact of approximately 0.4 acre associated with remedial investigations. However, during the 2006 fieldwork, no permanent wetland impacts were evident along the eastern or western edges of the landfill.

Landfill 2/3

Landfill 2/3 is an approximately 13-acre area located in the east-central portion of the former Griffiss AFB. Landfill 2 was operated from 1973 to 1982, and Landfill 3 is an asbestos cell located in the eastern portion of Landfill 2. Both landfills are unlined (E & E 2000a). Engineering design drawings developed by the United States Air Force Strategic Air Command (USAF SAC 1983) depict the extent of the capping activities at Landfill 2/3. Although capping activities were limited to two cells, grading was required across much of the site to meet established grades. Surface debris from various on-base landfills, including Landfill 2, was collected and buried at Landfill 2 in 1998. A map de-

picting the limits of the debris consolidation shows that the project occurred within approximately 30 feet of the wetland located south of the landfill.

Based on existing conditions in the wetland located at the toe of the landfill slope, it is reasonable to assume that some minor disturbance occurred in the wetlands during previous remedial activities. The plant community at the toe of the slope is primarily emergent vegetation, whereas the remainder of the wetland is predominantly either scrub-shrub or forested. The presence of steep slopes and miscellaneous debris imbedded in the slopes indicate that impacts from previous remedial actions likely did not result in the permanent loss of any wetlands. Based on the extent of the emergent vegetation, it is likely that impacts were minimal, on the order of 0.1 acre or less. Short-term impacts would have consisted of vegetation removal and soil disturbance. The action also may have resulted in a positive wetland impact through the removal of contaminated material from the wetland.

Landfill 2/3 received cover improvements as part of the ongoing base closure activities at the former Griffiss AFB. Landfill 2/3 was selectively cleared and grubbed, the existing topsoil was stripped, the subgrade was prepared, and a cap consisting of fill and topsoil was installed in 2003 (Conti 2005b) (see Figure 3-2 for current topography).

Based on the closure plans developed by the remedial contractor, minimal work was performed in the wetland immediately adjacent to the southwestern boundary of Landfill 2/3 (Conti 2002a). However, based on the severity of the slope of the landfill leading into the adjacent wetland area, there may have been a temporary impact on the wetland. The design drawings show a silt fence installed within the inside edge of the wetland adjacent to the landfill. The extent of disturbance did not exceed the narrow linear edge of the wetland that was likely disturbed during prior consolidation efforts.

Based on an assumed average of 15 feet of encroachment into the wetland, approximately 0.1 acre of the wetland may have been temporarily disturbed as a result of the remedial action. This minimal impact would be classified as a minor discharge and would fall within the USACE-permitted acreages covered under Nationwide Permit No. 18. No permanent impacts were noted. Following this action, the wetland area was restored to pre-construction grade and allowed to restore naturally to previous conditions following completion of the remediation.

In addition to the primary capping action, an associated remedial effort also included the excavation by hand of a 10-foot by 10-foot by 1-foot deep area in the wetland located west of the landfill area. This effort included collection of five soil samples. The samples did not have elevated concentrations of contaminants. Therefore, no additional sampling was required. The excavation affected approximately 0.002 acre.

Following the remedial action, this area was restored to preexisting conditions by replacing the soil to grade with topsoil amended with peat to enhance the organic content. A mulch layer, consisting of the existing materials that were removed prior to excavation activities, was placed over the topsoil layer. Revegetation was accomplished through natural recruitment from adjacent areas.

In October 2006, E & E re-delineated the wetland boundaries associated with Landfill 2/3 (see Figure 3-2), to provide comparison to wetland edges previously delineated by E & E in 2001/2002. Remedial restoration measures were observed along the southwestern wetland boundary as evidenced by new rock rip-rap at the landfill toe-of-slope. The miscellaneous debris that was present during prior field visits had successfully been removed, cap material installed, and the surface revegetated. In addition, a newly established storm water runoff drain (rock-lined) was observed adjacent to the north side of the access road. This drain discharges to the previously mapped wetland located northwest of Landfill 2/3 (see Appendix D). Based on field observations, no adverse impacts were noted as a result of construction of this drain. As a result of remedial activities, a slight increase (0.21 acre) in wetland acreage has been realized as shown in Table 3-1. The consolidation of material and removal of construction debris from this southwestern portion of Landfill 2/3 is the likely reason for the expansion of the wetland area. Based on the 2006 field surveys, landfill capping activities were contained within the historic boundary of Landfill 2/3. As such, no wetland impacts were observed along the existing northeastern landfill boundary. Although a mapped NYSDEC wetland encroaches into the landfill footprint, field work in 2002 confirmed that the actual wetland boundary is east of the landfill.

It should be noted that the remedial design for Landfill 2/3 was modified from the original design considered as part of the draft BWMP. Based on the design considered, the draft BWMP assumed an impact of approximately 0.2 acre of impact associated with

remedial investigations. In fact, the remedial action resulted in an addition of 0.2 acre of wetland.

Landfill 5

Landfill 5 is an approximately 4-acre capped, unlined refuse site located in the vicinity of Three Mile Creek (see Appendix A). Final closure construction work was completed in 2002. The soil cover was extremely shallow at the southern extent of the landfill, with wastes protruding from the ground surface. The southern portion of the landfill was constructed directly on the floodplain of Three Mile Creek. A drainage ditch located west of Landfill 5 empties into Three Mile Creek (USACE 1998; E & E 2000a). In 1998, surface debris was relocated from Landfill 5 to Landfill 2/3.

In 1997, E & E personnel observed extensive flooding in the vicinity of Landfill 5 and the portion of Three Mile Creek adjacent to the landfill, ostensibly caused by the presence of a beaver dam. The 1998 USACE document, *Landfill 5 and Drainage Ditch Remedial Action Scope of Work*, listed the breach of a beaver dam in Three Mile Creek as one of the tasks to be conducted during the remediation of Landfill 5 (USACE 1998). However, fieldwork conducted by E & E in autumn 2001 documented that there were no beaver dams in the creek (E & E 2001b) and there was no record of the beaver dam's removal (Wojnas 2001).

Historic activities that have occurred at Landfill 5 include clearing, grubbing, regrading, and covering with soil to reduce the amount of surface water infiltration at the site, thereby reducing source contamination from the site (USACE 1998). The remedial action resulted in some minimal wetland impacts, since the southeastern boundary of the landfill is adjacent to a wetland. In addition, during the wetland fieldwork conducted in autumn 2001, E & E personnel observed metallic debris and concrete in the wetland, which was removed as part of the remedial action. An estimated 0.1 acre of wetland was permanently impacted by closure activities (Conti 2002b). This minimal wetland impact was classified as a minor discharge and fell within the USACE-permitted acreages covered under Nationwide Permit No. 18. The actual permanent fill was likely less than 0.1 acre, since portions of the wetland impacted, but not permanently filled, were restored to pre-construction conditions following completion of the remediation.

Because the wetland is immediately adjacent to the landfill boundary slope, silt fencing was placed in the wetland. Excess sediment was removed from the wetland prior to removal of the silt fence and the silt fence remained in place until vegetation growth on the cap effectively trapped sediment, precluding further sedimentation of the wetland. Despite impacts on the wetland at the southeastern toe of Landfill 5, the remedial action reduced the landfill contamination of the wetland. Therefore, this action has resulted in long-term benefits to surrounding wetlands and wildlife.

Electrical Power Substation

The electrical power substation is located in the south-central portion of the former Griffiss AFB, in the vicinity of Three Mile Creek (see Appendix A). The substation relays power to facilities at the base. In the past, the station housed transformers that contained polychlorinated biphenyls (PCBs). Some of the transformers leaked, contaminating soil in the vicinity of the site (AFBCA 2001, International Technology Corporation 2000). Following a rupture of Transformer No. 1 in 1987, an area inside the station's fenced enclosure and east of the site's fenced boundary was excavated to depths ranging from 0.7 to 1.5 feet below ground surface (BGS) (AFBCA 2001).

Another remedial action was performed in 1998 and 1999 to remove additional contaminated soil at the electrical power substation. The remedial action entailed an excavation at the northern extent of the adjacent fork of Three Mile Creek (International Technology Corporation 2000). Wetland delineations (E & E 2001c) indicated that approximately 871 square feet (0.02 acre) of the creek channel was impacted as a result of the excavation. Although a silt fence was installed downstream of the limits of the excavation, the channel within the project limits was excavated and backfilled (International Technology Corporation 2000). Wetlands fieldwork performed in autumn 2001 indicated the presence of some aquatic and emergent vegetation within the portion of the stream that was remediated, although the similarities of pre- and post-remedial vegetation conditions are not known. It is assumed that no additional loss of wetland acreage (outside the actual channel excavation) occurred as a result of excavations at the electrical power substation site.

Explosive Ordnance Disposal

In the early 1970s, the Explosive Ordnance Disposal (EOD) site was known as the "rocket range." The approximately 6.2-acre site is located near the northeastern border of the former Griffiss AFB, in an area dominated by shrubby vegetation (E & E 2000b, E & E 2001b) (see Appendix A). The site contained a small-arms burn pit and an EOD demolition site characterized by craters and surrounded by a horseshoe-shaped berm. Two additional berms were present at the site and are likely to have been used for containment of fragments from larger detonations (E & E 2000b). The majority of the site consists of wetlands, with small watercourses and inundation present throughout the site (E & E 2001b). Historic conditions within this wetland indicate that a large beaver dam impounded a significant volume of water across the EOD site. While AFRPA initially proposed to fence off the site, the decision was made to clean up the site. However, to adequately complete this task, it was necessary to obtain approval to breach the beaver dam, which would create a minor disturbance within the wetland area. On September 8, 1997, the USACE New York District issued a letter to the AFRPA indicating that the proposed actions at the EOD facility could be accomplished under Nationwide Permit No. 38.

In 1998, unexploded ordnance and ordnance-related scrap removal activities were performed at the EOD site. The berms were leveled and the craters were excavated. The soil was searched with a magnetometer to detect ordnance-related waste in the berms and at the excavation locations. A sitewide survey resulted in the discovery and removal of further unexploded ordnance (E & E 2000b). It is estimated that approximately 1.0 acre was impacted by the remedial action. However, this impact was largely positive, since remediation included the removal of berms and unexploded ordnance. Any adverse impacts would have been short-term and minor and associated with the removal actions.

The AFRPA subsequently submitted a Compliance Certification and Report Form on August 28, 1998, indicating that the work had been completed in accordance with the terms and conditions of the permit and that any required mitigation had been completed in accordance with permit conditions. Fieldwork conducted in the fall of 2001 indicated that the EOD wetland boundaries presented in the 1995 *Final Environmental Impact Statement for Griffiss AFB* (USAF 1995) had not changed (E & E 2001b). However, it was noted that the beaver dam, which historically had flooded the area, had not been re-

built, resulting in the creation of a large palustrine scrub-shrub/emergent wetland. Based on the 2001 field surveys, the 1998 remedial action did not result in the permanent loss of wetland acreage. Conversely, because the remedial action removed berms and contamination, the action would likely result in a long-term net benefit to the wetlands, regardless of initial short-term impacts.

Hardfill 49B

Hardfill 49B is an approximately 2-acre site located in the northern portion of the former Griffiss AFB, east of Area of Interest (AOI) 431 (see Appendix A). Its southern boundary overlaps the limits of a wetland bordering an east-west flowing tributary of Six Mile Creek. The northern extent of Hardfill 49B was previously used as a sand-and-gravel borrow area. Refuse deposited in the remaining areas at Hardfill 49B included concrete, wood, and metallic debris (Parsons 1997; PEER 2001). Studies conducted in the 1990s indicated the presence of low levels of volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), petroleum hydrocarbons, and metals at Hardfill B (Parsons 1997; PEER 2001). Therefore, the site was covered with a soil cap in 1998. The site remedial action report stated that prior to installation of the cap, construction and demolition (C & D) debris was removed from the slope at the southern boundary of the hardfill. In addition, debris was removed from the adjacent wetland at the discretion of the on-site engineer (PEER 2001).

The AFRPA requested comment from regulatory agencies regarding the jurisdictional requirements of this action. According to the supporting documentation provided to NYSDEC and USACE for authorization of the removal action (AFBCA 1997), silt fencing was installed along the entire length of the delineated wetland. The drawings indicated one location where the remedial actions overlapped with mapped wetlands. The request for permit was largely for approval for work within the 100-foot buffer zone of a state-protected wetland.

Based on a comparison of the extent of mapped wetlands adjacent to Hardfill 49B and the extent of Hardfill 49B, approximately 0.02 acre of wetland are estimated to have been impacted during previous remedial actions. Silt fencing was likely placed at or within the wetland area to minimize impacts. Temporary impacts would not have affected more than 0.1 acre.

Although some minor wetland impacts may have resulted from the previous remedial action at Hardfill 49B, it was completed under the authorization of the USACE and NYSDEC. Wetlands fieldwork conducted in the fall of 2001 indicated that the wetland boundary was unchanged from the USACE-verified wetland boundary presented in the *Final Environmental Impact Statement for Griffiss AFB Realignment* (USAF 1995). Therefore, the 1998 Hardfill 49B remedial action does not appear to have resulted in permanent loss of wetland acreage.

Hardfill 49C

Hardfill 49C is located in the south-central portion of the former Griffiss AFB, in the vicinity of Three Mile Creek (see Appendix A). Concrete, wood, brick, asphalt, and metallic debris were deposited at the site at an unknown time. Past studies of Hardfill 49C indicated the presence of VOCs, SVOCs, and metals at the site (PEER 2001).

In 1998, surface waste at Hardfill 49C was consolidated and the site was covered with soil (PEER 2001). Based on the engineering drawings developed for the removal action, all significant ground disturbances occurred outside the limits of the wetlands adjacent to the site. However, notes on the drawings indicated that, at the discretion of the on-site engineer, C & D debris should be removed from within the wetland limits. Any removal would likely have entailed equipment operating outside the wetland reaching into the wetland to collect miscellaneous debris. Even assuming some minimal disturbance of the wetland, impacts would likely have affected less than 0.1 acre, and the impacts would have been temporary. Removal of miscellaneous debris would be considered a positive impact on the wetland system. No obvious signs of wetland impact were noted during the fieldwork conducted in 2001. Therefore, no long-term impacts resulting from the removal action are evident.

Rainbow Creek

Rainbow Creek is adjacent to the Coal Storage Yard site, which is in the central portion of the former Griffiss AFB (see Appendix A). Contained entirely within the boundaries of the former Griffiss AFB, the creek is characterized as a drainage that flows into Six Mile Creek (E & E 1995). Approximately one-half of Rainbow Creek consists of a buried culvert. The unculverted portion of the creek is located in an industrial area. It

flows near the perimeter of the Coal Storage Yard site, eventually flows northeast past the Pumphouse 5 site, and then flows into Six Mile Creek. The junction of Rainbow Creek and Six Mile Creek is a buried culvert.

In 1997, a 1,900-foot length of Rainbow Creek was excavated from the surface to 1 foot BGS, resulting in the removal of 4,143 tons of sediment from the creek. The creek was then lined with geotextile fabric, which was then covered with crushed aggregate. Riprap was placed in the vicinity of culverts to control erosion. To minimize erosion and sedimentation during the remedial action, water was diverted from a portion of Rainbow Creek. Hay bales and erosion matting were placed elsewhere in the channel (International Technology Corporation 1998). However, impacts on the creek channel were inevitable as a result of the sediment removal. Using the creek width of 15 feet reported by International Technology Corporation (1998), E & E estimates that approximately 28,480 square feet (0.7 acre) of creek channel were impacted by the remedial action. Due to its location within a maintained industrial land-use area, it is expected that vegetation that existed prior to the remediation work was similar in nature to existing conditions.

Wetlands fieldwork performed in autumn 2001 indicated that vegetation had been reestablished in the creek channel; although, it is unknown whether current vegetation conditions are similar to pre-remediation conditions. Despite the presence of geotextile fabric and gravel in the creek channel, sufficient sedimentation has occurred in the creek to support vegetation growth. Fieldwork showed that the channel is vegetated with dense cattail, sedges, and rushes, as well as several other wetland herbs. Therefore, there has been no long-term loss of stream bottom or wetland. However, due to the incorporation of geotextile fabric and aggregate into the stream bottom, these impacts were considered permanent.

Landfill 6

Landfill 6 is an approximately 8-acre, unlined refuse dump located near Three Mile Creek and the southern boundary of the former Griffiss AFB (see Appendix A). In 1986, a clay cap was constructed over the areas containing fuel-contaminated soils. Remedial investigations conducted in the 1980s and 1990s indicated the presence of metals, phenols, SVOCs, VOCs, pesticides, PCBs, cyanide, petroleum hydrocarbons, and glycol (E & E 2005). The cap was installed on the portion of the landfill east of the access road

and resulted in no wetland impacts. An impermeable cover was installed at Landfill 6 in spring 2004 for the purpose of reducing surface water infiltration and contaminant migration (E & E 2001d). The remedial action did not result in appreciable wetland impacts because only a very small portion of the landfill boundary is adjoined by wetlands. Proper erosion and sedimentation controls eliminated indirect impacts caused by sediment releases to wetlands located down gradient of the landfill. It is estimated that 0.1 acre of wetland was temporarily impacted.

During the construction phase of the Three Mile Creek restoration, excavated sediments were placed in the northwestern portion of Landfill 6. The landfill was capped in 2005 (Conti 2004). Based on the 2006 wetland delineations, the remedial closure of Landfill 6 resulted in no permanent wetland impacts. The northwestern boundary of the landfill borders a portion of the southeastern NYSDEC wetland boundary, but does not encroach upon it (see Figure 3-3).

As part of the remediation activities at Landfill 6, a vernal pool complex was created between the two primary capped sections of the landfill (see Figure 3-3), with hydrology driven by runoff from the adjacent landfill. An intermittent overflow channel provides an outlet from the vernal pool complex and connects these pools hydrologically to the larger wetlands associated with Three Mile Creek. Vegetation observed within the vernal pool complex included: smartweed (*Polygonum amphibium*); redtop (*Agrostis alba*); barnyard grass (*Echinochloa crus-galli*); wildrye (*Elymus canadensis*); and switchgrass (*Panicum virgatum*) (see Appendix D). Based on as-built design drawings and E & E's 2006 field visit, the constructed vernal pools provide 0.79 acre of new wetland area.

Landfill 6 Trichloroethylene Groundwater Plume

The Landfill 6 trichloroethylene (TCE) groundwater plume is located in the southeastern portion of the former Griffiss AFB (see Appendix A). Waste material disposed of at Landfill 6 is presumed to be the source of this contamination (E & E 2005). The plume flows south toward Three Mile Creek. Studies indicate that the plume ends approximately 100 feet north of the creek (E & E 2000d) and there is no indication that the plume discharges into the creek.

The anticipated remedial action recommended in the final feasibility study was groundwater extraction, treatment, and disposal with in situ bioremediation (EEEPC 2006). The current proposed remedial action is in situ bioremediation of the plume followed by groundwater extraction and recirculation, if needed (AFRPA 2007). The injection program will be developed to minimize migration of the bioremediation substrate to Three Mile Creek. Impacts to wetlands adjacent to Three Mile Creek during full-scale implementation of this remedial action cannot be anticipated at this time. Options for disposal of treated wastewater include discharge to the creek or to the nearby sanitary sewer system. The discharge of treated wastewater to the creek could result in impacts to wetlands as trenching and piping would likely be used to transport the treated wastewater to the creek. Predesign investigations were performed in 2006 to better define the extent of the contaminant plume (EEEPC 2007). Investigations primarily included installation and sampling of new groundwater monitoring wells. Four wells were installed in the wetland just north of Three Mile Creek. Impacts to the wetlands associated with the well installations were minor at less than 0.1 acre.

If treated wastewater is discharged to the creek for full-scale implementation of the remedial action, wetlands will be impacted. At this point in the remedial process, it is not possible to reasonably estimate potential impacts. Therefore, a separate analysis of potential wetland impacts may be required at Landfill 6. It is assumed that remedial actions at this site would be beneficial to wetlands by reducing the potential input of contaminants to Three Mile Creek.

AOC 9 Groundwater

The AOC 9 site was used as a landfill between 1943 and 1960 (see Appendix A). Contaminants known to be present at AOC 9 include VOCs and metals. Previous site studies suggest that the potential source areas for these contaminants are the former weapons storage area (WSA) landfill and the former storage bunkers that were on site (E & E 2001e).

Because AOC 9 releases contaminants via groundwater into the drainage basin of Six Mile Creek, including the wetlands that border the creek, future remedial action is warranted. In situ chemical oxidation using Fenton's reagent was recommended as the preferred remedial action in the final feasibility study (E & E 2004a). However, addi-

tional studies are currently being performed at AOC 9 and full-scale remedial activities have not yet been determined. In 2006, predesign investigations were performed to better define the extent of the contaminant plume and source of the plume (EEEPC 2007). Investigations primarily included installation and sampling of new groundwater monitoring wells. One of the wells was installed in the wetland area south of Perimeter Road. Impacts to the wetlands associated with the well installation were minor at less than 0.1 acre.

At this point in the investigation of AOC 9, it is not possible to reasonably estimate potential wetland impacts. Therefore, a separate analysis of the potential wetland impacts may be required at AOC 9. It is assumed that the remedial actions at AOC 9 would be beneficial to wetlands by reducing the potential input of contaminants to Six Mile Creek.

Three Mile Creek

Three Mile Creek is a stream located in the south-central portion of Griffiss AFB. In its original condition, Three Mile Creek was a forested headwater drainage with a meandering channel (United States Engineer Office 1942, Department of the Air Force 1961). After construction of the base, the creek was straightened and deepened to accommodate storm water discharges (Law 1996). Excavation and straightening of the majority of the channel appears to have occurred during the 1940s as well as additional excavations and straightening in the early 1960s. Due to historic operations at the former Griffiss AFB, contamination from on-base storm water discharges resulted in significant levels of contamination within the sediments of Three Mile Creek. Additionally, contamination was noted in the spoil piles that were created during past flood control projects. Because of these contamination levels, it was determined that remediation would be required.

Prior to channel modifications, Three Mile Creek potentially overflowed into the adjacent floodplain on a regular basis. This premise of overflow into the adjacent floodplain led to the basis for the development of the BWMP. Based on an evaluation of existing conditions within the creek, it was determined that restoration and enhancement of historic/existing wetlands within the Three Mile Creek floodplain would provide the needed mitigation for the loss of wetland acreage at the former the Griffiss AFB. Reme-

dial actions in Three Mile Creek resulted in the temporary impact of 2.46 acres of wetland. Restoration and enhancement of historic/existing wetlands resulted in 5.49 acres of new wetland area. Further details and discussion of the remedial action and wetland impacts within Three Mile Creek are presented in Section 4.

Summary

Approximately 5.1 acres of wetland have been impacted to some degree as a result of past remedial actions or planned future remedial efforts at the former Griffiss AFB. The majority of the impacts realized on base have been temporary in nature and allowed to restore to wetland conditions following completion of the remedial activities Approximately 6.49 acres of new wetlands have been created at the former Griffiss AFB. Table 3-1 summarizes the estimated impacts outlined in Section 3.1.

Table 3-1 Summary of Wetland Impacts at the Former Griffiss Air Force Base

Site Name	Estimated Acreage of Temporary Wetland Impact	Estimated Acreage of Permanent Wetland Impact	Estimated Acreage of New Wetland
Landfill 1	0.2	0.0	0.0
Landfill 2/3	0.1	0.0	0.21
Landfill 5	0.0	0.1	0.0
Electric Power Substation	0.0	0.02	0.0
Explosive Ordnance Disposal (EOD)	1.0	0.0	0.0
Hardfill 49B	0.1	0.0	0.0
Hardfill 49C	0.1	0.0	0.0
Rainbow Creek	0.0	0.7	0.0
Landfill 6	0.1	0.0	0.79
Landfill 6 TCE GW Plume	<0.1 [a]	0.0 [a]	0.0 [a]
AOC 9	<0.1 [a]	0.0 [a]	0.0 [a]
Three Mile Creek	2.46	0.0	5.49
Total	4.26	0.82	6.49

[a] Impacts following future remedial activities cannot be assessed at this time.

3.2 Areas of No Wetland Impacts

In addition to the on-base areas described above, additional areas were evaluated in the *Final Technical Memorandum No. 4* (E & E 2002a) and further identified based on work completed in the interim since issuance of the draft BWMP. Areas determined to

have no associated wetlands impacts due to past or planned future remedial activities are described below.

Landfill 7

Landfill 7 is approximately 10.6 acres and is located in the east-central portion of the base, near the main runway (see Appendix A). In 1985, the landfill was capped with clay and topsoil and seeded with grass (E & E 2000a). This remedial action may have resulted in the loss of wetland acreage south of the landfill. However, the wetland was, and continues to be, frequently mowed to maintain the vegetation in a low-growing, herbaceous state that is necessary for navigational safety on the runway. Mowing practices are likely to have contributed to the changes in the wetland delineations conducted in the recent past (USAF 1995, E & E 2001b). The artificial wetland boundaries created by mowing complicate any understanding of past and present wetland boundaries.

Landfill 7 received cover improvements as part of the ongoing base closure activities at the former Griffiss AFB. Landfill 7 was cleared, the existing topsoil was stripped, the subgrade was prepared, and the landfill was recapped with fill and topsoil in the spring of 2002 (Conti 2003).

Based on previous delineations of the wetlands adjacent to Landfill 7, no direct impacts occurred as a result of closure activities. Because of ongoing maintenance activities within the active flightline, NYSDEC requested a review of the wetland delineations in the spring of 2003 prior to any additional remedial activities, since conditions during a fall 2002 field visit were not conducive to confirming wetland delineations. During E & E's fall 2006 site visit, the AFRPA reported that no activity has occurred at Landfill 7 since the completion of cover improvements. E & E's field review indicated no appreciable change in the wetland boundaries, but ongoing maintenance prevented a full delineation.

Six Mile Creek

Six Mile Creek is a natural stream that enters the former Griffiss AFB near the northern boundary of the property (see Appendix A). A water-control structure regulates water flow onto the base and diverts floodwaters through a canal to the Mohawk River.

After exiting the base at the southeastern boundary, the creek flows approximately 2 miles to the New York State Barge Canal (E & E 1997).

The portion of the stream that flows within the base has been extensively modified. The on-base portion of the creek consists of culverted, unculverted, channelized, and unchannelized segments. The creek appears to be largely unaltered near the base boundaries, but it is channelized and culverted elsewhere on the base property. Approximately 8,400 feet of the on-base portion of the creek is unculverted, and an additional 7,200-foot segment of the on-base creek is buried and culverted along the runway.

The on-base portion of Six Mile Creek serves as a surface runoff and storm water drainage system. Surface water runoff from Landfill 1, the runway, and the WSA are received by the creek (E & E 1997). Historically, leachate from Landfill 1 also drained into the creek (E & E 2001b) and its tributaries. Past investigations have detected polynuclear aromatic hydrocarbons (PAHs), pesticides, PCBs, metals, SVOCs, and VOCs in Six Mile Creek (E & E 1997).

Contamination in Six Mile Creek is attributed to activities at sites in the vicinity of the creek, such as Landfill 1 (E & E 2000c). Although the creek has not undergone direct remedial actions entailing wetland impacts, sites adjacent to the creek have been remediated in the past and/or will be remediated in the future. For the purposes of the BWMP, E & E has evaluated only the portions of Six Mile Creek adjacent to sites that have been, or will be, directly affected by remedial actions.

Hardfill 49D

Hardfill 49D is located in the south-central portion of the former Griffiss AFB, adjacent to Landfill 5 (see Appendix A). The approximately 2.2-acre hardfill was used informally for the disposal of landscaping debris and C & D waste at an unknown time (PEER 2001).

Past remedial studies of Hardfill 49D indicated the presence of VOCs, SVOCs, metals, and petroleum hydrocarbons. In 1998, a remedial action was undertaken to remove C & D debris from the majority of the site and consolidate the debris within a small area adjacent to Patrick Square. The contractor was instructed to remove debris from within the northern portion of the drainage swale. Access to the southern portion of the swale was prohibited. Prior to implementing the remedial action, AFRPA sought and ob-

tained approval for this action from the USACE under Nationwide Permit No. 38. This action also was permitted by NYSDEC as part of a larger remedial action. Wetland impacts caused by the remediation of Hardfill 49D were limited to the drainage ditch that runs through Hardfill 49D to Three Mile Creek. Removal of materials from the ditch may have resulted in minimal impacts such as incidental removal of vegetation and increased sedimentation in the ditch. No evidence of long-term wetland impact was noted during the autumn 2001 field surveys.

AOI 24

AOI 24 consists of two sites located northeast of Three Mile Creek in the south-central portion of the former Griffiss AFB (see Appendix A). Approximately 3,200 gallons of paint/diesel fuel mixture were reportedly dumped at AOI 24 during an unknown period of time, but this volume estimate is not likely to be highly accurate (E & E 1998a). Studies of the two areas showed the presence of lead and PAHs in the soil. However, the results of a screening-level risk assessment indicated that the site does not pose a significant risk to human health. Therefore, no remedial action or associated wetland impacts are believed to have occurred at this site (E & E 1998a).

Building 775 TCE Groundwater Plume

The Building 775 TCE groundwater plume is located in the southeastern portion of the former Griffiss AFB, northeast of the Landfill 6 plume (see Appendix A). Building 775 (also referred to as Pumphouse 3) provided fuel for aircraft. Use of the pumphouse was discontinued in 1988, and the building was demolished in 1995.

Subsequent investigations have indicated the presence of TCE in the groundwater at Building 775 (E & E 2000d). The TCE-containing groundwater plume flows south toward Three Mile Creek and is upgradient of the Landfill 6 plume. Therefore, the Landfill 6 plume would have more of an impact on Three Mile Creek. There are no wetlands in the vicinity of the Building 775 plume.

The anticipated remedial action at this site is groundwater extraction, treatment, and disposal (EEEPC 2006 and AFRPA 2007). Impacts to Three Mile Creek and wetlands adjacent to the creek during full-scale implementation of this remedial action cannot be anticipated at this time. Options for disposal of treated wastewater include dis-

charge to the creek or to the nearby sanitary sewer system. The discharge of treated wastewater to the creek could result in impacts to wetlands as trenching and piping would likely be used to transport the treated wastewater to the creek.

If treated wastewater is discharged to the creek for full-scale implementation of the remedial action, wetlands will be impacted. At this point the remedial process, it is not possible to reasonably estimate potential impacts. Therefore, a separate analysis of potential wetland impacts may be required as part of the overall analysis for Building 775. It is assumed that remedial actions at this site would be beneficial to wetlands by reducing the potential input of contaminants to Three Mile Creek.

Building 817/Weapons Storage Area Groundwater

The Building 817/Weapons Storage Area (WSA) groundwater site is located northeast of the runway, near the boundary of the former Griffiss AFB (see Appendix A). Although not confirmed, the potential source area for groundwater contamination has been identified as Building 817. Studies conducted in the 1990s indicated the presence of SVOCs, VOCs, PCBs, and metals at the site (E & E 1998a).

The plume associated with this source area has yet to reach the culverted portion of Six Mile Creek, but it is generally trending in that direction. Remedial actions planned for this site include in situ enhanced bioremediation with implementation of a contingency air sparge wall, if needed (EEEPC 2006 and AFRPA 2007). For the full-scale implementation of this technology, an injection program will be developed to minimize migration of the bioremediation substrate to the culverted section of Six Mile Creek. In 2006, predesign investigations were conducted to better define the source area for this site and establish field information for the injection program (EEEPC 2007). Investigations primarily included installation and sampling of new groundwater monitoring wells. None of these wells were installed in wetland areas east of the site, thus there was no impact. In addition, an initial injection was performed in an upgradient portion of the plume using a mixture of vegetable oil/lactate. Injection activities were located nearly 1,000 feet upgradient of the creek.

Based on the selected remedial action it is unlikely that future remediation would directly impact wetlands. Conversely, the action may prevent indirect wetland impacts by intercepting contaminated groundwater.

AOI 431 (Bivouac Dump Area)

AOI 431 (Bivouac Dump Area) is located in the northern portion of the former Griffiss AFB, southwest of Landfill 1 (see Appendix A). The bivouac dump is an approximately 3-acre suspected landfill site (E & E 2000e). The contents of the site are thought to be debris, gravel, and fill. Sampling and geophysical analysis of the site in 1995 did not identify any significant impacts (E & E 1996).

In 1998, a partially buried bucket was found at AOI 431. The bucket contained a tar-like substance. The bucket and all visibly contaminated soil were excavated, placed in two 55-gallon drums, and removed for disposal (E & E 2000e). No obvious evidence of this removal action was noted during E & E's autumn 2001 wetland fieldwork. Past remedial actions do not appear to have resulted in any wetland impact at AOI 431.

Defense Reutilization Marketing Office

The Defense Reutilization Marketing Office (DRMO) area is located in the south-central portion of the former Griffiss AFB, near Building 35 and the Coal Storage Yard (see Appendix A). The DRMO was used as a salvage/storage yard at an unknown time. It is also possible that unexploded ordnance was stored at the site. Past studies of the DRMO indicated the presence of PCBs, SVOCs, and metals (International Technology Corporation 1999).

In 1997, the DRMO area was excavated to the depth of the water table. A total of 5,318 tons of soil were removed from the area (International Technology Corporation 1999). This remedial action was conducted concurrently with the Rainbow Creek remedial action discussed previously. Based on the remedial design report, the removal actions were limited to within the identified boundaries of the DRMO area, and there were no impacts on the adjacent portion of Rainbow Creek.

Building 35

The former Building 35 (west of Rainbow Creek) was located in an area that was used for outside storage of drums and scrap material during the 1940s. During the 1960s and 1970s, unknown quantities of drums and transformers were stored in the area. The interior of Building 35 was used as a hazardous waste storage area (HWSA) in the 1980s

and 1990s. Materials stored there included aircraft maintenance waste and PCBs. At least two PCB spills are known to have occurred in the building, and soil testing indicated the presence of PCBs (OHM Remediation Services Corporation 2000).

In 1997, Building 35 was demolished and contaminated soil was removed and replaced with clean backfill material (International Technology Corporation 1998). Building 35 was not immediately adjacent to Rainbow Creek; therefore, any impacts on the creek resulting from the Building 35 remediation action would have been negligible.

Coal Storage Yard Area

The Coal Storage Yard Area is an approximately 3-acre site located in the central portion of the former Griffiss AFB, immediately adjacent to Rainbow Creek (see Appendix A). The site was used as a salvage yard from the 1940s to the 1980s. Disposal of transformers, storage of pesticides, and releases of chemicals directly onto the soil are reported to have occurred at the site during the years of salvage yard operation (E & E 1995). In the 1980s, the site was proposed as the location for a new coal storage yard. PCBs were found during routine soil sampling in 1988, prior to establishing the site as the new location for coal storage. Because of the contaminant levels, the coal storage pad was never established at this location. Subsequent tests found metals, VOCs, scrap metal, buried containers, and additional PCBs (E & E 1995).

In 1997, the Coal Storage Yard Area was remediated by removing contaminated soils and replacing them with clean fill (International Technology Corporation 1998). The remedial action occurred in proximity to Rainbow Creek and measures were taken to minimize the impacts on Rainbow Creek. Erosion and sedimentation controls included installation of silt fencing, geotextile matting, and hay bales, and mulching and seeding. Remediation of the Coal Storage Yard Area occurred concurrently with the remedial actions at Rainbow Creek, which were discussed above.

Panamerican Consultants, Inc., Site 20

Panamerican Consultants, Inc., Site 20 (PCI 20) is a historical dump located along a wooded bank of the Mohawk River on the western boundary of the former Griffiss AFB (E & E 2000b) (see Appendix A). An investigation did not reveal any hazardous or potentially hazardous materials. Materials found during the study, which may date from the

late 19th century, included glass, ceramic, metal, rubber, plastic, leather, bone, shell, and coal. A mound of modern asphalt rubble was also found at the site. Although the investigation indicated that PCI 20 had the potential to be archaeologically sensitive, it was not recommended as eligible for inclusion on the National Register of Historic Places (E & E 2000b).

E & E inspected PCI 20 in May 1999 and confirmed the presence of a small amount of surface debris and a mound of asphalt rubble. No evidence of a release to the environment was observed (E & E 2000e). After soil samples were collected, surface debris was removed from the site. No excavations or other remedial actions performed at the site resulted in releases of sediment or other material to the Mohawk River; therefore, there have been no impacts on the river as a result of the remedial actions.

To verify that the debris removal performed at PCI 20 reduced lead contamination found in the soil samples taken prior to the removal, additional soil sampling may be conducted at the PCI 20 site. It is expected that the site will be recommended for no further study as a result of the soil analysis. However, if lead is found to be present in the soil at unacceptable levels, further debris removal may be necessary. It is unlikely that discharge to Mohawk River would occur as a result of future remedial actions at PCI 20, because only a small amount of debris remains at the site, and any necessary remedial action would thus be limited in scope.

Pumphouse 5

The Pumphouse 5 site is located in the southern portion of the former Griffiss AFB at the edge of an aircraft apron and immediately adjacent to Rainbow Creek (see Appendix A). The pumphouse was constructed in the 1950s and served as a fuel storage and transfer station for aircraft refueling operations until 1993. The pumphouse and five associated underground storage tanks (USTs) were removed in 1997. Records indicate that fuel spills occurred during operation of the pumphouse. At the time of the UST removals, 17,000 cubic yards of contaminated soil were excavated and removed from the tank areas (PEER 1999).

In the late 1990s, investigations indicated that the Pumphouse 5 site required remediation primarily for soil, groundwater, and surface water contaminated by VOCs and naphthalene (PEER 1999). An interim remedial action consisting of the excavation

and treatment of contaminated soil has been completed at the site. Contaminated soil was excavated from the site and transported to a nearby land farm for treatment (PEER 1999). Remedial actions were completed in 2000.

Although the Pumphouse 5 site is not in the vicinity of wetlands, it is immediately adjacent to Rainbow Creek, which is a tributary of Six Mile Creek and the New York State Barge Canal. As such, impacts on the creek would be regulated in a manner that is similar to the regulation of impacts on wetlands. The Pumphouse 5 remedial action entailed excavation adjacent to Rainbow Creek (PEER 1999). Although the remedial action work plan stated that the eastern edge of Rainbow Creek would be protected from impacts resulting from the remedial action (PEER 1999), fieldwork conducted by E & E in fall 2001 documented a minimal discharge of fill to Rainbow Creek, due to a collapsed silt fence. Direct impacts occurred from both the placement of fill material (soil and gravel) in the creek bed and the migration of sediments from the work site into the creek. No significant impact resulted, due to the typical low flow volumes in the creek. Remedial work for the inadvertent release of sediment was performed in the summer of 2003.

Nosedocks/Apron 2 Groundwater Plume

The Nosedocks/Apron 2 site is located in the southeastern portion of the former Griffiss AFB. Investigations at the site have indicated the presence of groundwater impacted by methyl tertiary butyl ether (MTBE), TCE, dichloroethylene (DCE), and vinyl chloride that is migrating towards Six Mile Creek. Of these contaminants, MTBE and vinyl chloride are believed to have the greatest potential to impact the creek. A horizontal air sparge barrier was installed in 2006 as part of remedial actions for MTBE impacted groundwater (FPM 2006). It is believed that all construction activities occurred outside wetland boundaries. The selected remedial approach for this site is monitored natural attenuation, including groundwater and surface water monitoring (AFRPA 2007). A contingency alternative, such as a horizontal air sparging barrier may be implemented, if needed. A separate analysis of potential wetland impacts may be required if any future remedial actions are identified as potentially impacting Six Mile Creek.

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Figure 3-1
Verified Wetland Boundaries and Existing Topography Landfill 1

- 5 Foot Contour Interval
- 1 Foot Contour Interval
- Landfill Boundary
- Fall 2006 Verified Wetland Boundary
- Verified Leachate Collection Line (2006)
- NYSDEC Wetlands
- 2001/2002 Wetlands
- Base Boundary

LANDFILL 1

LEACHATE COLLECTION LINE

SMALL ARMS RANGE

SIX N

N

0 125 250 375 500 Feet

Source-NYS GIS Clearinghouse Oneida County 30 cm Resolution Natural Color Orthoimagery

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Figure 3-2
Verified Wetland Boundaries
Landfill 2/3

- 5 Foot Contour Interval
- 1 Foot Contour Interval
- Landfill Boundary
- Fall 2006 Verified Wetland Boundary
- New Drainage (Verified 2006)
- NYSDEC Wetlands
- 2001/2002 Wetlands
- Newly Created Wetland Area
- Base Boundary

LANDFILL 7

LANDFILL 2/3

NEWLY CREATED WETLANDS

POTENTIAL WETLAND ENCROACHMENT AREA

N

0 125 250 500 Feet

Source-NYS GIS Clearinghouse Oneida County 30 cm Resolution Natural Color Orthoimagery

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Figure 3-3
Verified Wetland Boundaries
Landfill 6

- 5 Foot Contour Interval
- 1 Foot Contour Interval
- Landfill Boundary
- Fall 2006 Verified Wetland Boundary
- Hydraulic Connector
- New Drainage (Verified 2006)
- NYSDEC Wetlands
- 2001/2002 Wetlands
- Newly Created Wetland Area

LANDFILL 6

VERNAL POOL COMPLEX

REFORESTATION AREA

769

774

776

0 125 250 Feet

Source-NYS GIS Clearinghouse Oneida County 30 cm Resolution Natural Color Orthoimagery

4 Three Mile Creek Mitigation and Restoration

The following actions were implemented to assist in accomplishing the objective of the BWMP:

- Production of technical memoranda outlining wetland impacts that have occurred on the base;
- Site visits to the base with regulatory agencies including NYSDEC to confirm and agree upon all wetland boundaries that were delineated in advance of mitigation design; and
- Approvals from state and federal agencies for the use of impacted wetland areas for mitigation in accordance with improvement of the wetland function.

Based upon the results of the wetlands impact analysis that was performed in the *Final Technical Memorandum No. 4 (E & E 2002a)*, a value was determined for the loss of wetland acreage at the former Griffiss AFB and mitigation alternatives were evaluated. One of the proposed alternatives was utilization of the Three Mile Creek floodplain as a centralized mitigation area. Once this option was deemed viable, an effort was undertaken to determine the actions that would be needed for mitigation to occur, as presented in Section 2, Methodology. Three Mile Creek was determined to be an ideal location for mitigation since the floodplain is 1) located on a portion of the base that does not provide development opportunities, 2) sufficiently removed from the flight line such that bird airstrike hazards associated with restoration activities are limited, 3) already part of the on-base property, and 4) was a historic wetland area. The historic wetland characteristics of this area that made it a good candidate for mitigation efforts included organic peaty soils

ranging from less than 1 foot deep to several feet deep in the existing wetland areas and an existing seed base still present in the wetland soils.

The *Three Mile Creek Feasibility Study Report* (E & E 2002b), and other Three Mile Creek investigations discussed below, determined that the BWMP could be developed on the basis that successful mitigation in Three Mile Creek would be the platform of the plan to account for losses that had occurred in other on-base wetland areas, as presented in Section 3.1 (see Table 3-1). As indicated, the contaminant levels in Three Mile Creek were such that a remedial removal action was merited within the stream proper. The mitigation as part of the BWMP was implemented only following successful remediation of the stream and adjacent floodplain. Subsections 4.1 and 4.2 describe the pre-mitigation condition of Three Mile Creek and the conceptual design that was developed for the wetland mitigation. Section 4.3 describes the current status of Three Mile Creek as determined from E & E's October 2006 site visit.

4.1 Three Mile Creek: Pre-mitigation Condition

Three Mile Creek is located in the south-central portion of the Griffiss AFB. A review of historic aerial photographs and engineering design drawings indicates that the creek, in its original condition, was a forested headwater drainage with a meandering channel. Based on engineering drawings from the early 1940s, the Three Mile Creek floodplain was typical of headwater drainages. The upper portion of the headwater area had no defined drainage and was depicted as a thicket/swampy area. For reference purposes, this area was defined as the area immediately downstream of the drainage ditch from Hardfill 49D. On the historic engineering drawings, no actual creek channel is mapped for approximately the first 2,000 feet downstream of the upper headwaters. The drainage that eventually developed in the floodplain wetland is also depicted as a meandering channel, versus the straightened channel that resulted during basewide improvements in the 1940s and 1960s. Based on this depiction, the wetlands within the floodplain likely provided significant storm water retention, since no defined channels were available to quickly transport the water downstream.

Excavation and straightening of the majority of the channel appears to have occurred during the 1940s (United States Engineer Office 1942). A defined drainage ditch was constructed and dredged to better facilitate off-base flow. The development of sig-

nificant areas of impervious surface on base resulted in a need to better transport water off site to minimize the potential for flooding. The engineering plans called for excavations of several feet to create a channelized, straightened ditch to better carry storm water flow off site. Further impacting the existing conditions, a significant portion of the dredged material was sidecast along the banks of the excavated ditch, further restricting flow patterns. The rest of the channel was excavated and straightened in the early 1960s (Department of the Air Force 1961).

The creek is approximately 10,000 feet long, originates at two points of discharge for the base storm water collection system, and flows southeast to the New York State Barge Canal. The creek also receives surface water runoff and groundwater from the surrounding watershed, including Landfills 4, 5, and 6, Hardfills 49C and 49D, and the Electrical Power Substation (E & E 1997, 1998a, 1998b, 1999). Remedial studies conducted in the 1980s showed the presence of oil, grease, VOCs, and metals at Three Mile Creek. At that time, plans were made to clear and grub 22.0 acres of the floodplain and to remove 2,810 cubic yards of sediment from the creek channel (Griffiss AFB 1986). Handwritten notes accompanying military construction project data sheets state that the project was required under the Fiscal Year 1986 Defense Environmental Restoration Program (DERP) and would result in the removal of cadmium, lead, and zinc from the entire length of the creek. However, the project was not implemented (Wojnas 2001). A document review indicated that, with the exception of the electrical power substation excavation, no past remedial actions had occurred at Three Mile Creek prior to the recent actions completed in 2005.

A Three Mile Creek feasibility study (E & E 2002b) recommended dredging the entire 4,500-foot on-base portion of the Three Mile Creek channel (E & E 2000f), which would remove channel sediments containing PCBs, PAHs, VOCs, SVOCs, pesticides, metals, and dioxins/furans. The study also recommended dredging the drainage ditch in the vicinity of Landfill 5/Hardfill 49D. It was recognized that remedial action at Three Mile Creek would result in significant and unavoidable impacts on the creek (E & E 2000f). It was expected that removal of creek sediments would result in the loss of vegetation and habitat structure within the channel, the loss of invertebrates and small vertebrates inhabiting the channel during dewatering and excavation, and some downstream sediment releases following the remedial action. It was also expected that approximately

1.0 acre of creek bed and bank would be affected and that there would be unavoidable impacts on adjacent wetlands due to the proposed construction of two temporary access roads on the bank of the creek. However, impacts were significantly reduced during the course of the remedial action, as described in Section 4.2.

4.1.1 Three Mile Creek Sampling Efforts

Because Three Mile Creek and the adjacent floodplain provided an opportunity for wetland mitigation, a review of existing sampling and analytical data was undertaken to interpret pre-remediation contaminant levels in and adjacent to the creek, identify gaps in the existing data, and implement further data collection efforts that were compatible with the mitigation opportunities.

In-stream Sediment Sampling

Several investigations were performed to evaluate contaminants in the soil and sediment of the Three Mile Creek floodplain, the creek itself, and the adjacent landfills. This information was utilized to create a contaminant profile of the channel area and a clear picture of areas that needed remediation.

Samples collected from 26 sampling locations in spring 2001, were analyzed for pesticides, PCBs, PAHs, VOCs, dioxins, petroleum hydrocarbons, and metals. Detections were noted for all contaminant classes and the data provided a relatively clear understanding of the status of the Three Mile Creek channel. This information was utilized to create a contaminant profile of the channel area and a clear picture of areas that needed remediation. A complete description of the channel sediment sampling results was provided in the feasibility study (E & E 2002b, E & E 2002c). The feasibility study also outlined the areas of the Three Mile Creek channel requiring excavation.

Floodplain Sediment/Surface Water Sampling

During the 2001 sampling effort, four samples were collected along the floodplain. An additional 10 samples that had been collected near the upgradient extent of the floodplain during past investigations of AOI 24, Landfill 5, and Hardfills 49C and 49D, were evaluated. In general, concentrations of contaminants in these samples were an order of magnitude lower than what was measured in the sediment samples of the Three

Mile Creek channel. Low levels of PCBs (nondetect to less than 1 micrograms per kilogram [µg/kg]), total pesticides (nondetect to less than 100 µg/kg), VOCs (nondetect to less than 10 µg/kg), and PAHs (nondetect to less than 20 µg/kg) were found in the four floodplain samples collected close to the Three Mile Creek channel. Five of the 10 samples on the upgradient end of the floodplain had PAHs at levels greater than 1 µg/kg. These particular samples were not analyzed for VOCs, pesticides, or PCBs. It is important to note that the concentration of PAHs present on the floodplain was typical of what has been observed in other areas of Griffiss AFB. Based on a review of this data, it was determined that additional floodplain samples were needed to evaluate the design and management options that could be implemented in the floodplain area during creation of a mitigation wetland (E & E 2002d).

The rationale for the sampling design was based on a sampling grid laid out on the east and west sides of Three Mile Creek at approximately 400-foot grid intervals from the creek bank and covering all media that could potentially become flooded as part of a wetland mitigation project (see Figure 4-1). Sampling included both sediment and surface water sampling.

Results of the floodplain sediment sampling included exceedances of available NYSDEC sediment screening criteria for one SVOC (benz[a]anthracene), one PCB (Aroclor 1260), eight pesticides (4,4'-DDE, 4,4'-DDT, beta-BHC, dieldrin, endosulfan I, endosulfan II, gamma-chlordane, and heptachlor), and 11 metals (antimony, arsenic, cadmium, chromium, copper, iron, lead, manganese, mercury, nickel, and zinc). Results of the surface water sampling included exceedances of available NYSDEC surface water screening criteria for one SVOC (bis[2-ethylhexyl]phthalate); one PCB (Aroclor 1260); one pesticide (endosulfan sulfate); and four metals (aluminum, iron, lead, and thallium).

The total organic carbon content in these samples were elevated due to their characteristics as floodplain soils and the potential for toxicity or bioaccumulation is probably insignificant. Therefore, the results did not adversely impact the proposal to use the floodplain for wetland mitigation. Based on interpretation of this data, AFRPA determined that there was not an exposure risk in constructing a mitigation wetland on the Three Mile Creek floodplain. Both NYSDEC and the EPA concurred with this plan.

4.1.2 NYSDEC Design Concerns

Based on a site visit to Three Mile Creek conducted by personnel from E & E and NYSDEC on August 15, 2002, the following design concerns were considered in the Conceptual Design Report:

- The plan should not propose permanently flooding of significant areas, but provide for periodic flooding of the wetlands;
- Alterations to the stream channel should not result in a ponding condition within the stream (i.e., the use of a dam to raise water levels), which would result in increased water temperatures;
- Weirs or small check dams on wetland outlet tributaries could be used to allow slow release of ponded wetland water back to the stream channel;
- Alterations to the stream channel should incorporate features for improving fish habitat, such as a meandering channel, boulders or cobble for backfill, increased gradient, and riffle areas; and
- Stream bank vegetation must be restored in areas where removal or disturbance of the floodplain sediment has occurred.

4.2 Three Mile Creek Conceptual Mitigation Plan and Design

Past base activities altered the hydrology and vegetation of the Three Mile Creek floodplain, particularly dredging in the 1940s and 1960s, which altered the flow regime within the floodplain (see Section 4.1). As indicated by E & E's field surveys conducted prior to remediation, parts of the floodplain began to develop hydrological and vegetative features indicative of upland systems rather than wetlands. However, the Three Mile Creek floodplain in its pre-mitigation condition had a number of features that were favorable to wetland development, including well-developed hydric soils over much of the floodplain; a potential source of wetland seeds in the hydric soils; and a good source of hydrology with the connection to Three Mile Creek and potentially shallow groundwater within the floodplain.

4.2.1 Wetland Mitigation Concepts

Based on an understanding of the features of the Three Mile Creek floodplain, the extent of contamination in the creek, and the specific mitigation needs, a conceptual miti-

gation plan was developed with two alternatives for the design of mitigation activities. These included:

- Natural meanders, which would require less oversight and management and would promote a return of Three Mile Creek to its original state with less maintenance; and

- Weirs, which could be better for controlling water, but would require scheduled monitoring and maintenance to adjust water elevations and to remove silted-in areas.

While both options would encourage a return of hydric conditions to the floodplain area, it was determined that meanders would create a more natural system with minimum control of water levels. Therefore, the remediation was designed with natural meanders, which would be created by plugging certain portions of the channel to encourage flow into the wetland areas following natural topographic features of the floodplain and creating a more natural stream environment. Weirs, which would hold water back via mechanical controls and allow for the overflow to deposit in the floodplain, were not built.

4.2.2 Design Goals

Overall design goals included the restoration of a wetland hydrologic regime in the Three Mile Creek floodplain; the restoration of native floodplain communities; and the enhancement of aquatic and wildlife habitat through stream and wetland restoration.

Figure 4-2 provides a conceptual presentation of the extent of wetlands that were anticipated to be created through minimal efforts coordinated with the remedial removal action. Based on the pre-mitigation elevations within the floodplain, the goal of restoration activities was to re-establish regular flooding with a minimum of a two-week flooding event below the 460-foot contour line during the growing season. This roughly approximates the historic extent of flooding based on interpretations of existing soils maps, aerial photography, and field investigations. It was determined that restoring flooding to this elevation would not impact any areas outside of the historic floodplain, which was a critical consideration due to the development that has occurred in proximity to the creek.

Two measures to restore hydric conditions by raising base-flow elevations were incorporated into the remedial design for the floodplain. The first was the reestablish-

ment of the original contours of the floodplain to the extent possible. Since storm water conveyance is still a critical aspect of Three Mile Creek, complete reestablishment of contours (i.e., elimination of a channel in the upper bounds of the project area) was not considered viable. However, to provide better connectivity of the creek with the adjacent floodplain, the existing ditch would be partially filled following in stream remediation, which, in effect, would raise the level of the creek bottom to encourage overbank flow on a more regular basis. Prior to remediation and restoration, the floodplain flooded only during extreme events. By encouraging overbank flooding at a lower flood stage, the floodplain would provide storage over a greater range of flows. This would restore the more natural historic patterns of flooding, in which pulses of flow accompany precipitation events.

The second means to restore more natural hydric conditions would be through the elimination of the existing dredge disposal berms that run parallel to significant portions of the drainage ditch. The berms, which are remnants of the original excavations of the creek, restrict the flow from the ditch during high-flow periods, which further reduced the hydroperiods within the floodplain.

Another goal of the restoration activities was to increase the amount of time that the floodplain would be temporarily flooded, but not create conditions that would lead to extensive tree mortality. As shown on Figure 4-2, extending regular flooding to approximately the 460-foot contour line would reestablish approximately 10 acres of wetland in the floodplain, in addition to enhancing the existing hydrology within an additional 6 to 8 acres of wetlands. This would offset not only the expected impacts from the remediation of the creek, but also provide more than adequate offsets for wetland impacts elsewhere on the former base. These design goals demonstrated that more than sufficient opportunity existed for the AFRPA to address any required mitigation needs on site. In addition, the mitigation was completed concurrently with the remediation required within Three Mile Creek. It was also a goal of the mitigation effort to work in conjunction with the remediation effort to minimize impacts from construction equipment and removal/disturbance of material within the existing floodplain area.

4.2.3 Restoration Needs

The final design and extent of wetland restoration was appropriately sized to offset basewide wetland impacts at the former Griffiss AFB. Initial estimates developed for the draft BWMP indicated that approximately 5 acres of wetland impacts had occurred or would likely occur as a result of on-site remedial activities. This estimate has since been reduced based on the actual implementation of remedial activities at Landfills 1, 2/3, 6, as well as the remediation of Three Mile Creek. Based on the revised estimate of wetland impacts presented in Section 3, a net of approximately 4.5 acres of wetlands, which have been or will be impacted, require some offsetting mitigation. The majority of this impact is associated with the remediation of Three Mile Creek. As indicated previously, the restoration of Three Mile Creek and adjacent floodplain provided ample opportunity to offset basewide wetland impacts through enhancement and/or creation of the Three Mile Creek ecosystem. Furthermore, the broad-scale approach used to restore the Three Mile Creek floodplain provides additional wetland acreage that can be used to offset unexpected additional wetland impacts that may occur during any potential future remedial activities elsewhere on the former base.

4.2.4 Data Needs for Design Basis Report

A design-basis report for Three Mile Creek (E & E 2004b) was developed that further evaluated the design alternatives presented above and demonstrated the specifications for implementation of the mitigation in the floodplain area. In order to provide those specifications and design-basis engineering details, certain data elements were required. These included a hydrologic modeling exercise conducted prior to establishing the final flow elevations to verify that the alteration of stream flows and water levels in the floodplain would not have any adverse environmental impacts on surrounding communities or on-base facilities. This modeling was also needed to calculate the amount of water needed for flooding to occur in the wetland area and for the retention time required for the wetland species in the floodplain to reestablish and develop.

An extensive survey of the floodplain areas was performed to determine topography of the entire floodplain area in order to alleviate any errors in future design plans that would result in water levels being too low or too high for the mitigation to be successful.

In addition, a series of well points and stream gauges were installed in the floodplain and creek to assess seasonal groundwater and flow conditions in the floodplain. These allowed for better development of specific mitigation designs to ensure optimal restoration conditions. The data collected was used for development of the design basis report. The final design drawings are included in Appendix C.

4.3 Three Mile Creek Mitigation and Restoration Activities

Mitigation and restoration activities at Three Mile Creek began in July, 2004, and all construction activities were completed by September 2005. As designed, the project workspace was limited to the northeastern creek bank, with no construction impacts reported to the southwest bank, with the exception of a portion of the creek adjacent to the housing facility, which was used as a staging area for construction activities. Remedial actions involved the excavation of contaminated sediments within the channel to specific depths as defined in the design report. Following completion of the removal activities, the creek channel and adjacent floodplain were restored in accordance with the mitigation design.

Most locations within the Main Channel, North Channel, and Landfill 5 Tributary were excavated to a minimum depth of 4 feet before receiving backfill. Backfill was analyzed for chemical and geotechnical parameters to ensure that it was clean enough to be placed into the ground. Dams, pumps, and gabion baskets were used to divert the stream channel around excavation areas. To increase in-stream diversity, riffle-run complexes were constructed in the bottom half of Three Mile Creek.

During the course of construction, several changes were suggested that contributed to reducing the impacts on wetlands, while still achieving the project objectives. Specifically, by modifying construction traffic flow, and largely avoiding clearing of relatively undisturbed side slope hemlock forested wetland, the construction contractor was able to significantly reduce the impact to wetlands along the southern half of Three Mile Creek. Within this stretch of the creek, the contractor removed the adjacent spoil berms and then constructed access roads within this disturbed area. Although this resulted in an extension of the construction schedule, it ultimately resulted in less impact, which will allow for accelerated reestablishment of wetland conditions post construction. As a result of reducing the overall workspace, minor changes also were incorporated into the design

of stream meanders in the southern portion of the project area. To facilitate construction along the creek, without having to clear additional space within the largely undisturbed hemlock areas, the lengths of the stream meanders were shortened. The meanders still provide additional sinuosity within the floodplain. Post-construction final topographic contours of Three Mile Creek are shown in Appendix A.

Silt fence, straw bales and check dams were used to prevent erosion and sedimentation during construction. In some areas of the channel, erosion control matting was used to prevent the erosion of backfill before vegetation could be established. Clearing and grubbing of the site occurred in the disturbance area and were minimized to the extent practicable. A single temporary culverted crossing was constructed to provide adequate access across the creek for the duration of construction activities. Haul roads were constructed along the length of Three Mile Creek to facilitate equipment access as well as transfer excavated materials to either the staging area, or to Landfill 6 (the disposal site for most of the excavated sediment).

During restoration of the North Channel, a cobble outflow structure was constructed at the headwall, and cobble was placed from the base of the excavation to the final grade. Sand was used as backfill. During restoration of the Main Channel, sand was placed at the base of excavation and filled to the final grade. The side slopes of both channels were graded to a 2.5:1 slope and hydroseeded with a ryegrass mix. Meanders were created by diverting flow with gabion mattresses and baskets, fabric-covered gravel and sand, and cobbles. These materials served also to prevent erosion of the stream banks where the meanders turned. A single large meander was constructed immediately downstream of the existing steam pipe crossing, utilizing a large open area that historically had been impacted by beaver activity resulting a loss of tree species. Several smaller meanders were constructed downstream as indicated in the design drawings. At the southern base boundary, cobbles and boulders were used to construct three drop structures in the Main Channel (Cape 2006). The drop structures provide regulation of flow and water levels in the creek, while allowing fish passage.

Adjacent to creek, significant portions of the spoil berms were excavated and removed to provide greater connectivity within the floodplain. As with the excavated creek material, this berm material was disposed of at Landfill 6. As part of the removal activ-

ity, the floodplain was regarded to a more natural topography consistent with the undisturbed forest areas within the floodplain.

Following construction activities, the floodplain of Three Mile Creek and the surrounding disturbed areas were hydroseeded. Disturbed areas received nursery stock as a base layer. Adjacent to the Landfill 5 Tributary, disturbed areas received wildflower and wildlife seed mixes. A wetlands seed mix was used along the banks and meanders of the Main Channel, and trees and shrubs were planted at various locations to facilitate restoration of the floodplain. Portions of the floodplain along the Main Channel, not designated as wetlands, was seeded with upland wildlife seed mixes.

4.4 Current Status of Three Mile Creek

E & E conducted a qualitative investigation of the restored/enhanced Three Mile Creek complex on October 19, 2006. Survey objectives included:

- Mapping the restored channel centerline;
- Determining if the channel is functioning properly;
- Providing an analysis of the restoration effort;
- Verifying the newly created/enhanced wetland boundaries;
- Documenting the vegetative makeup of the construction impact areas; and
- Recommending additional mitigation measures required to meet the projects' stated goals, if needed.

4.4.1 Three Mile Creek Channel Restoration

Survey results are representative of the first growing season following construction activities. As such, it was expected that the results would be able to adequately assess whether Three Mile Creek and the adjacent floodplain were reasonably progressing toward stated goals and objectives. Appendix D contains photographs of the most recent observations.

During the course of E & E's investigation, the creek channel had a sustained flow of approximately 0.5 cubic foot per second, with approximately 3 to 12 inches of water present. The creek bed consisted of sand deposits with deep water zones (greater than 12 inches deep) noted in the larger created meander area located downstream of the steam-

pipe crossing. In addition, approximately seven riffle/pool complexes were also noted along the length of the channel.

As indicated above, deep water meanders were created downstream of the steam-pipe crossing creating a more natural alignment to the historic channelized creek bed. The relic channel was filled with excavated soils from the new meander, which provided an abundant seed source to this newly created wetland. In addition, gabion structures were installed at the creek bends to alleviate potential channel bank erosion.

Abundant riffle/pool complexes were observed along the length of the channel providing adequate oxygenation of the water column as it flows over the cobble structures. In addition, randomly spaced cobbles within the pool zone of this complex have created shelter spots for aquatic organisms.

Field surveys identified one area of severe bank erosion, located approximately 500 feet downstream of the steam-pipe crossing. The stream has a sharp meander bend at this location, and the eroding stream bank is located at a sharp bend within the tailrace section of a riffle structure. As the bank is comprised entirely of earthen material, and no dissipation structures (i.e., rock) were observed, the stream is significantly cutting into the bank, resulting in erosion and lack of bank stability. Based on field findings, a recommendation to armor this stream bank is being made to maintain bank integrity. The site should be fully assessed by an engineer to determine the adequate amount and placement of any rock material.

Overall, E & E found the restored Three Mile Creek channel to be functioning as designed with abundant riffle/pool complex zones, a meandering footprint, and a developing aquatic habitat. As with any natural stream channel, bank erosion is evident in a few isolated areas. Stabilization of this bank erosion with rock-armoring and live willow plantings is recommended. In addition, the smaller bank sloughing areas are not recommended for stabilizing since these areas may provide additional aquatic habitat diversity, provide nutrients to the water course, and may form the basis of a more stable bank side slope.

4.4.2 Three Mile Creek Wetland Restoration

Enhancement of the historic floodplain area was conducted simultaneously with the Three Mile Creek channel restoration between July 2004 and September 2005. The

project workspace was largely limited to the northeastern creek bank where channel dredge disposal berms were once placed.

The restored Three Mile Creek floodplain was walked and global positioning system points were obtained that verified wetland boundaries. In addition, a plant species list was developed to characterize the existing vegetative makeup and photographs were taken to document the restoration effort. Figure 4-3 presents E & E's 2001 verified wetland boundary. Figure 4-4 presents E & E's verified wetland boundary as identified on October 19, 2006.

The restored floodplain zone supports approximately 4.96 acres of newly created wetland habitat, which was found to support appropriate hydrophytic vegetation and hydrologic patterns. It appears that a more natural pattern of flooding, in which pulses of channel flow accompanying precipitation events, has returned to the Three Mile Creek floodplain, as evidenced by newly restored hydrologic patterns that included sediment deposition areas, drift lines, flow through channels, and saturated soils. Additionally, with the removal of the spoil berms in the southern portion of the project area, side slope seepage from adjacent hemlock wetland areas flows across the restored floodplain and adds hydrologic input, which will facilitate wetland reestablishment.

The vegetation observed along the restored floodplain included a dominance of hydrophytic plants with inclusions of non-hydrophytic species. Although cuttings of select woody shrubs were part of the restoration plan, the abundance and density of the herbaceous layer precluded the investigators from accurately documenting their success. Given that the surveys were completed at the end of the first growing season, herbaceous vegetation was overtopping much of the planted shrubby species. As the shrubs establish themselves within the floodplain, additional growth would be expected.

Dominant vegetation observed during the site survey included: common cattail (*Typha latifolia*); bulrush (*Scirpus* sp.); soft rush (*Juncus effusus*); reedcanary grass (*Phalaris arundinacea*); boneset (*Eupatorium perfoliatum*); blue vervain (*Verbena hastata*); switch grass (*Panicum virgatum*); redtop (*Agrostis alba*); smartweed (*Polygonum* sp.); and yellow nutsedge (*Cyperus esculentus*). In addition, black-eyed susan (*Rudbeckia hirta*), timothy (*Phleum pratense*), common mullein (*Verbascum thapsus*), big bluestem (*Andropogon gerardii*), and Queen Anne's lace (*Daucus carota*) dominated the upland restoration areas.

It should be noted that some *Phragmites*, an invasive plant was noted toward the northern end of both the Main Channel and the North Channel. This is not unexpected given the predominance of this species in these channels prior to restoration activities. A recommendation is made that AFRPA closely monitor these populations to take corrective actions as appropriate to prevent the spread of this species along the Main Channel.

A vernal pool complex was also created near the project's midpoint, in which an upland area dominated by sugar maple (*Acer saccharum*) was re-contoured to support four seasonally saturated zones. It was noted that during the course of construction activities, design was slightly modified in field. Because of existing hydrology, these areas were not fully graded, but rather remediation and restoration focused on the removal of woody material. This resulted in the development of a hummocky area, underlain by peaty subsoils, which will naturally encourage wetland restoration. However, open water that typically defines vernal pools will likely not develop; rather this area will develop as an emergent marsh, ultimately becoming a shrubby, then forested wetland area. Vegetation dominating this area included switchgrass and blue vervain.

Further observations within the surveyed area include the presence of deer and grouse utilizing the restoration site, as well as green frogs along the channel's edge. Scattered placement of cleared tree limbs and logs along the creek edge and within the restored floodplain zone provide additional habitat to aquatic and terrestrial species.

E & E found the restored Three Mile Creek floodplain to function as designed with newly restored wetland complexes, the beginnings of a diverse vegetative base with abundant hydrophytic plants, and significant wildlife usage. As the project site matures, it is anticipated that the surrounding forest will begin to encroach upon the restored floodplain, successfully reestablishing the area as a diverse forested habitat. Field observations are documented in the 2006 photo log (see Appendix D).

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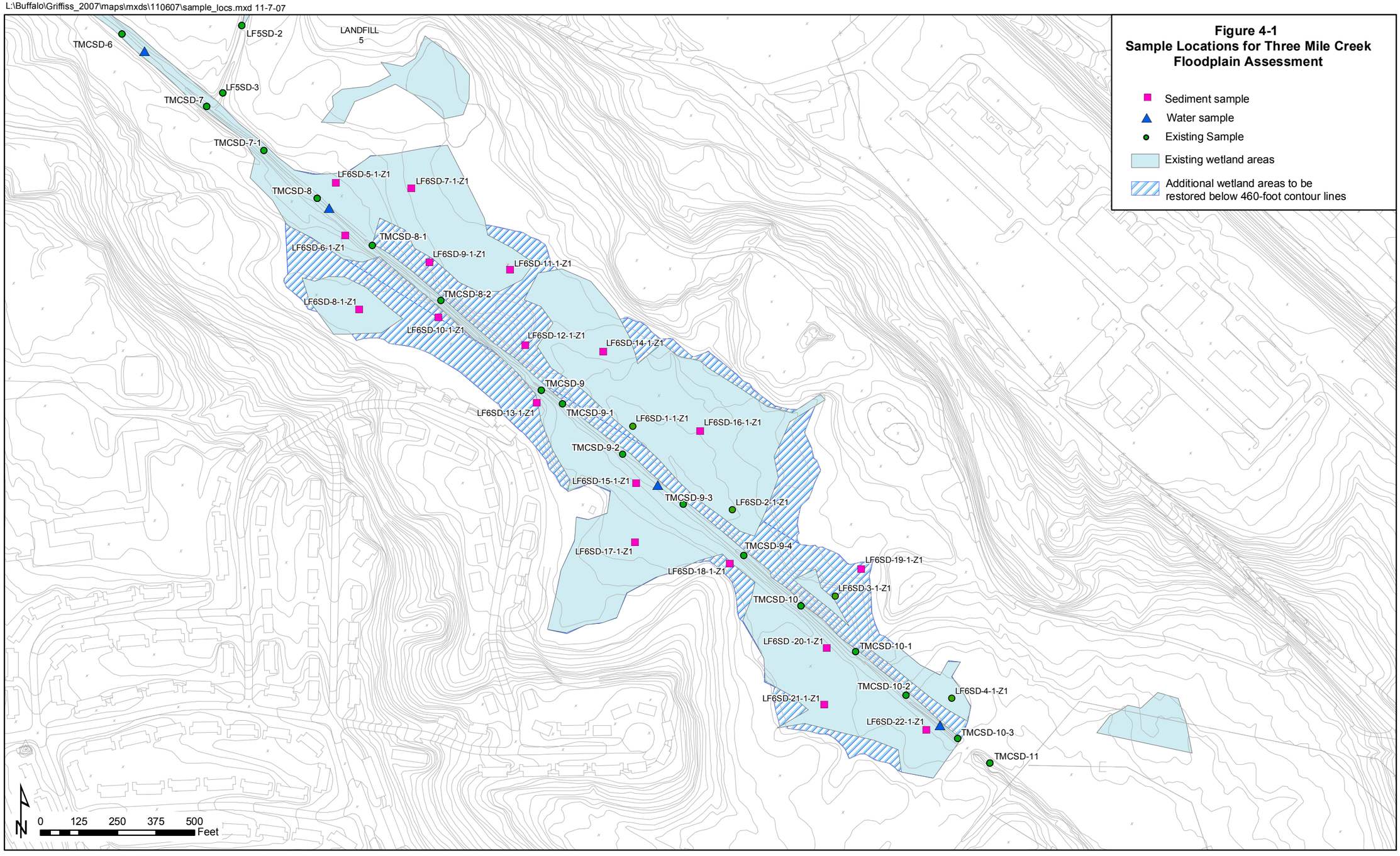
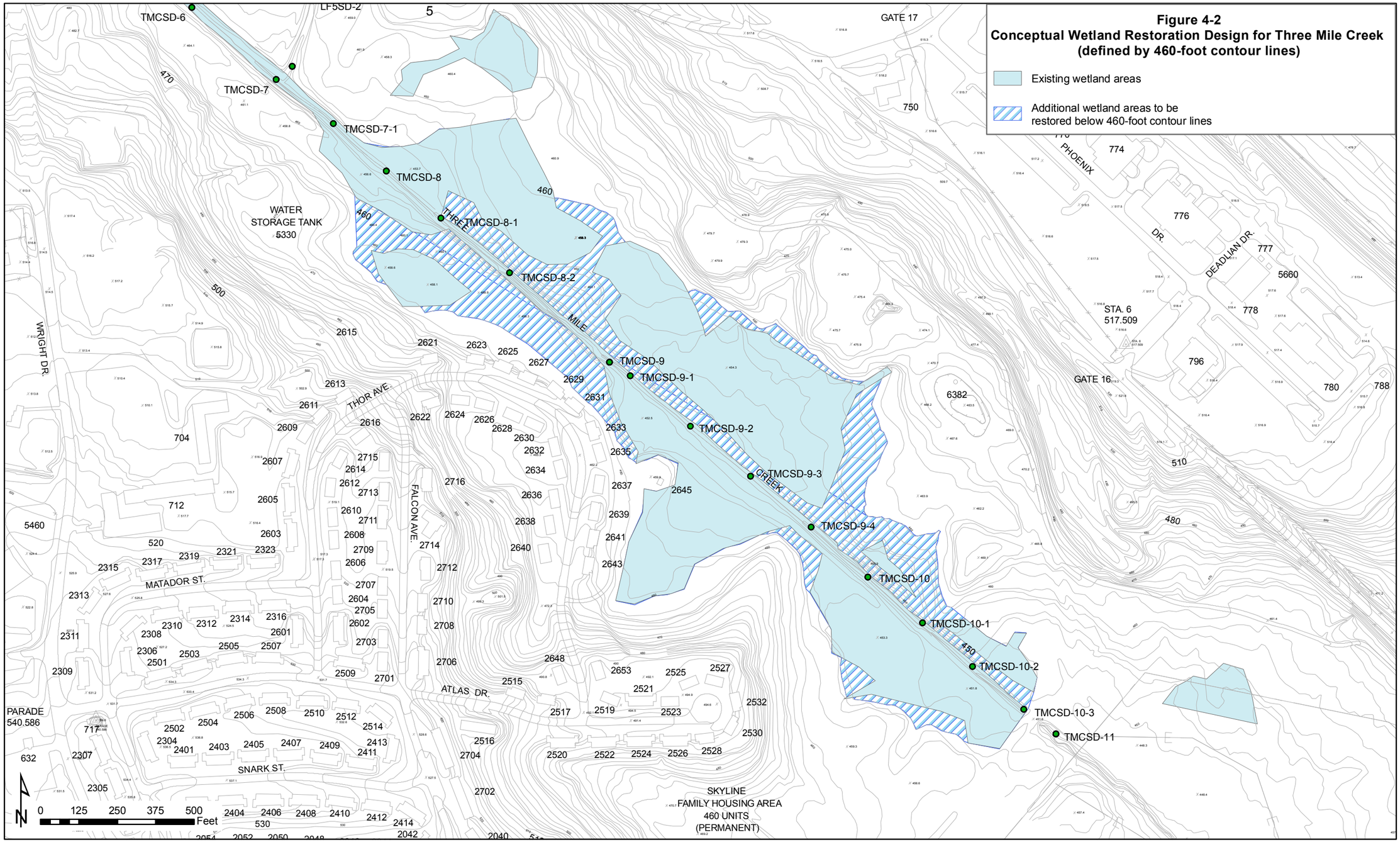


Figure 4-1
Sample Locations for Three Mile Creek Floodplain Assessment

- Sediment sample
- Water sample
- Existing Sample
- Existing wetland areas
- Additional wetland areas to be restored below 460-foot contour lines

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Figure 4-3
2001 Wetland Boundaries
Three Mile Creek

- 5 Foot Contour Interval
- 1 Foot Contour Interval
- Landfill Boundary
- Fall 2001 Wetland Delineation
- Historic Drainage Channel
- 2001 Wetlands
- Base Boundary

THREE MILE CREEK

LANDFILL 6

0 125 250 500 Feet

Source-NYS GIS Clearinghouse Oneida County 30 cm Resolution Natural Color Orthoimagery

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Figure 4-4
Restored Channel and Confirmed Wetland Boundaries
Three Mile Creek

- 5 Foot Contour Interval
- 1 Foot Contour Interval
- Landfill Boundary
- Fall 2006 Verified Wetland Boundary
- Hydraulic Connector
- Historic Drainage Channel
- New Drainage (Verified 2006)
- Restored Three Mile Creek Alignment (October 19, 2006)
- Riffle/Pool Complex (October 19, 2006)
- Vernal Pool Complex
- 2001 Wetlands
- Newly Created Wetland Area
- Base Boundary

THREE MILE CREEK

TYPICAL RIFFLE POOL COMPLEX LOCATION

NEWLY CREATED WETLANDS

VERNAL POOL COMPLEX

LANDFILL 6

PATRICK SD.

0 125 250 500 Feet

Source-NYS GIS Clearinghouse Oneida County 30 cm Resolution Natural Color Orthoimagery

5 Summary

The following is a summary of the BWMP and mitigation/restoration actions within the Three Mile Creek floodplain.

- Approximately 4.26 acres of temporary wetland impact and 0.82 acre of permanent wetland impact resulted from remedial actions at Griffiss AFB. The majority of this impact is associated with the remedial activities in and around the Three Mile Creek channel. The remaining impacts are small enough that under normal permitting circumstances they would be approved under Nationwide Permit 18 for minor discharges in wetlands.

- Approximately 6.49 acres of wetland were created by mitigation/restoration actions. Additional secondary enhancement of the Three Mile Creek floodplain will continue to be manifested due to increased hydrologic connectivity of the floodplain and restoration of a more natural flooding regime.

- Prior to mitigation/restoration, the vegetation communities within the Three Mile Creek floodplain were being encroached upon by species more adapted to upland, non-saturated conditions because of reductions in overbank flooding (from historic dredging). By restoring the historic flooding regime, wetland communities are naturally reestablishing themselves within the floodplain. The restored floodplain functions as designed with newly restored wetland complexes, the beginnings of a diverse vegetative base with abundant hydrophytic plants, and significant wildlife usage. As the project site matures, it is anticipated that the surrounding forest will begin to encroach upon the restored floodplain, successfully reestablishing the area as a diverse forested habitat.

- Restoration was accomplished through a combination of raising the base elevation of the creek bottom and removing dredge spoil piles that were sidecast during the original excavation of the creek. In addition, features included in the final mitigation/restoration plan developed for the Three Mile Creek

floodplain were natural meanders, riffle areas, and cobbles and boulders for backfill. The plan also called for the establishment of more regular flooding of at least a two-week duration below the 460-foot contour. The combination of these design elements are expected to reestablish more natural wetland conditions.

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A Basewide Wetlands Map

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Figure A-1
Verification of 2006 Wetland Boundaries at Former Griffiss Air Force Base
Rome, New York

- Fall 2001 Verified Wetland Boundary [c]
- Fall 2002 Verified Wetland Boundary [d]
- Fall 2006 Verified Wetland Boundary [e]
- Historic Drainage Channel
- Hydraulic Connector
- New Drainage (Verified 2006)
- Remedial Action Site
- Restored Three Mile Creek Alignment (October 19, 2006)
- Riffle/Pool Complex (October 19, 2006)
- Verified Leachate Collection Line (2006)
- Base Boundary
- NYSDEC Wetlands [a]
- Verified Wetland Area (October 19, 2006) [b]
- Vernal Pool Complex

List of Remedial Action Sites:

AOC 9
AOI 24
AOI 431 (Bivouac Dump Area)
Building 35
Building 775/Landfill 6 TCE Groundwater Plume
Coal Storage Yard
Electrical Power Substation Excavation
EOD
Hardfill 49A
Hardfill 49B
Hardfill 49C
Hardfill 49D
AOC 90 (Industrial Soil Pad)
Landfill 1
Landfill 2/3
Landfill 5
Landfill 6
Landfill 7
PCI 20
Pumphouse 5
Small Arms Range
Building 817/WSA Groundwater
Nosedocks/Apron 2 Groundwater Plume

Creeks (partial or entire remediation):
Rainbow Creek
Six Mile Creek
Three Mile Creek

0 250 500 1,000 Feet

Compiled from:

[a] New York State Department of Environmental Conservation, 1995, *Freshwater Wetlands Map for Oneida County as Originally Filed on August, 28, 1984 and Most Recently Amended on March 8, 1995, Coverage Completed on March 2, 1995*, New York State Department of Environmental Conservation Habitat Inventory Unit, Latham, New York.

[b] United States Air Force (USAF), 1995, *Final Environmental Impact Statement: Disposal and Reuse of Griffiss Air Force Base, New York*, Environmental Analysis Division, Brooks Air Force Base, Texas.

[c] Field work conducted in Fall of 2001.

[d] Field work conducted in Fall of 2002.

[e] Field work conducted in Fall of 2006.

LANDFILL 1
SMALL ARMS RANGE
AOI 431 (BIVOUAC DUMP AREA)
HARDFILL 49A
EOD
HARDFILL 49B
SIX MILE CREEK
AOC 9
BUILDING 817/WSA GROUNDWATER
PCI 20
LANDFILL 7
LANDFILL 2/3
RAINBOW CREEK
DRMO
BUILDING 35
NOSEDOCKS/ APRON 2 GROUNDWATER PLUME
ELECTRICAL POWER SUBSTATION
PUMPHOUSE 5
HARDFILL 49D
COAL STORAGE YARD
LANDFILL 5
BUILDING 775/LANDFILL 6 TCE GROUNDWATER PLUME
AOI 24
SIX MILE CREEK
HARDFILL 49C
LANDFILL 6
THREE MILE CREEK

Source-NYS GIS Clearinghouse Oneida County 30 cm Resolution Natural Color Orthoimagery

B Floodplain Sediment and Surface Water Sampling Results

Table 1a Screening Process for Organic Parameters for the 2002 Sediment Samples, Floodplain of Three Mile Creek, Former Griffiss Air Force Base, Rome, New York

Analyte	NYSDEC Guidance Values [1]			Most Stringent Ecological Screening Value [2]
	Benthic Aquatic Life		Bioaccumulation	
	Acute	Chronic	Wildlife	
TCL VOCs - 8260B (µg/kg)				
Acetone	-	-	-	NA
Methylene chloride	-	-	-	NA
Tetrachloroethene	-	-	-	NA
TCL SVOCs by Method 8270C (µg/kg)				
1,2-Dichlorobenzene	14400	1440	-	1440
1,4-Dichlorobenzene	14400	1440	-	1440
2-Methylnaphthalene	36480	4080	-	4080
Acenaphthene	-	16800	-	16800
Acenaphthylene	-	-	-	NA
Anthracene	118320	12840	-	12840
Benz(a)anthracene	11280	1440	-	1440
Benzo(a)pyrene	-	-	-	NA
Benzo(b)fluoranthene	-	-	-	NA
Benzo(g,h,i)perylene	-	-	-	NA
Benzo(k)fluoranthene	-	-	-	NA
Benzoic acid	-	-	-	NA
Bis(2-ethylhexyl)phthalate	-	23940	-	23940
Carbazole	-	-	-	NA
Chrysene	-	-	-	NA
Dibenz(a,h)anthracene	-	-	-	NA
Dibenzofuran	-	-	-	NA
Fluoranthene	-	122400	-	122400
Fluorene	8760	960	-	960
Indeno(1,2,3-cd)pyrene	-	-	-	NA
Naphthalene	30960	3600	-	3600
Phenanthrene	-	14400	-	14400
Pyrene	1053000	115320	-	115320
TCL PCBs - 8082 (µg/kg)				
Aroclor 1260	331296	2316	168	168
TCL Pesticides - 8081A (µg/kg)				
4,4´-DDD	132000	120	120	120
4,4´-DDE	132000	120	120	120
4,4´-DDT	132000	120	120	120
Aldrin	-	-	92.4	92.4
alpha-Chlordane	-	-	-	NA
beta-BHC	1512	7.2	180	7.2
Dieldrin	-	1080	92.4	92.4
Endosulfan I	93.6	3.6	-	3.6
Endosulfan II	93.6	3.6	-	3.6
Endosulfan sulfate	-	-	-	NA
Endrin	-	480	96	96
Endrin aldehyde	-	-	-	NA
Endrin ketone	-	-	-	NA
gamma-BHC	1512	7.2	180	7.2

Table 1a Screening Process for Organic Parameters for the 2002 Sediment Samples, Floodplain of Three Mile Creek, Former Griffiss Air Force Base, Rome, New York

Analyte	NYSDEC Guidance Values [1]			Most Stringent Ecological Screening Value [2]
	Benthic Aquatic Life		Bioaccumulation	
	Acute	Chronic	Wildlife	
gamma-Chlordane	168	3.6	0.72	0.72
Heptachlor epoxide	1572	12	3.6	3.6
Methoxychlor	-	72	-	72
Total 2,3,7,8-TCDD equivalent (ng/kg)				
TCDD equivalent	-	-	24	24
Total Recoverable Petroleum Hydrocarbons - 418.1M (mg/kg)				
TRPH	-	-	-	NA

[1] NYSDEC Technical Guidance for Screening Contaminated Sediments, January 1999. The screening criteria listed here were calculated using a 12% TOC.

[2] Final Screening Value represents most stringent criteria for ecological endpoints (it does not include the human bioaccumulation criteria or the site human health risk levels).

Key:

µg/kg	=	Micrograms per kilogram.
mg/kg	=	Millograms per kilogram.
ng/kg	=	Nanograms per kilogram.
NA	=	Not applicable since no criteria available.
NYSDEC	=	New York State Department of Environmental Conservation.
PCB	=	Polychlorinated biphenyls.
SVOC	=	Semivolatile organic compound.
TCL	=	Target Compound List.
TRPH	=	Total recoverable petroleum hydrocarbons.
VOC	=	Volatile organic compound.
-	=	Level has not been established.

Table 1b Screening Process for Inorganic Parameters for the 2002 Sediment Samples, Floodplain of Three Mile Creek, Former Griffiss Air Force Base, Rome, New York

NYSDEC Sediment Criteria for Inorganic Analytes [1]			
	Lowest Effect Level	Severe Effect Level	Final Screening Value
TAL Metals/Mercury by Method 6010B/7471A (mg/kg)			
Aluminum	-	-	-
Antimony	2	25	2
Arsenic	6	33	6
Barium	-	-	-
Beryllium	-	-	-
Cadmium	0.6	9	0.6
Calcium	-	-	-
Chromium	26	110	26
Cobalt	-	-	-
Copper	16	110	16
Iron	20000	40000	20000
Lead	31	110	31
Magnesium	-	-	-
Manganese	460	1100	460
Mercury	0.15	1.3	0.15
Nickel	16	50	16
Potassium	-	-	-
Selenium	-	-	-
Sodium	-	-	-
Thallium	-	-	-
Vanadium	-	-	-
Zinc	120	270	120
Hexavalent Chromium - 7196A (mg/kg)			
Chromium, Hexavalent	-	-	-
Cyanide, Total - 9012A (mg/kg)			
Cyanide	-	-	-

Key:

mg/kg = Milligrams per kilogram.
NYSDEC = New York State Department of Environmental Conservation.
TAL = Target Analyte List.
- = Level has not been established.

Table 2 Frequency of Detection and Exceedance of Criteria for Floodplain Sediment Samples, Three Mile Creek, Former Griffiss Air Force Base, Rome, New York

Analyte	Frequency of Detection	Minimum Detected Value	Maximum Detected Value	NYSDEC Sediment Screening Criteria	Frequency of Exceedance of Screening Criteria
TCL VOCs by Method 8260B (µg/kg)					
Acetone	1/19	11.3	11.3	NA	NA
Methylene chloride	1/19	1.63	1.63	NA	NA
Tetrachloroethene	3/19	2.42	22.8	NA	NA
TCL SVOCs by Method 8270C (µg/kg)					
1,2-Dichlorobenzene	4/19	37.5	264	1440	0
1,4-Dichlorobenzene	2/19	49.2	73	1440	0
2-Methylnaphthalene	3/19	65.2	387	4080	0
Acenaphthene	2/19	243	328	16800	0
Acenaphthylene	4/19	54.6	572	NA	NA
Anthracene	6/19	44.6	1150	12840	0
Benz(a)anthracene	12/19	47.6	6140	1440	2
Benzo(a)pyrene	12/19	61.5	5070	NA	NA
Benzo(b)fluoranthene	12/19	81.5	6180	NA	NA
Benzo(g,h,i)perylene	6/19	67.6	3210	NA	NA
Benzo(k)fluoranthene	13/19	86.3	5970	NA	NA
Benzoic acid	11/19	311	3430	NA	NA
Bis(2-ethylhexyl)phthalate	2/19	211	394	23940	0
Carbazole	3/19	77.9	566	NA	NA
Chrysene	15/19	35.7	6310	NA	NA
Dibenz(a,h)anthracene	3/19	89.6	775	NA	NA
Dibenzofuran	2/19	179	325	NA	NA
Fluoranthene	17/19	61.6	6300	122400	0
Fluorene	4/19	44.6	488	960	0
Indeno(1,2,3-cd)pyrene	5/19	50.3	1810	NA	NA
Naphthalene	3/19	48.6	370	3600	0
Phenanthrene	17/19	41.6	5590	14400	0
Pyrene	19/19	65.7	10700	115320	0
TCL PCBs by Method 8082 (µg/kg)					
Aroclor 1260	13/19	9.28	1220	168	4
TCL PCBs by Method 8082 (µg/kg)					
4,4´-DDD	8/19	0.883	70.8	120	0

Table 2 Frequency of Detection and Exceedance of Criteria for Floodplain Sediment Samples, Three Mile Creek, Former Griffiss Air Force Base, Rome, New York

Analyte	Frequency of Detection	Minimum Detected Value	Maximum Detected Value	NYSDEC Sediment Screening Criteria	Frequency of Exceedance of Screening Criteria
4,4´-DDE	10/19	0.685	771	120	2
4,4´-DDT	17/19	1.28	480	120	2
Aldrin	2/19	1.29	3.07	92.4	0
alpha-Chlordane	11/19	0.263	50.8	NA	NA
beta-BHC [1]	4/19	1.81	8.02	7.2	1
Dieldrin	5/19	4.21	1030	92.4	1
Endosulfan I	3/19	1.54	9.6	3.6	1
Endosulfan II	8/19	0.645	14.6	3.6	3
Endosulfan sulfate	12/19	1.39	52.1	NA	NA
Endrin	6/19	1.62	18.2	96	0
Endrin aldehyde	2/19	2.07	54.8	NA	NA
Endrin ketone	9/19	1.1	446	NA	NA
gamma-BHC [1]	2/19	0.923	5.58	7.2	0
gamma-Chlordane	8/19	0.5	50.3	0.72	7
Heptachlor	5/19	2.04	9.04	3.6	3
Methoxychlor	4/19	11	59.2	72	0
Total 2,3,7,8-TCDD equivalent (ng/kg)					
Total 2,3,7,8-TCDD equivalent	19/19	0.0007	0.21	24	0
TRPH by Method 418.1M (mg/kg)					
TRPH	14/19	110	849	NA	NA
TAL Metals/Mercury by Method 6010B/7471A (mg/kg)					
Aluminum	19/19	2220	16300	NA	NA
Antimony	14/19	0.921	18.8	2	13
Arsenic	17/19	2.64	93.6	6	9
Barium	19/19	15.2	331	NA	NA
Beryllium	6/19	0.612	3.52	NA	NA
Cadmium	11/19	1.03	31.6	0.6	11
Calcium	19/19	151	38300	NA	NA
Chromium	19/19	3.2	84.9	26	3
Cobalt	16/19	0.389	12.3	NA	NA
Copper	19/19	8.83	199	16	17
Iron	19/19	4960	39700	20000	3

Table 2 Frequency of Detection and Exceedance of Criteria for Floodplain Sediment Samples, Three Mile Creek, Former Griffiss Air Force Base, Rome, New York

Analyte	Frequency of Detection	Minimum Detected Value	Maximum Detected Value	NYSDEC Sediment Screening Criteria	Frequency of Exceedance of Screening Criteria
Lead	19/19	5.5	505	31	14
Magnesium	19/19	384	7360	NA	NA
Manganese	19/19	38.6	1300	460	8
Mercury	19/19	0.0116	1.12	0.15	14
Nickel	18/19	1.07	34.7	16	5
Potassium	19/19	126	1170	NA	NA
Selenium	5/19	2.62	5.73	NA	NA
Sodium	5/19	63	175	NA	NA
Thallium	4/19	2.02	4.06	NA	NA
Vanadium	19/19	3.08	72.7	NA	NA
Zinc	19/19	15.6	377	120	11
Hexavalent Chromium by Method 7196A (mg/kg)					
Chromium, Hexavalent	6/19	5.1	27	NA	NA
Total Cyanide by Method 9012A (mg/kg)					
Cyanide	9/19	0.734	1.43	NA	NA
Total Organic Carbon by Method Lloyd Kahn (mg/kg)					
Total Organic Carbon	19/19	1090	499000	NA	NA

Key:

µg/kg = Micrograms per kilogram.
mg/kg = Milligrams per kilogram.
ng/kg = Nanograms per kilogram.
NA = No criteria available.

Table 3 Summary of Positive Analytical Results for the 2002 Sediment Samples, Floodplain of Three Mile Creek, Former Griffiss Air Force Base, Rome, New York

Analyte	Screening Criteria	Sample ID: / Date:	LF6SD-5-1-Z1 07/17/02	LF6SD-6-1-Z1 07/16/02	LF6SD-7-1-Z1 07/17/02	LF6SD-7-1-Z1/D 07/17/02	LF6SD-8-1-Z1 07/17/02	LF6SD-9-1-Z1 07/17/02	LF6SD-10-1-Z1 07/16/02	LF6SD-11-1-Z1 07/17/02	LF6SD-12-1-Z1 07/17/02	LF6SD-13-1-Z1 07/16/02
TCL VOCs by Method 8260B (µg/kg)												
Acetone	NA		39.6 U	15.1 U	11.3 J	20.3 U	29.3 U	27.3 U	10.5 U	32.4 U	11.1 U	9.88 U
Methylene chloride	NA		19.8 U	7.57 U	11.0 U	10.1 U	14.6 U	13.6 U	5.27 U	16.2 U	5.55 U	4.94 U
Tetrachloroethene	NA		19.8 U	7.57 U	4.11 J	22.8 J	14.6 U	13.6 U	5.27 U	16.2 U	2.42 J	4.94 U
TCL SVOCs by Method 8270C (µg/kg)												
1,2-Dichlorobenzene	1440		1280 U	237 J	1410 U	1330 U	882 U	880 U	354 U	1070 U	338 U	297 U
1,4-Dichlorobenzene	1440		1280 U	1990 U	1410 U	1330 U	882 U	880 U	354 U	1070 U	338 U	297 U
2-Methylnaphthalene	4080		1280 U	387 J	1410 U	1330 U	882 U	880 U	354 U	1070 U	338 U	297 U
Acenaphthene	16800		1280 U	328 J	1410 U	1330 U	882 U	880 U	354 U	1070 U	338 U	297 U
Acenaphthylene	NA		1280 U	572 J	1410 U	1330 U	882 U	880 U	97.8 J	1070 U	338 U	297 U
Anthracene	12840		161 J	1150 J	1410 U	1330 U	882 U	880 U	123 J	1070 U	338 U	297 U
Benz(a)anthracene	1440		579 J	**6140**	284 J	1330 U	129 J	880 U	618	1070 U	47.6 J	297 U
Benzo(a)pyrene	NA		696 J	5070	1410 U	1330 U	101 J	93.9 J	544	1070 U	76.8 J	297 U
Benzo(b)fluoranthene	NA		770 J	6180	416 J	1330 U	145 J	880 U	731	1070 U	117 J	297 U
Benzo(g,h,i)perylene	NA		206 J	3210	1410 U	1330 U	882 U	880 U	261 J	1070 U	338 U	297 U
Benzo(k)fluoranthene	NA		989 J	5970	517 J	1330 U	882 U	130 J	736	1070 U	91.5 J	297 U
Benzoic acid	NA		3230 U	5010 U	3430 J	3400 J	718 J	772 J	891 U	635 J	2870	748 U
Bis(2-ethylhexyl)phthalate	23940		1280 U	394 J	1410 U	1330 U	211 J	880 U	354 U	1070 U	338 U	297 U
Carbazole	NA		1280 U	566 J	1410 U	1330 U	882 U	880 U	77.9 J	1070 U	338 U	297 U
Chrysene	NA		608 J	6310	285 J	1330 U	129 J	96.4 J	702	1070 U	77.8 J	35.7 J
Dibenz(a,h)anthracene	NA		1280 U	775 J	1410 U	1330 U	882 U	880 U	354 U	1070 U	338 U	297 U
Dibenzofuran	NA		1280 U	325 J	1410 U	1330 U	882 U	880 U	354 U	1070 U	338 U	297 U
Fluoranthene	122400		1220 J	6300	353 J	162 J	152 J	195 J	916	1070 U	121 J	61.6 J
Fluorene	960		1280 U	488 J	1410 U	1330 U	882 U	880 U	51.0 J	1070 U	338 U	297 U
Indeno(1,2,3-cd)pyrene	NA		1280 U	1810 J	1410 U	1330 U	882 U	880 U	123 J	1070 U	338 U	297 U
Naphthalene	3600		1280 U	370 J	1410 U	1330 U	882 U	880 U	354 U	1070 U	338 U	297 U
Phenanthrene	14400		752 J	5590	411 J	151 J	152 J	121 J	602	1070 U	73.2 J	41.6 J
Pyrene	115320		1160 J	10700	924 J	345 J	357 J	148 J	1470	166 J	117 J	85.6 J
TCL PCBs by Method 8082 (µg/kg)												
Aroclor 1260	168		**467 J**	**1220**	**249**	**200 J**	58.4 U	51.6 U	143	74.6	22.6	20.3 U
TCL Pesticides by Method 8081A (µg/kg)												
4,4´-DDD	120		2.52 J	70.8	62.8 U	29.8 U	43.8 U	2.55 J	123 U	9.24 U	3.19 U	19.5 J
4,4´-DDE	120		21.4	33.0 J	62.8 U	29.8 U	**132**	7.74 U	123 U	9.75	5.47	**771**
4,4´-DDT	120		17.7	**220**	50.2 J	62.8	39.2 J	24.8	34.7 J	25.2	4.26 U	**480**
Aldrin	92.4		16.1 U	61.2 U	83.7 U	39.7 U	58.4 U	10.3 U	164 U	3.07 J	4.26 U	162 U
alpha-Chlordane	NA		4.02 U	50.8	10.4 J	9.38 J	14.6 U	3.78	40.9 U	2.63 J	0.885 J	40.6 U
beta-BHC [1]	7.2		16.1 U	61.2 U	83.7 U	39.7 U	58.4 U	1.81 J	164 U	5.64 J	**8.02**	162 U
Dieldrin	92.4		20.1 U	45.3 J	105 U	49.6 U	73.0 U	12.9 U	**1030**	4.21 J	5.47	203 U

Table 3 Summary of Positive Analytical Results for the 2002 Sediment Samples, Floodplain of Three Mile Creek, Former Griffiss Air Force Base, Rome, New York

Analyte	Screening Criteria	Sample ID: Date:	LF6SD-5-1-Z1 07/17/02	LF6SD-6-1-Z1 07/16/02	LF6SD-7-1-Z1 07/17/02	LF6SD-7-1-Z1/D 07/17/02	LF6SD-8-1-Z1 07/17/02	LF6SD-9-1-Z1 07/17/02	LF6SD-10-1-Z1 07/16/02	LF6SD-11-1-Z1 07/17/02	LF6SD-12-1-Z1 07/17/02	LF6SD-13-1-Z1 07/16/02
Endosulfan I	3.6		20.1 U	76.5 U	105 U	49.6 U	73.0 U	1.54 J	205 U	15.4 U	5.32 U	203 U
Endosulfan II	3.6		12.1 U	45.9 U	**14.6 J**	**11.9 J**	43.8 U	7.74 U	123 U	**7.18 J**	3.19 U	122 U
Endosulfan sulfate	NA		5.90 J	91.9 U	37.5 J	52.1 J	87.6 U	24.2	245 U	15.5 J	8.38	244 U
Endrin	96		16.1 U	18.2 J	83.7 U	39.7 U	58.4 U	10.3 U	164 U	4.64 J	4.26 U	162 U
Endrin aldehyde	NA		40.2 U	54.8 J	209 U	99.2 U	146 U	25.8 U	409 U	30.8 U	10.6 U	406 U
Endrin ketone	NA		12.1 U	45.9 U	446	138	43.8 U	7.74 U	123 U	49.2	8.12	122 U
gamma-BHC [1]	7.2		8.04 U	30.6 U	5.58 J	19.8 U	29.2 U	5.16 U	81.8 U	6.16 U	0.923 J	81.2 U
gamma-Chlordane	0.72		**5.90 J**	**50.3**	41.8 U	19.8 U	**2.76 J**	5.16 U	81.8 U	**0.735 J**	**1.49 J**	81.2 U
Heptachlor	3.6		12.1 U	45.9 U	**9.04 J**	**3.88 J**	43.8 U	2.11 J	123 U	2.04 J	3.19 U	122 U
Methoxychlor	72		161 U	612 U	837 U	397 U	584 U	19.6 J	1640 U	123 U	42.6 U	1620 U
Total 2,3,7,8-TCDD equivalent (ng/kg)												
Total 2,3,7,8-TCDD equivalent	24		0.008	0.092	0.0207	0.0177	0.004	0.004	0.008	0.018	0.004	0.0007
TRPH by Method 418.1M (mg/kg)												
TRPH	NA		828 J	611 J	528 J	825 U	1190 U	1100 U	148 J	502 J	154 J	269 J
TAL Metals/Mercury by Method 6010B/7471A (mg/kg)												
Aluminum	NA		7200	14100	9500	10200	10100	16300	5610	5700	3040	4420
Antimony	2		**5.47**	**5.56 J**	**7.43 J**	**14.4**	**6.41**	**8.79 J**	4.06 U	**4.36**	0.921 J	**2.93 J**
Arsenic	6		**14.9**	**93.6**	22.7 U	5.90 J	5.14 J	34.2 U	**7.61 J**	5.22 J	2.80 J	2.64 J
Barium	NA		129	227	75.0	73.7	81.0	113	44.4	189	25.2	16.8
Beryllium	NA		0.981 J	3.52	4.55 U	5.15 U	1.03 J	6.85 U	2.03 U	1.53 U	0.565 U	2.28 U
Cadmium	0.6		**4.63 J**	**31.6**	18.2 U	20.6 U	**2.69 J**	27.4 U	**3.66 J**	**2.39 J**	2.26 U	9.14 U
Calcium	NA		25600	11600	6070	7250	11400	16800	1420	14400	1380	1260
Chromium	26		18.9	**84.9**	9.27 J	9.22 J	14.5	21.5 J	13.7	5.57 J	3.20	5.50 J
Cobalt	NA		3.97 J	12.3 J	18.2 U	20.6 U	1.58 J	9.08 J	3.51 J	2.14 J	1.19 J	3.08 J
Copper	16		**110**	**199**	**124**	**78.1**	**68.5**	**85.3**	**30.2**	**40.2**	**23.6**	**18.5**
Iron	20000		13500	**39700**	11600	10100	5710	**25400**	11400	5380	5430	11100
Lead	31		**112**	**505**	**118**	**54.7**	**71.0**	**50.2**	**45.7**	**32.9**	16.0	10.2
Magnesium	NA		3230	2660	433 J	404 J	646	7360	1670	412	782	2050
Manganese	460		**643**	455	289	227	**596**	**1100**	188	**493**	136	341
Mercury	0.15		**0.410**	**0.906**	**0.398**	**0.482**	**0.884**	**0.321**	0.125	**0.606**	0.0746	0.0116 J
Nickel	16		**16.1**	**34.7**	5.60 J	4.78 J	6.22 J	**17.7 J**	8.04 J	7.14	3.37	5.37 J
Potassium	NA		268 J	1070	139 J	126 J	291 J	1170 J	487	167 J	245	666
Selenium	NA		20.2 U	2.62 J	45.5 U	51.5 U	4.67 J	68.5 U	4.06 U	15.3 U	5.65 U	4.57 U
Sodium	NA		118 J	63.0 J	910 U	97.0 J	524 U	144 J	406 U	306 U	113 U	457 U
Thallium	NA		2.73 J	25.8 U	36.4 U	41.2 U	20.9 U	54.8 U	16.2 U	2.02 J	4.52 U	18.3 U
Vanadium	NA		54.5	72.7	17.0 J	11.5 J	18.3	20.7 J	12.7	18.5	9.46	4.85 J
Zinc	120		**263**	**377**	**145**	119	**165**	**245**	61.3	**238**	46.2	47.8

Table 3 Summary of Positive Analytical Results for the 2002 Sediment Samples, Floodplain of Three Mile Creek, Former Griffiss Air Force Base, Rome, New York

Analyte	Screening Criteria	Sample ID: / Date:	LF6SD-5-1-Z1 07/17/02	LF6SD-6-1-Z1 07/16/02	LF6SD-7-1-Z1 07/17/02	LF6SD-7-1-Z1/D 07/17/02	LF6SD-8-1-Z1 07/17/02	LF6SD-9-1-Z1 07/17/02	LF6SD-10-1-Z1 07/16/02	LF6SD-11-1-Z1 07/17/02	LF6SD-12-1-Z1 07/17/02	LF6SD-13-1-Z1 07/16/02
Hexavalent Chromium by Method 7196A (mg/kg)												
Chromium, Hexavalent	NA		17 U	5.1 J	8.5 J	8.2 U	15	11 U	4.3 U	7.0 J	4.5 U	4.2 U
Total Cyanide by Method 9012A (mg/kg)												
Cyanide	NA		2.10 U	0.790	1.04 J	1.15 J	1.33 U	0.805 J	0.533 U	0.857 J	0.554 U	0.516 U
Total Organic Carbon by Method Lloyd Kahn (mg/kg)												
Total Organic Carbon	NA		355000	216000	64500	368000	425000	201000	32400	499000	21600	5950

Table 3 Summary of Positive Analytical Results for the 2002 Sediment Samples, Floodplain of Three Mile Creek, Former Griffiss Air Force Base, Rome, New York

Analyte	Screening Criteria	Sample ID: Date:	LF6SD-14-1-Z1 07/17/02	LF6SD-15-1-Z1 07/16/02	LF6SD-16-1-Z1 07/16/02	LF6SD-17-1-Z1 07/16/02	LF6SD-18-1-Z1 07/16/02	LF6SD-19-1-Z1 07/16/02	LF6SD-20-1-Z1 07/16/02	LF6SD-21-1-Z1 07/16/02	LF6SD-22-1-Z1 07/16/02
TCL VOCs by Method 8260B (µg/kg)											
Acetone	NA		33.1 U	15.9 U	30.7 U	29.7 U	12.3 U	11.9 U	9.60 U	9.94 U	11.3 U
Methylene chloride	NA		16.5 U	1.63 J	15.4 U	14.9 U	6.13 U	5.97 U	4.80 U	4.97 U	5.66 U
Tetrachloroethene	NA		16.5 U	7.95 U	15.4 U	14.9 U	6.13 U	5.97 U	4.80 U	4.97 U	5.66 U
TCL SVOCs by Method 8270C (µg/kg)											
1,2-Dichlorobenzene	1440		998 U	264 J	1030 U	976 U	91.4 J	399 U	317 U	663 U	37.5 J
1,4-Dichlorobenzene	1440		998 U	73.0 J	1030 U	976 U	49.2 J	399 U	317 U	663 U	348 U
2-Methylnaphthalene	4080		998 U	211 J	1030 U	976 U	65.2 J	399 U	317 U	663 U	348 U
Acenaphthene	16800		998 U	243 J	1030 U	976 U	368 U	399 U	317 U	663 U	348 U
Acenaphthylene	NA		998 U	376 J	1030 U	976 U	54.6 J	399 U	317 U	663 U	348 U
Anthracene	12840		998 U	581	1030 U	976 U	75.7 J	399 U	317 U	663 U	44.6 J
Benz(a)anthracene	1440		998 U	**2990**	221 J	976 U	318 J	399 U	63.4 J	85.9 J	256 J
Benzo(a)pyrene	NA		998 U	2660	174 J	976 U	434	399 U	61.5 J	108 J	252 J
Benzo(b)fluoranthene	NA		998 U	2790	238 J	976 U	543	399 U	81.5 J	133 J	335 J
Benzo(g,h,i)perylene	NA		998 U	1390	1030 U	976 U	215 J	399 U	317 U	663 U	67.6 J
Benzo(k)fluoranthene	NA		149 J	3770	230 J	976 U	581	399 U	86.3 J	173 J	313 J
Benzoic acid	NA		1500 J	1260 U	585 J	548 J	927 U	311 J	798 U	794 J	876 U
Bis(2-ethylhexyl)phthalate	23940		998 U	500 U	1030 U	976 U	368 U	399 U	317 U	663 U	348 U
Carbazole	NA		998 U	325 J	1030 U	976 U	368 U	399 U	317 U	663 U	348 U
Chrysene	NA		108 J	3030	207 J	976 U	444	399 U	75.3 J	125 J	308 J
Dibenz(a,h)anthracene	NA		998 U	137 J	1030 U	976 U	89.6 J	399 U	317 U	663 U	348 U
Dibenzofuran	NA		998 U	179 J	1030 U	976 U	368 U	399 U	317 U	663 U	348 U
Fluoranthene	122400		193 J	2800	347 J	145 J	765	399 U	107 J	242 J	412
Fluorene	960		998 U	393 J	1030 U	976 U	44.6 J	399 U	317 U	663 U	348 U
Indeno(1,2,3-cd)pyrene	NA		998 U	759 J	1030 U	976 U	88.4 J	399 U	317 U	663 U	50.3 J
Naphthalene	3600		998 U	207 J	1030 U	976 U	48.6 J	399 U	317 U	663 U	348 U
Phenanthrene	14400		138 J	2560	254 J	115 J	461	399 U	66.5 J	165 J	269 J
Pyrene	115320		197 J	6740	608 J	224 J	793	65.7 J	181 J	216 J	760
TCL PCBs by Method 8082 (µg/kg)											
Aroclor 1260	168		41.4 J	117	105	59.8 U	23.2 U	23.6 U	9.28 J	34.5 J	40.6
TCL Pesticides by Method 8081A (µg/kg)											
4,4´-DDD	120		9.21 U	24.2 J	9.10 U	8.97 U	17.5	3.54 U	0.883 J	6.12 U	1.64 J
4,4´-DDE	120		9.21 U	5.75 J	9.10 U	8.97 U	17.4 U	0.685 J	2.99 U	11.4	3.54 J
4,4´-DDT	120		4.07 J	54.4	4.70 J	2.35 J	73.3	4.72 U	1.28 J	9.52	10.2 J
Aldrin	92.4		12.3 U	33.0 U	12.1 U	12.0 U	23.2 U	4.72 U	3.99 U	1.29 J	4.65 U
alpha-Chlordane	NA		1.44 J	8.26 U	1.82 J	1.50 J	5.81 U	1.18 U	0.263 J	1.10 J	1.16 U
beta-BHC [1]	7.2		12.3 U	33.0 U	12.1 U	2.57 J	23.2 U	4.72 U	3.99 U	8.16 U	4.65 U
Dieldrin	92.4		15.3 U	41.3 U	15.2 U	15.0 U	29.0 U	5.90 U	4.99 U	6.60 J	5.81 U

Table 3 Summary of Positive Analytical Results for the 2002 Sediment Samples, Floodplain of Three Mile Creek, Former Griffiss Air Force Base, Rome, New York

Analyte	Screening Criteria	Sample ID: Date:	LF6SD-14-1-Z1 07/17/02	LF6SD-15-1-Z1 07/16/02	LF6SD-16-1-Z1 07/16/02	LF6SD-17-1-Z1 07/16/02	LF6SD-18-1-Z1 07/16/02	LF6SD-19-1-Z1 07/16/02	LF6SD-20-1-Z1 07/16/02	LF6SD-21-1-Z1 07/16/02	LF6SD-22-1-Z1 07/16/02
Endosulfan I	3.6		15.3 U	41.3 U	**9.60 J**	15.0 U	29.0 U	5.90 U	4.99 U	1.79 J	5.81 U
Endosulfan II	3.6		1.51 J	24.8 U	9.10 U	1.23 J	17.4 U	3.54 U	0.645 J	1.43 J	1.43 J
Endosulfan sulfate	NA		5.40 J	49.5 U	24.1	6.61 J	4.14 J	7.07 U	1.39 J	8.47 J	6.97 U
Endrin	96		3.11 J	33.0 U	4.76 J	2.18 J	23.2 U	4.72 U	3.99 U	1.62 J	4.65 U
Endrin aldehyde	NA		30.7 U	82.6 U	30.3 U	29.9 U	58.1 U	11.8 U	9.98 U	20.4 U	2.07 J
Endrin ketone	NA		39.3	24.8 U	9.65	1.45 J	17.4 U	3.54 U	1.10 J	26.9	3.49 U
gamma-BHC [1]	7.2		6.14 U	16.5 U	6.07 U	5.98 U	11.6 U	2.36 U	2.00 U	4.08 U	2.32 U
gamma-Chlordane	0.72		**1.74 J**	**2.12 J**	6.07 U	5.98 U	11.6 U	0.500 J	2.00 U	4.08 U	2.32 U
Heptachlor	3.6		9.21 U	24.8 U	**7.90 J**	8.97 U	17.4 U	3.54 U	2.99 U	6.12 U	3.49 U
Methoxychlor	72		123 U	330 U	17.1 J	120 U	232 U	59.2 J	39.9 U	81.6 U	11.0 J
Total 2,3,7,8-TCDD equivalent (ng/kg)											
Total 2,3,7,8-TCDD equivalent	24		0.006	0.21	0.21	0.006	0.008	0.001	0.002	0.03	0.008
TRPH by Method 418.1M (mg/kg)											
TRPH	NA		849 J	256 J	382 J	366 J	149 J	488 U	110 J	853 U	197 J
TAL Metals/Mercury by Method 6010B/7471A (mg/kg)											
Aluminum	NA		10400	9360	16300	7590	5900	6690	3190	15800	2220
Antimony	2		**3.84**	**5.50 J**	**18.8**	**5.17**	4.88 U	1.03 U	2.03 U	**7.76 J**	2.36 U
Arsenic	6		**7.59**	**89.8**	**7.38 J**	**7.81**	**9.92 J**	3.06	2.73 J	**9.60 J**	5.59 J
Barium	NA		158	234	331	87.7	51.8	15.2	23.7	133	46.7
Beryllium	NA		0.621 J	2.49 J	7.58 U	0.612 J	2.44 U	0.517 U	1.02 U	4.23 U	1.18 U
Cadmium	0.6		**2.80 J**	**12.8 J**	30.3 U	**2.95 J**	**5.14 J**	2.07 U	**1.03 J**	16.9 U	**1.95 J**
Calcium	NA		17300	3340	24200	38300	4490	151 J	5240	14600	3490
Chromium	26		10.9	**32.5**	18.8 J	21.3	17.2	5.80	4.64	**32.0**	4.22 J
Cobalt	NA		1.91 J	7.64 J	30.3 U	2.01 J	4.46 J	0.389 J	2.39 J	5.84 J	1.66 J
Copper	16		**73.3**	**84.9**	**82.2**	**107**	**28.9**	**20.8**	8.83	**96.3**	10.5
Iron	20000		4960	**28000**	15200	6010	12300	16800	7130	9680	4980
Lead	31		**56.5**	**114**	**74.2**	**90.6**	**46.5**	12.3	5.50	**87.2**	9.88
Magnesium	NA		933	935	2160	2540	3020	384	3700	2160	1840
Manganese	460		**1300**	258	**1270**	**769**	305	38.6	273	**995**	148
Mercury	0.15		**0.751**	**1.12**	**0.660**	**0.374**	**0.173**	0.0744	0.0204 J	**0.781**	**0.159**
Nickel	16		7.50	**21.4**	30.3 U	12.9	9.36 J	1.07 J	4.51	**16.5 J**	2.76 J
Potassium	NA		262	841	595 J	343	614	166	539	494 J	307
Selenium	NA		12.7 U	3.43 J	2.62 J	5.73 J	4.88 U	5.17 U	5.08 U	42.3 U	5.91 U
Sodium	NA		253 U	767 U	1520 U	175 J	488 U	103 U	203 U	846 U	236 U
Thallium	NA		2.76 J	30.7 U	60.7 U	4.06 J	19.5 U	4.13 U	8.13 U	33.8 U	9.46 U
Vanadium	NA		14.4	44.5	11.5 J	26.4	10.1	31.8	4.48	19.7	3.08 J
Zinc	120		**244**	**142**	**189**	**297**	68.7	15.6	24.2	**249**	32.2

Table 3 Summary of Positive Analytical Results for the 2002 Sediment Samples, Floodplain of Three Mile Creek, Former Griffiss Air Force Base, Rome, New York

Analyte	Screening Criteria	Sample ID: Date:	LF6SD-14-1-Z1 07/17/02	LF6SD-15-1-Z1 07/16/02	LF6SD-16-1-Z1 07/16/02	LF6SD-17-1-Z1 07/16/02	LF6SD-18-1-Z1 07/16/02	LF6SD-19-1-Z1 07/16/02	LF6SD-20-1-Z1 07/16/02	LF6SD-21-1-Z1 07/16/02	LF6SD-22-1-Z1 07/16/02
Hexavalent Chromium by Method 7196A (mg/kg)											
Chromium, Hexavalent	NA		13 U	6.7 U	13 J	27	4.9 U	4.9 U	4.1 UJ	8.5 U	4.7 U
Total Cyanide by Method 9012A (mg/kg)											
Cyanide	NA		1.43 J	0.896	0.888 J	1.51 U	0.603 U	0.616 U	0.518 UJ	0.734 J	0.574 U
Total Organic Carbon by Method Lloyd Kahn (mg/kg)											
Total Organic Carbon	NA		325000	185000	362000	467000	46900	45100	1090 J	220000	40500

Notes:

Results that exceed the most stringent ecological screening criteria (as selected in Table 1) are bolded.

A TOC of 12% was used in the calculation of the criteria, because the average TOC of 20.4% is higher than the 12% maximum recommended for the calculations.

[1] Total Hexachlorocyclohexanes.

Key:

µg/kg = Micrograms per kilogram.
mg/kg = Milligrams per kilogram
ng/kg = Nanograms per kilogram.
NA = Criteria not applicable or not available.
J = Estimated value.
NYSDEC = New York State Department of Environmental Conservation.
PCB = Polychlorinated biphenyls.
TAL = Target Analyte List.
TCL = Target Compound List.
TOC = Total organic carbon.
TRPH = Total recoverable petroleum hydrocarbons.
SVOC = Semivolatile organic compound.
VOC = Volatile organic compound.
U = Not detected at the reported value.

Table 4 Summary of Positive Analytical Results for the 2002 Surface Water Samples, Three Mile Creek, Former Griffiss Air Force Base, Rome, New York

Analyte	Screening Criteria [1]	Sample ID: Date:	TMCSW-901 07/17/02	TMCSW-902 07/17/02	TMCSW-903 07/17/02	TMCSW-903/D 07/17/02	TMCSW-904 07/17/02
TCL VOCs by Method 826CB (µg/L)							
No VOCs were detected in any of the samples							
TCL SVOCs by Method 8270C (µg/L)							
Bis(2-ethylhexyl)phthalate	0.6		10.0 U	10.0 U	**3.86 J**	NS	10.0 U
Fluoranthene	NA		3.19 J	10.0 U	10.0 U	NS	10.0 U
TCL PCBs by Method 8082 (µg/L)							
Aroclor 1260	0.000001 (sum of PCBs)		0.500 U	0.500 U	0.500 U	NS	**1.14**
TCL Pesticides by Method 8081A (µg/L)							
Endosulfan sulfate	0.009 (standard for endosulfan)		0.100 U	0.100 U	0.100 U	NS	**0.193**
TAL Metals/Mercury by Method 6010B/7470A (µg/L)							
Aluminum	100		**2870**	63.1 J	**166 J**	200 U	**212**
Antimony	NA		7.38 J	5.61 J	6.58 J	5.90 J	7.51 J
Arsenic	150		8.69 J	25.0 U	25.0 U	25.0 U	7.69 J
Barium	NA		257	54.2	54.3	53.1	51.5
Calcium	NA		87700	91300	92600	90100	99400
Chromium [2]	188.05		9.44 J	10.0 U	10.0 U	10.0 U	10.0 U
Copper [2]	23.659		20.0 J	20.0 U	20.0 U	20.0 U	20.0 U
Iron	300		**6050**	199 J	**407 J**	152 J	**395**
Lead [2]	12.72		**33.9**	5.00 U	5.00 U	5.00 U	3.69 J
Magnesium	NA		23300	19600	19500	19500	15400
Manganese	NA		316	84.6	94.7	76.6	11.3
Mercury	0.77		0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
Nickel [2]	136.07		3.62 J	20.0 U	20.0 U	20.0 U	20.0 U
Potassium	NA		2280	1730	1750	1690	1840
Sodium	NA		67500	72700	74500	72100	93300
Thallium	8		**9.14 J**	**8.65 J**	**8.38 J**	**10.2 J**	**10.3 J**
Vanadium	14		12.6 J	20.0 U	20.0 U	20.0 U	20.0 U
Zinc [2]	217.18		95.0	10.0 U	10.0 U	10.0 U	7.90 J

Table 4 Summary of Positive Analytical Results for the 2002 Surface Water Samples, Three Mile Creek, Former Griffiss Air Force Base, Rome, New York

Analyte	Screening Criteria [1]	Sample ID: Date:	TMCSW-901 07/17/02	TMCSW-902 07/17/02	TMCSW-903 07/17/02	TMCSW-903/D 07/17/02	TMCSW-904 07/17/02
Hexavalent Chromium by Method 7196A (mg/L)							
Chromium, Hexavalent	0.011		0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Total Cyanide by Method 9012A (mg/L)							
Cyanide	0.0052		0.01 U	0.01 U	0.01 U	0.01 U	0.01 U

Note: Results that exceed the screening criteria are bolded.

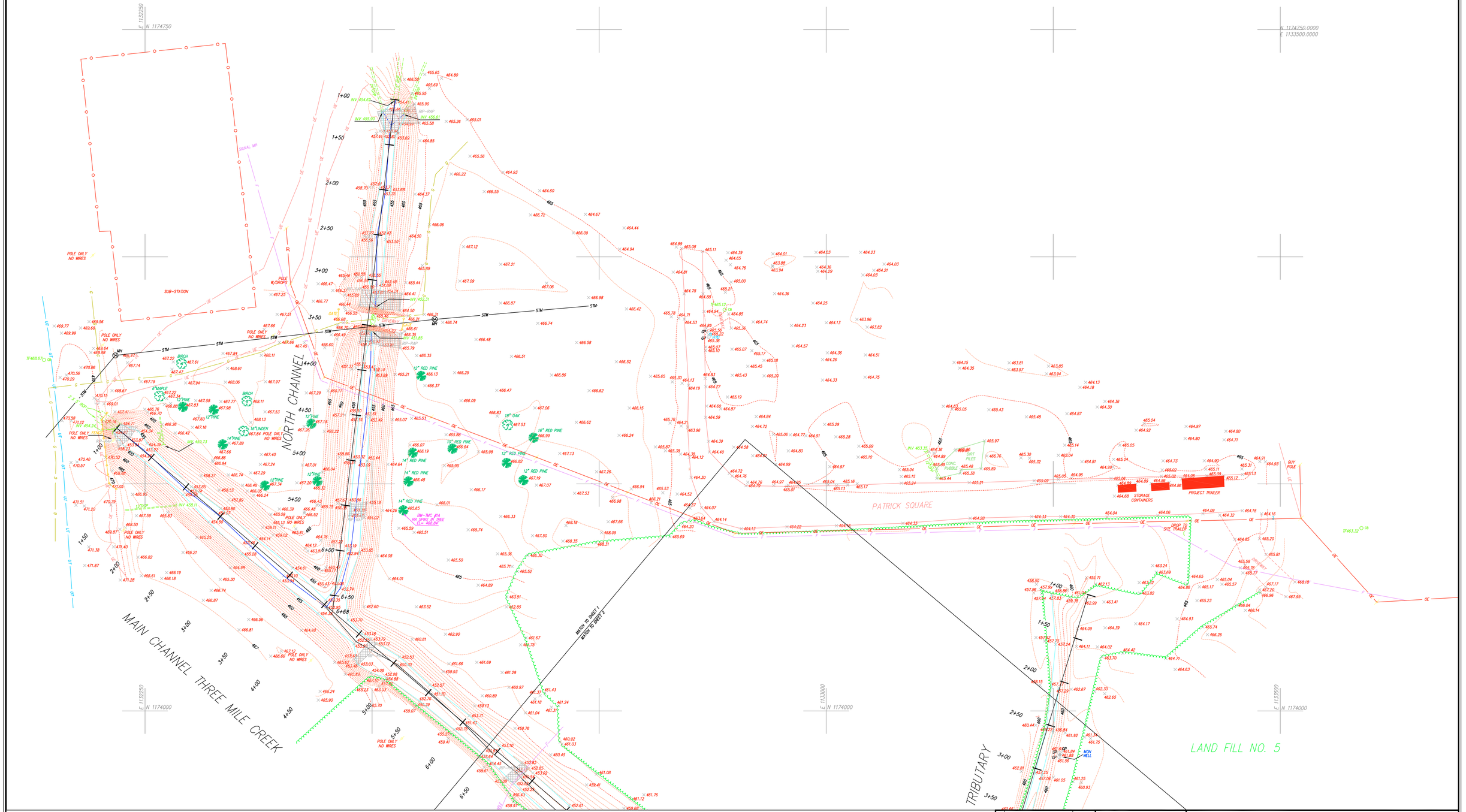
[1] New York State Department of Environmental Conservation, Technical and Operational Guidance #1.1.1: Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations, 1998. Class C Groundwater standards listed here.

[2] The standard listed for this parameter was calculated based on the average hardness (311.69 ppm) for the surface water samples collected. The hardness (in ppm) was calculated as: [(2.497 Calcium in ppm) + (4.118 Magnesium in ppm)]

Key:

µg/L = Micrograms per liter.
mg/L = Milligrams per liter.
NA = Criteria not applicable or not available.
J = Estimated value.
NS = Sample not collected for this parameter.
NYSDEC = New York State Department of Conservation.
PCB = Polychlorinated biphenyls.
TAL = Target Analyte List.
TCL = Target Compound List.
SVOC = Semivolatile organic compound.
VOC = Volatile organic compound.
U = Not detected at the reported value.

C Three Mile Creek Final Design Drawings



LEGEND

- CONTROL STATION
- UTILITY POLE/ GUY WIRE
- SOFTWOOD TREE (14" RED PINE)
- HARDWOOD TREE (18" OAK)
- CATCH BASIN (CB)
- CULVERT
- UTILITY BOX
- WATER VALVE (WV)
- HYDRANT (HYD)
- MONITORING WELL (MW)
- SPOT ELEVATION (423.1)
- STEAM LINE (STM)
- GAS LINE (G)
- OVERHEAD ELECTRIC LINE (OE)
- UNDERGROUND ELECTRIC LINE (UE)
- FIBER OPTIC LINE (F)
- WIRE FENCE LINE
- CHAINLINK FENCE LINE
- BASELINE STATIONS (6+00, 6+50)
- RIP-RAP

GRAPHIC SCALE

50 0 25 50 100 200

(IN FEET)

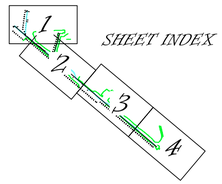
1 inch = 50 ft.

GRID NORTH NAD83

NOTES

1. HORIZONTAL CONTROL IS NEW YORK STATE PLANE COORDINATES, NORTH AMERICAN DATUM (NAD) 1983, FEET, NY CENTRAL ZONE
2. VERTICAL DATUM IS NATION GEODETIC VERTICAL DATUM (NGVD) 1929, FEET
3. CONTOUR INTERVAL IS ONE FOOT
4. SURVEY PHASES OF THREE MILE CREEK
   - PRE EXCAVATION STARTED OCTOBER 2003 (THRU STA 36+50) COMPLETED MARCH 2005 (37+00–44+50)
   - POST EXCAVATION PERFORMED AS CONSTRUCTION PROCEEDED
   - FINAL AS-BUILT SURVEY COMPLETED JUNE 2005

SHEET INDEX



REV	DESCRIPTION	DATE
1	ADDED TREE PLANTINGS & FENCES	10/25/05

TOPOGRAPHY MAP OF THREE MILE CREEK FINAL AS-BUILT SURVEY

PREPARED FOR CAPE ENVIRONMENTAL

CITY OF ROME

ONEIDA COUNTY NEW YORK

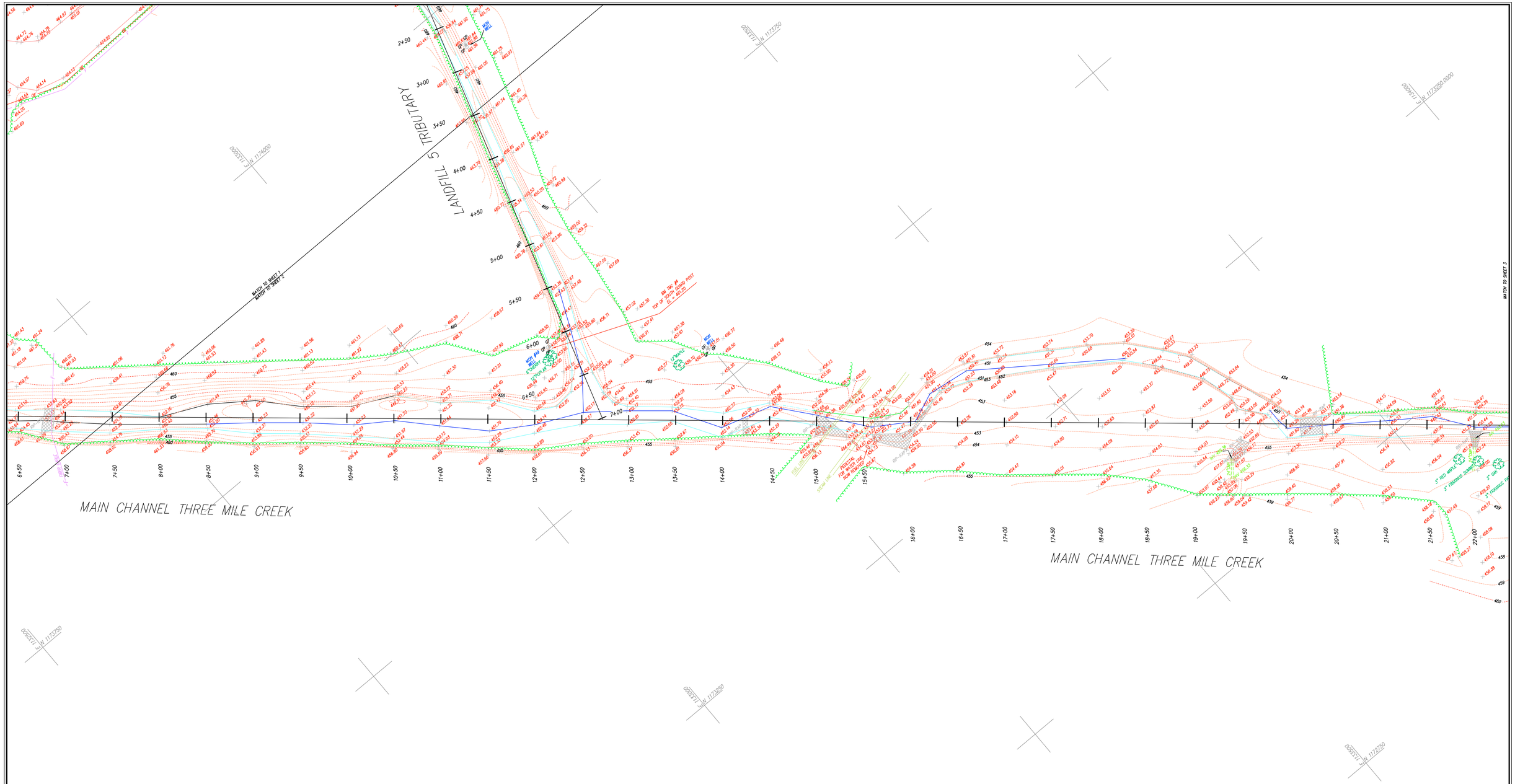
LaFAVE, WHITE & McGIVERN, L.S., P.C.

LAND SURVEYORS PHOTOGRAMMETRISTS

THERESA BOONVILLE ROME

NEW YORK

DRAWN	CHECKED	DATE	SCALE	FILE	SHEET
T.J.B.	A.R.B.	AUGUST 1, 2005	1" = 50'	04-C01-R0	1 OF 12



LEGEND

- CONTROL STATION
- UTILITY POLE/ GUY WIRE
- SOFTWOOD TREE
- HARDWOOD TREE
- CATCH BASIN
- CULVERT
- UTILITY BOX
- WATER VALVE
- HYDRANT
- MONITORING WELL
- SPOT ELEVATION
- STEAM LINE
- GAS LINE
- OVERHEAD ELECTRIC LINE
- UNDERGROUND ELECTRIC LINE
- FIBER OPTIC LINE
- WIRE FENCE LINE
- CHAINLINK FENCE LINE
- BASELINE STATIONS
- RIP-RAP

GRAPHIC SCALE

50 0 25 50 100 200

(IN FEET)
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GRID NORTH NAD83

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SHEET INDEX

1 2 3 4

REV	DESCRIPTION	DATE
1	ADDED TREE PLANTINGS & FENCES	10/25/05

TOPOGRAPHY MAP – THREE MILE CREEK
FINAL AS-BUILT SURVEY
PREPARED FOR CAPE ENVIRONMENTAL
CITY OF ROME–FORMER GRFISS AIR FORCE BASE
ONEIDA COUNTY NEW YORK

LaFAVE, WHITE & McGIVERN, L.S., P.C.
LAND SURVEYORS PHOTOGRAMMETRISTS
THERESA BOONVILLE ROME
NEW YORK

DRAWN	CHECKED	DATE	SCALE	FILE	SHEET
T.J.B.	A.R.B.	AUGUST 1, 2005	1" = 50'	04-C01-R0	2 OF 12

MATCH TO SHEET 2

MATCH TO SHEET 4

MAIN CHANNEL THREE MILE CREEK

LEGEND

- CONTROL STATION
- UTILITY POLE/ GUY WIRE
- 14" RED PINE — SOFTWWOOD TREE
- 18" OAK — HARDWOOD TREE
- CB — CATCH BASIN
- CULVERT
- UTILITY BOX
- WV — WATER VALVE
- HYD — HYDRANT
- MONITORING WELL
- 423.1 — SPOT ELEVATION

- STM — STEAM LINE
- G — GAS LINE
- OE — OVERHEAD ELECTRIC LINE
- UE — UNDERGROUND ELECTRIC LINE
- F — FIBER OPTIC LINE
- WIRE FENCE LINE
- CHAINLINK FENCE LINE
- 6+00 6+50 — BASELINE STATIONS
- RIP-RAP

GRAPHIC SCALE

50 0 25 50 100 200

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GRID NORTH NAD83

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SHEET INDEX

1 2 3 4

REV	DESCRIPTION	DATE
1	ADDED TREE PLANTINGS & FENCES	10/25/06

TOPOGRAPHY MAP – THREE MILE CREEK
FINAL AS-BUILT SURVEY

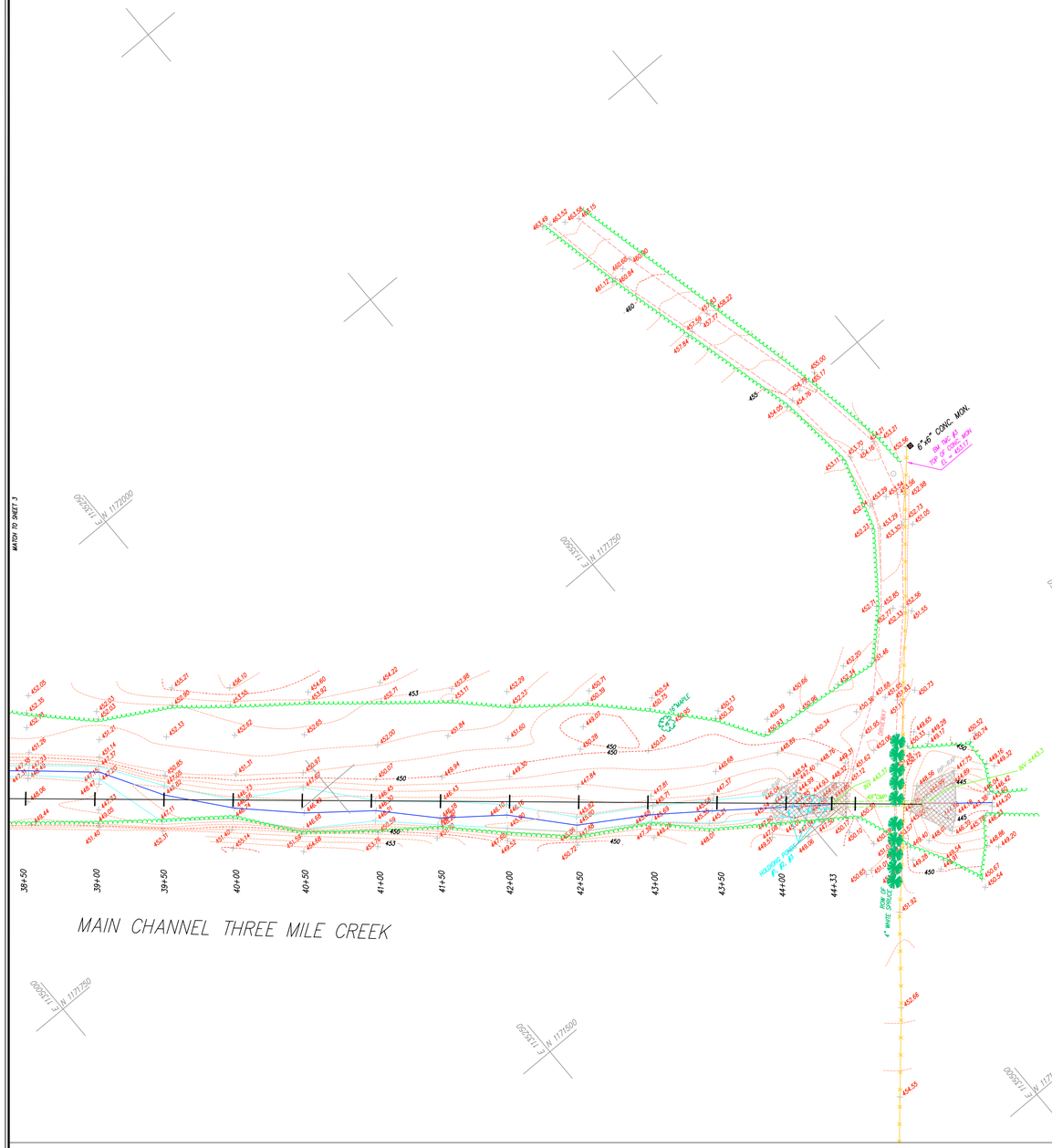
PREPARED FOR CAPE ENVIRONMENTAL

CITY OF ROME – FORMER GRIFFIS AIR FORCE BASE
ONEIDA COUNTY NEW YORK

LaFAVE, WHITE & McGIVERN, L.S., P.C.
LAND SURVEYORS PHOTOGRAMMETRISTS
THERESA BOONVILLE ROME
NEW YORK

DRAWN	CHECKED	DATE	SCALE	FILE	SHEET
T.J.B.	A.R.B.	AUGUST 1, 2005	1" = 50'	04-C01-RO	3 OF 12

MATCH TO SHEET 3



LEGEND

- CONTROL STATION
- UTILITY POLE/ GUY WIRE
- 14" RED PINE — SOFTWOOD TREE
- 18" OAK — HARDWOOD TREE
- CB — CATCH BASIN
- CULVERT
- UTILITY BOX
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- HYD — HYDRANT
- MONITORING WELL
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- WIRE FENCE LINE
- CHAINLINK FENCE LINE
- 6+00 6+50 — BASELINE STATIONS
- RIP-RAP

GRAPHIC SCALE

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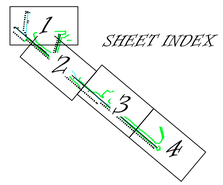
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SHEET INDEX



REV	DESCRIPTION	DATE
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TOPOGRAPHY MAP – THREE MILE CREEK
FINAL AS-BUILT SURVEY
PREPARED FOR CAPE ENVIRONMENTAL
CITY OF ROME – FORMER GRIFFIS AIR FORCE BASE
ONEIDA COUNTY NEW YORK

LaFAVE, WHITE & McGIVERN, L.S., P.C.
LAND SURVEYORS PHOTOGRAMMETRISTS
THERESA BOONVILLE ROME
NEW YORK

DRAWN	CHECKED	DATE	SCALE	FILE	SHEET
T.J.B.	A.R.B.	AUGUST 1, 2005	1" = 50'	04-C01-R0	4 OF 12

D Field Investigation Photo Log October 2006

Former Griffiss Air Force Base

Field Investigation Photo Log

October 2006

Landfill 1

Landfill 2/3

Landfill 6

Three Mile Creek



Photo-1: Northerly view along eastern wetland edge at Landfill 1.



Photo-2: Southerly view along leachate collection line at Landfill 1.



Photo-3: Southern view from access road along Landfill 2/3 wetland edge.



Photo-4: Westerly view along storm water drain at Landfill 2/3.



Photo-5: Southerly view along northeastern Landfill 2/3 boundary.



Photo-6: Southwestern view overlooking vernal pool complex at Landfill 6.



Photo-7: Constructed vernal pool at Landfill 6.



Photo-8: Northwestern view of Landfill 6 permitted expansion toe-of-slope and wetland edge.



Photo-9: Three Mile Creek meander and gabion structure.



Photo-10: Downstream view of newly created meander.



Photo-11: Upstream view from the old channel centerline.



Photo-12: Three Mile Creek typical riffle structure.



Photo-13: Downstream view of a typical pool zone within Three Mile Creek.



Photo-14: Downstream view of Three Mile Creek bank erosion.



Photo-15: Upstream view of Three Mile Creek bank erosion.



Photo-16: Northwesterly view along Three Mile Creek's restored floodplain.



Photo-17: Upstream view of restored floodplain hydrology along Three Mile Creek.



Photo-18: Typified view of restored floodplain/forest edge vegetation.



Photo-19: Typified view of restored upland zone.



Photo-20: Northerly view overlooking the Three Mile Creek vernal pool complex. Note Landfill 6 in background.



Photo-21: Reuse of cleared limbs as additional habitat enhancement within channel.



Photo-22: Reuse of cleared limbs/logs within restored floodplain zone.