FINAL

REMOVAL ACTION COMPLETION REPORT

FORMER MARKLEY SMALL ARMS FIRING RANGE

FORMER FORT DEVENS ARMY INSTALLATION, DEVENS, MA

MAY 2013

Prepared for:
US Army Corp of Engineers
New England District
Concord, Massachusetts

Prepared by:
Sovereign Consulting Inc.
Contract No.: W912WJ-10-D-0003
Delivery Order: 0007

SOVEREIGN CONSULTING INC.

DRAFT FINAL

REMOVAL ACTION COMPLETION REPORT

FORMER MARKLEY SMALL ARMS FIRING RANGE

FORMER FORT DEVENS ARMY INSTALLATION, DEVENS, MA

MARCH 2013

Prepared for:
US Army Corp of Engineers
New England District
Concord, Massachusetts

Prepared by:
Sovereign Consulting Inc.
Contract No.: W912WJ-10-D-0003
Delivery Order: 0007

NOTICE

The United States Department of Defense, Department of Army, funded wholly or in part the preparation of this document and work described herein under Contract No. W912WJ-10-D-0003 and Delivery Order 0007. Mention of trade names or commercial products does not constitute endorsement or recommendation for use.

Removal Action Completion Report
Former Markley Small Arms Firing Range

DRAFT FINAL

Devens, Massachusetts

March 2013

CERTIFICATION:

I hereby certify that the enclosed Report, shown and marked in this submittal, is that proposed to be incorporated with Contract Number W912WJ-10-D-0003 DO#0007. This Document has been prepared in accordance with USACE Scope of Work and is hereby submitted for Government Approval.

Reviewed By:

3/8/13

Sovereign Project Manager **Date**

3/8/13

Sovereign Quality Control Manager **Date**

Received By:

USACE Project Manager **Date**

Removal Action Completion Report
Former Markley Small Arms Firing Range

FINAL

Devens, Massachusetts

May 2013

CERTIFICATION:

I hereby certify that the enclosed Report, shown and marked in this submittal, is that proposed to be incorporated with Contract Number W912WJ-10-D-0003 DO#0007. This Document has been prepared in accordance with USACE Scope of Work and is hereby submitted for Government Approval.

Reviewed By:

5/1/13

Sovereign Project Manager — Date

5/1/13

Sovereign Quality Control Manager — Date

Received By:

USACE Project Manager — Date

TABLE OF CONTENTS

List of Figures

Tables

Attachments

ABBREVIATIONS, ACRONYMS, AND SYMBOLS

AHA	Activity Hazard Analysis
ALM	Adult Lead Model
AM	Action Memorandum
Alpha	Alpha Laboratories
Army	U.S. Army
ASR	Archives Search Report
BAR	Browning Automatic Rifle
BCT	Base Closure Team
bgs	below ground surface
BRAC	Base Realignment and Closure
BTAG	Biological Technical Advisory Group
COPC	Contaminant of Potential Concern
COPEC	Contaminant of Potential Environmental Concern
CQCP	Contractor Quality Control Plan
CSM	Conceptual Site Model
Fort Devens	former Fort Devens
DEC	Devens Enterprise Commission
DOD	Department of Defense
DOT	Department of Transportation
DQO(s)	Data Quality Objectives
DU	Decision Unit
E&E	Ecology & Environment
EcoSSL	Ecological Soil Screening Levels
ft	feet
HGL	HydroGeologic, Inc.
IEUBK	Integrated Exposure-Uptake Biokinetic Model
ISM	Incremental Sampling Method
IDW	investigation-derived wastes
Keating	P.J. Keating Company
LOAEL	lowest observed adverse effects levels
LOQ	Limit of Quantitation
MA	Massachusetts
Markley Range	former Markley Small Arms Firing Range
MassDEP	Massachusetts Department of Environmental Protection
MassDevelopment	Massachusetts Development and Finance Agency
MCP	Massachusetts Contingency Plan
MC	Munitions Constituent
mg/kg	milligram per kilogram
MI	Michigan
MS/MSD	Matrix Spike/Matrix Spike Duplicate
NH	New Hampshire
Nobis	Nobis Engineering, Inc.
NFA	No Further Action
PACE	People of Ayer Concerned About the Environment
PAL	Project Action Level
PCB	polychlorinated biphenyl
QA/QC	Quality Assurance/Quality Control
RAB	Restoration Advisory Board

RACR	Removal Action Completion Report
RAWP	Removal Action Work Plan
RCRA	Resource Conservation and Recovery Act
SOP(s)	Standard Operating Procedure
SOW	Statement of Work
Sovereign	Sovereign Consulting Inc.
SSHP	Site Safety and Health Plan
SVOC	semivolatile organic compound
SI	Site Inspection
TAL	Target Analyte List
TestAmerica	TestAmerica Laboratories, Inc.
TCLP	Toxicity Characteristic Leaching Procedure
UFP-QAPP	Uniform Federal Policy - Quality Assurance Project Plan
µg/dl	micrograms per deciliter
USACE	United States Army Corp of Engineers
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
UXO	Unexploded Ordinance
VOC	volatile organic compound
XRF	X-Ray Florescence technology

1.0 PROJECT DESCRIPTION

This Removal Action Completion Report (RACR) was prepared by Sovereign Consulting Inc. (Sovereign) to document remediation activities and summarize post-remediation conditions at the former Markley Small Arms Firing Range (Markley Range) at the former Fort Devens Army Installation (Fort Devens) located in Devens, Massachusetts (MA). A Site Location Map is provided as **Figure 1**. The actions described in this document were performed by Sovereign under United States Army Corps of Engineers (USACE) Contract W912WJ-10-D-0003 DO#0007. The primary project goal was to reduce concentrations of lead in soil at the South Berm (Decision Unit 1 (DU-1)) portion of the former range to below established Project Action Levels (PALs) in order to be protective of human health and the environment and prepare the Markley Range for eventual reuse or redevelopment into open space and/or recreational use.

Remedial actions at the site addressed lead-impacted soil removal as well as sediment and groundwater sampling to confirm the presence or absence of contaminants of potential concern (COPCs) and contaminants of potential environmental concern (COPECs) at the Markley Range. Identified COPCs and COPECs were further evaluated for potential risks to human and environmental receptors in a risk evaluation.

1.1 Site Background and Contaminants

Devens is located approximately 35 miles northwest of the city of Boston, within the towns of Ayer, Shirley (Middlesex County), Harvard and Lancaster (Worcester County) in the Commonwealth of MA (see **Figure 1**). Fort Devens was established in 1917 for military training and logistical support during World War I. Fort Devens became a permanent Base in 1931 and continued service until its Base Realignment and Closure (BRAC) Committee closure in 1996. Following the closure of the Base in March 1996, portions of the facility have been subject to property transfer to Massachusetts Development and Finance Agency (MassDevelopment) as part of closure activities. The Markley Range is located on property owned and managed by MassDevelopment and is currently zoned for open space/recreation use.

To the south, the Markley Range abuts the former Davao housing area, zoned innovation and technology business. Robbins Pond is located approximately 750 feet west of the site. The area located north of Markley Range, across Barnum Road, is zoned industrial and trade and is developed with a currently vacant distribution building and the 94th Regional Readiness Command (U.S. Army Reserves) (**Figure 2**).

The Markley Range is a former rifle and machine gun range that was operational from the 1920s through the 1940s, and possibly into the mid-1950s [HydroGeologic, Inc. (HGL), 2011]. A 1942 range location map from the 1995 Archives Search Report (ASR) identified the Markley Range as a "1000-Inch Rifle and Machine Gun Range," with target storage, observation and other support structures. Subsequent range maps (1950s era) identify the Markley Range as a 1000-inch Browning Automatic Rifle (BAR) and carbine range (HGL, 2011).

A review of historical aerial photographs for the years 1965, 1980, and 2007 was performed as part of the August 2011 *Final Site Inspection Report, Markley Range, Former Fort Devens Army Installation, Devens, Massachusetts*, prepared by HGL (HGL, 2011). This review indicated that the Markley Range may have been active in the early 1960s, due to ground scarring and the absence of vegetation observed in the 1965 aerial photograph; however, the construction of the Davao

housing area immediately downrange (south) of the Markley range in the early 1960s suggests the range was largely abandoned once the housing area was developed. Based on observations made of the 1980 and 2007 aerial photographs, HGL confirmed the likely firing line was located at the northern end of the range with a backstop at the southern end. The South Berm (DU-1) was historically a sandy former backstop/berm area at the southern end of the range which was removed at an unknown date (**Figure 3**).

Cold Spring Brook is located to the south and east of the former range, flowing generally to the northeast (**Figure 1**). Based on groundwater data collected by Sovereign in 2011, groundwater flows west to east in the vicinity of the Markley Range. To the south of the site, the terrain rises steeply in elevation. Local topography drains to the wetland to the east of the site. An overgrown and unimproved gravel road leads from Barnum Road to a partial clearing that represents the remnants of the Markley Range. The old access road then continues to the southeast along the wetland area located to the east. No buildings or structures remain at the site. The site is largely flat and forested at the perimeter (**Figures 3 and 4**).

In 2009 and 2010, HGL performed Site Inspection (SI) activities which included unexploded ordnance (UXO) clearance, establishing individual sample area DUs, collection of soil and sediment samples to confirm the presence or absence of munitions constituents (MC), evaluation of analytical results and identifying COPCs, performing cumulative human health and risk screening, and developing a Conceptual Site Model (CSM) for the Markley Range area to identify whether the Markley Range required a response action such as soil removal, or qualified for No Further Action (NFA) (HGL, 2011).

Shallow soil samples were collected in six (6) DUs (DU-1 through DU-6) across the Markley Range including the presumed berm areas (DU-1 and DU-2), the firing areas (DU-3 and DU-4), the down range area (DU-5), and the uphill area (DU-6) at multiple depth intervals up to 18 inches below grade (**Figure 3**). As part of an Incremental Sampling Method (ISM) approach (USACE, 2009), a systematic, random sampling grid was developed for each DU where 80 or more increments were collected between depths of 0 to 18 inches below grade and combined into one composite sample. For each DU, one (1) composite sample (1 kilogram or larger) was submitted for metals analysis and select samples from three (3) of the six (6) DUs (DU-3, DU-4, and DU-5) were submitted for explosives analysis. To assess additional ecological risk of grit ingestion by fowl, HGL conducted a lead fragment count analysis of samples collected from three (3) DUs (DU-1, DU-2, and DU-6) where lead shot would likely be found. One (1) sediment sample (MR-SD200-0409) was also collected from the wetland located to the east of the former range and analyzed for metals and explosives (**Figure 3**).

HGL conducted human health and ecological risk screenings to evaluate contaminants detected in investigation data and determine risk threshold values for each receptor. A human health risk screening value for lead in soil of 300 milligrams per kilogram (mg/kg) was established based on the Massachusetts Contingency Plan (MCP) S-1 soil standard for lead for unrestricted use of the property. Based on this screening value and a lead detection of 1,100 mg/kg at 16-18 inches below grade at DU-1, lead was retained as the primary COPC at the site. HGL determined that the extent of lead concentrations above the 300 mg/kg human health screening value for lead appeared limited to the DU-1 area. Lead-contaminated soil at DU-1 was detected at up to 18 inches below grade, however, further vertical extent of lead-contaminated soil was not conducted during the SI. Lead concentrations in shallow soil at DU-1 were deemed to pose

a potential risk to human health due to soil contact and potential impact on the underlying groundwater.

HGL established an ecological risk screening value for lead in soil of 100 mg/kg for ecological receptors, based on a screening level cleanup goal developed by the United States Environmental Protection Agency (USEPA) for a trap and skeet range at the Patuxent Research Refuge in Maryland and used for a removal action at the Bryant Range (Weston, 2006), located 1.2 miles from the Markley Range. The similarities between the ecological communities and sources of lead contamination for the Markley Range and Bryant Range sites suggested that the Bryant Range cleanup goal was appropriate for use at the Markley Range. Maximum lead concentrations in soil at the Markley Range exceeded the ecological screening value at four (4) DUs: DU-1 (1,100 mg/kg), DU-4 (110 mg/kg), DU-5 (120 mg/kg), and DU-6 (160 mg/kg). However, lead concentrations at DU-4, DU-5, and DU-6 were considered to pose minimal threat to ecological receptors based on the low ratios by which the three lead detections exceeded the screening value and based on a comparison to the lowest observed adverse effects levels (LOAELs) calculated in the Patuxent Research Refuge risk assessment (260 mg/kg for the earthworm; 320 mg/kg for the American robin; and 440 mg/kg for the short-tailed shrew), [U.S. Fish and Wildlife Service (USFWS) and USEPA, 2004]. The lead concentration in soil at DU-1 was greater than all the LOAELs and was determined to pose a threat to ecological receptors. Thus, lead was retained as a primary COPEC at the site. Antimony at DU-1 and copper at DU-1 were also retained as COPECs based on exceedances of the USEPA Ecological Soil Screening Levels (EcoSSL) (USEPA, 2007) for these metals in soil. It was determined that lead was the major risk driver at the site; all other contaminants of concern were typically co-located with lead and a removal action targeted towards lead within the DU-1 area would directly result in the reduction of ancillary contaminant of concern risks (HGL, 2011).

The results of the lead particle evaluation were within the range considered to be protective of avian species, with the exception of one (1) sample collected at DU-1 which exceeded the acceptable range of 3-13 particles. The recommended DU-1 removal action to address COPCs and COPECs in soil was deemed suitable to address lead particle exceedances and no additional site actions were recommended. No explosives were detected above PALs in any of the samples submitted for analysis.

HGL compared results from a single sediment sample collected in the wetland to USEPA Region 3 Biological Technical Advisory Group (BTAG) Freshwater Sediment Screening Benchmarks (USEPA Region 3, 2012) and maximum background levels for sediment, specific to Fort Devens [Ecology & Environment (E&E), 1994]. Based on these screening levels, HGL identified the following primary COPECs in sediment: antimony, arsenic, copper, lead, manganese, and nickel.

2.0 NATURE AND EXTENT OF CONTAMINATION

At the conclusion of the SI, HGL developed a CSM for the Markley Range describing the nature and extent of contamination. Based on historical site use as a firing range, metals were identified as the most likely contaminants at the site due to their presence as Small Arms Range (SAR) MCs. Results from soil and sediment sampling conducted by HGL as part of the SI confirmed that historical operations resulted in contamination of shallow soils in the vicinity of DU-1 and the potential existed for contaminants to leach from the soils to underlying groundwater and affect nearby sediments. The CSM identified potential risks to human health

as a result of exposure to lead concentrations in soil at DU-1. Potential risks to ecological receptors existed from lead, copper, and antimony concentrations in soil at DU-1, however HGL identified lead as the major risk driver and any lead remediation would directly result in the reduction of copper and antimony risks. HGL recommended further investigation to determine if a potential link existed between metals in on-site soils and metals in the adjacent wetland sediment. At the conclusion of the SI, HGL recommended the following:

- Complete a soil removal action at DU-1;
- Collect groundwater samples to assess whether lead has leached from the site soil into the underlying groundwater;
- Collect sediment samples to assess whether metals contaminants from the site have impacted the adjacent wetland and whether the contamination poses a threat to ecological receptors; and
- Perform blood lead modeling to confirm that current site conditions do not pose a threat to human health.

These recommendations were implemented as part of removal activities completed by Sovereign in 2011 and 2012, as described in this RACR.

3.0 SCOPE AND OBJECTIVES

3.1 Removal Objectives

In accordance with the Removal Action Work Plan (RAWP) (Sovereign, October 2011a), the primary project goal was to reduce concentrations of lead in soil at the Markley Range to below the established PAL of 300 mg/kg in order to be protective of human health and reduce the threat to ecological receptors. The project goal is intended to prepare the former Markley Range for eventual reuse or redevelopment into open space/recreation use. The PAL is based upon the MassDEP soil standard for unrestricted use and addresses the potential human health risks associated with lead contamination.

In addition, an evaluation of the condition of underlying groundwater and nearby wetland sediments was needed to determine if threats to nearby ecological receptors existed. Updated data following the removal was used to evaluate human-health and ecological risks at Markley Range.

3.2 Summary of Removal Action Work Plan

Sovereign prepared a RAWP (Sovereign, October 2011a) in which site investigation and removal activities were proposed including the removal of lead-impacted soil from shallow depths [0-2 feet (ft) below grade] within DU-1, well installation and groundwater sampling, sediment sampling in the adjacent wetland, and soil sampling at 18-24 inches below grade in the Uphill Unit (DU-6) to confirm lead impacts did not extend into the uphill area. The RAWP outlined the methodologies for proposed excavation activities, well installations, and groundwater, sediment and soil sampling.

During soil removal activities completed from August through October 2011 in accordance with the approved RAWP, Sovereign encountered a larger than anticipated extent of soil containing

lead in exceedance of the PAL. In particular, lead-contaminated soil with lead bullet fragments was encountered east of DU-1 in an area previously uninvestigated (DU-1 EXT), south of DU-1 at DU-6, and at a depth greater than 2 feet below grade within DU-1 (**Figure 4**). Details of the removal activities are discussed below in **Section 4.0**.

Based on this new information, the U.S Army (Army) concluded that DU-6 was historically used as a backstop for shots fired over the South Berm (identified as DU-1 on **Figure 3**). A determination was made by the Army to conduct additional removal activities in the DU-1 and DU-6 areas at the Markley Range, as described in the Removal Action Work Plan Addendum (Sovereign, February 2012). The RAWP Addendum proposed the removal of lead-contaminated soil from DU-1, a DU-1 Extension (DU-1 EXT) area to the east, and DU-6. The RAWP Addendum also described the process for treatment of excavated soil prior to removal from the site for disposal, including stabilization of leachable lead and removal of bullet fragments as required for soil with lead concentrations exceeding the approved PAL for lead of 300 mg/kg. The removal action resumed in February 2012 in accordance with the RAWP Addendum. Details of the removal activities are discussed below in **Section 4.0**.

3.3 Data Quality Objectives

The data quality objectives (DQOs) for this removal action were to:

- Produce accurate, legally defensible data to support the human health and ecological risk evaluations, and ensure the data meet federal and state requirements for quality and usability, including the USACE requirements for data quality;
- Expedite the soil removal action by using an XRF instrument for field screening purposes; and,
- Produce soil analytical data to verify that remaining soil lead impacts at the Markley range were below the PAL of 300 mg/kg.

4.0 REMOVAL ACTIVITIES

The following is a description of removal action activities involving the excavation of lead-impacted soil at the Markley Range. These activities were completed by Sovereign from August 2011 through July 2012.

4.1 Pre-mobilization

Prior to mobilization, Sovereign coordinated utility clearances. An on-site pre-construction meeting with USACE representatives and the Sovereign project team was conducted to discuss the excavation approach, define project requirements and expectations, and ensure that all team members understood their roles and responsibilities. Due to the proximity of excavation work to nearby wetlands, Sovereign submitted a wetland delineation report to USACE for notification to the local Devens Enterprise Commission (DEC) in order to ensure that activities to be performed near environmentally sensitive areas were in compliance with local officials. No further Federal or State permits were required.

4.2 Mobilization and Site Preparation

After pre-mobilization requirements were completed, equipment and personnel were mobilized to the site to prepare and organize for removal activities. All personnel were trained and had the necessary certifications in accordance with the Site Safety and Health Plan (SSHP) (Sovereign, 2011b). The tasks for mobilization and site preparation included, but were not limited to, the following:

- Review of the Activity Hazard Analysis (AHA) for the activities that were conducted for that day with site personnel in accordance with the SSHP;
- Inspection and transport of construction equipment to the site;
- Preparation of lay down and parking areas to receive field trailers, heavy equipment, personal vehicles, and miscellaneous materials and supplies;
- Installation of temporary facilities including an office trailer, male and female sanitary facilities, hand wash station, and traffic control barriers and devices. Temporary power was provided to the office trailer by a diesel powered generator;
- Established traffic control and radio communication procedures;
- Installation of erosion and sediment control measures (i.e. hay bales) at the request of USACE;
- Clearance of vegetation in and around the excavation limits and proposed stockpile areas. Only vegetation that impeded with the safe and effective implementation of the excavation design was cleared. Removed vegetation was consolidated, chipped, and spread at the site perimeter; large stumps were piled on the site perimeter in forested areas; and
- Set up of soil stockpile areas.

4.3 Excavation

The removal action included the excavation of lead-impacted soil from existing decision units DU-1 and DU-6 and from two extension areas adjacent to the decision units. The DU-1 EXT was located to the east of DU-1 and the DU-6 Extension (DU-6 EXT) was located to the west of DU-6 (**Figure 4**).

The initial DU-1 excavation consisted of removing soil from an approximate 200 x 30 x 2 ft deep area. Screening of soil was conducted using X-ray Fluorescence (XRF) technology in order to record soil lead levels in the field and indicate if deeper excavation was warranted. During the excavation, soil lead concentrations above the PAL were observed at the excavation base and outside of the proposed excavation boundary on the eastern sidewall. The excavation base was excavated further to 4 ft below ground surface (bgs) in DU-1 East and 3 ft bgs in DU-1 West, based on field screening levels (**Figure 4**). Additional excavation of an approximately 50 x 50 x 3 ft area, based on field screening levels, was conducted adjacent to the eastern excavation boundary. This area was identified as DU-1 EXT (**Figure 4**). The base of DU-1 EXT was further excavated to 4 ft bgs in order to reach lead concentrations below the primary PAL for lead of 300 mg/kg. A total of approximately 1,600 tons of soil was removed from the DU-1 areas.

DU-6 had not been previously identified during the HGL SI as an impacted area needing soil removal. To confirm, Sovereign conducted preliminary soil sampling within DU-6, consisting of three (3) surficial soil samples (SO001, SO002, and SO003). These samples were collected within DU-6 at approximately 1.5 ft bgs and submitted to the laboratory for lead analysis. The

resulting analytical data revealed lead impacts above the PAL in areas where Sovereign had visually observed bullet fragments beginning at approximately 1.5 ft bgs. Sovereign began initial removal of shallow soils in these areas and conducted test-pitting along the length of the hillside thus revealing observable target areas and a bullet fragment layer that extended across the hillside at approximately 2 to 4 ft below grade. Soil was stained with rust from rounds containing steel jackets. Target posts, used to hold vertical targets in place, were found below grade in areas with high bullet concentrations. Based on this evidence, the Army concluded that the DU-6 hillside was historically used as a range backstop behind the primary berm at DU-1.

The DU-6 excavation area measured approximately 200 x 50 ft, to an approximate depth of 3-7 ft below grade, varying based on the elevation change of the DU-6 hillside (**Figure 4**). Where possible, the top 1 ft of organic soil (documented to be non-impacted during the HGL investigation) was set aside to be reused as fill material. During the excavation, soil was screened in the field by XRF and soils with lead concentrations above the PAL were observed outside of the proposed DU-6 excavation boundary on the western sidewall. A series of test-pits were dug beyond the western sidewall to find the extent of target areas and bullet fragments. Based on test pit results and XRF field screenings, an additional 270 cubic yards (400 tons) of soil was removed from an area adjacent to the western excavation boundary identified as DU-6 EXT (**Figure 4**). A total of approximately 2,400 tons of soil was removed from the DU-6 areas.

Soil within the excavation areas containing bullet fragments and high lead concentrations was excavated, stockpiled and treated using EnviroBlend® stabilization material to reduce lead leachability prior to removal from the site. Following treatment, excavated soil was mechanically screened to remove lead particles greater than 0.25 inches in diameter using a Trommel screen and a secondary vibratory screen. Samples were collected from treated and screened soil piles and analyzed for Toxicity Characteristic Leaching Procedure (TCLP) for lead to confirm the effectiveness of the EnviroBlend® treatment and to ensure soil met non-hazardous disposal facility requirements. Treated soil was subsequently transported off site for disposal as non-hazardous material at the Waste Management Landfill Facility in Rochester, New Hampshire (NH). The lead bullets and other tailings and debris removed during the screening process were segregated, containerized, and disposed of as hazardous material at the EQ Detroit Class C facility for hazardous waste in Detroit, Michigan (MI). Refer to Section 8.0 for further information regarding soil disposal.

A photograph log showing site removal activities is presented in **Attachment A**.

4.4 Confirmatory Soil Sampling

4.4.1 Sampling Methodology and Analysis

The collection of confirmatory soil samples was completed in all excavation areas. An ISM approach (USACE, 2009) was conducted at the base of each excavation. One (1) composite sample (at approximately 1 kilogram) was submitted based on incremental samples collected from within a systematic, random grid set up within each of the excavation bases for DU-1 EXT, DU-6 EXT, DU-1, and DU-6. Due to the size of DU-6 and DU-1, each of these units was separated into east and west sampling grids. In total, six (6) ISM sampling grids, or decision units, were created. The number of incremental sample points per grid varied from 37 to 85

depending upon the size of the particular excavation area. Refer to **Figure 5** for a depiction of the sampling grids for each DU. For each grid, a duplicate and triplicate sample was collected, according to ISM protocol and the approved RAWP. The collection location of the incremental sample in each grid square varied based on the sample's designation as the primary, duplicate or triplicate, according to ISM protocol. ISM soil samples were submitted to TestAmerica Laboratories, Inc. (TestAmerica) in Burlington, Vermont for lead analysis following laboratory preparation by Method 8330B protocol, including air drying and sieving, however the samples were not ground with a puck mill by the laboratory, due to possible positive bias of metals data due to the wear metals of the case iron puck mill grinder contaminating the incremental soil sample. The low chromium case ion puck mill grinder bowl and disc that TestAmerica uses contains known concentrations of lead and other metals. Subsequent analysis of lead was performed using USEPA Method 6010B, which also includes a thorough homogenization procedure as well as a sub-sampling procedure of the entire incremental sample.

Confirmatory sidewall samples were collected from each outer wall of the excavation areas. The shallow depth of the sidewall samples was consistent at 18-24 inches so as to be relevant for the ecological risk evaluation for the Markley Range. Grab samples were collected along each sidewall at a rate of approximately one (1) per 20 lateral feet and composited into one (1) sample per sidewall. Soil samples were composited and homogenized using stainless steel scoops and bowls and properly preserved prior to submittal to Alpha Laboratories (Alpha) of Westborough, MA for lead analysis by EPA Method 6010B.

4.4.2 Summary of Field Screening

A properly calibrated Innov-X Systems XRF field instrument was used for on-site field screening for lead during excavation activities in order to guide excavation limits. XRF field screening was also performed on the ISM samples and sidewall samples prior to submittal for laboratory confirmatory analysis. Refer to **Figures 6-11** for a depiction of the final excavation base and sidewall XRF lead screening results, collected prior to ISM sample collection within each DU.

4.4.3 Summary of Sample Results

The confirmatory sample results verified that lead-contaminated soils with concentrations above the PAL were removed from the excavation areas. A summary of the results for the sidewall samples in relation to the PAL is presented in **Table 1**. A summary of the results for the ISM samples in relation to the PAL is presented in **Table 2**. The associated data quality evaluation report and laboratory analytical reports are presented in **Attachment B**. It should be noted that the original, preliminary surficial soil samples collected from DU-6 (SO001, SO002, and SO003) have not been included in **Table 1** with the confirmatory sample results, as these sample areas were over-excavated and no longer exist at the site. However, the preliminary sample results have been included with **Attachment B,** for reference.

4.5 Site Restoration

Upon completion of the removal and receipt of the confirmatory soil data, each excavation area was backfilled with clean fill from the USACE-approved P.J. Keating Company (Keating) of Lunenberg, MA off-site backfill source. A total of 3,900 tons of fill material was brought on-site from Keating. Site restoration included re-grading to match the local topography to return the

site to prior conditions. To protect from erosion, topsoil was added over disturbed areas and an approved native seed mix was applied to the restored area.

5.0 INVESTIGATIVE ACTIVITIES

The information contained in this portion of the RACR includes a description of the investigative activities completed by Sovereign to evaluate potential impacts to site groundwater and wetland sediments.

5.1 Monitoring Well Installation and Groundwater Sampling

5.1.1 Monitoring Well Rationale and Installation

Five (5) temporary groundwater monitoring points were installed via direct-push drilling methods at the site in August 2011. Two (2) points (MR-GSP001, and MR-GSP002) were placed on the downgradient path to the wetland and one (1) point (MR-GSP003) was placed upgradient of DU-1. These three (3) were used as groundwater sampling points and were properly developed and logged immediately following installation according to USEPA Standard Operating Procedure (SOP) #2044 *Monitor Well Development* (USEPA, 2001). The final two (2) points (MR-GFCP004 and MR-GFCP005) were used as groundwater flow confirmation points and were placed laterally to sampling points in order to obtain an accurate triangulation of groundwater flow (**Figure 4**). All five (5) temporary groundwater monitoring points were removed in October 2012.

5.1.2 Sampling Methodology and Analysis

Groundwater from three (3) of the monitoring points (MR-GSP001, MR-GSP002, and MR-GSP003) was sampled in order to characterize background conditions and determine groundwater quality in the area downgradient of DU-1 (i.e., between DU-1 and the nearby wetland). Groundwater samples and one (1) duplicate sample were collected on 19 August 2011 via Low-Flow sampling methods, as described in USEPA SOP #GW0001 *Low Stress (low flow) Purging and Sampling Procedure for the Collection of Ground Water Samples from Monitoring Wells* (USEPA, 2010). A YSI Multi-Meter and separate turbidity meter were used to collect Low-Flow, Low-Stress parameters prior to sampling. Samples were collected within 24 to 72 hours of installation, field-filtered using a disposable 0.45-micron pore size filter, preserved in appropriate containers, and courier-delivered to Alpha for lead analysis by EPA Method SW6010B.

5.1.3 Summary of Sampling Results

Results for groundwater collected from the three (3) temporary monitoring wells were non-detect for dissolved lead. A summary of the results for the groundwater samples in relation to the suitable analogous MCP Method 1 GW-3 standard for lead for use with any groundwater potentially discharging to surface water is presented in **Table 3**. Data validation reports and associated laboratory reports are presented in **Attachment B**. Groundwater gauging and elevation data are reported in **Table 4**.

5.2 Sediment Sampling

5.2.1 Rationale

In order to confirm the results of the one (1) sediment sample collected by HGL during the SI (**Figure 3**) and document whether or not sediment conditions are potentially harmful to ecological receptors, four (4) sediment samples (MR-SD001 through MR-SD004) were collected from the wetland sediments located to the east of the site. Sediment samples were collected from the nearby wetland in drainage locations in-line with the presumed groundwater flowpath from the Markley Range. Sample locations were also based on the direction of stormwater runoff from the area of contamination, in-line with the potential locations where eroded soils from the impacted area enter the wetland.

5.2.1 Sampling Methodology and Analysis

Sediment samples including one (1) duplicate sample were collected on 18 August 2011 using a properly decontaminated stainless steel hand-auger according to USEPA SOP #2016 *Sediment Sampling* (USEPA, 1994a) and homogenized with stainless steel scoops and bowls prior to containerization and placement in a cooler with ice to 4°C (+/- 2°C). Samples were courier-delivered to Alpha for analysis of target analyte list (TAL) metals by USEPA Methods 3050B/6010B and mercury by USEPA Method 7471A.

5.2.2 Summary of Sampling Results

Concentrations of TAL metals in sediment samples were below established USEPA BTAG Freshwater Sediment Screening Benchmarks, with the exception of arsenic in sample MR-SD004 at 14.3 mg/kg. This result was confirmed in the Quality Assurance/Quality Control (QA/QC) duplicate sample collected at this location at 16.3 mg/kg. However, these arsenic results were within the range of maximum background concentrations for sediment specific to Fort Devens (E&E, 1994), suggesting that the arsenic is naturally occurring. In addition, this arsenic value was consistent with background arsenic concentrations in soil, as found in the Final Metals In Soil Investigation In Support of Arsenic Background Study performed by Nobis Engineering, Inc. (Nobis, 2004). A summary of the results for the sediment samples in relation to the applicable USEPA BTAG levels (UESPA, 2012) and Fort Devens maximum background concentrations (E&E, 1994) is presented in **Table 5**. Data validation reports and associated laboratory reports are presented in **Attachment B**.

6.0 RISK EVALUATION

6.1 Human Health Evaluation

The groundwater data collected in August 2011 are presented in **Table 3**. Lead was not detected in any of the groundwater samples and the reporting limit or Limit of Quantitation (LOQ) (0.010 mg/L) was less than the MCL (0.015 mg/L). These data demonstrate that lead has not leached from the site into the groundwater and that the groundwater does not pose a threat to human health.

The soil lead data collected between October 2011 and June 2012 are presented in **Tables 1 and 2**. The soil lead data set contains both sidewall composite samples and bottom ISM samples. The sidewall composite samples contained a mean lead concentration (arithmetic average) of

76.5 mg/kg for DU-1, including the DU-1 EXT, and 28.8 mg/kg for DU-6 including the DU-6 EXT. The bottom ISM sample results contained a mean lead concentration of 46.1 mg/kg for DU-1, including the DU-1 EXT, and 48.9 mg/kg for DU-6 including the DU-6 EXT.

As recommended in the SI Report (HGL, 2011), the post excavation lead results were evaluated to assess potential risks to human health. The potential risks associated with exposure to lead are evaluated with models that estimate blood lead concentrations. The USEPA has developed two models for this evaluation: (1) the Integrated Exposure Uptake Biokinetic (IEUBK) model; and (2) the Adult Lead Model (ALM). Children and fetuses are the most sensitive receptors with respect to health effects from lead. IEUBK is used to evaluate children's exposure to lead. The ALM is used to assess exposure to the fetus if the pregnant woman is exposed to lead in soil. The ALM calculates the average soil concentration that will result in a fetal blood lead concentration less than 10 micrograms per deciliter (µg/dL), the value determined by USEPA to be protective. IEUBK considers children's exposure to lead in soil and other media, including water and diet.

The ALM was used to estimate soil concentrations protective of a fetus whose mother may be exposed either as an outdoor maintenance worker or a construction worker. The ALM model input and results are shown in **Table 6** (outdoor maintenance worker) and **Table 7** (construction worker). The protective soil concentrations were calculated to be 1,120 mg/kg for the outdoor maintenance worker and 560 mg/kg for the construction worker. All lead detection concentrations for both bottom ISM samples and composite sidewall samples were less than these protective concentrations, demonstrating that the site does not pose a threat to human health under these two scenarios. Because the outdoor maintenance worker and construction worker would experience greater exposure than a trespasser, visitor, or recreational user, the concentrations calculated with the ALM are protective of these other non-residential receptors.

The most conservative exposure scenario is a potential future residential use of the site. The IEUBK model is used to assess the potential threat posed by lead under residential land use. As noted above, this model considers exposure to lead in multiple media. For soil, the model uses the mean value as the exposure point concentration for soil. Because the ISM samples are composite samples, each ISM result represents a mean concentration for the sampled area. The maximum ISM concentration was 97.1 J mg/kg. The average concentration of the sidewall composite samples was 52.7 mg/kg. To ensure a conservative analysis, the maximum ISM result (97.1 mg/kg) was the exposure point concentration for the IEUBK model.

Other than the soil concentration, all input parameters to the IEUBK model were set to the default values. The model output is presented in **Attachment C**. The soil concentration of 97.1 mg/kg resulted in a geometric mean blood lead concentration of 1.775 µg/dL, with the blood lead concentration for 99.988 percent of the exposed population falling below the target concentration of 10 µg/dL. If at least 95 percent of the exposed population is estimated to have a blood lead concentration less than 10 µg/dL, then site conditions are protective. The IEUBK output demonstrates that lead in the Markley Range soil does not pose a threat to children exposed under a residential land use.

Exposure to site sediment is identified as an incomplete, or limited, exposure pathway for human health. Accordingly, potential risks to human health were not evaluated relative to site sediment.

In summary, as demonstrated by the ALM and IEUBK results and the groundwater data, current site conditions do not pose a threat to human health.

6.2 Ecological Risk Screening

6.2.1 Soil

The USEPA Ecological Soil Screening Levels (Eco-SSLs) for lead are not applicable to the site because the lead source is metallic lead from lead bullets (HGL, 2011). Metallic lead is resistant to corrosion and not easily broken down by environmental exposure. The Eco-SSLs were developed to address inorganic lead, not specifically metallic lead (USEPA, 2007). If the contaminant source is metallic lead, USEPA recommends that a site-specific evaluation be performed (USEPA, 2005). The HGL SI Report identified a screening value of 100 mg/kg developed for a trap and skeet range at the Patuxent Research Refuge in Laurel, Maryland [U.S. Fish and Wildlife Service (USFWS) and USEPA, 2004] and used for a removal action at the Bryant Range (Weston, 2006), located 1.2 miles from the Markley Range.

Of the 27 total soil samples collected, 26 lead results were less than the benchmark value of 100 mg/kg. One (1) composite sidewall sample result collected from the DU-1 Extension (210 mg/kg at MR-DU1EXT-102511) exceeded this screening value. However, this detection was less than the lowest observed adverse effects levels (LOAELs) (260 mg/kg for the earthworm; 320 mg/kg for the American robin; and 440 mg/kg for the short-tailed shrew) calculated in the Patuxent Research Refuge risk assessment (USFWS and USEPA, 2004). Based on the isolated exceedance and the comparison to the LOAELs, lead in soil at Markley Range poses minimal threat to ecological receptors.

6.2.2 Sediment

As shown in **Figures 3 and 4**, the 2011 sediment samples were collected proximal to the SI sample. As illustrated in **Table 5**, three (3) of the 2011 sediment samples had no exceedances of the sediment benchmark values. Arsenic concentrations at the fourth sample location exceeded the sediment benchmark value in both the parent (MR-SD004-081811) and duplicate (FD-081811-01) samples. However, the two (2) arsenic results (14.3 mg/kg in MR-SD004-081811; 16.3 mg/kg in FD-081811-01), were within the range of maximum background concentrations for sediment specific to Fort Devens, suggesting that the arsenic is naturally occurring. The 2011 data confirm that the Markley Range site has not affected the wetland area. For this reason, the site does not pose a threat to benthic invertebrates or other ecological receptors that may contact the sediment.

7.0 SUMMARY CONCLUSIONS

This site evaluation is based on the potential nature and extent of any MC contamination, potential pathways of exposure to current and future human and ecological receptors, the results of the soil and sediment analyses completed as part of the SI performed by HGL, and the results of the soil, groundwater and sediment analyses completed as part of removal activities completed by Sovereign in 2011 and 2012.

The human health risk characterization screening associated with exposure to soil at the Markley Range was based on the most stringent criteria under unrestricted residential reuse scenarios. Soil concentrations of lead in shallow soil at DU-1 were found to be the sole driver of

potential risk to human health under this scenario. Potential exposure pathways included inhalation of windborne dust and direct dermal contact with the soil. During the SI, soil lead analytical results documented lead concentrations at the Markley Range up to 1,100 mg/kg at DU-1, thus exceeding human health and ecological risk thresholds and prompting the removal action initiated by the Army and completed by Sovereign in 2011. The removal action further refined the extent of lead-impacted areas where lead concentrations exceeded the MassDEP lead soil standard for unrestricted use of the property (300 mg/kg). These areas included soil within DU-1 (to a depth of up to 4 ft below grade), DU-1 EXT (to a depth of up to 4 ft below grade), DU-6 (to a depth of 7 ft below grade), and DU-6 EXT (to a depth of 3 ft below grade). Post-excavation confirmatory soil samples were collected between August 2011 and June 2012 in each excavation area. Soil lead results following removal confirm that current levels of lead in Markley Range soil do not pose a threat to human health or the environment.

As suggested in the SI, historic elevated lead concentrations in soil at DU-1 offered the potential for an adverse impact to the underlying groundwater if lead leached out of the soil into groundwater. Groundwater flow and sampling data were collected as part of initial Sovereign removal action activities. Groundwater flow data confirmed the depth to groundwater in the vicinity of the Markley Range (7 to 16 ft bgs) and the direction of groundwater towards the east and the nearby wetland. Dissolved lead concentrations were non-detect in groundwater samples collected from one point upgradient of DU-1 and two downgradient points; therefore, these data demonstrate that historical lead contamination has not leached from the site into groundwater and that groundwater does not pose a threat to human health. An exposure pathway was not found to exist between lead in soil and underlying groundwater. Furthermore, sediment samples collected from the nearby wetland in drainage locations in line with the presumed groundwater flowpath from the Markley Range contained metal concentrations below the range of background values for Fort Devens. Thus, it is unlikely that elevated contaminant concentrations in soil at the Markley Range have migrated to nearby wetland sediments through a groundwater exposure pathway.

Based on data collected by Sovereign during the removal activities, current site conditions do not pose a threat to human health or the environment.

8.0 WASTE DISPOSAL

8.1 Solid Wastes

8.1.1 Soil Stockpiling at the Site

Excavated soils were stored temporarily on-site prior to transporting to the approved disposal facilities. The soil stockpiles were sampled and analyzed for waste disposal parameters in accordance with the RAWP (Sovereign, 2011a) and disposal facility permit requirements. Waste characterization samples were collected at a minimum of one sample per 500 tons of material excavated. A total of 13 waste samples were analyzed for the following parameters:

- TCLP Resource Conservation and Recovery Act (RCRA)-8 Metals - USEPA Methods 1311/3050B/6010B/7471A
- Total Volatile Organic Compounds (VOCs) - USEPA Methods 5030A/8260B
- Total Semivolatile Organic Compounds (SVOCs) - USEPA Methods 3546/8270C
- Total Pesticides - USEPA Methods 8151A/8081A

- Total Herbicides – USEPA Methods 3580/8151
- Total Polychlorinated Biphenyls (PCB) - USEPA Method 3546/8082
- Ignitability - USEPA Method 1010
- Corrosivity - USEPA Method 9045A
- Cyanide/Sulfide Reactivity - USEPA Methods 7.3.4.1/7.3.4.2
- TCLP VOCs - USEPA Method 1311/5030A/8260B, if necessary based on total VOC results
- TCLP SVOCs - USEPA Method 1311/8270C, if necessary based on total SVOC results

As the excavation progressed, soils with highly elevated lead concentrations were uncovered and results from soil waste characterization samples collected from these areas documented TCLP lead outside the range acceptable for the disposal facility. Soils that did not meet disposal facility requirements for TCLP lead were considered hazardous. In order to dispose of these soils, soil treatment was required prior to disposal in order to limit the ability of the high concentrations of lead in soil to leach out when in the presence of water. Soils were subsequently blended with EnviroBlend, a magnesium-based granular soil additive, to limit lead leachability and then screened through a Trommel screen and a secondary vibratory screen to sieve out lead bullets. Soils were then stockpiled in 100 ton piles which were each re-tested for TCLP lead to confirm the effectiveness of the EnviroBlend treatment. Soil stockpiles were generated at maximum volumes of 100 tons in order to ensure adequate waste characterization. After TCLP lead results from each soil pile were documented within the range acceptable for the disposal facility, soil piles were transported and disposed of as non-hazardous waste at the selected disposal facility. Refer to Attachment D for soil waste analytical data including TCLP lead data.

Stockpiles were staged on and covered with polyethylene sheeting to minimize any potential impact to underlying natural materials. The covers were secured with sand bags to prevent wind damage to the cover and stockpile. Storm water controls for the protection of the stockpile included hay bales placed around the perimeter of the stockpiles to prevent storm water runoff or run-on. Stockpiles were inspected daily to ensure they were properly secured and the covers were repaired or replaced in order to maintain integrity of the protection of the stockpiled soils. Items found to be deficient were corrected immediately to prevent potential release of stockpiled soil or associated contaminants in the soils.

8.1.2 Tailings Stockpiling at the Site

As soil was screened through the Trommel on-site, tailings including lead bullets, bullet casings, and various metal and vegetative debris were recovered and containerized. This waste was classified as hazardous material requiring a separate disposal facility. Tailings were stored temporarily on site in roll-off containers covered with water-tight tarps prior to transporting to an approved disposal facility. Roll-off containers were inspected daily to ensure the covers were properly secured. No waste sampling was required.

8.1.3 Load-out to the Disposal Facility

Stockpiled soils were loaded into trucks in designated areas only with adequate spill control measures, consisting of gravel underlain by filter fabric to catch and contain spillage. Truck loads were covered with a tarp or other suitable covering for transport. Trucks transported soils under signed waste manifests to Waste Management's Turnkey Landfill in Rochester, NH.

Roll-off containers with tailings were loaded onto trucks at the site and transported under hazardous waste manifests to Worcester where they were subsequently loaded onto rail cars for rail transport to EQ Detroit, Inc. in Detroit, MI.

For all wastes transported for off-site disposal, Federal Department of Transportation (DOT) regulations were followed during transport activities. Records were maintained for wastes shipped for off-site disposal. Refer to Attachment E for copies of soil waste manifests and hazardous waste manifests.

The waste generated, associated quantities transported for off-site disposal, and the respective disposal facilities are presented below:

Summary of Wastes Disposed Off Site

Waste Material	Classification	Quantity	Disposal Facility/Location
Soils	Non-Hazardous	3,983.04 tons	WM Turnkey Landfill Rochester, New Hampshire
Tailings	Hazardous	204.01 tons	EQ Detroit Detroit, Michigan

8.2 Liquid Wastes

Liquid waste consisted of monitoring well development and purge liquids. In accordance with MCP regulations, monitoring well purge water was disposed of at the ground surface in close proximity to each wellhead location from which it came. No containerization and off-site disposal of liquid wastes was necessary during removal activities.

9.0 PERFORMANCE STANDARDS & QUALITY CONTROL

9.1 General Quality Assurance/Quality Control Procedures

Sample analysis via an off-site laboratory adhered to QA/QC requirements and guidance provided in the MCP, the *Statement of Work* (*SOW*) (USACE, 2011), the Department of Defense (DOD) *Quality Systems Manual for Environmental Laboratories* (Final Version 4.2) (DOD, 2006), and the *Uniform Federal Policy - Quality Assurance Project Plan (UFP-QAPP)* (Sovereign, 2011c). Field QA/QC was achieved via collection of field duplicate and matrix spike/matrix spike duplicate (MS/MSD) samples used by the project chemist to determine precision in percent relative standard deviation and matrix interferences. Quality control samples were also collected in the field, including equipment rinsate blanks, to ensure compliance with decontamination procedures. Quality assurance split samples were not required per the *SOW* (USACE, 2011).

9.2 Health and Safety

All removal action field activities were performed in accordance with the requirements of the SSHP (Sovereign, 2011b). Health and safety issues encountered during the implementation of field activities were addressed immediately and recorded in daily QA/QC logs. Daily safety

briefings were held prior to the start of work and included all field personnel. Daily safety inspections were conducted on all heavy equipment prior to use. Periodic safety inspections were carried out by the Sovereign Health and Safety Officer.

9.3 Decontamination

Decontamination of equipment was necessary to prevent cross-contamination between sample locations. Equipment was properly decontaminated prior to sample collection, between sampling locations, and following a sampling event. Decontamination procedures were performed in accordance with USEPA Region 1 Decontamination SOP No. 2000 (USEPA, 1994b) as presented in Section 5.6 of the RAWP (Sovereign, 2011a).

9.4 Assessment of Data Quality

The *UFP-QAPP* (Sovereign, 2011c) identifies QA/QC policies and procedures for laboratory analysis, instrument calibration, data reduction and reporting, internal quality control, and corrective action. The RAWP (Sovereign, 2011a) presents QA/QC procedures implemented during field work and sampling activities. The purpose of the QA/QC procedures is to address specific objectives for analytical accuracy, precision, completeness, representativeness, and comparability.

The project chemist performed a review of groundwater, sediment, and confirmatory soil data collected during the remediation activities for completeness, consistency, and compliance with the project QA requirements. All appropriate data was provided by the laboratories as required for a complete Tier III data validation. A 90% Tier II and 10% Tier I data validation was performed on all the data. The validation effort was guided by project-specific information presented in the site-specific *UFP-QAPP* (Sovereign, 2011c). The validation results concluded that all required data elements were reported for each sample, and that all analyses were in accordance with requirements. Based on the level of review completed in the validation process, there were no significant findings that impacted data usability for the intended purposes. The data validation reports are included in **Attachment B** along the with the laboratory data packages.

9.5 Comparison to Cleanup Goals

The determination of the PAL as a cleanup goal is outlined in Section 3.1 and removal activities that required comparison to the PAL have all been implemented. Overall, the removal of soils within the excavation areas has reduced soil lead concentrations in those areas to below the selected PAL.

10.0 DEMONSTRATION OF COMPLETION

10.1 Achievement of Data Quality Objectives

The data produced during the removal action are accurate, legally defensible, and meet federal and state requirements for quality and usability. These data verify that remaining soil lead impacts at the Markley range are below the PAL of 300 mg/kg. The data further support human health and ecological risk evaluations.

10.2 Removal Action Contract Inspections

In accordance with the Contractor Quality Control Plan (CQCP) (Sovereign, 2011d), field inspections were performed by the on-site QC Manager using the USACE three-phase control system consisting of the preparatory, initial and follow-up inspections phases. Representatives of the USACE were on-site to inspect the remediation activities at regular intervals and convey any concerns or discrepancies to the on-site Sovereign management. Separate additional on-site visits were conducted by MassDEP to measure progress during the remediation activities.

10.3 Removal Action Completion

On July 10, 2012, a final walkthrough and inspection was performed at the Markley Range by members of USACE in order to review all site activities and to provide comment and recommendation. Sovereign addressed all comments and completed all removal activities for the site on August 6, 2012.

11.0 COST SUMMARY

The following presents the approximate cost associated with the Markley Range removal action:

Costs Incurred To-Date:	$1.0 MM

12.0 COMMUNITY RELATIONS

A press release was published to inform the public of the existence of an Action Memorandum (AM) summarizing actions underway to reduce risk to human health and the environment from contaminants in soil. An informal public comment period on this document was held from October 24 to November 23, 2011. No comments were received. Throughout the investigation and response action, the BCT, including representatives from USEPA, MassDEP, MassDevelopment, the Devens Restoration Advisory Board (RAB), and the People of Ayer Concerned about the Environment (PACE), was kept informed of activities at the site through informational correspondence and monthly meetings. Details of the changing scope, including soil screening and analytical results which determined the necessity for further investigation, were delivered to the BCT in regular electronic mail updates on recent findings and activities.

13.0 CERTIFICATION STATEMENT

In accordance with the intents and provisions of the SOW, the physical removal of soil has been completed and no significant risks to human health and the environment are identified at the site. No further action is recommended with regard to the investigation and removal of lead-impacted soil at the site. This RACR demonstrates completion of the removal action objectives at the Markley Range.

13.0 REFERENCES

Department of Defense. 2006. *Quality Systems Manual for Environmental Laboratories* (Final Version 4.2). January.

Ecology & Environment, Inc. (E&E). 1994. *Remedial Investigations Report, Functional Area II, General Information, Vol IV,Appendix K, Former Fort Devens Army Installation, Devens, Massachusetts.* August.

Hydrogeologic, Inc. 2011. *Final Site Inspection Report Markley Range Former Fort Devens Army Installation, Devens, Massachusetts.* August.

Massachusetts Department of Environmental Protection. *Massachusetts Contingency Plan* (310 Code of Massachusetts Regulations 40.0000).

Nobis Engineering, Inc. (Nobis). 2004. *Final Metals In Soil Investigation In Support of Arsenic Background Study, Former Fort Devens, Devens, Massachusetts.* January.

Sovereign Consulting Inc. (Sovereign). 2011a. *Removal Action Work Plan, Former Markley Range, Former Fort Devens Army Installation, Devens, Massachusetts.* October.

Sovereign. 2011b. *Site Safety and Health Plan, Former Markley Range, Former Fort Devens Army Installation, Devens, Massachusetts.* July.

Sovereign. 2011c. *Uniform Federal Policy - Quality Assurance Project Plan, Former Markley Range, Former Fort Devens Army Installation, Devens, Massachusetts.* October.

Sovereign. 2011d. *Contractor Quality Control Plan, Former Markley Range, Former Fort Devens Army Installation, Devens, Massachusetts.* July.

Sovereign. 2012. *Removal Action Work Plan Addendum, Former Markley Range, Former Fort Devens Army Installation, Devens, Massachusetts.* February.

USACE. 2009. *Interim Guidance 09-02 – Implementation of Incremental Sampling (IS) of Soil for the Military Munitions Response Program.* July.

USACE (New England District). 2011. *Statement of Work.* 4 May.

United States Environmental Protection Agency (USEPA). 1994a. Standard Operating Procedure (SOP) #2016 *Sediment Sampling.* November.

USEPA. 1994b. Emergency Response Team. SOP #2000 *Sampling Equipment Decontamination.* September.

USEPA. 2001. SOP #2044 *Monitor Well Development.* October.

USEPA. 2007. *Guidance for Developing Ecological Soil Screening Levels,* OSWER 9285.7-55. April.

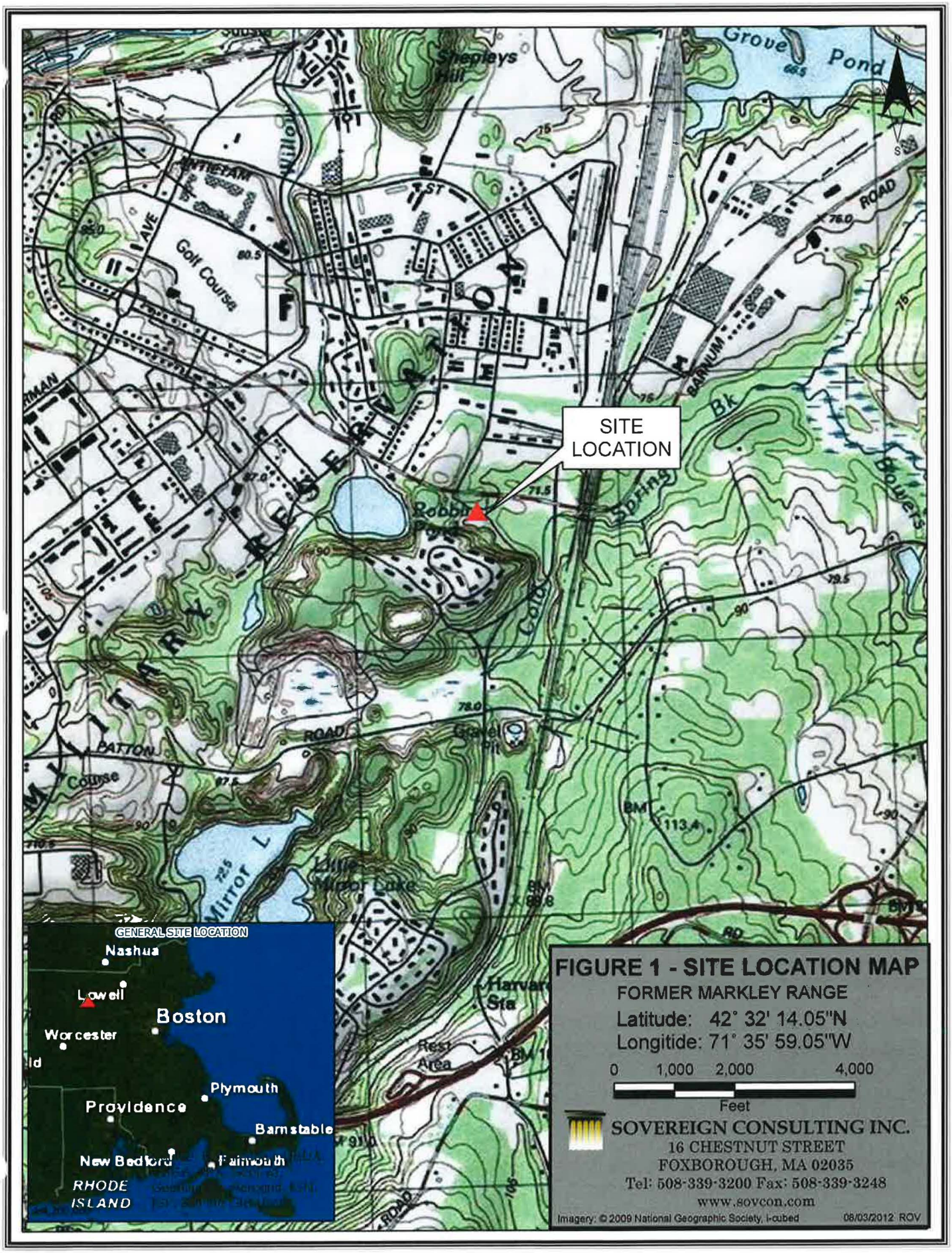
USEPA. 2010. SOP #GW0001 *Low Stress (low flow) Purging and Sampling Procedure for the Collection of Groundwater Samples from Monitoring Wells.* Revision 3. January.

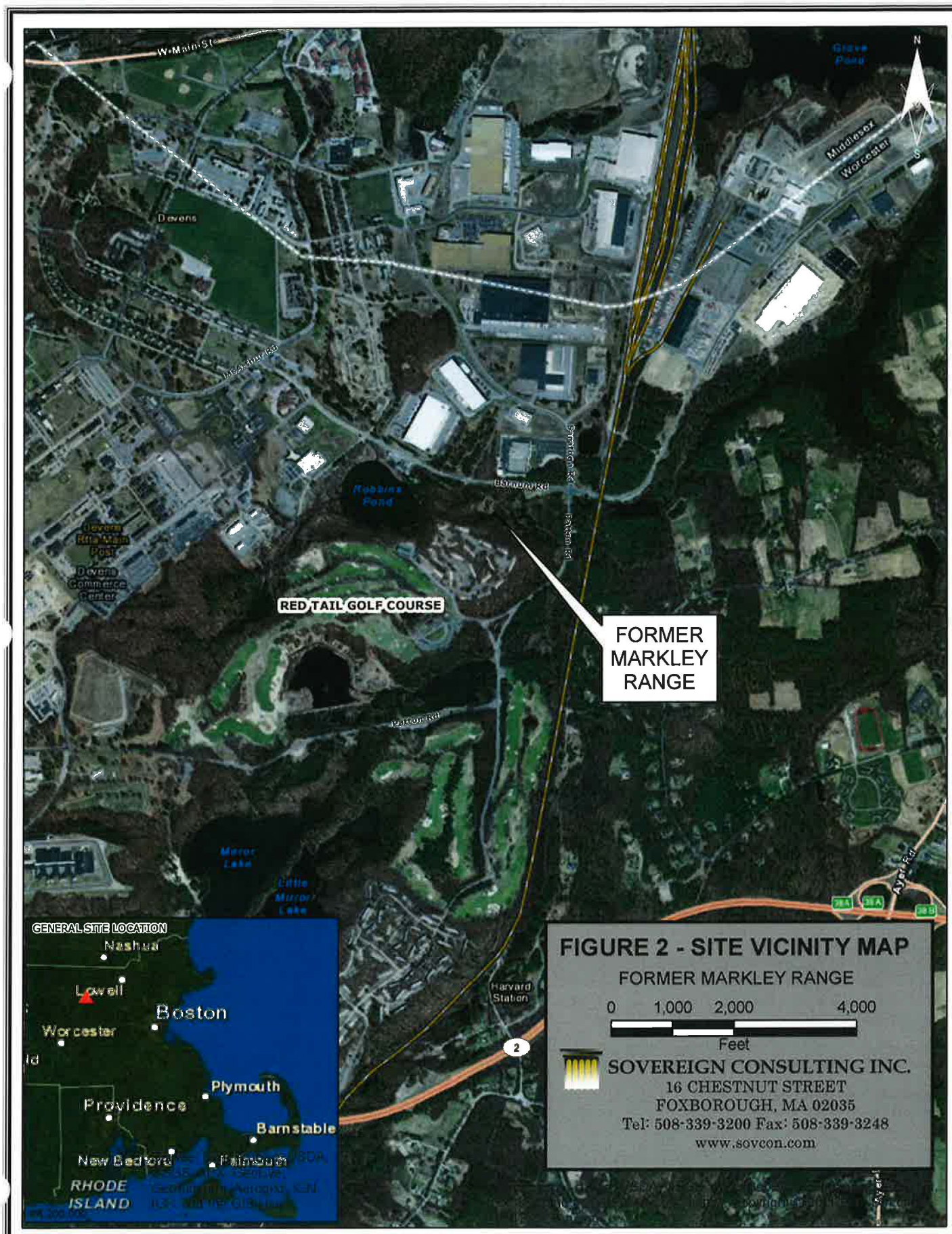
USEPA Region 3. 2012. Biological Technical Advisory Group Freshwater Sediment Screening Benchmarks. May. http://www.epa.gov/reg3hwmd/risk/eco/btag/sbv/fwsed/screenbench .htm

United States Fish and Wildlife Service and USEPA. 2004. *Ecological Risk Assessment for Range 17 (Trap and Skeet Range), Patuxent Research Refuge, Laurel, MD.* March.

Weston Solutions, Inc. 2006. *Final Bryant Range Action Memorandum.* April.

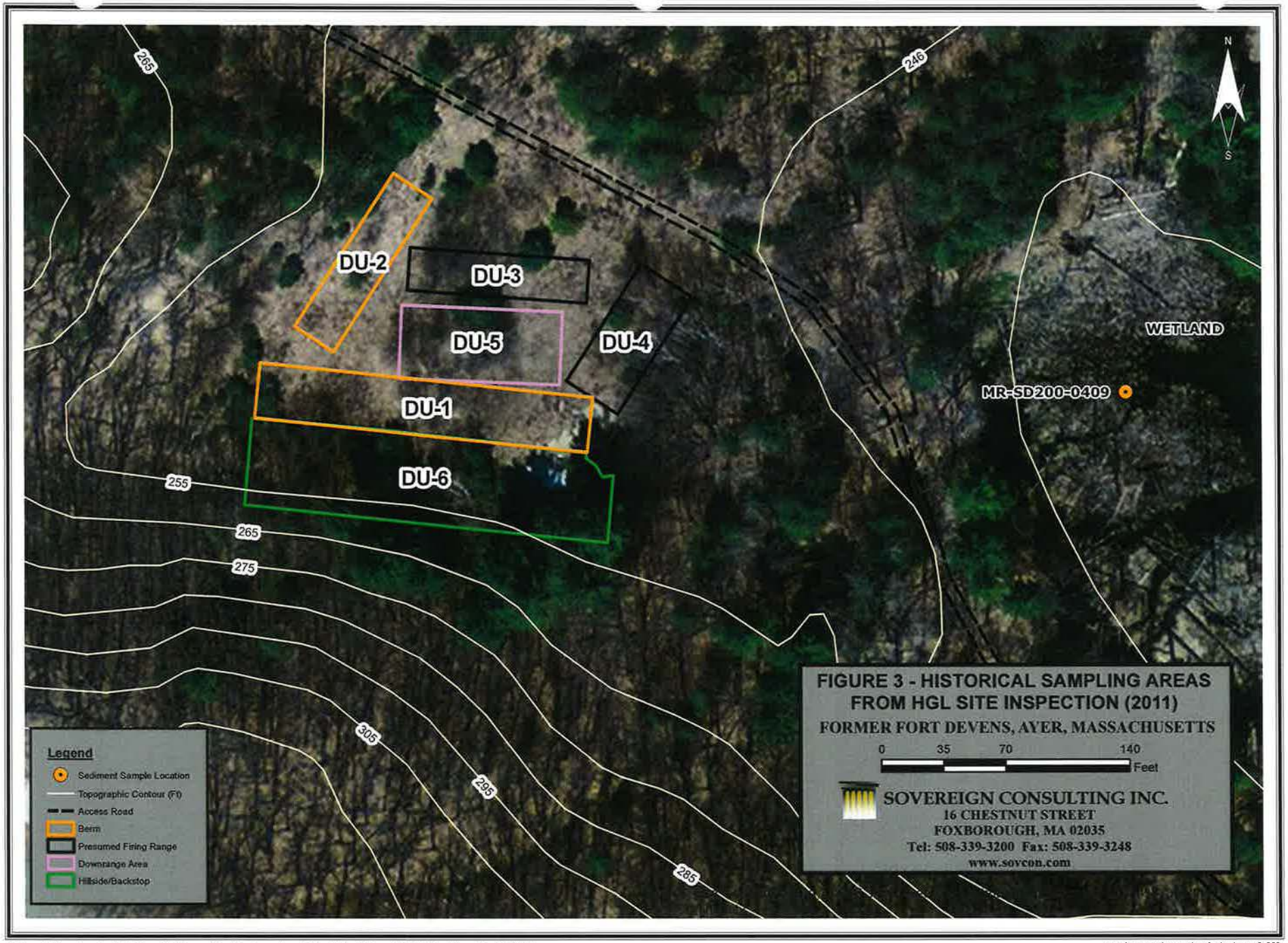
FIGURES


SITE LOCATION
GENERAL SITE LOCATION
Nashua
Lowell
Boston
Worcester
Plymouth
Providence
Barnstable
New Bedford
Falmouth
RHODE ISLAND
Grove Pond
Golf Course
Gravel Pit
Mirror Lake
Harvard Sta
Rest Area
PATTON ROAD
BARNUM ROAD
Bowers Brook
Cold Spring
FIGURE 1 - SITE LOCATION MAP
FORMER MARKLEY RANGE
Latitude: 42° 32' 14.05"N
Longitide: 71° 35' 59.05"W
0 1,000 2,000 4,000
Feet
SOVEREIGN CONSULTING INC.
16 CHESTNUT STREET
FOXBOROUGH, MA 02035
Tel: 508-339-3200 Fax: 508-339-3248
www.sovcon.com
Imagery: © 2009 National Geographic Society, i-cubed
08/03/2012 ROV



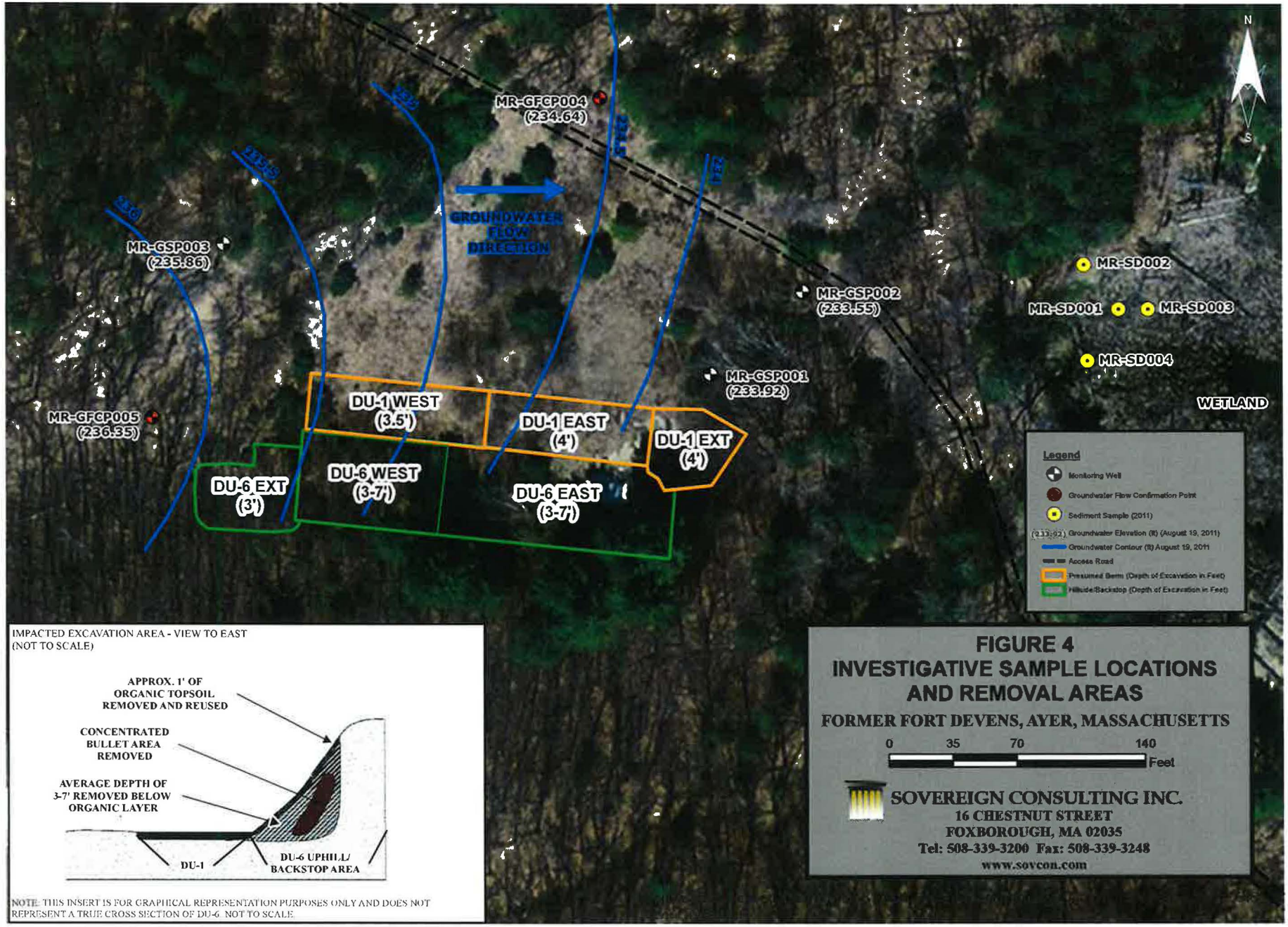
Source: 2010 Figure 2.2 Former Markley Range Site Location Map, HydroGeoLogic Inc. CNL

08/03/2012 ROV



Notes: 1) Figure based off of "Figure 3.1 Former Markley Range" created by HydroGeoLogic (HGL) Inc (November 19, 2010).

7/25/2012 ROV Updated 8/03/2012 ROV



IMPACTED EXCAVATION AREA - VIEW TO EAST
(NOT TO SCALE)

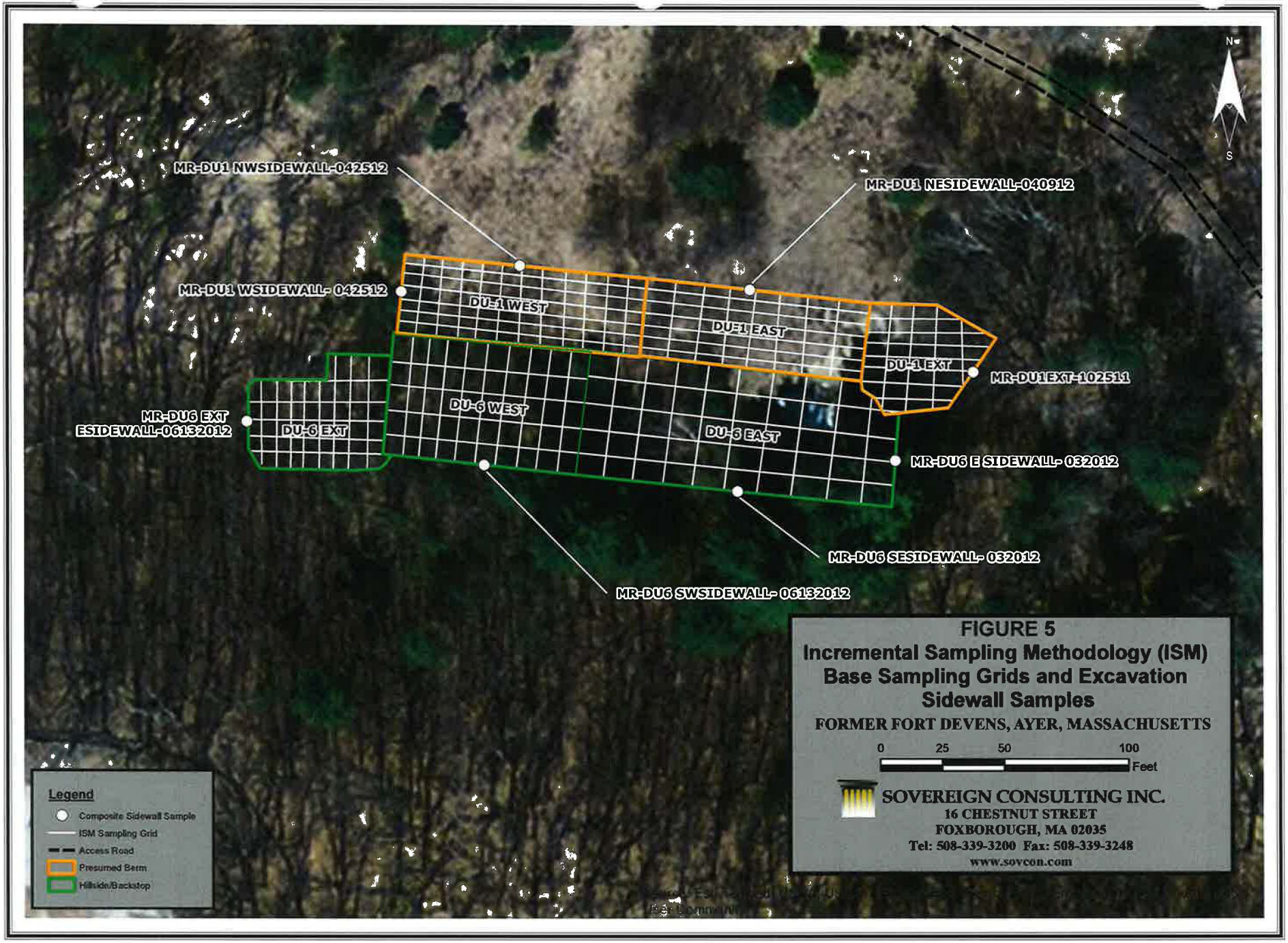
NOTE: THIS INSERT IS FOR GRAPHICAL REPRESENTATION PURPOSES ONLY AND DOES NOT REPRESENT A TRUE CROSS SECTION OF DU-6 NOT TO SCALE

FIGURE 4
INVESTIGATIVE SAMPLE LOCATIONS AND REMOVAL AREAS

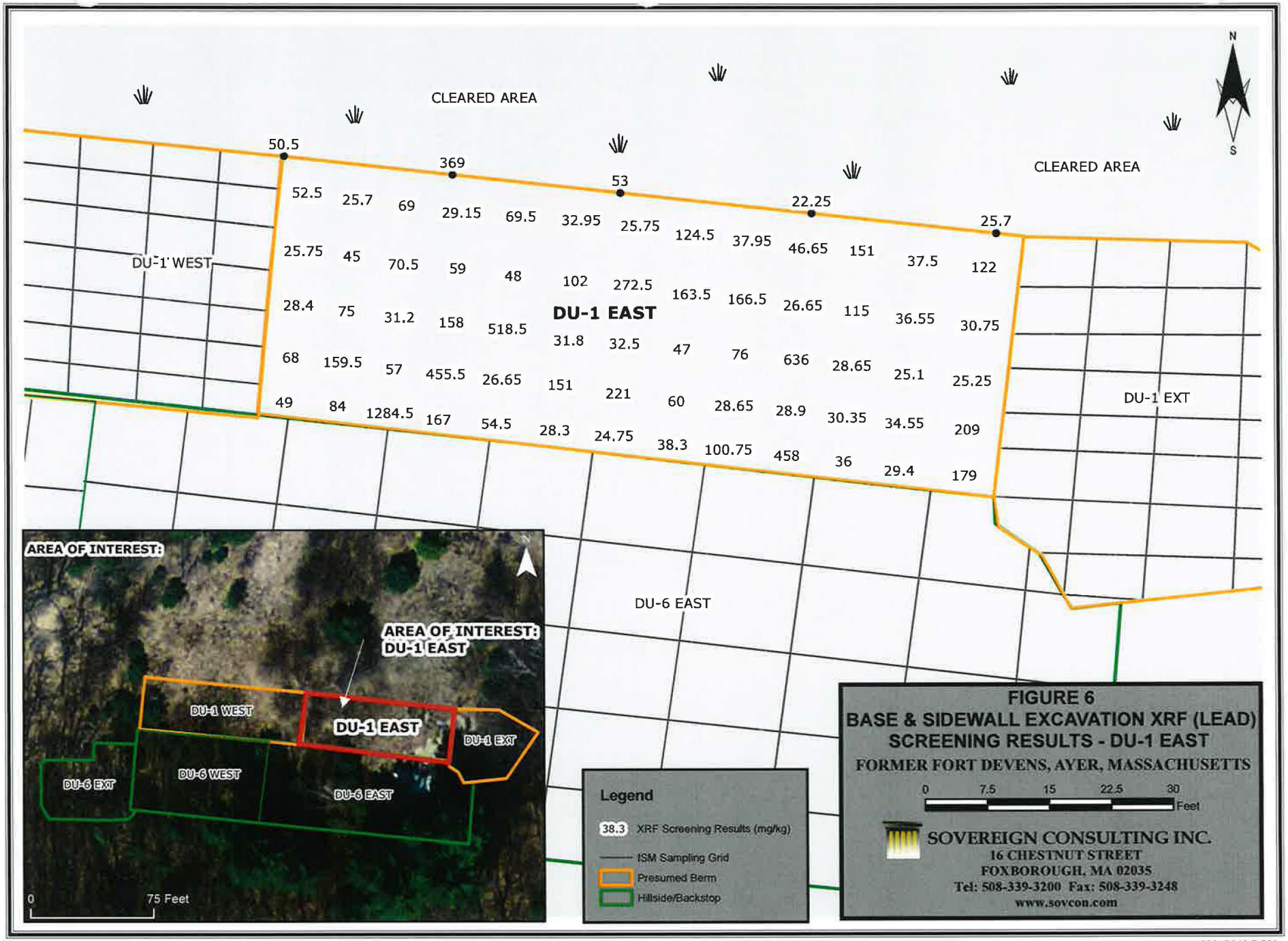
FORMER FORT DEVENS, AYER, MASSACHUSETTS

0 35 70 140 Feet

SOVEREIGN CONSULTING INC.
16 CHESTNUT STREET
FOXBOROUGH, MA 02035
Tel: 508-339-3200 Fax: 508-339-3248
www.sovcon.com

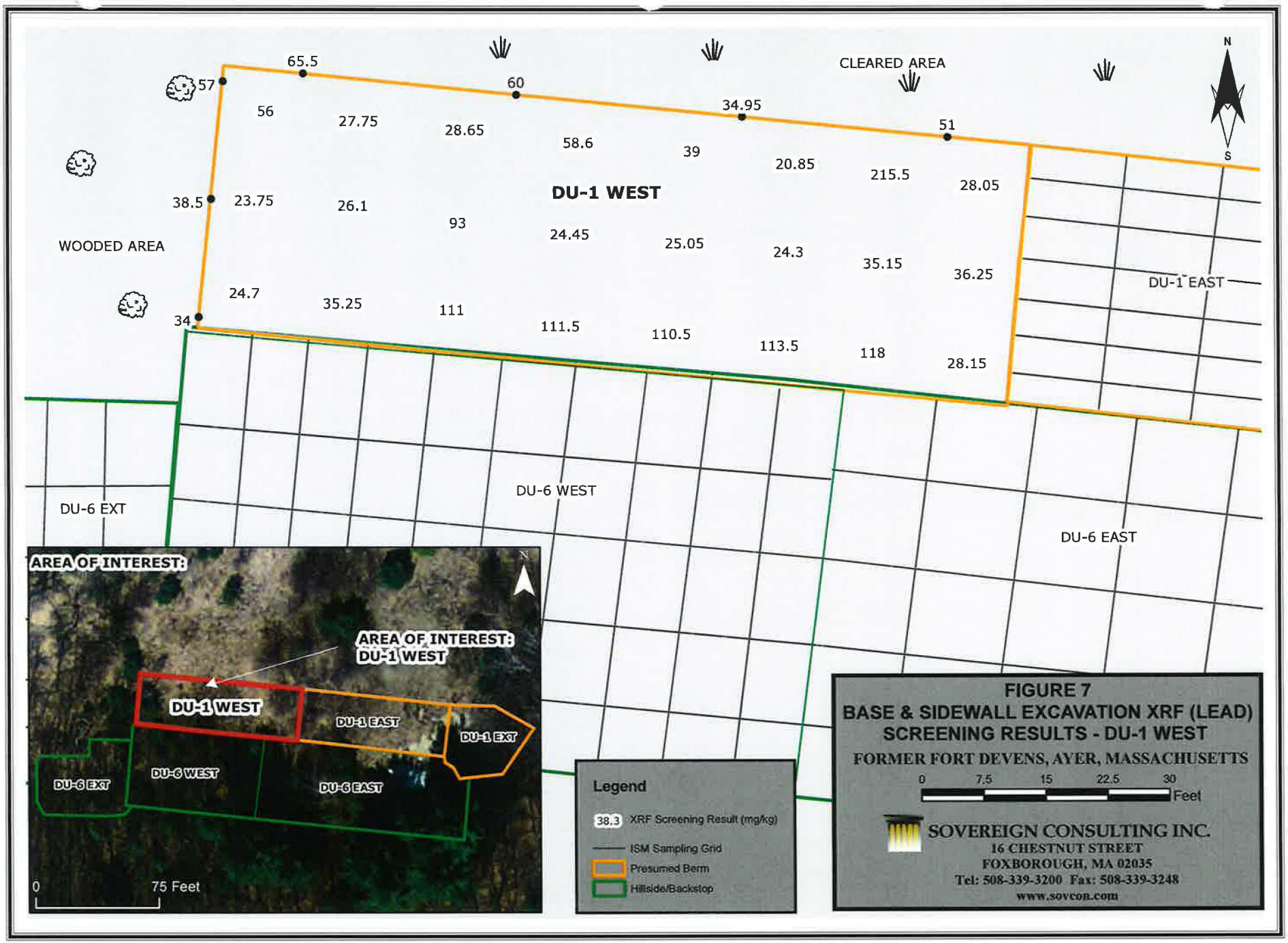


7/25/2012 ROV Updated 02/25/2013 ROV



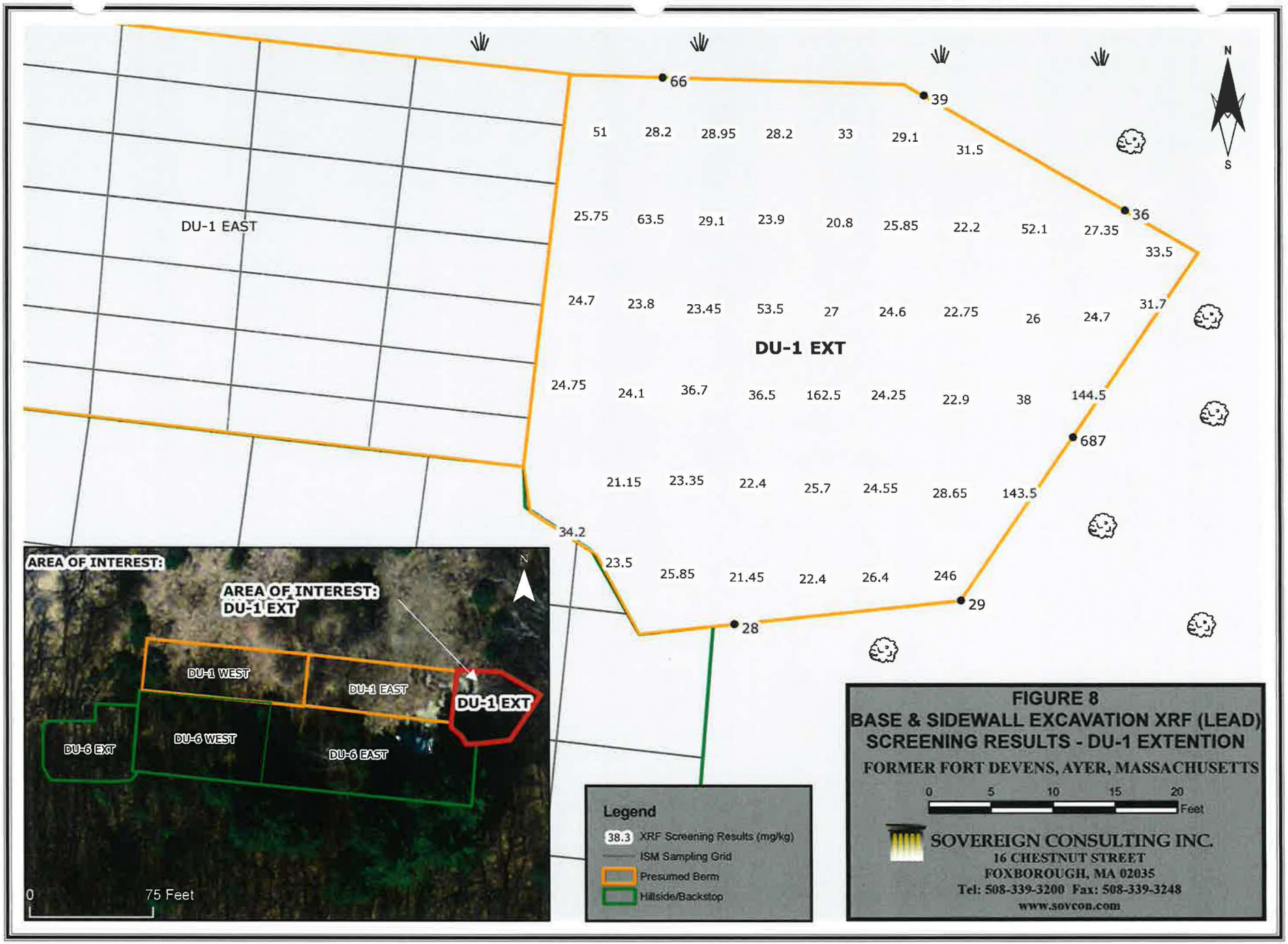
USGS Color Ortho Imagery. Office of Geographic Information (MassGIS), Commonwealth of Massachusetts Executive Office of Environmental Affairs. 2008/2009.
Note: XRF screening result locations are approximate.

02/5/2013 ROV
Updated 02/25/2013 ROV



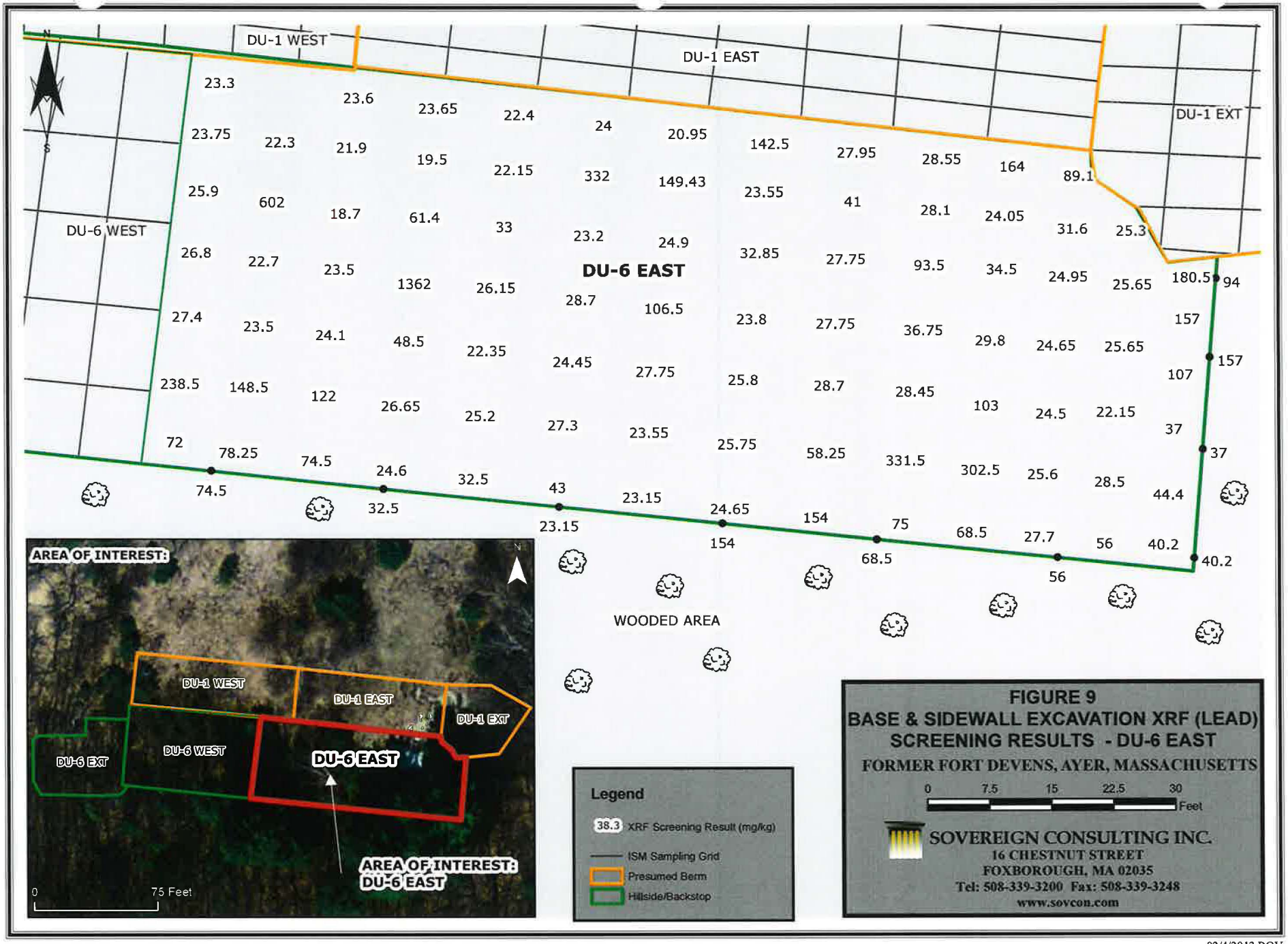
USGS Color Ortho Imagery. Office of Geographic Information (MassGIS), Commonwealth of Massachusetts Executive Office of Environmental Affairs. 2008/2009.
Note: XRF screening result locations are approximate.

02/5/2013 ROV
Updated 02/25/2013 ROV



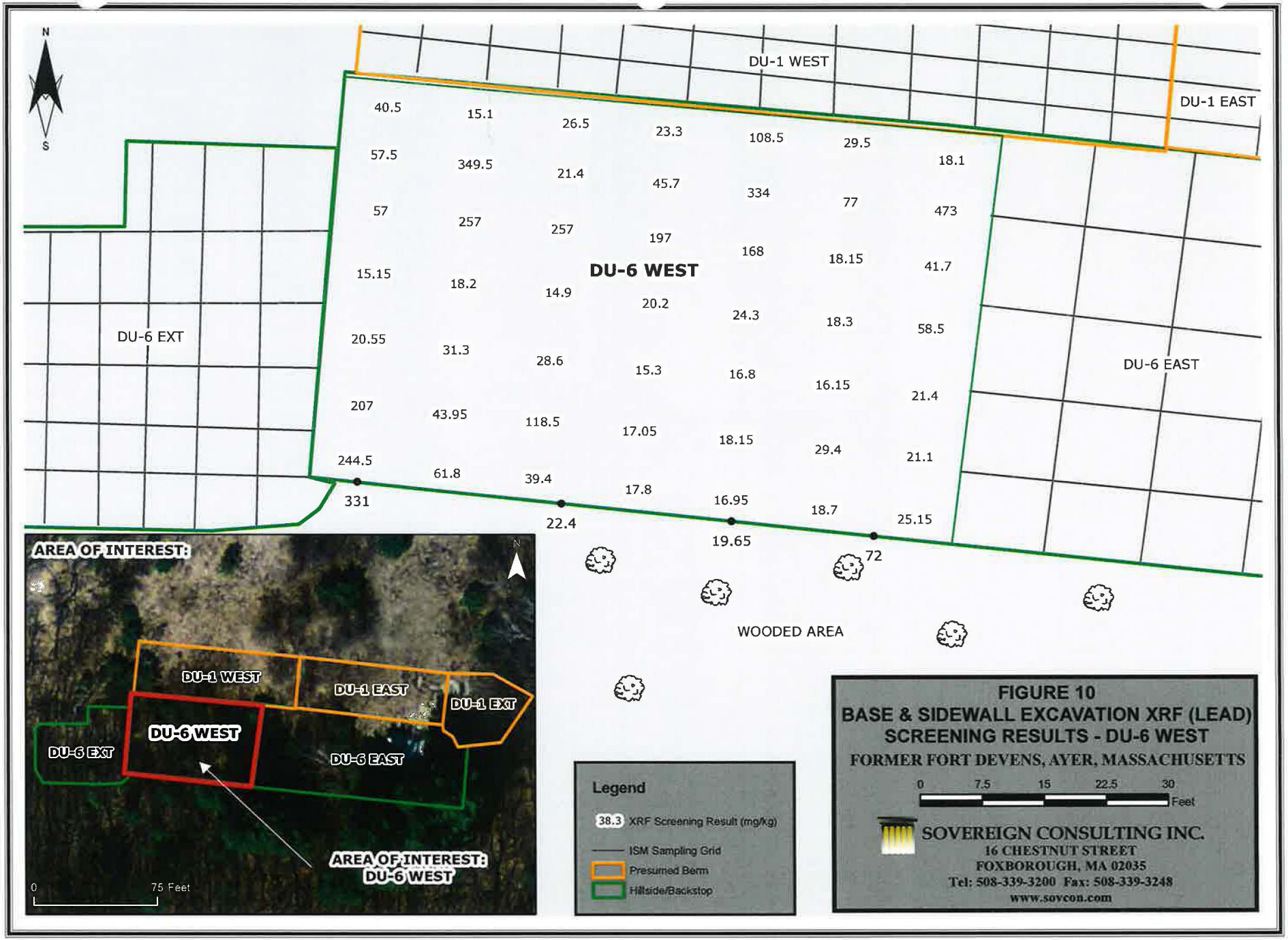
USGS Color Ortho Imagery. Office of Geographic Information (MassGIS), Commonwealth of Massachusetts Executive Office of Environmental Affairs. 2008/2009.
Note: XRF screening result locations are approximate.

02/4/2013 ROV
Updated 02/20/2013 ROV



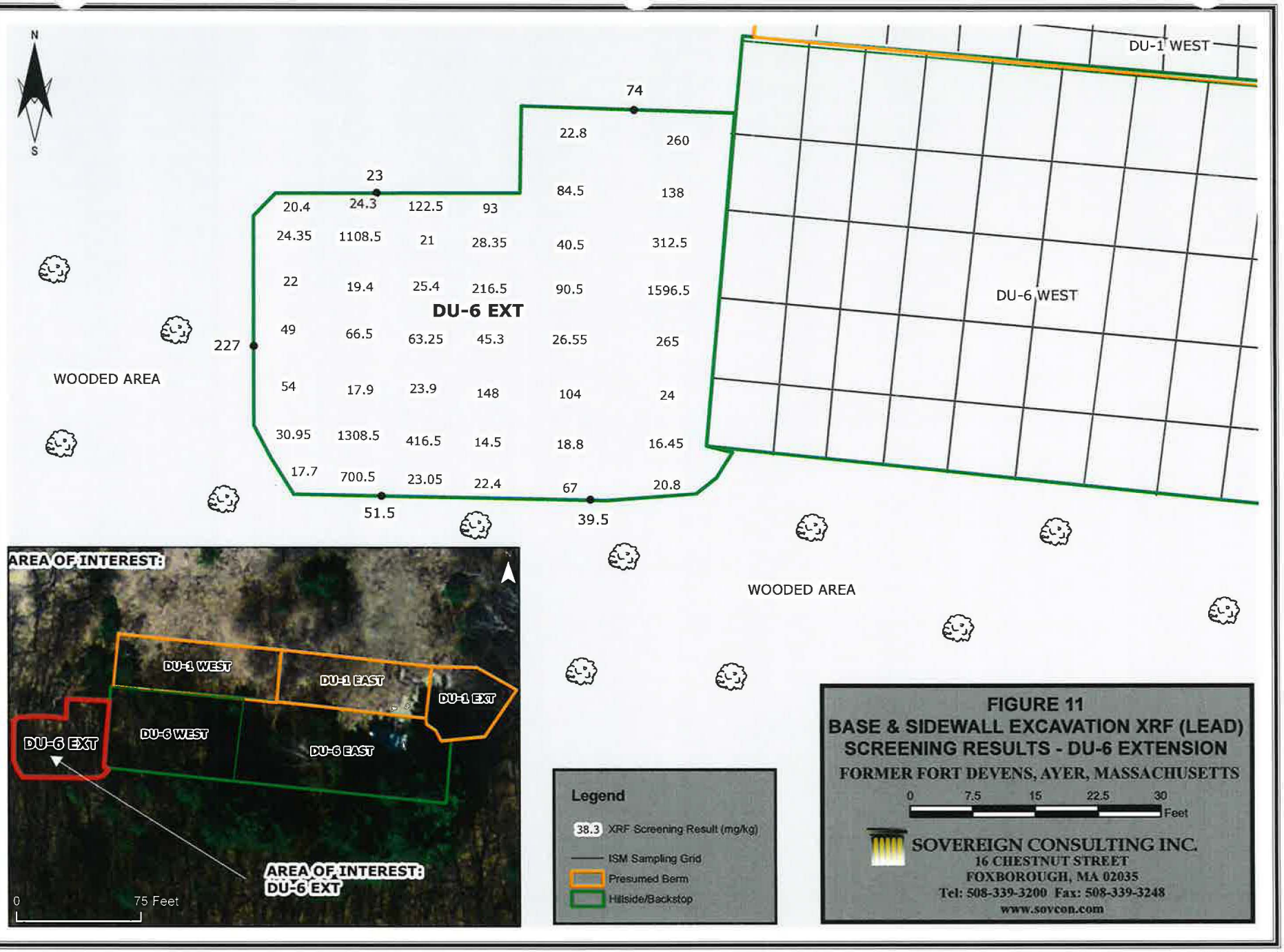
USGS Color Ortho Imagery. Office of Geographic Information (MassGIS), Commonwealth of Massachusetts Executive Office of Environmental Affairs. 2008/2009.
Note: XRF screening result locations are approximate.

02/4/2013 ROV
Updated 02/25/2013 ROV



USGS Color Ortho Imagery. Office of Geographic Information (MassGIS), Commonwealth of Massachusetts Executive Office of Environmental Affairs. 2008/2009.
Note: XRF screening result locations are approximate.

02/4/2013 ROV
Updated 02/20/2013 ROV



USGS Color Ortho Imagery. Office of Geographic Information (MassGIS), Commonwealth of Massachusetts Executive Office of Environmental Affairs. 2008/2009.
Note: XRF screening result locations are approximate.

02/5/2013 ROV
Updated 02/20/2013 ROV

TABLES

Table 1
Confirmatory Soil Sample Results - Excavation Sidewalls
Markley Range, Former Fort Devens Army Installation
Devens, Massachusetts

Station ID	Sample ID	Sample Date	Sample Depth (feet bgs)	QC Type	Laboratory Report No.	Units	LEAD, Total
					Project Action Level (mg/kg):		300
DU-1 Extension Sidewall	MR-DU1EXT-102511	10/25/2011	1.5 - 2.0		L1117653	mg/kg	210
DU-1 - Northeast Sidewall	MR-DU1 NESIDEWALL-040912	4/9/2012	1.5 - 2.0		L1206046	mg/kg	14
DU-1 - Northeast Sidewall	FD-040912-01	4/9/2012	1.5 - 2.0	FD	L1206046	mg/kg	15
DU-1 - West Sidewall	MR-DU1 WSIDEWALL-042512	4/25/2012	1.5 - 2.0		L1207273	mg/kg	17 J
DU-1 - Northwest Sidewall	MR-DU1 NWSIDEWALL-042512	4/25/2012	1.5 - 2.0		L1207273	mg/kg	65
DU-1 - Northwest Sidewall	FD-042512-01	4/25/2012	1.5 - 2.0	FD	L1207273	mg/kg	53
DU-6 - Southeast Sidewall	MR-DU6 SESIDEWALL-032012	3/20/2012	1.5 - 2.0		L1204694	mg/kg	34 J
DU-6 - East Sidewall	MR-DU6 E SIDEWALL-032012	3/20/2012	1.5 - 2.0		L1204694	mg/kg	41 J
DU-6 - Southeast Sidewall	FD-032012-01	3/20/2012	1.5 - 2.0	FD	L1204694	mg/kg	29 J
DU-6 - Southwest Sidewall	MR-DU6 SWSIDEWALL-06132012	6/13/2012	1.5 - 2.0		L1210514	mg/kg	4.2
DU-6 Extension Sidewall	MR-DU6 EXT SIDEWALL-06132012	6/13/2012	1.5 - 2.0		L1210514	mg/kg	36
DU-6 Extension Sidewall	FD-06132012-01	6/13/2012	1.5 - 2.0	FD	L1210514	mg/kg	34

Note: Shaded and bolded values exceed the Standard

FD = Field Duplicate

mg/kg = milligrams per kilogram

QC = Quality Control

J=The reported concetration is less than the Contract Required Detection Limit (CRDL) but greater than the Method Detection Limit (MDL)

Table 2
Confirmatory Soil Sample Results - Incremental Sampling Methodology (ISM)
Markley Range, Former Fort Devens Army Installation
Devens, Massachusetts

Station ID	Sample ID	Sample Date	Sample Depth (feet bgs)	QC Type	Laboratory Report No.	Units	LEAD, Total
					Project Action Level (mg/kg):		300
DU-1 EXT	DU-1 EXT MIS-032012	3/20/2012	4.0		200-9943-1	mg/kg	46.5 J
DU-1 EXT	DU-1 EXT MIS DUPLICATE-032012	3/20/2012	4.0	FD	200-9943-1	mg/kg	41.7 J
DU-1 EXT	DU-1 EXT MIS TRIPLICATE-032012	3/20/2012	4.0	FD	200-9943-1	mg/kg	83.8 J
DU-1 EAST	DU-1 EAST MIS-04042012	4/4/2012	4.0		200-10224-1	mg/kg	65.4
DU-1 EAST	DU-1 EAST DUPLICATE MIS-04042012	4/4/2012	4.0	FD	200-10224-1	mg/kg	51.1
DU-1 EAST	DU-1 EAST TRIPLICATE MIS-04042012	4/4/2012	4.0	FD	200-10224-1	mg/kg	74.2
DU-1 WEST	DU-1 WEST MIS-043012	4/30/2012	3.5		200-10628-1	mg/kg	26.5
DU-1 WEST	DU-1 WEST MIS DUPLICATE-043012	4/30/2012	3.5	FD	200-10628-1	mg/kg	20.9
DU-1 WEST	DU-1 WEST MIS TRIPLICATE-043012	4/30/2012	3.5	FD	200-10628-1	mg/kg	18.1
DU-6 EXT	DU-6 EXT MIS-061212	6/12/2012	3.0		200-11271-1	mg/kg	32.8
DU-6 EXT	DU-6 EXT MIS DUPLICATE-061212	6/12/2012	3.0	FD	200-11271-1	mg/kg	28.3
DU-6 EXT	DU-6 EXT MIS TRIPLICATE-061212	6/12/2012	3.0	FD	200-11271-1	mg/kg	22.6
DU-6 EAST	DU-6 EAST MIS-031912	3/19/2012	3-7*		200-9943-1	mg/kg	46.8 J
DU-6 EAST	DU-6 EAST MIS DUPLICATE-031912	3/19/2012	3-7*	FD	200-9943-1	mg/kg	97.1 J
DU-6 EAST	DU-6 EAST MIS TRIPLICATE-031912	3/19/2012	3-7*	FD	200-9943-1	mg/kg	74.6 J
DU-6 WEST	DU-6 WEST MIS-061212	6/12/2012	3-7*		200-11271-1	mg/kg	67.1 J
DU-6 WEST	DU-6 WEST MIS DUPLICATE-061212	6/12/2012	3-7*	FD	200-11271-1	mg/kg	35.6 J
DU-6 WEST	DU-6 WEST MIS TRIPLICATE-061212	6/12/2012	3-7*	FD	200-11271-1	mg/kg	19.8 J

Note: Shaded and bolded values exceed the Standard

FD = Field Duplicate

mg/kg = milligrams per kilogram

QC = Quality Control

J=The reported concetration is above the PQL established for replicate samples in the QAPP.

* = The base depth within the excavation varied relative to DU-6 topographic incline.

Table 3
Groundwater Sample Results
Markley Range, Former Fort Devens Army Installation
Devens, Massachusetts

Well Location:			MR-GSP001	MR-GSP002	MR-GSP003	MR-GSP003
Sample Date :			8/19/2011	8/19/2011	8/19/2011	8/19/2011
Sample ID:			MR-GW001-081911	MR-GW002-081911	MR-GW003-081911	FD-081911-01
Laboratory Report:			L1112931	L1112931	L1112931	L1112931
Sample Type:			Grab	Grab	Grab	FD
Chemical Name	**Units**	**MassDEP Method 1 GW-3 Standard**				
LEAD, Dissolved	mg/L	0.010	0.010 U	0.010 U	0.010 U	0.010 U

Note: Shaded and bolded values exceed the Standard
mg/L = milligrams per Liter
FD = Field Duplicate
U= Analyte was non-detect at the concentration indicated

Table 4
Groundwater Gauging Data
Markley Range, Former Fort Devens Army Installation
Devens, Massachusetts

Well Location:		MR-GSP001	MR-GSP002	MR-GSP003	MR-GFCP004	MR-GFCP005
Gauging Date :		8/19/2011	8/19/2011	8/19/2011	8/19/2011	8/19/2011
TOC Elevation:		243.26	240.56	252.06	246.21	249.40
Chemical Name	**Units**					
Depth to Water (DTW)	ft	9.34	7.01	16.20	11.57	13.05
Groundwater Elevation	ft	233.92	233.55	235.86	234.64	236.35

TOC = Top of Casing
ft = feet

Table 5
Sediment Sample Results
Markley Range, Former Fort Devens Army Installation
Devens, Massachusetts

Sample Location: Sample Date : Sample ID: Laboratory Report: Sample Type: Chemical Name	Units	Fort Devens Maximum Background Level - Sediment	USEPA BTAG Sediment Screening Level	SD001 8/18/2011 MR-SD001-081811 L1112928 Grab	SD002 8/18/2011 MR-SD002-081811 L1112928 Grab	SD003 8/18/2011 MR-SD003-081811 L1112928 Grab	SD004 8/18/2011 MR-SD004-081811 L1112928 Grab	SD-004 8/18/2011 FD-081811-01 L1112928 FD
Total Metals by 6010B								
ALUMINUM	mg/kg	10,500	NE	3,300	2,500	2,000	2,800	3,200
ANTIMONY	mg/kg	0.5	2	0.804 U	0.845 U	0.816 U	0.786 U	0.796 U
ARSENIC	mg/kg	26	9.8	7.74	4.79	7.45	**14.3**	**16.3**
BARIUM	mg/kg	26.2	NE	12.5	6.09	5.1	7.42	8.14
BERYLLIUM	mg/kg	0.5	NE	0.214 J	0.139 J	0.145 J	0.239 J	0262 J
CADMIUM	mg/kg	0.5	0.99	0.081 U	0.086 U	0.083 U	0.10 J	0.131 J
CALCIUM	mg/kg	1,100	NE	560	410	630	370	420
CHROMIUM	mg/kg	15.9	43.4	7.9	4.9	4.8	6.6	7.7
COBALT	mg/kg	7.2	50	1.76 J	1.89 J	1.50 J	3.86	3.94
COPPER	mg/kg	14.3	31.6	2.21	1.55	1.49	1.69	2.14
IRON	mg/kg	7,900	20,000	2,900	2,400	2,800	2,900	3,400
LEAD	mg/kg	12.5	35.8	5.18	2.94	3.54	4.44 J	6.42
MAGNESIUM	mg/kg	3,100	NE	570	470	450	460 J	580
MANGANESE	mg/kg	600	460	64.4	38.9	42.6	128	139
MERCURY by 7471A	mg/kg	0.05	0.18	0.02 UJ	0.02 UJ	0.02 UJ	0.02 UJ	0.02 U
NICKEL	mg/kg	18.6	22.7	7.89	3.8	6.26	5.73	5.66
POTASSIUM	mg/kg	292	NE	220 J	280	190 J	190 J	240 J
SELENIUM	mg/kg	0.2	2	0.356 U	0.374 U	0.362 U	0.348 U	0.353 U
SILVER	mg/kg	0.2	1	0.193 U	0.203 U	0.196 U	0.189 U	0.191 U
SODIUM	mg/kg	289	NE	56 U	59 U	57 U	55 U	56
THALLIUM	mg/kg	0.5	NE	0.552 U	0.580 U	0.561 U	0.540 U	0.547 U
VANADIUM	mg/kg	13.3	NE	3.16	2.95	2.64	3.57	4.44
ZINC	mg/kg	55.6	121	7.12	5.58 U	5.93 U	5.37 U	7.23

Note: Shaded and bolded values exceed the BTAG screening value only. The sediment background level was not exceeded, therefore, these metals are not considered Contaminants of Potential Ecological Concern (COPECs) at the si
NE = Not Established
USEPA BTAG = United States Environmental Protection Agency Biological Techincal Advisory Group
mg/kg = milligrams per kilogram
FD = Field Duplicate
U= Analyte was non-detect at the concentration indicated
J=The reported concetration is less than the CRDL but greater than the MDL
Maximum background concentrations in sediment obtained from Ecology and Environment, 1994. RI Report, Volume IV, Appendix K, Former Fort Devens Army Installation

Table 6
Lead Risk-based Concentration for the Adult - Outdoor Maintenance Worker
Markley Range, Former Fort Devens Army Installation
Devens, Massachusetts

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Soil
Exposure Point: Markley Range Soil
Receptor Population: Outdoor Maintenance Worker
Receptor Age: Adult

$$PbB_{adult,\ central} = PbB_{fetal,\ 0.95,goal} / ((GSD^{1.645}) * R)$$

$$PbS = ((PbB_{adult,\ central} - PbB_{adult,0}) * AT) / (BKSF * IR * AF * EF)$$

Exposure Parameter	Description	Industrial Adult Values	Source[1]
PbS	Calculated Soil Lead Concentration expressed in µg/g;	1,120	Calc.
$PbB_{adult,central}$	Central estimate of Blood Lead Concentrations in adults exposed to the site expressed in ug/dl;	4.23	Calc.
$PbB_{fetal,0.95,goal}$	Goal for 95th % blood lead concentration (µg/dL);	10	A
GSD	Geometric standard deviation (dimensionless);	1.8	B
R	Constant of proportionality between fetal blood lead concentration at birth and maternal blood lead concentration (dimensionless);	0.9	A
$PbB_{adult,0}$	Typical Blood Lead Concentration in the absence of exposure to the site expressed in µg/dL;	1.00	B
AT	Averaging Time (days/year)	365	A
BKSF	Biokinetic Slope Factor expressed in ug/dL blood lead increase per ug/day lead uptake;	0.4	A
IR	Intake rate of soil (g/day);	0.1	C
AF	Gastrointestinal absorption fraction for ingested lead in soil and lead in dust from soil (dimensionless)	0.12	A
EF	Exposure frequency (days/year)	219	C

A - EPA, January 2003. *Recommendations of the Technical Review Group for Lead for an Approach to Assessing Risks Associated with Adult Exposure to Lead in Soil. EPA-540-R-03-001*

B - EPA, June 2009. *Update of the Adult Lead Methodology's Default Baseline Blood Lead Concentration and Geometric Standard Deviation Parameters.* OSWER 9200.2-82.

C - EPA Adult Lead Model website, found at http://www.epa.gov/superfund/health/contaminants/lead/almfaq.htm
Soil ingestion rate = 100 mg/day because outdoor worker assumed to have higher exposure than indoor worker.
Exposure frequency is recommended central tendency value.

Note:

µg/g = micrograms per gram

µg/dL = micrograms per deciliter

g/day = grams per day

mg/day = milligrams per day

Table 7
Lead Risk-based Concentration for the Adult - Construction Worker
Markley Range, Former Fort Devens Army Installation
Devens, Massachusetts

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Soil
Exposure Point: Markley Range Soil
Receptor Population: Recreational User
Receptor Age: Adult

$$PbB_{adult,\ central} = PbB_{fetal,\ 0.95,goal} / ((GSD^{1.645}) * R)$$

$$PbS = ((PbB_{adult,\ central} - PbB_{adult,0}) * AT) / (BKSF * IR * AF * EF)$$

Exposure Parameter	Description	Industrial Adult Values	Source[1]
PbS	Calculated Soil Lead Concentration expressed in µg/g;	560	Calc.
$PbB_{adult,central}$	Central estimate of Blood Lead Concentrations in adults exposed to the site expressed in ug/dl;	4.23	Calc.
$PbB_{fetal,0.95,goal}$	Goal for 95th % blood lead concentration (µg/dl);	10	A
GSD	Geometric standard deviation (dimensionless);	1.8	B
R	Constant of proportionality between fetal blood lead concentration at birth and maternal blood lead concentration (dimensionless);	0.9	A
$PbB_{adult,0}$	Typical Blood Lead Concentration in the absence of exposure to the site expressed in µg/dL;	1.00	B
AT	Averaging Time (days/year)	365	C
BKSF	Biokinetic Slope Factor expressed in ug/dL blood lead increase per ug/day lead uptake;	0.4	A
IR	Intake rate of soil (g/day);	0.2	C
AF	Gastrointestinal absorption fraction for ingested lead in soil and lead in dust from soil (dimensionless)	0.12	A
EF	Exposure frequency (days/year)	219	C

A - EPA, January 2003. *Recommendations of the Technical Review Group for Lead for an Approach to Assessing Risks Associated with Adult Exposure to Lead in Soil. EPA-540-R-03-001*

B - EPA, June 2009. *Update of the Adult Lead Methodology's Default Baseline Blood Lead Concentration and Geometric Standard Deviation Parameters.* OSWER 9200.2-82.

C -Site-specific values. Assumed same soil ingestion rate as for cancer risk/non-cancer hazard calculations. Averaging time based on April - October exposure period.

Note:

µg/g = micrograms per gram

µg/dL = micrograms per deciliter

g/day = grams per day

mg/day = milligrams per day

ATTACHMENT A

PHOTOGRAPH LOG

Photo #1: Date - 8/23/2011 Direction - E File - IMG_0036

Description - DU-1 excavation

Photo #2: Date - 10/17/2011 Direction - Down File - IMG_0092

Description - Bullet layer

Photo #3: Date - 10/21/2011 Direction - SW File - IMG_0120

Description - DU-1 excavation and partial DU-6 excavation

Photo #4: Date - 10/24/2011 Direction - SE File - IMG_0129

Description - DU-6 bullet layer at 4 ft below grade

Photo #5: Date - 3/8/2012 Direction - S File - Picture 007

Description - Treated soil being fed through Trommel screen

Photo #6: Date - 3/14/2012 Direction - NW File - Picture 15

Description - View of site operations from DU-1 Extension area with on-site soil XRF screening

Photo #7: Date - 3/19/2012 Direction - W File - Picture 019

Description - DU-6 East ISM grid

Photo #8: Date - 4/4/2012 Direction - NW File - Picture 023

Description - DU-6 and DU-1 excavation areas

Photo #9: Date - 4/9/2012 Direction - S File - Picture 026

Description - DU-6 southwall excavation

Photo #10: Date - 4/10/2012 Direction - S File - Picture 036

Description - Soil treatment operations

Photo #11: Date - 4/10/2012 Direction - SE File - Picture 037

Description - Trommel screening operations with treated and screened soil pile in foreground

Photo #12: Date - 7/5/2012 Direction - S File -

Description - Markley Range site restoration

ATTACHMENT B

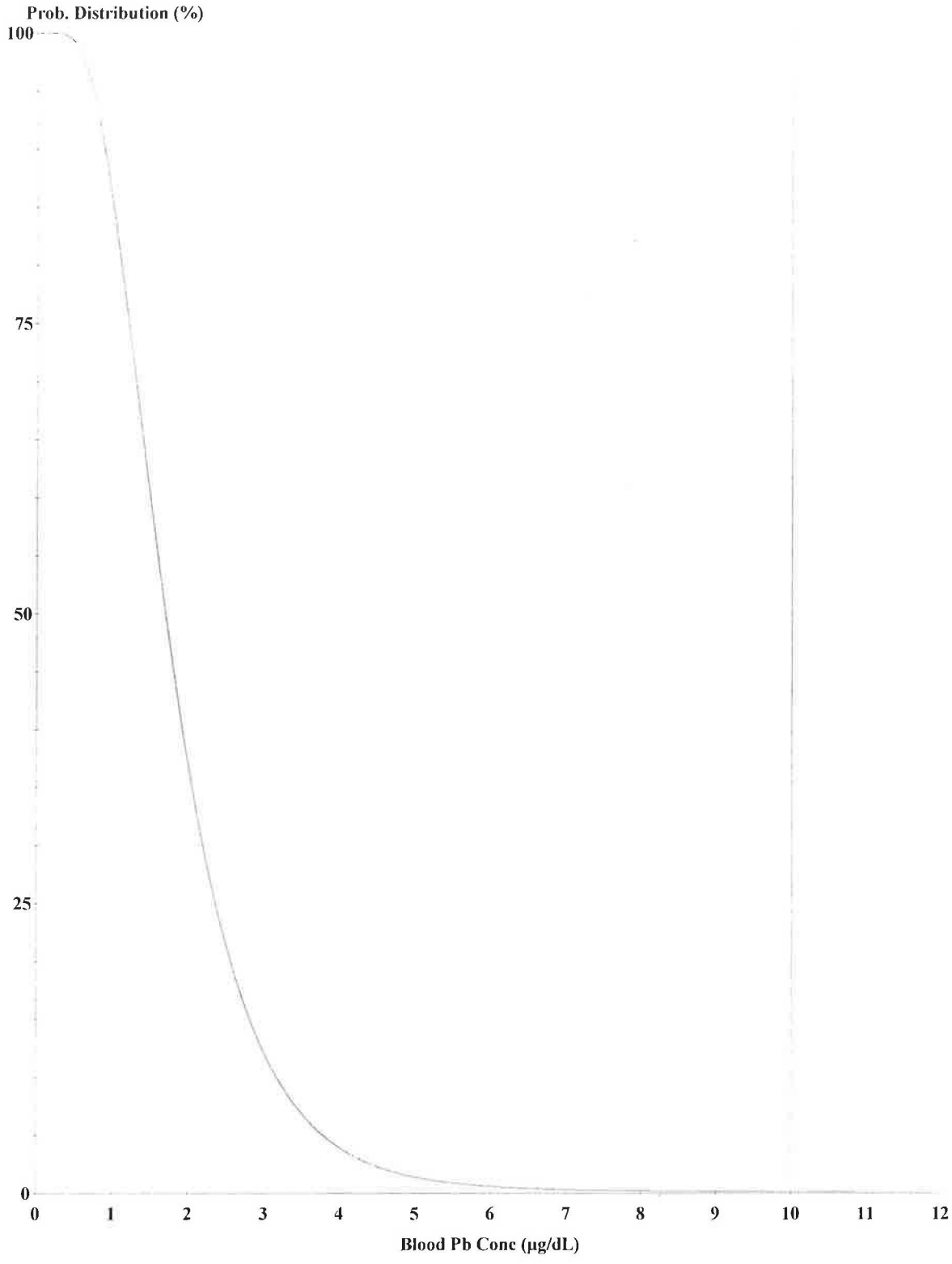
DATA QUALITY EVALUATION REPORT AND

LABORATORY ANALYTICAL DATA

(See CD Included Separately)

ATTACHMENT C

IEUBK MODEL OUTPUT



Cutoff = 10.000 µg/dl
Geo Mean = 1.775
GSD = 1.600
% Above = 0.012

Age Range = 0 to 84 months

Run Mode = Research

ATTACHMENT D

WASTE ANALYTICAL DATA

(See CD Included Separately)

ATTACHMENT E

COPIES OF WASTE MANIFESTS

(See CD Included Separately)

ATTACHMENT F

RESPONSE TO COMMENTS FOR

DRAFT REMOVAL ACTION COMPLETION REPORT

Document Title: RACR - Markley Range
Version: Draft – October 2012
Reviewers: Ron Ostrowski (MassDev), David Chaffin (MassDEP, Ginny Lombardo (USEPA)

Reviewer	Cmt. #	Comment	Location		Comment Response
			Sec.	Page	
MassDevelopment (MassDev)					
RO	1.	Site location is in Devens, MA	1.0	1	The text has been changed to Devens.
RO	2.	Add month to Base closure date	1.1	1	Added 'March 1996'.
RO	3.	Reworded 'To the South, the Markley Range abuts the former Davao housing area, zoned innovation and technology business.'	1.1	1	Reworded.
RO	4.	Replace Anheuser Busch distribution building	1.1	1	Corrected to 'currently vacant' distribution building.
RO	5.	Cold Spring Brook flow direction, replace east with northeast.	1.1	2	Corrected to northeast.
RO	6.	Insert Devens Enterprise Commission (DEC).	4.1	5	Replaced Town of Harvard Conservation Commission with Devens Enterprise Commission (DEC)
RO	7.	Were temporary wells removed? If so, please state so.	5.1.1	8	Inserted 'All five (5) temporary groundwater monitoring points were removed in October 2012' at the end of Section 5.1.1.
Massachusetts Department of Environmental Protection (MassDEP)					
DC	8.	To demonstrate completion of an adequate confirmation sample program, the report should include a more detailed description of the "systematic, random grid set up" used to collect floor samples from each of the six incremental sampling areas (e.e, maps showing the grids and the individual incrememental sampling locations).	4.4.1		An additional figure (Figure 5) has been added to show the approximate divisions of the ISM grids. As stated in Section 4.4.1, one incremental sample was collected per grid square, but the location per square varied depending on if the sample was the primary, duplicate, or triplicate, as required in the ISM Interim Guidance. Therefore, exact individual incremental sampling locations have been omitted from this figure.

Document Title: RACR - Markley Range
Version: Draft – October 2012
Reviewers: Ron Ostrowski (MassDev), David Chaffin (MassDEP, Ginny Lombardo (USEPA)

Reviewer	Cmt. #	Comment	Location		Comment Response
			Sec.	Page	
DC	9.	Consistent with February 24, 2012 response to MassDEP comments on the workplan addendum, the report should include a map shoing the XRF sample locations and a table presenting the sample results.	4.4.2		XRF data have been omitted from this report since this instrument was only used as a guide for the extent of excavation in the field. Most XRF screenings were above the PAL and therefore over-excavated. Only laboratory analytical data, not XRF data, were used as confirmation of the excavation extents. In addition, XRF data have a slight degree of error, inherrant with field instrumentation, whereas laboratory analytical data were validated to a level defined in the site-specific QAPP.
DC	10.	To demonstrate that monitoring wells GSP001 and GSP002 and the four sediment samples were located downradient of the removal area, the report should include a table listing the water level and elevation measurements from the five monitoring wells and a site map with contoured water level elevations.	5.1.1		A Table (Table 4) has been added to the RACR tables showing groundwater level and elevation measurements. Contoured groundwater levels elevations were added to Figure 4.
DC	11.	The report should include copies of waste disposal documentation, including the sample results used to characterize the soil disposed off-site and the manifests used to deliver soil and tailings to the disposal facilities.	8.1		Waste analytical data including TCLP lead data have been added as Attachment D. Copies of waste manifests have been added as Attachment E. Please note that the waste data package exceeds 1,200 pages, therefore it will be included only on a CD in the final submittal.
DC	12.	Attachment B: The DQE report should include the table of analytical results cited on the first page.	Attachment B		Full DQE attached, including tables of analytical results.
DC	13.	Attachment B: The report should include a brief discussion of the collection and analysis of soil samples SO001, SO002, and SO003. Alternatively, if the results from these samples are not relevant to an evaluation of the removal action, they could be deleted from the report to avoid confusion.	Attachment B		A brief discussion of the collection and analysis of soil samples SO001, SO002, and SO003 was added to Sections 4.3 and 4.4.3. These samples were collected from soil that was later over-excavated. They are noted as not relevant to the site evaluation.
DC	14.	Attachment B should include copies of the laboratory reports associated with all the confirmation samples (refer to Section 4.4.3).	Attachment B		Copies of the laboratory reports have been added to Attachment B. Please note that the laboratory data package exceeds 1,100 pages, therefore it will be included on a CD in the final submittal.

Document Title: RACR - Markley Range
Version: Draft – October 2012
Reviewers: Ron Ostrowski (MassDev), David Chaffin (MassDEP, Ginny Lombardo (USEPA)

Reviewer	Cmt. #	Comment	Location		Comment Response
			Sec.	Page	
US Environmental Protection Agency (USEPA)					
GL	15.	Throughout the report, including the report title, revise the term "remedial" to "removal". These terms have very specific meanings under the CERCLA program and the action completed at Markley Range was a removal action, not a remedial action.	All	All	Corrected – changes made throughout document.
GL	16.	The water level and elevation data for the 5 groundwater monitoring points should be reported and Figure 4 should be revised to include groundwater contours and interpreted flow direction.	Section 5.1.1	8-9	A Table (Table 4) has been added to the RACR showing groundwater level and elevation measurements. Contoured groundwater levels elevations were added to Figure 4.
GL	17.	In addition to noting the rationale for the sediment locations as "in line with the presumed groundwater flowpath", also add, if appropriate, that the locations are also based on stormwater runoff direction from the area of contamination, so would address eroded soils from the impacted area that were potentially transported to the wetland areas.	5.2.1; 7	9; 12-13	In Section 5.2.1, the following was added: 'Sample locations were also based on the direction of stormwater runoff from the area of contamination, in-line with the potential locations where eroded soils from the impacted area enter the wetland.'

Document Title: RACR - Markley Range
Version: Draft – October 2012
Reviewers: Ron Ostrowski (MassDev), David Chaffin (MassDEP, Ginny Lombardo (USEPA)

Reviewer	Cmt. #	Comment	Location		Comment Response
			Sec.	Page	
GL	18.	The report references the Ecology & Environment, Inc. (E&E) 1994 RI report as the basis for maximum background concentrations for sediment at Fort Devens. Please clarify whether the E&E Report provides the basis for an approved sediment background study for Devens. The Removal Action Completion Report should refer also to the "Final Metals in Soil Investigation in Support of Arsenic Background Study," dated January 6, 2004, prepared by Nobis Engineering, Inc. If there is inadequate support for background sediment data, it is recommended that the report be revised to include a comparison of the site sediment data to the approved soil background concentration data. This should not change the conclusions that the arsenic level of 14.3 mg/kg (16.3 mg/kg duplicate) is consistent with background levels of arsenic. The sediments that were tested could be considered to be wetland soils since the wetlands from which they were taken are periodically dry.	5.2.2; 6.2.2; Table 4	9-10; 12	The Investigation Report prepared by Nobis has been added in Section 5.2.2 as a reference for background arsenic concentrations in soil at Devens. Due to use of the E&E report in the previous RI Report for the Markley Range, it has not been omitted as a reference, but included to further the argument, particularly with confirmation of a arsenic background value for sediment. The E&E report was obtained through the Army's Historical Document Library and has been formally reviewed by USEPA.
GL	19.	Copies of hazardous waste manifests, waste profiles, and any associated waste characterization sampling data should be referenced here and copies should be included in an appendix to the report.	8.1	13-14	Waste analytical data including TCLP lead data have been added as Attachment D. Copies of waste manifests have been added as Attachment E. These two attachments have been referenced in the text in Section 8.1. Please note that the waste data package exceeds 1,200 pages, therefore it will be included on a CD in the final submittal.

Document Title: Response to Review of the Response Comments for the RACR - Markley Range
Version: Draft – October 2012
Reviewers: David Chaffin (MassDEP)

Reviewer	Cmt. #	Comment	Location		Comment Response
			Sec.	Page	
Massachusetts Department of Environmental Protection (MassDEP)					
DC	1.	Assuming adequate followup, responses to all of the MassDEP comments except Comment 9 are acceptable. Regarding the response to Comment 9, omitting the XRF data from the report is not acceptable. MassDEP understands the inherent limitations of screening data and will consider these limitations when reviewing the data; however, it is essential that these data be included in the report because the results from the laboratory samples are not sufficient to confirm the completeness of the removal action. The combined use of screening laboratory data and screening data during a removal action is a common cost and time saving practice - essentially, less expensive, less precise screening samples with quick turnaround were substituted for a larger number of expensive, relatively precise laboratory samples with slow turnaround – however, because this approach entails a dependent connection between the laboratory sample results and the screening sample results, the combined results from the screening samples and laboratory samples must be considered to evaluate the removal action. In other words, reviewers have to have the screening data to understand the how the XRF results were "…used as a guide for the extent of excavation in the field."	4.4.1		An additional six figures (Figures 6-11) have been added to show the final excavation base XRF field readings from each DU. These data were collected prior to ISM sampling and represent approximate lead concentrations from the remaining material at the base of each excavation area, which was subsequently sampled for the final ISM bottom sample in triplicate and submitted for laboratory analysis. XRF results in mg/kg are listed on the figures. XRF screenings from excavated/removed soil are not included on these figures, as this material is no longer present at the site and is not relevant as a descriptor of existing conditions.

Simkins, Laura

From: Chaffin, David (DEP) [david.chaffin@state.ma.us]
Sent: Monday, February 25, 2013 12:08 PM
To: Simkins, Laura
Cc: Ginny Lombardo; Ostrowski, Ron; Julie Corenzwit; Laurie Nehring; Richard Doherty; Liang, Hui (DEP); dgevalt@HaleyAldrich.com; greacen@mabbett.com; Simeone, Robert J CIV (US); Iorio, Maryellen NAE; Simpson, Eric; Cicalese, Marc
Subject: RE: Markley Range Draft Removal Action Completion Report - RTCs

For Use In Intra-Agency Policy Deliberations

OK...with the legend modified as indicated, these figures will address the comment.

Also, I think the figures could be presented in an appendix if you want to reduce the amount of detail in the body of the report.

David Chaffin
Massachusetts Department of Environmental Protection
617-348-4005
Follow MassDEP on Twitter: twitter.com/MassDEP
Subscribe to the MassDEP e-newsletter: mass.gov/dep/public/publications/enews.htm
Visit our web site: mass.gov/dep

From: Simkins, Laura [mailto:LSimkins@sovcon.com]
Sent: Monday, February 25, 2013 10:56 AM
To: Chaffin, David (DEP)
Cc: Ginny Lombardo; Ostrowski, Ron; Julie Corenzwit; Laurie Nehring; Richard Doherty; Liang, Hui (DEP); dgevalt@HaleyAldrich.com; greacen@mabbett.com; Simeone, Robert J CIV (US); Iorio, Maryellen NAE; Simpson, Eric; Cicalese, Marc
Subject: RE: Markley Range Draft Removal Action Completion Report - RTCs

Yes that is correct, the grids were used for MIS sampling, not for XRF screening. It's no problem to modify the legend to specify this – we will change it to say 'ISM Sampling Grid', since that is how we refer to it in the report text. Thanks for reviewing.

Laura

From: Chaffin, David (DEP) [mailto:david.chaffin@state.ma.us]
Sent: Monday, February 25, 2013 10:41 AM
To: Simkins, Laura
Cc: Ginny Lombardo; Ostrowski, Ron; Julie Corenzwit; Laurie Nehring; Richard Doherty; Liang, Hui (DEP); dgevalt@HaleyAldrich.com; greacen@mabbett.com; Simeone, Robert J CIV (US); Iorio, Maryellen NAE; Simpson, Eric; Cicalese, Marc
Subject: RE: Markley Range Draft Removal Action Completion Report - RTCs

For Use In Intra-Agency Policy Deliberations

Each figure shows a "sampling grid" on adjacent DUs, but these grids do not align with the XRF screening locations shown in other figures. For example, Figure 6 shows 13 columns of XRF samples in DU-1 EAST, but Figure 9 shows a grid with 8 columns in DU-1 EAST. Were the "sampling grids" used to collect MIS samples (rather than XRF samples)? If so, can the legend be modified to clarify? If not, what were the "sampling grids" used for?

David Chaffin
Massachusetts Department of Environmental Protection
617-348-4005
Follow MassDEP on Twitter: twitter.com/MassDEP
Subscribe to the MassDEP e-newsletter: mass.gov/dep/public/publications/enews.htm
Visit our web site: mass.gov/dep

From: Simkins, Laura [mailto:LSimkins@sovcon.com]
Sent: Friday, February 22, 2013 3:35 PM
To: Chaffin, David (DEP)
Cc: Ginny Lombardo; Ostrowski, Ron; Julie Corenzwit; Laurie Nehring; Richard Doherty; Liang, Hui (DEP); dgevalt@HaleyAldrich.com; greacen@mabbett.com; Simeone, Robert J CIV (US); Iorio, Maryellen NAE; Simpson, Eric; Cicalese, Marc
Subject: RE: Markley Range Draft Removal Action Completion Report - RTCs

Attached please find our newly revised RACR figures showing sidewall XRF screening lead values within each DU. These soil screenings were conducted prior to collection of sidewall composite soil samples for lab analysis. Please let me know if you have any further comments/revisions we need to address - Thanks!

Laura

From: Chaffin, David (DEP) [mailto:david.chaffin@state.ma.us]
Sent: Wednesday, February 13, 2013 12:52 PM
To: Simkins, Laura
Cc: Ginny Lombardo; Ostrowski, Ron; Julie Corenzwit; Laurie Nehring; Richard Doherty; Liang, Hui (DEP); dgevalt@HaleyAldrich.com; greacen@mabbett.com; Simeone, Robert J CIV (US); Iorio, Maryellen NAE; Simpson, Eric; Cicalese, Marc
Subject: RE: Markley Range Draft Removal Action Completion Report - RTCs

For Use In Intra-Agency Policy Deliberations

Sounds good...I appreciate the followup.

David Chaffin
Massachusetts Department of Environmental Protection
617-348-4005

Follow MassDEP on Twitter: twitter.com/MassDEP
Subscribe to the MassDEP e-newsletter: mass.gov/dep/public/publications/enews.htm
Visit our web site: mass.gov/dep

From: Simkins, Laura [mailto:LSimkins@sovcon.com]
Sent: Wednesday, February 13, 2013 12:18 PM
To: Chaffin, David (DEP)
Cc: Ginny Lombardo; Ostrowski, Ron; Julie Corenzwit; Laurie Nehring; Richard Doherty; Liang, Hui (DEP); dgevalt@HaleyAldrich.com; greacen@mabbett.com; Simeone, Robert J CIV (US); Iorio, Maryellen NAE; Simpson, Eric; Cicalese, Marc
Subject: RE: Markley Range Draft Removal Action Completion Report - RTCs

These figures show just the base excavation XRF screenings, however we can revise the figures to add sidewall XRF screenings as well.
I will resend revised versions to all when ready.

Laura

From: Chaffin, David (DEP) [mailto:david.chaffin@state.ma.us]
Sent: Wednesday, February 13, 2013 11:09 AM
To: Simkins, Laura
Cc: Ginny Lombardo; Ostrowski, Ron; Julie Corenzwit; Laurie Nehring; Richard Doherty; Liang, Hui (DEP); dgevalt@HaleyAldrich.com; greacen@mabbett.com; Simeone, Robert J CIV (US); Iorio, Maryellen NAE; Simpson, Eric; Cicalese, Marc
Subject: RE: Markley Range Draft Removal Action Completion Report - RTCs

For Use In Intra-Agency Policy Deliberations

I appreciate the followup on this comment – do the figures include the results from sidewall samples?

David Chaffin
Massachusetts Department of Environmental Protection
617-348-4005
Follow MassDEP on Twitter: twitter.com/MassDEP
Subscribe to the MassDEP e-newsletter: mass.gov/dep/public/publications/enews.htm
Visit our web site: mass.gov/dep

From: Simkins, Laura [mailto:LSimkins@sovcon.com]
Sent: Tuesday, February 12, 2013 4:06 PM
To: Chaffin, David (DEP)
Cc: Ginny Lombardo; Ostrowski, Ron; Julie Corenzwit; Laurie Nehring; Richard Doherty; Liang, Hui (DEP); dgevalt@HaleyAldrich.com; greacen@mabbett.com; Simeone, Robert J CIV (US); Iorio, Maryellen NAE; Simpson, Eric; Cicalese, Marc
Subject: RE: Markley Range Draft Removal Action Completion Report - RTCs

Mr. Chaffin,

Attached please find our response to your comment below from the RTCs for the Draft Removal Action Completion Report for the Markley Range. To address this, we've created six additional figures (one per DU) showing the XRF screening results from the base of the excavations. These lead values were collected from our final soil screening prior to ISM sampling at each DU. Please review and let us know if this addresses your concerns – if so, we will go ahead and issue a Final Report.

Thank you!

Laura

Laura Simkins
Project Manager | email: lsimkins@sovcon.com
phone: 508-339-3200 | fax: 508-339-3248 | cell: 508-463-7845

Sovereign Consulting Inc.
16 Chestnut Street, Suite 520
Foxborough, MA 02035
www.sovcon.com

Science. Service. Solutions.

From: Chaffin, David (DEP) [mailto:david.chaffin@state.ma.us]
Sent: Tuesday, January 22, 2013 2:07 PM
To: Simeone, Robert J CIV (US); Iorio, Maryellen NAE; Simkins, Laura; Simpson, Eric; Cicalese, Marc
Cc: Ginny Lombardo; Ostrowski, Ron; Julie Corenzwit; Laurie Nehring; Richard Doherty; Liang, Hui (DEP); dgevalt@HaleyAldrich.com; greacen@mabbett.com
Subject: RE: Markley Range Draft Removal Action Completion Report - RTCs

For Use In Intra-Agency Policy Deliberations

Assuming adequate followup, responses to all of the MassDEP comments except Comment 9 are acceptable. Regarding the response to Comment 9, omitting the XRF data from the report is not acceptable. MassDEP understands the inherent limitations of screening data and will consider these limitations when reviewing the data; however, it is essential that these data be included in the report because the results from the laboratory samples are not sufficient to confirm the completeness of the removal action. The combined use of screening laboratory data and screening data during a removal action is a common cost and time saving practice - essentially, less expensive, less precise screening samples with quick turnaround were substituted for a larger number of expensive, relatively precise laboratory samples with slow turnaround – however, because this approach entails a dependent connection between the laboratory sample results and the screening sample results, the combined results from the screening samples and laboratory samples must be considered to evaluate the removal action. In other words, reviewers have to have the screening data to understand the how the XRF results were "...used as a guide for the extent of excavation in the field."

David Chaffin
Massachusetts Department of Environmental Protection
617-348-4005
Follow MassDEP on Twitter: twitter.com/MassDEP
Subscribe to the MassDEP e-newsletter: mass.gov/dep/public/publications/enews.htm
Visit our web site: mass.gov/dep

From: Simkins, Laura [mailto:LSimkins@sovcon.com]
Sent: Friday, January 18, 2013 4:10 PM
To: Chaffin, David (DEP); Ginny Lombardo; Ostrowski, Ron; Julie Corenzwit; Laurie Nehring; Richard Doherty; Liang, Hui (DEP); dgevalt@HaleyAldrich.com; greacen@mabbett.com
Cc: Simpson, Eric; Cicalese, Marc; Simeone, Robert J CIV (US); Iorio, Maryellen NAE
Subject: Markley Range Draft Removal Action Completion Report - RTCs

Attached please find our Response to Comments for the Draft Removal Action Completion Report for the Markley Range. Please review and let us know if you have any further comments on this submittal.

Thank you!

Laura,

Laura Simkins
Project Manager | email: lsimkins@sovcon.com
phone: 508-339-3200 | fax: 508-339-3248 | cell: 508-463-7845

Sovereign Consulting Inc.
16 Chestnut Street, Suite 520
Foxborough, MA 02035
www.sovcon.com

Science. Service. Solutions.

Simkins, Laura

From: Laurie Nehring [lnehring100@gmail.com]
Sent: Wednesday, February 13, 2013 4:21 PM
To: Simkins, Laura
Cc: Iorio, Maryellen NAE; robert.j.simeone.civ@mail.mil; Chaffin, David (DEP); Ginny Lombardo; Ostrowski, Ron; Julie Corenzwit; Richard Doherty; Liang, Hui (DEP); dgevalt@HaleyAldrich.com; greacen@mabbett.com; Simpson, Eric; Cicalese, Marc
Subject: Re: Markley Range Draft Removal Action Completion Report - RTCs (UNCLASSIFIED)

Okay, thank you Laura.
So, I think I understand this concept of averaging samples together, which has been used with other sights. I don't have the knowledge to digest the full report & methodology - however, the bottom line seems to be that the hot spots were excavated, along with the rest of the site, regardless of the fact that the overall average lead concentrations were below 300. And so, nobody will be exposed to the high concentrations at target sites, which are clearly hazardous (shall I say Toxic?)

Laurie

On Wed, Feb 13, 2013 at 12:24 PM, Simkins, Laura <LSimkins@sovcon.com> wrote:

> Laurie,
>
> Yes, lead levels were not uniform because there was an unequal distribution of bullets over the entire site – some areas contained higher concentrations (i.e. target areas where lead bullets were more concentrated). The screening values were averaged over each Decision Unit and the average was below our acceptable limit of 300 ppm. This is in-line with the approved sampling method for this site which was Incremental Sampling Methodology (ISM). This methodology is based on small incremental soil samples that are composited to create one large sample representative of an entire decision unit – in other words, the result is an average of all the lead concentrations over the entire excavation base. In our case, the ISM laboratory samples we submitted confirm the Decision Unit-wide average is below our goal of 300 ppm. For reference, I've attached the methodology to this email (also included as one of the appendices to our approved Removal Action Work Plan for the site) which describes ISM in more detail.
>
> Laura
>
> ---
>
> **From:** Laurie Nehring [mailto:lnehring100@gmail.com]
> **Sent:** Wednesday, February 13, 2013 10:43 AM
> **To:** Simkins, Laura
> **Cc:** Iorio, Maryellen NAE; robert.j.simeone.civ@mail.mil; Chaffin, David (DEP); Ginny Lombardo;

Ostrowski, Ron; Julie Corenzwit; Richard Doherty; Liang, Hui (DEP); dgevalt@HaleyAldrich.com; greacen@mabbett.com; Simpson, Eric; Cicalese, Marc
Subject: Re: Markley Range Draft Removal Action Completion Report - RTCs (UNCLASSIFIED)

Thank you for your immediate response, Laura! This was very helpful.

I see that figure 6 & 11 show some really high numbers in rather isolated areas. Is there an explanation for this unusual pattern? Also, I notice that some of the highest numbers appear to be right on the edge of the sampling range. How do we know that there are no additional 'hot" spots beyond the sampling range, with this kind of data?

Thanks again.

Laurie Nehring

PACE

On Wed, Feb 13, 2013 at 9:02 AM, Simkins, Laura <LSimkins@sovcon.com> wrote:

Laurie,

The screening results shown on the figures are from the field instrument we used on-site which detects approximate lead levels in soil using x-ray fluorescence (XRF). We used this instrument as a guide while we were excavating to gauge whether we had reached acceptable lead levels (300 ppm lead) or needed to excavate further in each area. We collected many screenings per excavation area, typically on a grid pattern as seen in the figures. Once the soil screenings at the base and sides of each excavation were, on average, below 300 ppm lead, we went on to collect laboratory soil samples, which we then used as the basis for the Removal Action Completion evaluation. For all excavation areas, the laboratory soil samples confirmed that lead in soil at the excavation bases and sidewalls was below our 300 ppm goal. Mr. Chaffin had additionally requested that we include our field screening results to show how we used the XRF lead results as a guide in the field. The new figures show this additional information.

Please let me know if this answers your concerns or if you need any further info - thanks!

Laura

-----Original Message-----
From: Laurie Nehring [mailto:lnehring100@gmail.com]
Sent: Tuesday, February 12, 2013 8:05 PM
To: Simkins, Laura
Cc: Chaffin, David (DEP); Ginny Lombardo; Ostrowski, Ron; Julie Corenzwit; Richard Doherty; Liang, Hui (DEP); dgevalt@HaleyAldrich.com; greacen@mabbett.com; Simeone, Robert J CIV (US); Iorio, Maryellen NAE; Simpson, Eric; Cicalese, Marc
Subject: Re: Markley Range Draft Removal Action Completion Report - RTCs

Ms. Simkins,
Could you kindly explain what the numbers mean on the screening results? Is each a representation of sampling you did for lead? If so, what is the acceptable level? Some samples appear very high.

Thank you.
Laurie Nehring
PACE

On Tue, Feb 12, 2013 at 4:06 PM, Simkins, Laura <LSimkins@sovcon.com> wrote:

Mr. Chaffin,

Attached please find our response to your comment below from the RTCs for the Draft Removal Action Completion Report for the Markley Range. To address this, we've created six additional figures (one per DU) showing the XRF screening results from the base of the excavations. These lead values were collected from our final soil screening prior to ISM sampling at each DU. Please review and let us know if this addresses your concerns - if so, we will go ahead and issue a Final Report.

Thank you!

Laura

Laura Simkins

Project Manager | email: lsimkins@sovcon.com <mailto:lsimkins@sovcon.com>

phone: 508-339-3200 | fax: 508-339-3248 | cell: 508-463-7845

Sovereign Consulting Inc.

16 Chestnut Street, Suite 520

Foxborough, MA 02035

www.sovcon.com <http://www.sovcon.com/>

Science. Service. Solutions.

From: Chaffin, David (DEP) [mailto:david.chaffin@state.ma.us]
Sent: Tuesday, January 22, 2013 2:07 PM
To: Simeone, Robert J CIV (US); Iorio, Maryellen NAE; Simkins, Laura; Simpson, Eric; Cicalese, Marc
Cc: Ginny Lombardo; Ostrowski, Ron; Julie Corenzwit; Laurie Nehring; Richard Doherty; Liang, Hui (DEP); dgevalt@HaleyAldrich.com; greacen@mabbett.com
Subject: RE: Markley Range Draft Removal Action Completion Report - RTCs

For Use In Intra-Agency Policy Deliberations

Assuming adequate followup, responses to all of the MassDEP comments except Comment 9 are acceptable. Regarding the response to Comment 9, omitting the XRF data from the report is not acceptable. MassDEP understands the inherent limitations of screening data and will consider these limitations when reviewing the data; however, it is essential that these data be included in the report because the results from the laboratory samples are not sufficient to confirm the completeness of the removal action. The combined use of screening laboratory data and screening data during a removal action is a common cost and time saving practice - essentially, less expensive, less precise screening samples with quick turnaround were substituted for a larger number of expensive, relatively precise laboratory samples with slow turnaround - however, because this approach entails a dependent connection between the laboratory sample results and the screening sample results, the combined

results from the screening samples and laboratory samples must be considered to evaluate the removal action. In other words, reviewers have to have the screening data to understand the how the XRF results were "...used as a guide for the extent of excavation in the field."

David Chaffin
Massachusetts Department of Environmental Protection

617-348-4005

Follow MassDEP on Twitter: twitter.com/MassDEP <http://twitter.com/massEEA/>

Subscribe to the MassDEP e-newsletter: mass.gov/dep/public/publications/enews.htm <http://www.mass.gov/dep/public/publications/enews.htm>

Visit our web site: mass.gov/dep <http://www.mass.gov/dep>

From: Simkins, Laura [mailto:LSimkins@sovcon.com]
Sent: Friday, January 18, 2013 4:10 PM
To: Chaffin, David (DEP); Ginny Lombardo; Ostrowski, Ron; Julie Corenzwit; Laurie Nehring; Richard Doherty; Liang, Hui (DEP); dgevalt@HaleyAldrich.com; greacen@mabbett.com <mailto:greacen@mabbett.com>
Cc: Simpson, Eric; Cicalese, Marc; Simeone, Robert J CIV (US); Iorio, Maryellen NAE
Subject: Markley Range Draft Removal Action Completion Report - RTCs

Attached please find our Response to Comments for the Draft Removal Action Completion Report for the Markley Range. Please review and let us know if you have any further comments on this submittal.

Thank you!

Laura

Laura Simkins

Project Manager | email: lsimkins@sovcon.com <mailto:lsimkins@sovcon.com>

phone: 508-339-3200 | fax: 508-339-3248 | cell: 508-463-7845

Sovereign Consulting Inc.

16 Chestnut Street, Suite 520

Foxborough, MA 02035

www.sovcon.com <http://www.sovcon.com/>

Science. Service. Solutions.

Classification: UNCLASSIFIED
Caveats: NONE

TRANSMITTAL MEMO

		Copies
To	Ginny Lombardo – USEPA	2 - CD / Attachments
	David Chaffin – MADEP	CD / Attachments
	Hui Laing – MADEP	CD / Attachments
	Julia Corenzwit – Co-Chair, Devens Restoration Advisory Board	CD / Attachments
	Laurie Nehring – PACE	CD / Attachments
	Richard Doherty – Engineering and Consultant Resources, Inc.	CD
	James Greacen – Mabbett & Associates	CD / Attachments
	Ron Ostrowski – Mass Development	CD / Attachments
	Deborah Gevalt – Haley & Aldrich, Inc.	CD / Attachments
From:	Laura Simkins – Sovereign Consulting Inc.	
cc:	Bob Simeone – BEC, Devens RFTA	CD / Daptiv / Attachments
	Ellen Iorio – USACE New England District	2 - CD / Daptiv / Attachments
	Marc Cicalese – Sovereign Consulting	Electronic copy
	Date May 2013	

Subject: **Former Markley Small Arms Firing Range – Removal Action Completion Report (Final Version)**
Contract Number W912WJ-10-D-0003, Delivery Order 0007

On behalf of the US Army Corps of Engineers (USACE) New England District and the Army BRAC Environmental Office at Devens, Sovereign is pleased to provide the following attachments:

1. CD, including Report text and all Report attachments
2. Replacement cover pages & signature page

These items are provided to update the March 2013 Draft Final version of the Removal Action Completion Report.

Please contact Bob Simeone or myself if there are questions regarding the attachments.

Sincerely,

Laura Simkins
Project Manager

Sovereign Consulting Inc
16 Chestnut Street, Suite 520
Foxboro, Massachusetts 02035
Tel 508-339-3200 / Fax 508-339-3248

TRANSMITTAL MEMO

		Copies
To	Ginny Lombardo – USEPA	2 - CD / Attachments
	David Chaffin – MADEP	CD / Attachments
	Hui Laing – MADEP	CD / Attachments
	Julia Corenzwit – Co-Chair, Devens Restoration Advisory Board	CD / Attachments
	Laurie Nehring – PACE	CD / Attachments
	Richard Doherty – Engineering and Consultant Resources, Inc.	CD
	James Greacen – Mabbett & Associates	CD / Attachments
	Ron Ostrowski – Mass Development	CD / Attachments
	Deborah Gevalt – Haley & Aldrich, Inc.	CD / Attachments
From:	Laura Simkins – Sovereign Consulting Inc.	
Cc:	Bob Simeone – BEC, Devens RFTA	CD / Daptiv / Attachments
	Ellen Iorio – USACE New England District	2 - CD / Daptiv / Attachments
	Marc Cicalese – Sovereign Consulting	Electronic copy

Date March 2013

Subject: **Former Markley Small Arms Firing Range – Removal Action Completion Report (Draft Final Version)**
Contract Number W912WJ-10-D-0003, Delivery Order 0007

On behalf of the US Army Corps of Engineers (USACE) New England District and the Army BRAC Environmental Office at Devens, Sovereign is pleased to provide the following attachments:

1. CD, including Report text and all Report attachments
2. Draft Final Removal Action Completion Report (Report text only)

Upon receipt of this Draft Final Removal Action Completion Report, please note that the 45-day review period will commence on the No Further Action Decision Document (Draft Version) for the Markley Range, which was previously distributed on 8 November 2012. The 45-day review period for both documents will conclude on 10 May 2013.

Please contact Bob Simeone or myself if there are questions regarding the attachments.

Sincerely,

Laura Simkins
Project Manager

Sovereign Consulting Inc
16 Chestnut Street, Suite 520
Foxboro, Massachusetts 02035
Tel 508-339-3200 / Fax 508-339-3248