

**Final Reports on Implementation
of Remedial Action
at Landfill 5 and Landfill 7**

**Former Griffiss Air Force Base
Rome, New York**

August 2005



AIR FORCE REAL PROPERTY AGENCY

**Final Report on Implementation of
Remedial Action at Landfill 5**

**Former Griffiss Air Force Base
Rome, New York**

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AIR FORCE REAL PROPERTY AGENCY

**FINAL REPORT ON IMPLEMENTATION
OF REMEDIAL ACTION AT
LANDFILL 5
Former Griffiss Air Force Base, Rome, New York**

1.0 INTRODUCTION AND SITE BACKGROUND

The purpose of this report is to document the implementation of remedial actions for Landfill 5 at the former Griffiss Air Force Base (AFB).

1.1 Site History

Landfill 5 is an unlined landfill situated on approximately 4-acres in the south-central portion of the former Griffiss AFB (see Figure 1). It is a marshy, wooded area located less than 1,000 feet south of the base industrial complex. The northern portion of the landfill is flat and was covered with grass. It was constructed using an area-type method to a total depth of approximately 6 feet. The southern portion of the landfill was heavily wooded and covered by dense, brush undergrowth. A shallow layer of soil covered the site prior to capping in 2002.

The landfill was constructed directly on the floodplain of Three Mile Creek (TMC) to a height of approximately 12 feet and is adjacent to regulated forested wetland areas. Landfill 5 was in operation for one year, 1959, during which an estimated 18,000 cubic yards of municipal waste were burned and covered at the landfill. Landfill 5 was abandoned in 1960. A hardfill area (Hardfill 49d) is located adjacent to the west side of Landfill 5.

1.2 Characterization Results

Several investigations at Landfill 5 were performed between 1981 and 1998 including initial site investigations, a remedial investigation (RI), an RI supplemental investigation (SI), a landfill cover investigation, and a landfill consolidation interim remedial action.

As part of the initial site investigations performed in 1981, a groundwater monitoring well was installed downgradient of Landfill 5. In 1982, the monitoring well

was sampled and dissolved chromium, copper, and zinc were detected. This well was also included in the 1992/1993 quarterly sampling program performed at the former base. Quarterly sampling results indicated the presence of acetone, methylene chloride, di-n-butylphthalate, and total glycols.

The RI was performed in 1994 and included a ground-penetrating radar (GPR) survey; a passive soil gas survey; and sampling and analysis of surface soil, groundwater, drainage ditch sediments, and wetland sediments.

The RI GPR survey indicated the presence of numerous anomalies throughout the survey area (with the exception of the southwestern area), and a reinforced concrete slab was identified at one location. The passive soil gas survey indicated the presence of volatile organic compound (VOC) emissions.

Analysis of groundwater samples collected during the RI indicated the presence of VOCs, semivolatile organic compounds (SVOCs), pesticides, metals, glycols, and petroleum hydrocarbons. The concentrations of one VOC, four SVOCs, four pesticides, eight metals, and petroleum hydrocarbons exceeded the most stringent criteria (see Table 1 in the Landfill 5 Area of Concern [AOC] Record of Decision [ROD]).

Analysis of the wetland sediment samples collected for the RI indicated the presence of VOCs, SVOCs, pesticides/polychlorinated biphenyls (PCBs), metals, dioxin, and petroleum hydrocarbons. The concentrations of eight SVOCs, 11 pesticides, seven metals, and one dioxin exceeded the most stringent criteria (see Table 2 in the Landfill 5 AOC ROD).

Analysis of three surface soil samples collected during the RI indicated the presence of VOCs, SVOCs, pesticides/PCBs, metals, dioxins/furans, and petroleum hydrocarbons. The concentrations of one VOC, four SVOCs, two pesticides, one PCB, and nine metals exceeded the most stringent criteria (see Table 3 in the Landfill 5 AOC ROD).

The SI was performed in 1997 and included excavation of three test pits at the location of the three strongest geophysical anomalies, sampling and analysis of one leachate and three near- surface soil samples, installation and sampling of one new monitoring well, and sampling and analysis of existing monitoring wells.

No drums were found in the test pits. The leachate sample contained VOCs, SVOCs, and metals. Only two metals (zinc and manganese) were detected at concentrations exceeding the most stringent criteria. The metals detected are characteristic of uncontaminated groundwater and indicate that leachate is not a source of contamination to other media. The near-surface soil contained SVOCs, pesticides/PCBs, and metals. Eight SVOCs, two pesticides, and seven metals were detected at concentrations exceeding the most stringent criteria (see Table 4 in the Landfill 5 AOC ROD). The groundwater sampling confirmed the presence of carbon tetrachloride, but no other results exceeded the most stringent criteria.

A Landfill Cover Investigation performed in 1997 included the following tasks: historical records search, field survey, aerial photographic survey, auger investigation, permeability sample collection, and hydrologic evaluation of landfill performance model analysis. The investigation further defined the areal extent of the landfill and the landfill boundary and revealed that the thickness of the existing landfill soil cover ranged from 0.8 to 2.4 feet.

In 1998, three drums were found near Landfill 5 during the surface debris consolidation project. The drums were inspected and monitored with portable field equipment for VOCs and radiation. It was determined that the drums were empty, and they were crushed and transported to Landfill 2/3 for disposal. Soil beneath these drums exhibited minor staining and was removed to a depth of 1 foot. Confirmatory soil samples were collected and analyzed for VOCs, SVOCs, polycyclic aromatic hydrocarbons (PAHs), pesticides/PCBs, and metals. The results indicated there was no residual contamination from the drums.

During the Long-Term Monitoring (LTM) Baseline Study (FPM, 2000), iron and manganese concentrations exceeded the screening criteria in two background wells (LF5MW-1 and LF5MW-1A) as well as the other wells sampled during the quarterly sampling program. While VOCs were detected during the RI and SI in the Landfill 5 monitoring wells, significant levels were not found during the LTM Baseline Study. It was concluded that reducing conditions exist in the groundwater in the landfill and that the causes of the fluctuations in concentrations of the two metals in the various wells are joint influences of available mineral resources, flow conditions, and anaerobic conditions.

The study also reported total dissolved solids and hardness levels above screening levels in most of the wells. The highest levels of hardness were consistently detected in well MW49D-03.

During the LTM Baseline Study, quarterly surface water samples were collected at TMC locations LF5SW-1, LF5SW-2, and LF5SW-3 (see Figure 2). Two VOCs (benzene and chlorobenzene) and several metals were intermittently detected. Three metals (aluminum, iron, and sodium) were detected above screening levels during the January round. Sodium exceeded screening levels during all sampling rounds whereas iron exceeded screening levels during the August and November sampling rounds. The study concluded that the relatively high concentrations of these three metals detected in the January 1999 samples were likely due to changes in runoff sources to TMC other than Landfill 5.

Additional details on the site characterization and investigation results for Landfill 5 are provided in the draft-final *Remedial Investigation Report* (Law Environmental [Law], 1996); final *Supplemental Investigation Report* (Ecology and Environment [E&E], 1998); *Landfill Cover Investigation Report* (Law, 1998); draft *Design Analysis Report* (United States Army Corps of Engineers [USACE], 1998); *Baseline Study Report, AOC Long-Term Monitoring Baseline Study* (FPM, 2000); final *Long-Term Monitoring Work Plan, Landfill 5 Area of Concern* (FPM, 2002); and *Long Term Monitoring Report for Landfills 1, 2/3, 4, 5, and 7 AOCs* (FPM, 2005).

2.0 REAL ESTATE ISSUES

2.1 Property Proposed for Transfer

This document will be used in conjunction with the preparation and submission of a Finding of Suitability to Transfer (FOST), as required in Section 120(h) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). A complete description of the Landfill 5 AOC can be found in the Landfill 5 ROD.

2.2 Institutional Controls/Deed Restrictions

CERCLA Section 120(h)(3) requires that deeds transferring property where hazardous substances had been stored, released or disposed of, shall contain a covenant

warranting that: “all remedial action necessary to protect human health and the environment with respect to any [hazardous] substance remaining on the property has been taken before the date of such transfer.” CERCLA Section 120(h)(3) was amended in October 1992 to add language stating that all necessary actions have been taken “if the construction and installation of an approved remedial design has been completed and the remedy has been demonstrated to the [EPA] Administrator to be operating properly and successfully.”

Institutional controls in the form of deed restrictions and signage will be implemented and enforced during the 30-year post-closure maintenance period. Through deed restrictions, the property owner is restricted as follows:

- Groundwater extraction/ utilization/consumption by any current or future landowner within the groundwater restriction area (see Figure 1) will not be permitted without prior testing and written approval from the New York State Department of Health (NYSDOH).
- Activities that disrupt or interfere with the post-closure activities will not be permitted.
- Intrusive work within the groundwater restriction area will not be permitted without prior written approval from the Air Force Real Property Agency (Air Force), New York State Department of Environmental Conservation (NYSDEC), and United States Environmental Protection Agency (EPA).
- Intrusive work or other activities that impact the effectiveness or integrity of the landfill closure, or effectiveness of post-closure activities will not be allowed within the restricted landfill boundary.

Signs erected during closure construction will serve to minimize the potential for interference with closure and post-closure activities. Signs have been posted along the landfill property boundary that read “SOLID WASTE LANDFILL - CONTAINS HAZARDOUS SUBSTANCES - NO TRESPASSING.”

Each identified institutional control will specify the restriction imposed on the property, and how such a restriction will be implemented, monitored, and later enforced if a violation occurs.

2.3 Adjacent Properties

A hardfill area (Hardfill 49d) is located west of Landfill 5. A drainage ditch located northwest of Landfill 5 and adjacent to Hardfill 49d, forms, in effect, a tributary (Landfill 5 tributary) to TMC. This tributary, which contains VOCs, SVOCs, PCBs, and dioxins, is being remediated under the TMC remedial action. A regulated forested wetland lies between Landfill 5 and TMC. A small pond also lies immediately southeast of the site. The closure action at Landfill 5 affected approximately 0.1 acre of the wetland area. Wetland restoration will be accomplished during remediation and restoration activities at TMC in accordance with the Base-Wide Wetland Management Plan and the *Final Design Basis Report for Three Mile Creek, Former Griffiss Air Force Base* (E&E, 2004).

3.0 DOCUMENTATION OF REMEDIAL ACTION IMPLEMENTATION

3.1 Record of Decision

The Landfill 5 ROD was issued after the public comment period (February 7, 2000 to March 8, 2000). A public meeting on the proposed plan was held on February 23, 2000. The ROD was signed on June 5, 2000, by the Air Force and the EPA, with concurrence from NYSDEC.

The Landfill 5 ROD presented the following remedial action objectives (RAOs) to address existing and future potential threats posed by Landfill 5:

- Consolidation of various debris and waste areas into the main landfill boundary in order to reduce the area to be capped and the potential for nearby wildlife and human populations to be exposed to the landfill mass;
- Reduce infiltration of rainwater and snowmelt water through the landfill mass in order to minimize the potential for leachate generation and groundwater contamination;
- Monitoring the groundwater and stream environment (which may include, but is not necessarily limited to, sediment, surface water, and biota) downgradient of the site; and
- Implementation of institutional controls in the form of deed restrictions of the main landfill boundary to prohibit use of the area and groundwater.

To address the RAOs listed above, the presumptive remedy (i.e., preferred alternative) in the Landfill 5 ROD called for:

- Installation of a low-permeability soil cover in accordance with 6 NYCRR Part 360 landfill closure regulations, dated April 1, 1987.
- Long-term monitoring of groundwater and surface water in accordance with the Air Force's LTM program.

The Landfill 5 presumptive remedy components relative to the implementation of remedial action include:

- Placing a minimum of 18 inches of low-permeability soil and 6 inches of topsoil over the entire landfill surface to reduce the amount of water infiltration through the landfill. The soil is specified to have a hydraulic conductivity value of 10^{-5} cm/sec or less;
- Maintenance of the cover;
- Implementation of an LTM program at the site for the groundwater and stream environment; the groundwater will be monitored in accordance with the Air Force's LTM program and the stream environment will be monitored in accordance with a plan prepared for the TMC AOC; both plans have been reviewed and approved by the EPA and NYSDEC;
- Monitoring the groundwater and stream environment downgradient of the site to evaluate the effectiveness of the presumptive remedy;
- Implementation of institutional controls in the form of deed restrictions of the main landfill boundary and groundwater to prohibit use of the area and groundwater, and to ensure the cap is not damaged and the area is maintained as a landfill; and
- Evaluation of site conditions at least once every five years to ensure that the remedy is protective of human health and the environment.

The placement and grading of the new low-permeability soil cover minimizes contact by human and wildlife populations to contaminants in the landfill by blocking or restricting the routes of exposure, and minimizes infiltration of rain and snowmelt water into the landfill waste. The implementation of the LTM program allows for the continued evaluation and effectiveness of the remedial actions at Landfill 5.

Contaminant concentrations in the groundwater will not immediately comply with the groundwater applicable or relevant and appropriate requirements (ARARs) under the presumptive remedy. However, the institutional controls will restrict the ingestion of groundwater, which is the primary pathway that poses a potential risk to human health at this AOC. Further, groundwater monitoring will be conducted to assure that there is no further contaminant migration and that groundwater standards will be achieved over time. In addition, the Landfill 5 AOC wetland sediments will be monitored as part of the presumptive remedy described above, but will remain in their existing state with no remedial action. Upon consultation with the state and federal Fish and Wildlife offices, the Air Force determined that the sediments do not pose an unacceptable risk to humans, and removal of the sediments would require the actual destruction of the aquatic and benthic life and forested wetlands. The minimal risks posed to aquatic and benthic life do not warrant their destruction and the destruction of a forested wetland. The wetland will benefit from the additional soil cover to be placed on Landfill 5 and the LTM program included in the presumptive remedy.

3.2 Remedial Design

The final design of the Landfill 5 remedial action was issued in July 2002. Details of the remedial design are presented in the *Landfill 5 Cover Improvements at the Former Griffiss Air Force Base, Rome, New York, Closure Plan* (USACE, 2002).

3.3 Remedial Action Construction

Conti Environmental, Inc. (Conti) was issued a notice to proceed on April 23, 2002. In July 2002, final versions of the Landfill 5 Closure Plan, Project Work Plan, Site Safety and Health Plan, Contractor Quality Control Plan (CQCP), and Sampling and Analysis Plan were submitted to USACE and subsequently approved by EPA and NYSDEC. USACE personnel conducted oversight of construction activities throughout the Landfill 5 remedial construction to help ensure that the CQCP was followed and the work was performed in accordance with the design.

Actual fieldwork was initiated on July 8, 2002, with site preparation activities including site clearing, tree grubbing, utility pole removal, access road relocation and

construction, and decontamination pad and tracking pad construction. Site clearing involved felling, trimming, and cutting of vegetation. Other site preparation activities included abandonment of monitoring wells and implementation of erosion and sedimentation controls. The existing landfill surface was graded and borrow soils were placed to match the designed contours and slopes. Approximately 15,876 cubic yards of low-permeability soil were placed in an 18-inch thick layer. Six inches of topsoil were placed over the low-permeability soil layer for an approximate total volume of 4,800 cubic yards. A wildlife-friendly seed mix, also suitable for erosion control, was planted in the topsoil. No drums were encountered during the operations. Construction affected only a small portion of the wetland area. Wetland restoration at Landfill 5 was not performed, however, wetland restoration/mitigation will be performed during remediation and restoration activities along TMC. After completion of cover improvement work, signs and elevation benchmarks were installed as specified in the design.

The Landfill 5 cover improvement was substantially completed and inspected by the USACE and the Air Force on November 15, 2002. Documentation of remedial construction activities is provided in the *Landfill 5 Cover Improvements Engineer's Certification Report* (Conti, 2003). This report was reviewed and approved by the EPA and NYSDEC. Final inspection of the landfill was conducted in September 2003, after the vegetative cover was fully established. Documentation of this inspection is provided as the first quarterly cover inspection during the operations and maintenance (O&M) period, which is reported in the *Long Term Monitoring Report for Landfills 1, 2/3, 4, 5, and 7 AOCs* (FPM, 2005).

3.4 Remedial Action Performance

3.4.1 Operations and Maintenance. *The Landfill 5 Post-Closure Operation and Maintenance Manual* (Conti, May 2004) provides a guide to the landfill owners for maintenance and facility monitoring for a period of 30 years. The manual fulfills NYSDEC's requirements for post-closure operations and maintenance for closed solid waste landfills (6 NYCRR Part 360-2.15[k]).

In accordance with the O&M Manual, periodic inspections of the landfill are being performed. During the first year after final inspection of the construction, quarterly inspections of the landfill cover and inspections following major rainfall events have been performed to ensure that the final landfill cover materials, site drainage swales, and on-site monitoring wells are maintained and functioning within the design standards. The property has also been inspected to ensure compliance with institutional control measures. A checklist is utilized to facilitate and standardize post-closure inspections. Contingency maintenance measures are performed if any deficiencies are encountered during these inspections, and the AFRPA is notified if unauthorized activity is observed on the landfill property. Post-closure inspection activities at Landfill 5 include:

- Soil cover integrity is inspected for holes, rifts, ruts, washouts or similar damage;
- The vegetative cover and grass-lined swales are inspected for proper establishment, thickness of growth, and signs of stress or disturbance due to erosion;
- The landfill is inspected for leachate breakouts;
- Slopes and the top surface of the landfill are inspected for major deviations from as-built grades and any areas of significant surface water ponding;
- The monitoring wells are inspected for integrity and damage to the surface protective casings;
- The landfill surface is inspected for the presence of intrusive animals such as groundhogs; and
- To ensure compliance with institutional control measures, the landfill property is inspected for any evidence of activities, such as construction activities, that have not been approved by NYSDEC, EPA, and the Air Force; and signs and support structures are inspected for damage or wear.

Landfill maintenance activities include grass mowing and any contingency maintenance measures required as a result of the above inspections. The O&M Manual specifies two mowings in the first year (one in late spring/early summer and one after September 1st), and one mowing after September 1st every year thereafter, which allows

for grass germination and full coverage development, and helps to preserve avian habitats. Mowings have been performed at Landfill 5 as specified in the O&M manual.

As reported in the June 2003 inspection, the bedrock monitoring well LF5MW-100 was damaged when the concrete pad supporting the well casing subsided approximately 2 feet. This well was replaced (March 2004) as a part of contingency maintenance and is now identified as LF5MW-100R.

Annual baseline and quarterly routine monitoring is being performed on groundwater and surface water for a minimum period of five years (see Section 3.4.2). Records are maintained of all site inspections, sampling events, and any contingency maintenance measures. The O&M Contractor prepares environmental monitoring reports and annual summary reports outlining the previous year's monitoring and maintenance activities. Site conditions will be evaluated every five years to ensure that the remedy is protective of human health and the environment. Alterations to the frequency and duration of the landfill inspections and environmental monitoring may be sought at any time and are subject to the approval of EPA and NYSDEC.

3.4.2 Environmental Monitoring. The LTM program for Landfill 5 groundwater is described in the final *Long-Term Monitoring Work Plan, Landfill 5 Area of Concern* (FPM, July 2002). The monitoring results through September 2004 are provided in the *Long Term Monitoring Report for Landfills 1, 2/3, 4, 5, and 7 AOCs* (FPM, 2005). Environmental monitoring and summary reports are prepared annually.

Groundwater

Baseline monitoring for VOCs, metals (including mercury), cyanide, PCBs, and landfill leachate indicators was conducted at five monitoring wells. Quarterly sampling is being conducted at four monitoring wells (LF5MW-3, MW49D-07, LF5MW-5, and LF5MW-100R) to evaluate spatial and short-term variability of contaminant concentrations. Samples are analyzed for metals (except mercury), PCBs (groundwater/leachate only), and landfill leachate parameters. Water level measurements are collected at the monitoring wells to assess groundwater elevations and flow directions.

A summary of the groundwater monitoring parameters and prescribed analytical methodologies, as specified in the LTM Plan, is provided below.

<u>Parameter</u>	<u>EPA (or other) Method</u>
Static Water Level	Field Measurement
Electrical Conductivity	Field Measurement
Temperature	Field Measurement
pH	Field Measurement
Dissolved Oxygen	Field Measurement
Oxidative Reduction Potential	Field Measurement
Turbidity	Field Measurement
VOCs	8260B (baseline and first quarter only)
Metals (except Mercury)	6010B
Mercury	SW-846 (baseline and first quarter only)
Cyanide	9010B (baseline and first quarter only)
PCBs	8082 (groundwater/leachate only)
Anions	9056
Total Kjeldahl Nitrogen	351.3
Ammonia	350.2
Chemical Oxygen Demand	5220C
Biochemical Oxygen Demand	5210B
Total Organic Carbon	9060
Total Dissolved Solids	160.1
Alkalinity	310.1
Phenols	9065
Total Hardness as CaCO ₃	130.2
Color	110.2 (baseline and first quarter only)
Boron	6010B (baseline and first quarter only)

Surface Water

Baseline monitoring for VOCs, metals (including mercury), cyanide, and landfill leachate indicators was conducted at three TMC locations (LF5SW-1, LF5SW-2, and LF5SW-3) downstream of Landfill 5. Quarterly sampling is being conducted at the same three TMC locations to determine the water quality of the creek. Samples are analyzed for metals (except mercury) and landfill leachate parameters. The results are compared to baseline conditions in the creek prior to construction of additional landfill cover.

Leachate

No leachate has been noted. Quarterly landfill inspections will include observation and documentation of leachate outbreaks. If leachate is present, samples will be collected and analyzed for the same parameters as the groundwater samples.

Landfill Gas

Gas monitoring was performed prior to construction of the landfill cap and gas generation from the landfill was deemed insignificant, therefore, no gas monitoring is planned.

Sediment

Sediment monitoring will be performed under the Comprehensive Three Mile Creek LTM Plan.

3.4.3 Remedy Performance. The key to documenting implementation of the remedy is the evaluation of remedy performance as it relates to applicable RAOs presented in the ROD. More than one year of O&M and LTM quarterly sampling has been completed for Landfill 5. The quarterly reports are provided in the *Long Term Monitoring Report for Landfills 1, 2/3, 4, 5, and 7 AOCs* (FPM, 2005). Because this monitoring is a continuance of the monitoring started during the remedial construction period, the quarterly reports start in the first quarter of 2003, after substantial completion of the remedial construction. An evaluation of the Landfill 5 presumptive remedy activities is provided below.

Landfill 5 Soil and Solid Waste

- Surface debris from Landfill 5 was consolidated within the Landfill 2 boundary in 1998. This met the RAO established in the ROD to reduce the area requiring cover.
- The placement of low-permeability cover soil and topsoil was completed in November 2002. The additional cover soil reduces infiltration of rainwater and snowmelt water through the landfill and minimizes the potential for leachate generation and groundwater contamination. The potential for nearby wildlife and human populations to be exposed to the landfill has also been

reduced by this measure. Thus, this action of the presumptive remedy satisfies the RAOs established for Landfill 5.

Groundwater Quality

- Groundwater at the Landfill 5 is being monitored in accordance with the approved LTM Plan. In February 2003, quarterly LTM sampling began. The current LTM network consists of five groundwater monitoring wells as shown on Figure 2. The LTM network is analyzed quarterly for NYSDEC Part 360 routine parameters and annually for NYSDEC Part 360 baseline parameters and VOCs. Groundwater LTM data indicate various metals and leachate indicators remain above NYS Groundwater Standards at the Landfill 5 AOC. Since LTM sampling began at the Landfill 5 AOC, no VOCs or PCBs have been identified above NYS Groundwater Standards at any of the groundwater monitoring wells and the majority of the metal and leachate indicator exceedances at the wells were within one order of magnitude of their respective NYS Groundwater Standards. In addition, metal concentrations that exceeded the standards at downgradient monitoring wells (excluding magnesium) were similar to the concentrations reported at upgradient monitoring well LF5MW-1A.
- The landfill has been capped, thereby removing direct contact exposures to the public. The remedial actions, which included placement of additional landfill cover materials and grading the landfill to reduce rain and surface water infiltration and the migration of contaminated soil, have satisfied the RAOs. In addition, the cover is expected to reduce leachate generation, which in turn will reduce the potential for transporting contaminants from the landfill to the creek via groundwater.

Surface Water Quality

- Surface water at the Landfill 5 is being monitored in accordance with the approved LTM Plan. In February 2003, quarterly LTM sampling began. The current LTM network consists of the collection of three surface water samples as shown on Figure 2. Benzene exceedances were reported at two of the three surface water sampling locations during the February 2003 and March 2004 sampling rounds. As was noted in previous reports, based on the absence of similar contamination in groundwater downgradient of Landfill 5, the benzene detection in Three Mile Creek is likely from another source (e.g., parkway drainage discharges into the creek) and not Landfill 5.

3.4.4 Protection of Human Health and the Environment. The presumptive remedy implemented at Landfill 5 has reduced the risks posed to human health and the environment by eliminating, reducing, or controlling exposure to human and

environmental receptors through engineering controls, institutional controls, and monitoring.

Specifically, this has been accomplished through:

- Grading the landfill to promote surface water drainage and minimize infiltration;
- Covering the landfill with low-permeability soils and topsoil to reduce water infiltration and reduce receptor exposure to contaminants by reducing leachate generation and potential transportation of contaminants from the landfill to the creek via groundwater migration;
- Placement of additional landfill cover materials to eliminate the possibility of human exposure to contaminated soils;
- Implementation of institutional controls to provide adequate protection from exposure to groundwater by limiting the future use of the landfill (see Section 2.2); and
- Conducting LTM to ensure that the remedial action is continuing to operate properly and successfully.

3.5 Enforceability

Griffiss AFB was placed on the National Priorities List on July 15, 1987. On August 21, 1990, the Air Force, EPA, and NYSDEC entered into a Federal Facility Agreement (FFA) under Section 120 of CERCLA. Both the EPA and NYSDEC have been continuously involved in the enforcement of remedial actions undertaken at the former Griffiss AFB. The FFA provides the enforcement vehicle for continued action at the former Griffiss AFB, including all work associated with implementation and monitoring of remedial actions. Additionally, the Landfill 5 ROD is a vehicle of enforceability in itself. These two documents provide sufficient enforcement avenues to ensure actions are continued as necessary to achieve the Landfill 5 RAOs.

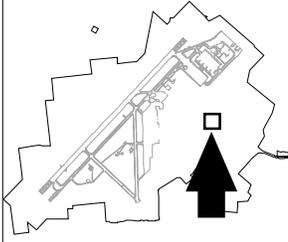
3.6 Technology Reliability and Uncertainty Analysis

Placement of a low-permeability soil cover is a standard presumptive remedy for closure of landfills and has been demonstrated to be effective for similar military landfills. Landfill 5 was covered in accordance with 6 NYCRR 360 regulations dated

April 1, 1987, as agreed upon by the EPA, NYSDEC, and the Air Force. At Landfill 5, the results from the first year of monitoring indicate that VOCs and PCBs are no longer appearing in the groundwater, but leachate indicators are still fluctuating in both the groundwater and surface water. Therefore, monitoring will continue to be conducted to verify a decrease in concentrations of contaminants of concern (COCs) and the effectiveness of the cover.

4.0 CONCLUSIONS

The Air Force concludes that the remedial actions at Landfill 5 are being properly implemented consistent with the provisions of CERCLA Section 120(h)(3) and that further monitoring will be needed to confirm successful reduction of COCs to below the NYS Groundwater and Surface Water Standards.



Landfill 5 Restrictions

- Wetland Area
- Landfill Boundary
- Roads
- Streams/Creeks
- Land Use Controls
- Ground Surface Elevation Contours (5-ft intervals, not shown)



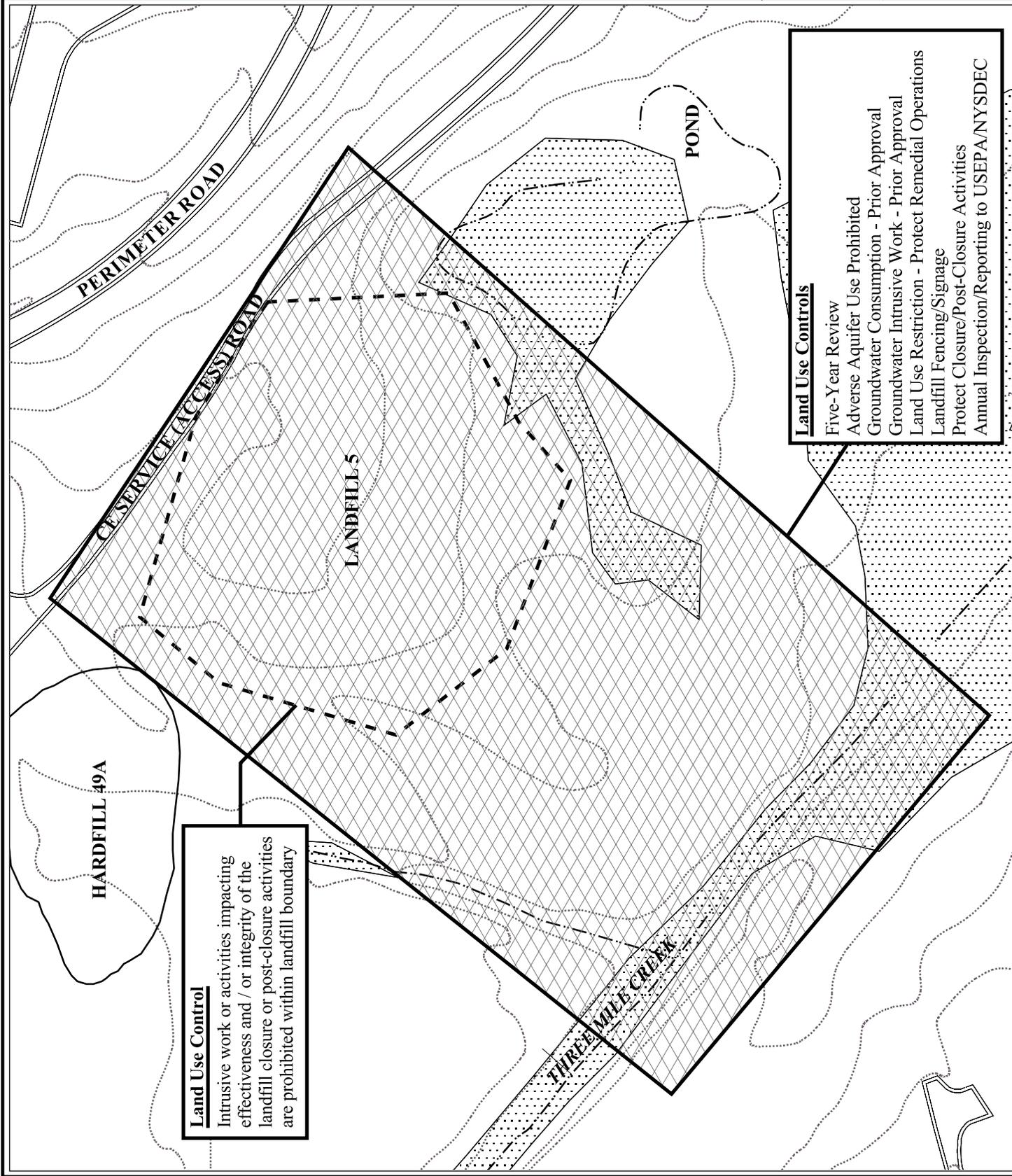
UNITED STATES AIR FORCE
GRIFFISS AIR FORCE BASE
ROME, NEW YORK

Figure 1 Landfill 5 Restrictions

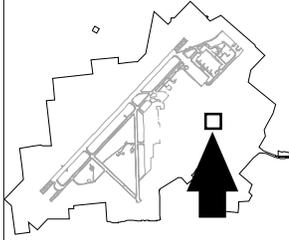
FPM group

Land Use Controls
 Five-Year Review
 Adverse Aquifer Use Prohibited
 Groundwater Consumption - Prior Approval
 Groundwater Intrusive Work - Prior Approval
 Land Use Restriction - Protect Remedial Operations
 Landfill Fencing/Signage
 Protect Closure/Post-Closure Activities
 Annual Inspection/Reporting to USEPA/NYSDEC

Land Use Control
 Intrusive work or activities impacting effectiveness and / or integrity of the landfill closure or post-closure activities are prohibited within landfill boundary



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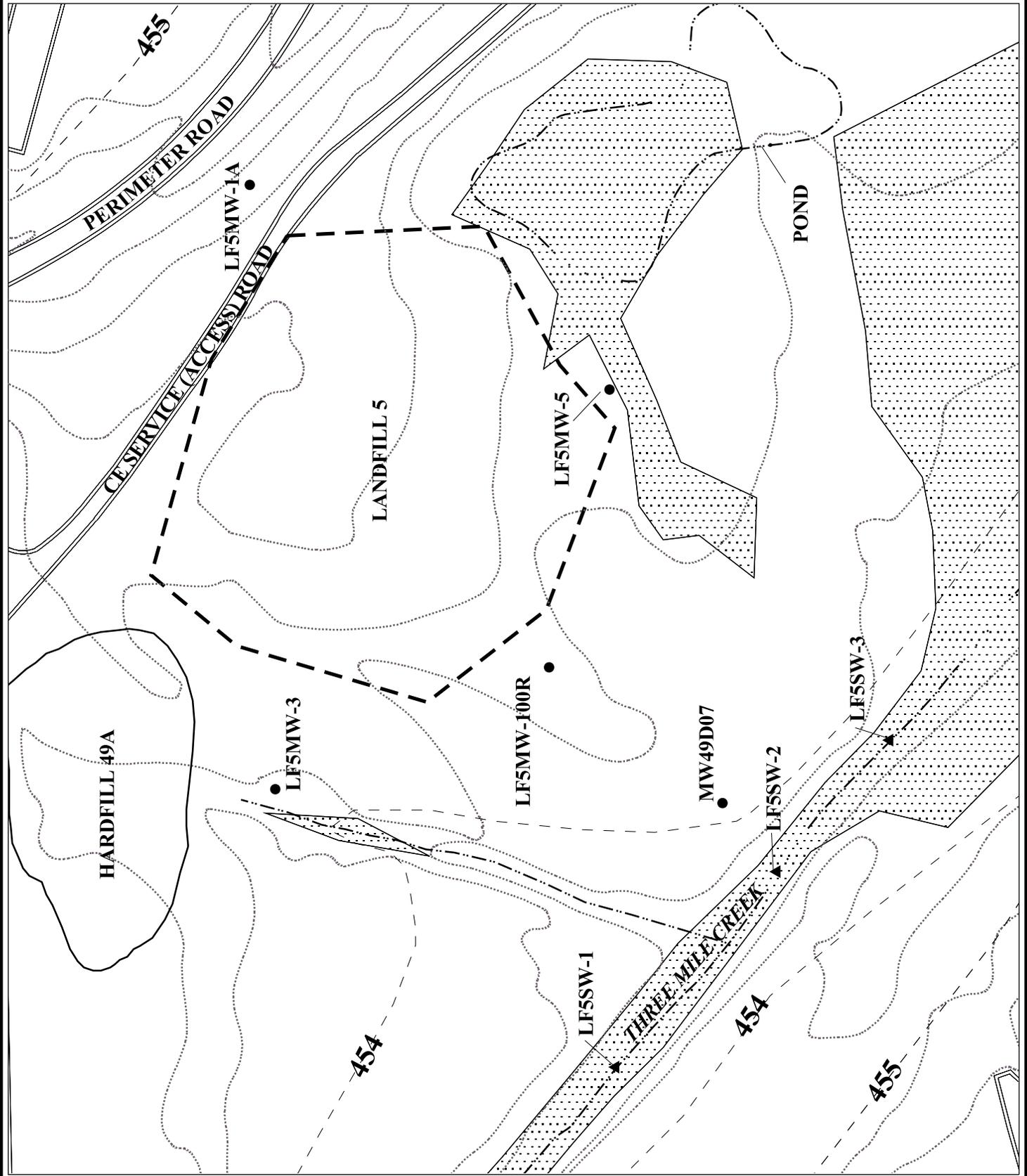
Landfill 5 LTM Network

- LTM Existing Well with ID & Dec.
- 1998 Well Water Level (optional)
- ▲ Surface Water Sampling Location and ID
- ▨ Wetland Area
- December 1998 5-ft Water Level Contour (ft MSL)
- - - Landfill Boundary
- == Roads
- ~ Streams/Creeks



Figure 2 Landfill 5 LTM Network

FPM group



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1.0 INTRODUCTION AND SITE BACKGROUND

The purpose of this report is to document the implementation of remedial actions for Landfill 7 at the former Griffiss Air Force Base (AFB).

1.1 Site History

Landfill 7 is an unlined landfill situated on approximately 10.7 acres in the east-central portion of the former base, between the main runway and Perimeter Road (see Figure 1). The landfill was capped in 1985 with an additional 6 inches of clay, and then covered by 6 inches of topsoil and seeded with grass. With the exception of the paved access drive to the observation point, the landfill is completely covered by grass. Landfill 7 was active from 1950 to 1954 and was the first landfill operated at the base. It reportedly received domestic refuse solid waste, unknown types of liquid wastes that may have included spent solvents and petroleum products, and miscellaneous wastes such as airplane parts. Wastes were burned in four trenches running parallel to the runway. Each trench measured 20 feet deep by 400 feet long by 50 to 60 feet wide. Liquid wastes were reportedly disposed of in small pits dug in the bottom of the trenches. Ponding occurred along the base of the landfill where the ground surface is below the elevation of a series of storm water catch basins situated between the runway and the landfill.

The site is located on a topographical high relative to the runway. The southern boundaries of the site were generally evident by topography; however, the remaining boundaries were not well defined and they were verified during construction and documented in the *Landfill 7 Cover Improvements Engineer's Certification Report* (Conti, 2003). Surface water features in the area of Landfill 7 include Six Mile Creek (SMC) and a SMC tributary that flows along the north side of the landfill. North of Landfill 7, SMC is diverted into an underground culvert, and the creek flows through this culvert as it passes to the southwest of the landfill. A tributary of SMC flows into this

culvert northwest of Landfill 7. Groundwater flow is generally to the southwest across the site. Runoff from the site flows into a low area to the south of the site. A storm drain running from southeast to northwest drains the area.

1.2 Characterization Results

Several investigations at Landfill 7 have been performed between 1981 and 1998 including initial site investigations; a remedial investigation (RI); an RI supplemental investigation (SI); and a landfill cover investigation.

Between 1981 and 1990, seven groundwater monitoring wells were installed in the vicinity of Landfill 7. The monitoring wells were sampled after well development and also during quarterly groundwater sampling in 1992 and 1993. Analytical results indicated the presence of volatile organic compounds (VOCs), metals, total organic carbon, pesticides, glycols, oil and grease.

In 1991, sampling and analysis of soil, sediment, and surface water from the tributary of SMC that flows north of Landfill 7 indicated the presence of VOCs, pesticides, and metals in the surface water; and semivolatile organic compounds (SVOCs), methylene chloride, pesticides, and metals in the creek bank soil and sediment.

The RI was performed in 1994 and included a geophysical survey (magnetometry and ground-penetrating radar [GPR]); a passive soil gas survey; and sampling and analysis of surface soil, groundwater, surface water, and sediment. The RI GPR survey indicated the presence of four major trenches and several smaller discrete anomalous areas. The passive soil gas survey indicated the presence of VOC emissions in several locations in the southern area of the landfill.

Analysis of surface soil samples collected during the RI indicated the presence of SVOCs, pesticides, metals, and petroleum hydrocarbons. The concentrations of one SVOC, one pesticide, and one metal exceeded the most stringent surface soil criteria (see Table 1 in the Landfill 7 Area of Concern [AOC] Record of Decision [ROD]).

Analysis of the surface water samples indicated the presence of VOCs, pesticides, metals, glycols, and petroleum hydrocarbons. The concentrations of three SVOCs and four metals exceeded the most stringent criteria for surface water (see Table 2 in the Landfill 7 AOC ROD).

Analysis of groundwater samples collected during the RI indicated the presence of VOCs, SVOCs, pesticides, metals, glycols, dioxins/furans, and petroleum hydrocarbons. The concentrations of one VOC, three pesticides, and five metals exceeded the most stringent criteria for groundwater (see Table 3 in the Landfill 7 AOC ROD).

Analysis of the sediment samples indicated the presence of VOCs, SVOCs, pesticides, metals, cyanide, and petroleum hydrocarbons. The concentrations of nine SVOCs, nine pesticides, and eight metals exceeded the most stringent criteria for sediments (see Table 4 in the Landfill 7 AOC ROD).

The SI was performed in 1997 and included excavation of three test pits, sampling and analysis of two leachate/seep samples, installation and sampling of two temporary wells, and sampling and analysis of six existing wells. No drums were encountered during test pit excavation, therefore, no samples were collected from the test pits. The leachate results identified only iron and magnesium at concentrations exceeding the screening criteria for leachate. In the groundwater samples, the concentrations of five VOCs, including trichloroethene (TCE), exceeded the most stringent criteria.

Groundwater analytical results from the RI and SI indicated the presence of a narrow (approximately 500 feet wide and 600 feet long) TCE plume at this AOC. The plume is hydraulically isolated from potential future receptors.

A Landfill Cover Investigation performed in 1997 included the following tasks: historical records search, field survey, aerial photographic survey, auger investigation, permeability sample collection, and a hydrologic evaluation of landfill performance model analysis. The investigation further defined the areal extent of the landfill and the landfill boundary and revealed that the thickness of the existing landfill soil cover ranged from 1.2 to 4 feet.

During the wetland delineation confirmation performed in September 2001, the landfill soil cover was well established with mowed turf and there were no flowing seeps or staining of surficial sediments observed.

During the Long-Term Monitoring (LTM) Baseline Study (FPM, 2000), TCE was detected repeatedly in two wells (LF7MW-17 and LF7MW-22) during quarterly sampling at concentrations above the New York State Department of Environmental

Conservation (NYSDEC) groundwater standard. An elevated concentration of TCE was also found in wetland sample LF7WL-4 collected during the November 1999 quarterly sampling event. However, TCE was not detected in any of the temporary wells located downgradient of the storm drain. In addition to TCE, cis-1,2-dichloroethene (cis-1,2-DCE) was detected above the groundwater standard in well LF7MW-22 during one of the quarterly sampling events and near but below the standard during two of the sampling rounds. Wetland sample LF7WL-4 collected in November 1999 also contained an elevated level of cis-1,2-DCE. The detected cis-1,2-DCE levels are strongly indicative of ongoing biodegradation.

The LTM Baseline Study reported arsenic, iron, and manganese at concentrations exceeding applicable or relevant and appropriate requirements (ARARs) in an upgradient well during two sampling rounds. Iron and manganese were detected at levels exceeding ARARs in every well sampled during at least one of the rounds, including another upgradient well twice. The study reported that these elevated concentrations partly reflected background conditions and that the increasingly anoxic conditions with depth at the temporary well sites downgradient of the storm drain indicate that the landfill leachate plume has deepened as it has flowed into the area. There were no contaminants of concern (COCs) in bedrock monitoring well LF7MW-100. The study also reported that the water levels measured in three temporary wells in the storm drain area were higher than those measured in the wells immediately to the northeast, adjacent to the storm drain. Based on this information, it was concluded that some of the shallow flow from the landfill is intercepted by the storm drain and does not primarily migrate under the runway area. The SI reported that the 30-inch storm drain was below the water table and continuously flowing, which also supports the concept that shallow groundwater may be discharging into the storm drain. Water quality interpretations of landfill leachate concluded that there is also a deeper flow component, which flows beneath the storm drain to the southwest toward Six Mile Creek.

The LTM Baseline Study concluded that based on a comparison between alkalinity, hardness, and total dissolved solids, a continuous plume originates from the landfill area and attenuates in the area of the 30-inch storm drain. Landfill leachate

indicators implied that the leachate plume is located northwest of well LF7MW-23 (in the vicinity of LF7MW-22; see Figure 2).

Additional details on the site characterization and investigation results for Landfill 7 can be found in the draft-final *Remedial Investigation Report* (Law Environmental [Law], 1996); final *Supplemental Investigation Report* (Ecology and Environment [E&E], 1998); *Landfill Cover Investigation Report* (Law 1998); draft-final *Design Analysis Report for Landfill 7 Cover* (E&E, 1999); *Baseline Study Report, AOC Long-Term Monitoring Baseline Study* (FPM, 2000); final *Long-Term Monitoring Work Plan, Landfill 7 Area of Concern* (FPM, 2002), and the *Long Term Monitoring Report for Landfills 1, 2/3, 4, 5, and 7 AOCs* (FPM, 2005).

2.0 REAL ESTATE ISSUES

2.1 Property Proposed for Transfer

This document will be used in conjunction with the preparation and submission of a Finding of Suitability to Transfer (FOST), as required in Section 120(h) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). A complete description of the Landfill 7 AOC can be found in the Landfill 7 ROD.

2.2 Institutional Controls/Deed Restrictions

CERCLA Section 120(h)(3) requires that deeds transferring property where hazardous substances had been stored, released or disposed of, shall contain a covenant warranting that: “all remedial action necessary to protect human health and the environment with respect to any [hazardous] substance remaining on the property has been taken before the date of such transfer.” CERCLA Section 120(h)(3) was amended in October 1992 to add language stating that all necessary actions have been taken “if the construction and installation of an approved remedial design has been completed and the remedy has been demonstrated to the [EPA] Administrator to be operating properly and successfully.”

Institutional controls in the form of deed restrictions and signage will be implemented and enforced during the 30-year post-closure maintenance period. Through deed restrictions, the property owner is restricted as follows:

- Groundwater extraction/ utilization/consumption by any current or future landowner within the groundwater restriction area (see Figure 1) will not be permitted without prior testing and written approval from the New York State Department of Health (NYSDOH).
- Activities that disrupt or interfere with the post-closure activities will not be permitted.
- Intrusive work within the groundwater restriction area will not be permitted without prior written approval from the Air Force Real Property Agency (Air Force), New York State Department of Environmental Conservation (NYSDEC), and United States Environmental Protection Agency (EPA).
- Intrusive work or other activities that impact the effectiveness or integrity of the landfill closure, or effectiveness of post-closure activities will not be allowed within the restricted landfill boundary.

Signs erected during closure construction will serve to minimize the potential for interference with closure and post-closure activities. Signs have been posted along the landfill property boundary that read “SOLID WASTE LANDFILL - CONTAINS HAZARDOUS SUBSTANCES - NO TRESPASSING.”

Each identified institutional control will specify the restriction imposed on the property, and how such a restriction will be implemented, monitored, and later enforced if a violation occurs.

2.3 Adjacent Properties

The landfill is located along the runway. Surface water eventually drains to SMC. Jurisdictional wetlands and New York state-regulated wetlands are present along the area between the toe of the landfill and the runway on the west side of the landfill. An open wet-meadow wetland adjacent to and to the southeast of the site is considered a special interest area in the New York Natural Heritage Program. Adjacent properties have not been affected by the remedial action at this site. Best management practices were incorporated into the closure for Landfill 7 to minimize erosion and prevent transport of fine-grained material downgradient into the wetland.

3.0 DOCUMENTATION OF REMEDIAL ACTION IMPLEMENTATION

3.1 Record of Decision

The Landfill 7 ROD was issued after a public comment period (February 7, 2000 to March 8, 2000). A public meeting on the proposed plan was held on February 23, 2000. The ROD was signed on June 5, 2000, by the Air Force and the EPA with concurrence from NYSDEC.

The Landfill 7 ROD presented the following remedial action objectives (RAOs) to address existing and future potential threats posed by Landfill 7:

- Consolidation of various debris and waste areas into the main landfill boundary in order to reduce the area to be capped and the potential for nearby wildlife and human populations to be exposed to the landfill mass;
- Reduce infiltration of rainwater and snowmelt water through the landfill mass in order to minimize the potential for leachate generation and groundwater contamination;
- Monitoring the groundwater and stream environment (which may include, but is not necessarily limited to, sediment, surface water, and biota) downgradient of the site; and
- Implementation of institutional controls in the form of deed restrictions of the main landfill boundary to prohibit use of the area and groundwater.

To address the RAOs listed above, the presumptive remedy (i.e., preferred alternative) in the Landfill 7 ROD called for:

- Installation of a low-permeability soil cover in accordance with 6 NYCRR Part 360 landfill closure regulations, dated April 1, 1987.
- Long-term monitoring of groundwater and surface water in accordance with the Air Force's LTM Program.

The Landfill 7 presumptive remedy components relative to the implementation of remedial action include:

- Placing a minimum of 18 inches of low-permeability soil and 6 inches of topsoil over the entire landfill surface to reduce the amount of water

infiltration through the landfill. The soil is specified to have a hydraulic conductivity value of 10^{-5} cm/sec or less;

- Maintenance of the cover;
- Implementation of an LTM program at the site for the groundwater and stream environment; the groundwater will be monitored in accordance with the Air Force's LTM Program and the stream environment will be monitored in accordance with a plan prepared for the SMC AOC; both plans have been reviewed and approved by the EPA and NYSDEC;
- Monitoring the groundwater and stream environment downgradient of the site to evaluate the effectiveness of the presumptive remedy;
- Implementation of institutional controls in the form of deed restrictions of the main landfill boundary and groundwater to prohibit use of the area and groundwater, and to ensure the cap is not damaged and the area is maintained as a landfill; and
- Evaluation of site conditions at least once every five years to ensure that the remedy is protective of human health and the environment.

The placement and grading of the new low-permeability soil cover minimizes contact by human and wildlife populations to contaminants in the landfill by blocking or restricting the routes of exposure. The placement and grading of the new low-permeability soil cover minimizes infiltration of rain and snowmelt water into the landfill waste. The implementation of the LTM Program allows for the continued evaluation and effectiveness of the remedial actions at Landfill 7.

Contaminant concentrations in the groundwater will not immediately comply with the groundwater ARARs under the presumptive remedy. However, the institutional controls will restrict the ingestion of groundwater, which is the only pathway that poses a potential risk to human health from the landfill waste. In addition, the TCE plume, which contains TCE in concentrations that exceed the most stringent criteria, appears to be hydraulically isolated from potential future receptors and will be monitored to assure that there is no further contaminant migration and that groundwater standards will be achieved over time.

3.2 Remedial Design

The final design of the Landfill 7 remedial action was issued in March 2002 with revisions issued in May and July 2002. Details of the remedial design are presented in the *Landfill 7 Cover Improvements at the Former Griffiss Air Force Base, Rome, New York, Closure Plan* (United States Army Corps of Engineers [USACE], 2002).

3.3 Remedial Action Construction

Conti Environmental, Inc. (Conti) was issued a notice to proceed on April 23, 2002. In March 2002, final versions of the Landfill 7 Closure Plan, Project Work Plan, Site Safety and Health Plan, Contractor Quality Control Plan (CQCP), and Sampling and Analysis Plan were submitted to USACE and subsequently approved by EPA and NYSDEC. USACE personnel conducted oversight of construction activities throughout the Landfill 7 remedial construction to help ensure that the CQCP was followed and the work was performed in accordance with the design.

Actual fieldwork was initiated on May 13, 2002, with site preparation activities including mowing, removal of asphalt, installation of a silt fence along the perimeter of the landfill, and construction of a stabilized construction entrance and decontamination pad. Other site preparation activities included abandonment of monitoring wells and implementation of erosion and sedimentation controls. The existing landfill surface was graded, borrow soils were placed, and the subgrade was prepared to match the final designed contours and slopes. An existing transformer pad was relocated to the north of the landfill and the existing underground lines were abandoned in place. Existing swales were modified during final cover installation and an existing culvert was removed, the area was re-graded, and a new culvert was installed. A minor landfill boundary adjustment was performed during the cap construction.

Approximately 47,346 cubic yards of low-permeability soil were placed in an 18-inch thick layer. Six inches of topsoil were placed over the low-permeability soil layer for an approximate total volume of 15,494 cubic yards. A wildlife-friendly seed mix, also suitable for erosion control, was planted in the topsoil. No drums were encountered during the operations. Closure action did not affect the wetland area and best management practices were incorporated to minimize erosion and prevent transport of

fine-grained material downgradient into the wetland. After completion of cover improvement work, signs and elevation benchmarks were installed as specified in the design.

The Landfill 7 cover improvement was substantially completed and inspected by the USACE and the Air Force on October 30, 2002. Documentation of remedial construction activities is provided in the *Landfill 7 Cover Improvements Engineer's Certification Report* (Conti, 2003). This report was reviewed and approved by the EPA and NYSDEC. Final inspection of the landfill was conducted in September 2003, after the vegetative cover was fully established. Documentation of this inspection is provided as the first quarterly cover inspection during the operations and maintenance (O&M) period, which is reported in the *Long Term Monitoring Report for Landfills 1, 2/3, 4, 5, and 7 AOCs* (FPM, 2005).

3.4 Remedial Action Performance

3.4.1 Operations and Maintenance. *The Landfill 7 Post-Closure Operations and Maintenance Manual* (Conti, September 2003) provides a guide to the landfill owners for maintenance and facility monitoring for a period of 30 years. The manual fulfills NYSDEC's requirements for post-closure operations and maintenance for closed solid waste landfills (6 NYCRR Part 360-2.15[k]).

In accordance with the O&M Manual, periodic inspections of the landfill are being performed. During the first year after final inspection of the construction, quarterly inspections of the landfill cover and inspections following major rainfall events have been performed to ensure that the final landfill cover materials, site drainage swales, and on-site monitoring wells are maintained and functioning within the design standards. The property has also been inspected to ensure compliance with institutional control measures. A checklist is utilized to facilitate and standardize post-closure inspections. Contingency maintenance measures are performed if any deficiencies are encountered during these inspections, and the AFRPA is notified if unauthorized activity is observed on the landfill property. Post-closure inspection activities at Landfill 7 include:

- Soil cover integrity is inspected for holes, rifts, ruts, washouts or similar damage;
- The vegetative cover and grass-lined swales are inspected for proper establishment, thickness of growth, and signs of stress or disturbance due to erosion;
- The landfill is inspected for leachate breakouts;
- Slopes and the top surface of the landfill are inspected for major deviations from as-built grades and any areas of significant surface water ponding;
- The monitoring wells are inspected for integrity and damage to the surface protective casings;
- The landfill surface is inspected for the presence of intrusive animals such as groundhogs; and
- To ensure compliance with institutional control measures, the landfill property is inspected for any evidence of activities, such as construction activities, that have not been approved by NYSDEC, EPA, and the Air Force; and signs and support structures are inspected for damage or wear.

Landfill maintenance activities include grass mowing and any contingency maintenance measures required as a result of the above inspections. The O&M Manual specifies two mowings in the first year (one in late spring/early summer and one after September 1st), and one mowing after September 1st every year thereafter, which allows for grass germination and full coverage development, and helps to preserve avian habitats. Mowings have been performed at Landfill 7 as specified in the O&M manual. No contingency maintenance was performed during 2003.

Annual baseline and quarterly routine monitoring is being performed on groundwater and surface water for a minimum period of five years (see Section 3.4.2). Records are maintained of all site inspections, sampling events, and any contingency maintenance measures. The O&M Contractor prepares environmental monitoring reports and annual summary reports outlining the previous year's monitoring and maintenance activities. Site conditions will be evaluated every five years to ensure that the remedy is protective of human health and the environment. Alterations to the frequency and

duration of the landfill inspections and environmental monitoring may be sought at any time and are subject to the approval of EPA and NYSDEC.

3.4.2 Environmental Monitoring. The LTM program for Landfill 7 groundwater is outlined in the final *Long-Term Monitoring Work Plan, Landfill 7 Area of Concern* (FPM, March 2002). The monitoring results through September 2004 are provided in the *Long Term Monitoring Report for Landfills 1, 2/3, 4, 5, and 7 AOCs* (FPM, 2005). Environmental monitoring and summary reports are prepared annually.

Groundwater

Baseline monitoring for VOCs, metals (including mercury), cyanide, and landfill leachate indicators was conducted at eight wells (existing wells LF7MW-22, LF7MW-23, and LF7MW-100 and new wells LF7MW-26, LF7MW-27, LF7MW-28, LF7MW-29, and LF7MW-30). Quarterly sampling is conducted from all the baseline wells to evaluate spatial and short-term variability of contaminant concentrations. Samples are analyzed for the routine and baseline parameters defined in Section 3.1.6 of the *Long-Term Monitoring Work Plan, Landfill 7 Area of Concern* (FPM, March 2002) which is based on 6 NYCRR Part 360, Subpart 2. Water level measurements are collected at the monitoring wells to assess groundwater elevations and flow directions.

A summary of the groundwater monitoring parameters and prescribed analytical methodologies, as specified in the LTM Plan, is provided below.

<u>Parameter</u>	<u>EPA (or other) Method</u>
Static Water Level	Field Measurement
Electrical Conductivity	Field Measurement
Temperature	Field Measurement
pH	Field Measurement
Dissolved Oxygen	Field Measurement
Oxidative Reduction Potential	Field Measurement
Turbidity	Field Measurement
VOCs (COCs: TCE, DCE, vinyl chloride)	8260B (COCs only for quarterly)
Metals (except Mercury)	6010B
Mercury	SW-846 (baseline and first quarter only)

<u>Parameter</u>	<u>EPA (or other) Method</u>
Cyanide	9010B (baseline and first quarter only)
Anions	9056
Total Kjeldahl Nitrogen	351.3
Ammonia	350.2
Chemical Oxygen Demand	5220C
Biochemical Oxygen Demand	5210B
Total Organic Carbon	9060
Total Dissolved Solids	160.1
Alkalinity	310.1
Phenols	9065
Total Hardness as CaCO ₃	130.2
Color	110.2 (baseline and first quarter only)
Boron	6010B (baseline and first quarter only)

Surface Water

Baseline monitoring for VOCs, metals (including mercury), cyanide, and landfill leachate indicators was conducted at two surface water/leachate locations (LF7WL-3 and LF7WL-4). Quarterly sampling is conducted at the same two locations. The samples are analyzed for the same parameters as the groundwater samples (see above table) to determine the water quality in the adjacent wetlands. The results are compared to baseline conditions prior to construction of additional landfill cover to see if the landfill is influencing the water quality in the wetlands.

Leachate

No leachate has been noted. Quarterly landfill inspections will include observation and documentation of leachate outbreaks. If leachate is present, samples will be collected and analyzed for the same parameters as the groundwater samples.

Landfill Gas

Gas monitoring was performed prior to construction of the landfill cap and gas generation from the landfill was deemed insignificant, therefore, no gas monitoring is planned.

3.4.3 Remedy Performance. The key to documenting remedy implementation is the evaluation of remedy performance as it relates to applicable RAOs presented in the ROD. More than one year of O&M and LTM quarterly sampling has been completed for Landfill 7. The quarterly reports are provided in the *Long Term Monitoring Report for Landfills 1, 2/3, 4, 5, and 7 AOCs* (FPM, 2005). Because this monitoring is a continuance of the monitoring started during the remedial construction period, the quarterly reports start in the first quarter of 2003, after substantial completion of the remedial construction. An evaluation of the Landfill 7 presumptive remedy activities is provided below.

Landfill 7 Soil and Solid Waste

- The placement of low-permeability cover soil and topsoil was completed in October 2002. The additional cover soil reduces infiltration of rainwater and snowmelt water through the landfill and minimizes the potential for leachate generation and groundwater contamination. The potential for nearby wildlife and human populations to be exposed to the landfill has also been reduced by this measure. Thus, this action of the presumptive remedy satisfies the RAOs established for Landfill 7.

Groundwater Quality

- Groundwater at the Landfill 7 is being monitored in accordance with the approved LTM Plan. In February 2003, quarterly LTM sampling began. The current LTM network consists of eight groundwater monitoring wells as shown on Figure 2. The LTM network is analyzed quarterly for NYSDEC Part 360 routine parameters and annually for NYSDEC Part 360 baseline parameters and VOCs. Groundwater LTM data indicate that various VOCs, metals, and leachate indicators remain above NYS Groundwater Standards at the Landfill 7 AOC. As noted in the previous investigations, a TCE plume exists at Landfill 7. The TCE plume extrapolated from the June 2004 groundwater data indicates that the plume has decreased in size when compared to the plumes from the SI and Baseline Study. The lack of TCE detections, along with no leachate indicator exceedances at the point of compliance (POC) monitoring well LF7MW-28, suggests that the TCE plume has not advanced past the 24/30-inch storm drain at the toe of Landfill 7 and is likely intercepted by the drain. This does not currently pose a concern. Surface water in the storm drain will continue to be monitored under the Six Mile Creek AOC LTM program. The presence of elevated iron and manganese concentrations, along with elevated concentrations of alkalinity at monitoring wells within the plume, suggests that the solubilization of iron is

occurring at Landfill 7 and is likely the result of ongoing anaerobic biodegradation.

- The landfill has been capped removing direct contact exposures to the public. The remedial actions of placing additional landfill cover materials and grading the landfill to reduce the migration of contaminated soil and rain and surface water infiltration have satisfied the RAOs. In addition, the cover is expected to reduce leachate generation, which in turn will reduce the potential for transporting contaminants from the landfill to the creek via groundwater.

Surface Water Quality

- Wetland surface water at Landfill 7 is being monitored in accordance with the approved LTM Plan. In February 2003, quarterly LTM sampling began. The current LTM network consists of the collection of two wetland surface water samples as shown on Figure 2. The sampling data indicates that the surface water quality parameters (metals) are fluctuating, which are likely the result of seasonal conditions. Field notes confirm that the sampling events with higher metal concentrations were collected from shallow pools of water that exhibited high suspended solids content.

3.4.4 Protection of Human Health and the Environment. The presumptive remedy implemented at Landfill 7 has reduced the risks posed to human health and the environment by eliminating, reducing, or controlling exposure to human and environmental receptors through engineering controls, institutional controls, and monitoring.

Specifically, this has been accomplished through:

- Grading the landfill to promote surface water drainage and minimize infiltration;
- Covering the landfill with low-permeability soils and topsoil to reduce water infiltration and reduce receptor exposure to contaminants by reducing leachate generation and potential transportation of contaminants from the landfill to the creek via groundwater migration;
- Placement of additional landfill cover materials to eliminate the possibility of human exposure to contaminated soils;
- Implementation of institutional controls to provide adequate protection from exposure to groundwater by limiting the future use of the landfill (see Section 2.2).

- Monitoring of the TCE plume: The TCE plume appears to be hydraulically isolated from potential future receptors and the first year of monitoring indicates that after initially increasing, it now seems to be reducing in concentration and size. Further monitoring will be needed to confirm a continued decrease in size and concentration; and
- Conducting LTM to ensure that the remedial action is continuing to operate properly and successfully.

3.5 Enforceability

Griffiss AFB was placed on the National Priorities List on July 15, 1987. On August 21, 1990, the Air Force, EPA, and NYSDEC entered into a Federal Facility Agreement (FFA) under Section 120 of CERCLA. Both the EPA and NYSDEC have been continuously involved in the enforcement of remedial actions undertaken at the former Griffiss AFB. The FFA provides the enforcement vehicle for continued action at the former Griffiss AFB, including all work associated with implementation and monitoring of remedial actions. Additionally, the Landfill 7 ROD is a vehicle of enforceability in itself. These two documents provide sufficient enforcement avenues to ensure actions are continued as necessary to achieve the Landfill 7 RAOs.

3.6 Technology Reliability and Uncertainty Analysis

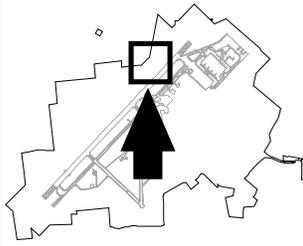
Placement of a low-permeability soil cover is a standard presumptive remedy for closure of landfills and has been demonstrated to be effective for similar military landfills. Landfill 7 was covered in accordance with 6 NYCRR 360 regulations dated April 1, 1987, as agreed upon by the EPA, NYSDEC, and the Air Force. The additional cover soil and grading have been shown to be effective in protecting human health and the environment in the past. Early indications are that the TCE plume at Landfill 7 has begun to shrink in size and decrease in concentration and it is expected that the metals and other COCs will follow suit. Continued monitoring will be needed to verify this decrease and the effectiveness of the soil cover.

4.0 CONCLUSIONS

The Air Force concludes that the remedial actions at Landfill 7 are being properly implemented consistent with the provisions of CERCLA, Section 120(h)(3) and that

further monitoring will be needed to confirm successful reduction of COCs to below the NYS Groundwater and Surface Water Standards.

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Landfill 7 Restrictions

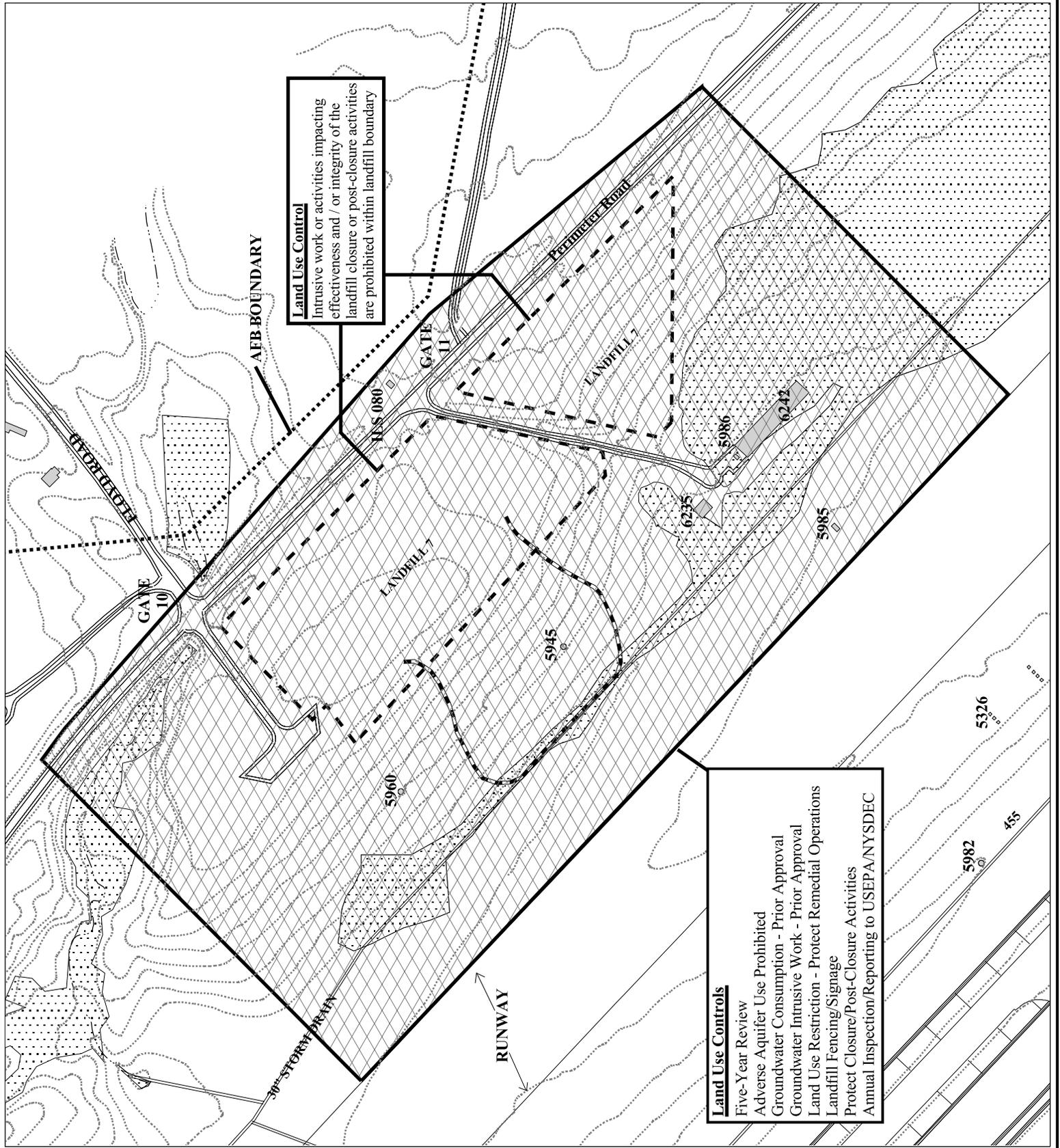
- Ground Surface
- Elevation Contours (5-ft intervals, not shown)
- 5 ppb Groundwater Plume Contour for TCE (from 1999 Data and SI, 1998)
- 30" Storm Drain
- Streams/Creeks
- Roads
- AFB Boundary
- Landfill Boundary
- Buildings
- Wetland Area
- Land Use Controls

100 0 100 Feet

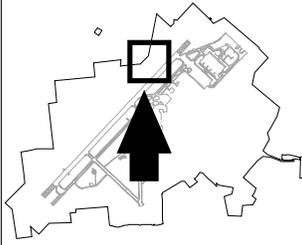


Figure 1
Landfill 7
Restrictions

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Landfill 7 LTM Network 20

LTM Existing Well ID & Dec. '98
Water Level (optional) (ft MSL)

5 ppb Groundwater Plume
Contour for TCE (from 1999
Data and SI, 1998)

Surface-Water Sampling
Location and ID

30" Storm Drain

Streams/Creeks

December 1998 5-ft Water-
Level Contour (ft MSL)

Roads

Landfill Boundary

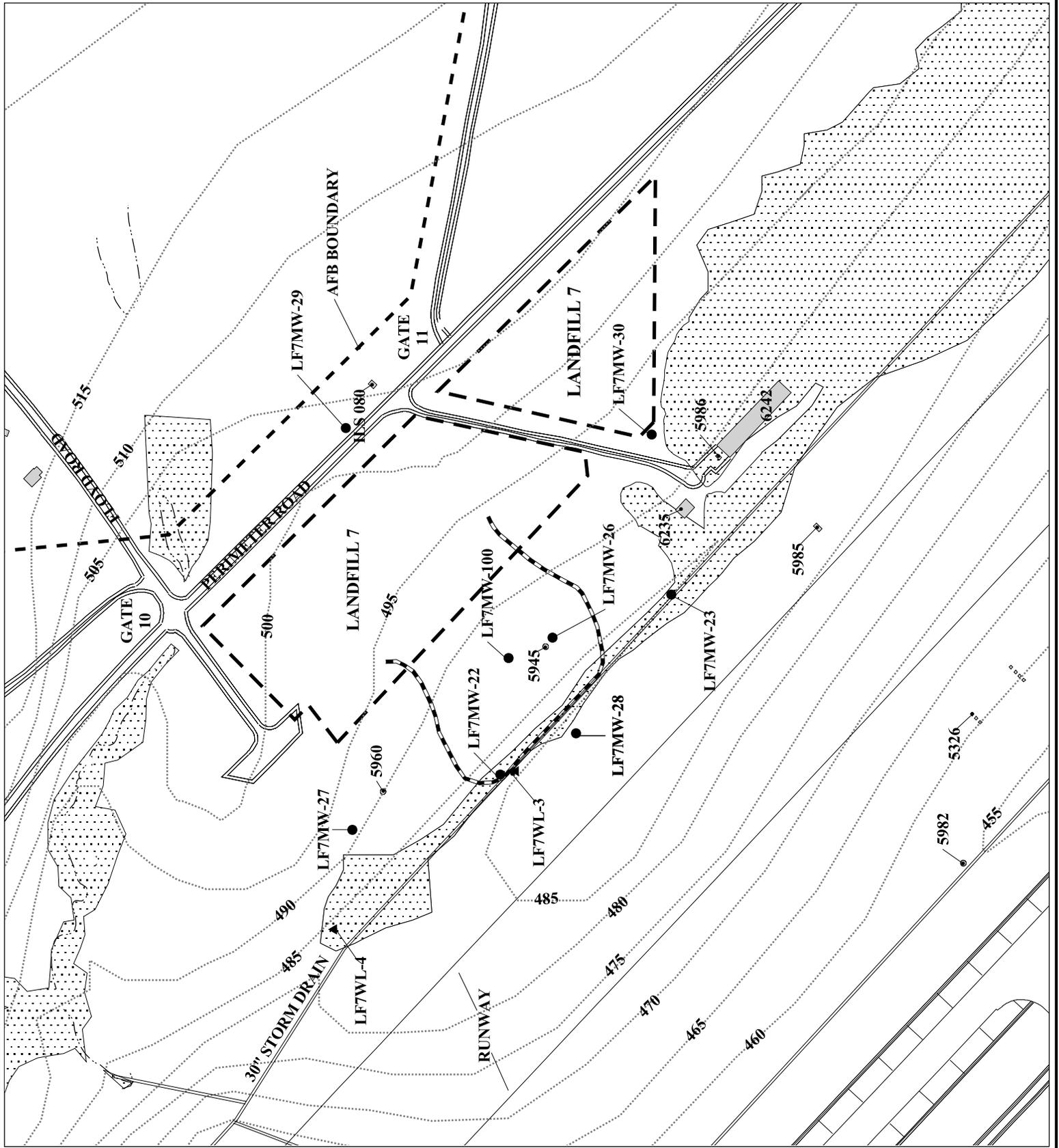
Buildings

Wetland Area



Figure 2 Landfill 7 LTM Network

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