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US ARMY INSTALLATION MANAGEMENT COMMAND
HEADQUARTERS, UNITED STATES ARMY GARRISON
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FORT GEORGE G. MEADE, MARYLAND 20755-5000

October 9, 2014

Environmental Division

Mr. John Burchette
NPL/BRAC/Federal Facilities Branch
U.S. Environmental Protection Agency
1650 Arch Street
Philadelphia, PA 19103-2029

Dear Mr. Burchette:

This letter serves as notification that the *Record of Decision, Manor View Dump Site FGGM-93* (ROD) dated September 2014, has been finalized. The ROD has been revised based on comments received from the United States Environmental Protection Agency (USEPA) on September 8, 2014. The Maryland Department of the Environment (MDE) approved the Final ROD on September 24, 2014. Copies of the ROD have been furnished to Mick Butler (Fort George G. Meade), Francis Coulters (U.S. Army Environmental Command), Elisabeth Green (MDE), Matthew Almes (Anne Arundel County Schools), and the Fort Meade Restoration Advisory Board.

If you have any questions, please feel free to contact Ms. Denise Tegtmeyer at (301) 677-9559 or me at (301) 677-7999.

Sincerely,

George B. Knight, PG
Acting Program Manager, Installation Restoration Program
Directorate of Public Works-Environmental Division

Enclosure

ARCADIS

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FINAL Record of Decision

Manor View Dump Site (FGGM 93), Fort George G. Meade, Maryland

September 2014

RECORD OF DECISION
FOR THE MANOR VIEW DUMP SITE
(FGGM 93)

FORT GEORGE G. MEADE
MARYLAND

National Superfund Database Identification Number
MD 9210020567

FINAL **September 2014**

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LIST OF ACRONYMS AND ABBREVIATIONS

µg/L	micrograms per liter
µg/m^3	micrograms per cubic meter
ARAR	Applicable or Relevant and Appropriate Requirement
ARCADIS	ARCADIS U.S., Inc.
Army	United States Army
bgs	below ground surface
BRAC	Base Realignment and Closure Act
C&D	construction and demolition
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
cm/sec	centimeters per second
COCs	Constituents of Concern
COMAR	Code of Maryland Regulations
DERP	Defense Environmental Restoration Program
D.C.	District of Columbia
EE/CA	Engineering Evaluation/Cost Analysis
EPCs	Exposure Point Concentrations
FFA	Federal Facility Agreement
FGGM	Fort George G. Meade
FGGM 93	Manor View Dump Site
FS	Feasibility Study
ft	feet
HHRA	Human Health Risk Assessment
HI	Hazard Index
IRAR	Interim Removal Action Report
LEL	Lower Explosive Limit
LTM	Long-Term Monitoring
LUC	Land Use Control
MCL	Maximum Contaminant Level
MCLG	Maximum Contaminant Level Goal
MD	Maryland
MDE	Maryland Department of the Environment
mg/kg	milligrams per kilogram

LIST OF ACRONYMS AND ABBREVIATIONS

MGW	methane generating waste
msl	mean sea level
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPL	National Priorities List
NTCRA	Non-Time Critical Removal Action
O&M	Operation and Maintenance
PA/SI	Preliminary Assessment/Site Investigation
PAHs	polyaromatic hydrocarbons
PP	Proposed Plan
ppmv	parts per million by volume
PQL	Practical Quantitation Limit
PRG	Preliminary Remediation Goal
RA	Remedial Action
RAB	Restoration Advisory Board
RAO	Remedial Action Objective
RG	Remediation Goal
RI	Remedial Investigation
ROD	Record of Decision
RSL	Regional Screening Level
SCLs	Site Cleanup Levels
SVOC	Semi-Volatile Organic Compound
TCE	Trichloroethene
USEPA	United States Environmental Protection Agency
VC	Vinyl Chloride
VISL	Vapor Intrusion Screening Level
VOC	Volatile Organic Compound

1.0 PART 1: DECLARATION

1.1 SITE NAME AND LOCATION

Fort George G. Meade (FGGM) is located in Anne Arundel County, Maryland (MD), equidistant between the cities of Baltimore, MD, and Washington, District of Columbia (D.C.; **Figure 1**). FGGM was placed on the National Priorities List (NPL) on July 28, 1998, and a Federal Facility Agreement (FFA) was signed by the United States Army (Army), the United States Environmental Protection Agency (USEPA), the United States Department of the Interior, and the Architect of the Capitol in June 2009. The National Superfund Database Identification Number for the installation is MD9210020567. All sites on FGGM are controlled by the FFA and are being investigated and remediated in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), and the Army's Defense Environmental Restoration Program (DERP).

The Manor View Dump Site (hereinafter referred to as FGGM 93 or the "Site") is located near the intersection of MacArthur Road and 2nd Corps Boulevard in the northern portion of FGGM. A site location map is provided as **Figure 2**, and an aerial map of the Site is presented in **Figure 3**. The buried waste at the Site is classified into two general categories: methane generating waste (MGW), and construction and demolition (C&D) debris/fill. A Non-Time Critical Removal Action (NTCRA) was conducted from February through August 2012 in accordance with 40 Code of Federal Regulations (CFR) part 300.415 at the western portion of the Site (**Figure 4**) to address safety hazards associated with methane gas present above the Lower Explosive Limit (LEL) due to the decomposition of MGW. The NTRCA consisted of excavation, transportation, and off-Site disposal of approximately 27,700 tons of non-hazardous MGW.

This Record of Decision (ROD) addresses potential risks to human health and the environment identified under existing conditions (following completion of the NTCRA at FGGM 93 in 2012) posed by constituents of concern (COCs) in groundwater, soil, indoor air, and the remaining buried C&D waste located on the eastern portion of the Site.

1.2 STATEMENT OF BASIS AND PURPOSE

This ROD presents the selected Remedial Action (RA) for FGGM 93. The RA is selected in accordance with CERCLA, as amended, and, to the extent practicable, the NCP. The information supporting the selection of the RA is contained in the Administrative Record file. This ROD is issued jointly by the Army and the USEPA in consultation with the Maryland Department of the Environment (MDE).

1.3 ASSESSMENT OF THE SITE

The RA selected in this ROD is necessary to protect public health and welfare and the environment from COCs identified in groundwater and soil that contribute to unacceptable risk at the Site under future scenarios, and physical hazards posed by the remaining buried waste at the Site.

1.4 DESCRIPTION OF THE SELECTED RESPONSE ACTION

The selected RA for FGGM 93 incorporates the following components:

- Maintenance of the existing soil cover;
- Implementation of land use controls (LUCs) to prohibit residential land use, groundwater use, and unauthorized intrusive activities; and
- Long-term monitoring (LTM) of soil gas (methane), groundwater, and indoor air.

As previously discussed, a NTCRA was conducted from February through August 2012 at the western portion of the Site (**Figure 4**) to address safety hazards associated with methane gas present above the LEL due to MGW decomposition. Following achievement of the vertical and horizontal excavation limits, the excavation was backfilled. Overburden soil was placed within the bottom of the excavation, and clean imported fill was then placed over the overburden soil and graded to ensure at least an 18 inch soil cover over the overburden soil. Finally, a 6 inch layer of topsoil was placed over the clean fill to support

vegetative growth. The selected RA will maintain the existing soil cover over both the eastern and western parcels of the Site to prevent exposure to buried waste and soil that may pose physical or chemical hazards. LUCs will prohibit: (1) residential use of the Site, (2) groundwater use at the Site, (3) unauthorized intrusive activities at the Site, and (4) full-time occupancy of the crawl space at the Manor View elementary School; and will require: (1) the maintenance of the existing methane monitors at the Site, and (2) the development of provisions to prevent potential vapor intrusion in any new construction within 100 feet (ft) of the Site. LTM will be performed to monitor soil gas, groundwater, and indoor air conditions. The selected RA was chosen based on its ability to protect human health and the environment, and to effectively address the environmental impacts posed by buried waste and contaminated media at FGGM 93. The components of the selected RA are discussed in further detail in Section 2.13 of Part 2, the Decision Summary.

1.5 STATUTORY DETERMINATIONS

The selected RA is protective of human health and the environment, complies with Federal and State requirements that are applicable or relevant and appropriate to the RA (unless non-compliance is justified by a waiver), is cost effective, and utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable.

The chemical-specific and action-specific applicable or relevant and appropriate requirements (ARARs) are presented in **Tables 1 and 2**, respectively. The implementation of the selected RA will comply with ARARs for soil either directly, or through the application of a variance. The selected RA (i.e., use of the existing soil cover) does not meet the landfill closure cap design criteria promulgated under the Code of Maryland Regulation (COMAR) 26.04.07.21. However, the State of Maryland concurs that the existing cover provides a level of protection equivalent to that provided by the cap specified in COMAR 26.04.07.21, as provided for by the variance provisions in COMAR 26.04.07.26. The ARARs for groundwater will be attained over the next two years as a result of the 2012 NTCRA, which removed the source of groundwater contamination.

The RA for FGGM 93 does not satisfy the statutory preference for treatment as a principal element of the remedy. Contaminants identified within groundwater occur at relatively low concentrations which would limit the overall volume of contaminant mass for destruction via treatment; thus, treatment would not be an effective component of the remedy.

Under section 121(c) of the CERCLA law (Title 42 U.S.C. § 9621), any remedial action that results in any contaminants remaining on-Site must be reviewed at least once every five years. Under this RA, groundwater, subsurface soil, and indoor air COCs, as well as buried waste, will remain that preclude the unrestricted use of the Site. During the five year site reviews, an assessment will be made of whether the implemented RA continues to be protective of human health and the environment, or whether the implementation of additional remedial action is appropriate.

Further discussion pertaining to the statutory determinations applicable to the selected RA is provided in Section 2.14.

1.6 RECORD OF DECISION DATA CERTIFICATION CHECKLIST

The following information is included in the Decision Summary (Part 2) of this ROD and was used to determine the Selected RA for FGGM 93. Additional site information can be found in the Administrative Record file for FGGM 93.

- COCs and their respective concentrations (Section 2.5);
- Baseline risk represented by the COCs (Sections 2.7);
- Site Cleanup Levels (SCLs) established for COCs and the basis for these levels (Section 2.8).
- How source materials constituting principal threats will be addressed (Section 2.12)
- Current and reasonably anticipated future land use assumptions and current and potential future beneficial uses of groundwater used in the baseline risk assessments and ROD (Section 2.6).

- Potential land and groundwater use that will be available at the Site as a result of the Selected Remedy (Section 2.13.4)
- Estimated capital, annual operation and maintenance, and total present worth costs, discount rate, and the number of years over which the remedy cost estimates are projected (Section 2.10, Section 2.13.3 and **Appendix A**)
- Key factors that led to selecting the remedy (e.g., a description of how the Selected Remedy provides the best balance of tradeoffs with respect to the balancing and modifying criteria, with emphasis on the criteria key to the decision) (Section 2.13.1).

1.7 AUTHORIZING SIGNATURES

Brian P. Foley
Colonel, Signal Corps, Commanding

9/30/14
Date

Cecil Rodrigues, Director
Hazardous Site Cleanup Division
United States Environmental Protection Agency, Region III

SEP 30 2014
Date

2.0 PART 2: DECISION SUMMARY

2.1 SITE NAME, LOCATION, AND DESCRIPTION

This Record of Decision (ROD) describes the selected Remedial Action (RA) at the Manor View Dump Site, also designated FGGM 93, at Fort George G. Meade (FGGM), Maryland (MD). FGGM is located midway between the cities of Baltimore, MD and Washington District of Columbia (D.C.) in Anne Arundel County, MD, as shown in **Figure 1**.

FGGM was placed on the National Priorities List (NPL) on July 28, 1998 and a Federal Facility Agreement (FFA) was signed by the United States Army (Army), the United States Environmental Protection Agency (USEPA), the United States Department of the Interior, and the Architect of the Capitol in June 2009. The National Superfund Database Identification Number for the installation is MD9210020567. All sites on FGGM are controlled by the FFA and are being investigated and remediated in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), and the Army's Defense Environmental Restoration Program (DERP). The Army and USEPA Region III jointly selected the RA for the Manor View Dump Site and issue this ROD in consultation with the Maryland Department of the Environment (MDE).

The Manor View Dump Site (hereinafter referred to as FGGM 93 or the "Site") is approximately 10 acres and is located near the intersection of MacArthur Road and 2nd Corps Boulevard in the northern portion of Fort Meade. A site location map is provided as **Figure 2**, and an aerial map of the Site is presented in **Figure 3**. Environmental impacts at FGGM 93 including groundwater and soil contamination are a result of buried waste identified at the Site. The buried waste at the Site is classified into two general categories: methane generating waste (MGW) and construction and demolition (C&D) debris/fill. In general, the MGW with the potential to generate methane occupied an approximately one-acre area confined to the western portion of the Site and was excavated and disposed of off-Site during completion of a Non-Time Critical Removal Action (NTCRA) conducted in 2012. The remaining 9 acres of FGGM 93 contains primarily C&D debris/fill beneath a soil cover which ranges between 2 feet (ft) and 8 ft thick.

This ROD addresses environmental impacts at FGGM 93 posed by the remaining buried waste and contaminated groundwater and soil at the Site. The selected RA will be funded by the Army.

2.2 SITE HISTORY AND ENFORCEMENT ACTIVITIES

2.2.1 Fort George G. Meade Background

FGGM became an Army installation in 1917 and encompassed 9,349 acres. During World War I, over 100,000 soldiers passed through FGGM. The 79th, 92nd, and 11th Infantry Divisions trained at the installation, and an Ordnance Supply School was established in 1918. When the war ended, FGGM served as a demobilization center for returning troops. FGGM became a permanent Army installation after World War I.

By 1940, there were 251 permanent and 218 temporary buildings and over 2,100 enlisted soldiers on post. By December 1941, the total land acquired by FGGM had grown to approximately 13,800 acres. After World War II, the National Security Agency relocated to FGGM and Tipton Airfield was constructed in 1960. In 1988, FGGM was realigned under the first round of the Base Realignment and Closure Act (BRAC). The BRAC program authorized 9,000 acres to be divested from FGGM. As a result of the 1988 BRAC realignment, the installation now includes 5,145 acres. The current installation boundaries encompass the area previously referred to as the cantonment area, which is used for administrative, recreational, and housing facilities. FGGM contains approximately 65.5 miles of paved roads, 3.3 miles of secondary roads, and about 1,300 buildings. The USEPA placed FGGM on the NPL on July 22, 1998, after an evaluation of contamination due to past storage and disposal of hazardous substances.

2.2.2 Manor View Dump Site Background

FGGM 93 was discovered in 2003 during site preparation and utility work associated with the construction of the Potomac Place residential development (located in the west portion of the Site). Waste materials were recovered and dated as originating from the 1940s. Further analysis indicated that the buried waste extended beyond the planned limits of the housing area and onto the Manor View Elementary School property located immediately east of the Site. A site location map is provided as **Figure 2**, and an aerial map of the site is presented in **Figure 3**.

The buried waste at the Site is classified into two general categories: MGW and C&D debris/fill. The MGW typically consisted of municipal waste and household debris capable of decomposition and methane production. The municipal waste with the potential to generate methane occupied approximately a one-acre area confined to the western portion of the Site, which is bounded to the east by the unnamed north/south oriented drainage swale and to the north and west by the Potomac Place Housing Area. The remaining approximately nine acres of FGGM 93 contain primarily C&D debris/fill typically consisting of construction debris, rubble, brick, block, and other construction material. No records were identified describing the operation or waste stream of the dump.

The following table provides a brief chronology of events associated with the Site:

Chronology of Events	
Date	**Event**
Approximately 1920s-1940s	Site was used as a landfill.
2003	Methane generating waste discovered.
April 2003	Field investigations in support of the Preliminary Assessment/Site Investigation (PA/SI) were completed and included surface and subsurface soil sampling, completion of a geophysical survey, and construction and logging of test pits.
July - August 2005	Passive trench system installed to vent methane.
December 2005	Nearby residences evacuated and the passive system was converted to an active system with vapor extraction.
2004 - 2005	Field investigations in support of the Remedial Investigation (RI) were completed and included the collection of soil, groundwater, soil gas, indoor/ambient air, sediment, and surface water samples. Additionally, testing of the vapor extraction system was conducted.
November 2008	PA/SI and RI field activities documented in the Final RI document.
2009 - 2012	Supplemental field investigations including groundwater monitoring conducted in 2009, 2011, and 2012; additional sediment sampling conducted in 2010; and pre-design cone penetrometer testing conducted in 2010.
October 2011	Final Engineering Evaluation/Cost Analysis (EE/CA) issued.
October 27/28, 2011	Public notice of the availability of the EE/CA for review and comment published.
November 1 - 30, 2011	Public comment period on the EE/CA.
November 9, 2011	Public Meeting to discuss the NTRCA at the Manor View Elementary School.
December 2011	Action Memorandum issued.
February 2012	NTCRA Work Plan submitted.

February 2012 - August 2012	Implementation of the NTCRA
October 2012	Final Interim Removal Action Report documenting completion of the NTCRA issued.
March 12, 2014	Final RI report Final Addendum issued presenting the revised Human Health Risk Assessment (HHRA) for FGGM 93.
March 19, 2014	Final Feasibility Study (FS), Revision 1 issued.
March 2014	Proposed Plan (PP) issued to the public for review.
March 20 - April 19, 2014	30-day public comment period for the PP.
March 27,2014	PP public meeting.

As presented above, the NTCRA was conducted from February through August 2012 (in accordance with 40 Code of Federal Regulations [CFR] 300.415) at the western portion of the Site (**Figure 4**) to address safety hazards associated with methane gas present above the Lower Explosive Limit (LEL) due to the decomposition of MGW. Following achievement of the vertical and horizontal excavation limits, the excavation was backfilled. Overburden soil was placed within the bottom of the excavation. Clean imported fill was then placed over the overburden soils and graded to ensure at least an 18 inch soil cover over the overburden soil. Finally, a six inch layer of topsoil was placed over the clean imported fill to support vegetative growth. A high visibility mesh fabric was placed to serve as a witness layer 2 ft below grade beneath the clean soil cover. Buried C&D waste remains on the eastern parcel of the Site beneath a vegetative soil cover approximately 2 ft to 8 ft thick. A chain link fence located along the north-south oriented drainage swale separates the eastern and western parcels each with distinctly different land uses: Community Recreational and Community Educational (See **Figure 5**). Current land use is described in greater detail in Section 2.6 below.

A Revised HHRA and an Ecological Pathway Evaluation were conducted to evaluate various exposure pathways and quantify risks based upon the existing site conditions following the NTCRA completed February 2012 through July 2012. In order to finalize the RI Report, a Final RI Report Addendum including the revised HHRA was issued in March 2014 (ARCADIS U.S., Inc. [ARCADIS], 2014a). Based on the revised HHRA, potential risks to future students/teachers, construction workers, and future hypothetical residents on the western parcel and off-Site[1] adjacent residents exist at FGGM 93. The Final HHRA did not evaluate the future residential use of the eastern portion of the Site as the current foreseeable future land use is a school (ATKINS, 2011). However, this land use scenario was evaluated by the USEPA during review of the HHRA and unacceptable cancer risk and non-cancer hazards were identified.

2.2.3 Enforcement Activities

No formal enforcement activities have occurred at FGGM 93.

2.3 COMMUNITY PARTICIPATION

FGGM 93 has been the topic of presentations at bi-monthly FGGM Restoration Advisory Board (RAB) meetings. The Site has been discussed regularly with the RAB including briefings on methane monitoring results and updates throughout the duration of the NTCRA. A copy of the Draft Final PP (ARCADIS, 2014b) was provided to the FGGM RAB members. The PP for FGGM 93 was issued in March 2014, and made available to the public at the information repositories listed below:

[1] The “adjacent off-Site resident” refers to an occupant of the housing units located immediately north and west of the Site boundaries as depicted on Figure 3; however, under CERCLA “the Site” includes the location of a release (or releases) of hazardous substances and wherever such hazardous substances have come to be located. (I.e., under CERCLA, “the Site” would encompass the aerial extent of the contamination, including the groundwater plume, and not just the location of the release.)

Fort Meade Environmental Division Office
4215 Roberts Avenue, Suite 320
Fort Meade, MD 20755

Anne Arundel County Library, West County Area Branch
1325 Annapolis Rd
Odenton, MD 21113

A newspaper notification was published in compliance with the public notification requirements of the NCP (40 CFR 300.430(f)(3)) to inform the public of the start of the PP comment period, to solicit comments from the public, and to announce the public meeting. The notification ran in the Capital Gazette newspaper on March 16, 2014 and in the SoundOff! on March 13, 2014. A copy of the certificate of publication is provided in **Appendix A**. Additional information, including a fact sheet, was published on the Fort Meade Environmental Management System website (www.ftmeade.army.mil/environment). A public meeting was held on March 27, 2014, to inform the public about the selected RA for FGGM 93 and to seek public comments. At this meeting, representatives from the Army, USEPA, and MDE were present to answer questions about the Site and remedial alternatives under consideration. A public comment period was held from March 20, 2014 to April 19, 2014, during which written comments from the public were accepted. Public comments and prepared responses are presented in Section 3.0 of this ROD.

2.4 SCOPE AND ROLE OF RESPONSE ACTION

This RA represents the final selected remedy for FGGM 93. The Site is one of many sites at FGGM that are in the CERCLA and Installation Restoration Program process. There are currently three other Sites for which a final ROD has been issued. The Site Management Plan (URS, 2013) provides details on other sites at FGGM that will be addressed in separate RODs. The anticipated schedule for each of those sites is also provided in the Site Management Plan.

This ROD provides a summary of the remedial alternatives considered for the Site and selects Remedial Alternative 2 – Maintenance of the Existing Soil Cover, Land Use Controls (LUCs), and Long-Term Monitoring (LTM).

The selected RA for FGGM 93 incorporates the following components:

- Maintenance of the existing soil cover;
- Implementation of LUCs; and
- LTM of soil gas (methane), groundwater, and indoor air.

The selected RA will maintain the existing soil cover over both the eastern and western parcels of the Site to prevent exposure to buried waste and soil that may pose physical or chemical hazards. LUCs will prohibit (1) residential use of the Site, (2) groundwater use at the Site, (3) unauthorized intrusive activities at the Site, and (4) full-time occupancy of the crawl space at the Manor View Elementary School; and will require (1) the maintenance of the existing methane monitors at the Site, and (2) the development of provisions to prevent potential vapor intrusion in any new construction within 100 ft of the Site. LTM will be performed to monitor soil gas, groundwater, and indoor air conditions. The selected RA was chosen based on its ability to protect human health and the environment and to effectively address the environmental impacts posed by buried waste and contaminated media at FGGM 93. The components of the selected RA are discussed in further detail in Section 2.13.2, below.

2.5 SITE CHARACTERISTICS

FGGM 93 is located near the intersection of MacArthur Road and 2nd Corps Boulevard in the northern portion of Fort Meade. A site location map is provided as **Figure 2**, and an aerial map of the Site is presented on **Figure 3**. The Site is bounded by a group of vacant residential housing and an open field to the north, 2nd Corps Boulevard to the south, a group of vacant residential housing and Hayden Drive to the west, and Manor View Elementary School and

MacArthur Road to the east. The residential area to the west of the site is part of the Potomac Place Neighborhood. In total, the area of the Site is approximately 10 acres.

The topography at FGGM 93 slopes downward to the south and southwest from the northern boundary of the Site toward the Manor View Elementary School. Precipitation runoff is collected in a shallow subsurface stormwater collection system which empties into the stormwater retention ponds at the southern perimeter of the Site. Water in the retention ponds is directed east toward the Midway Branch via additional stormwater drainage systems. The Midway Branch empties into Kelly Pool, then Lake Allen, and then continues south to the Little Patuxent River. The ground surface at FGGM 93 ranges between approximately 195 ft above mean sea level (msl) and 210 ft above msl.

FGGM 93 is situated within the outcrop and recharge area of the Lower Patapsco sands in the central portion of FGGM. Sediments at the Site are primarily fine to medium grained sands with silt and clay layers that vary both vertically and horizontally. The clay layers do not form significant aquicludes within the system. Groundwater at FGGM 93 occurs under unconfined or water table conditions and is encountered at approximately 50 ft below ground surface (bgs). Groundwater flow at FGGM 93 is generally toward the southeast.

Nature and Extent of Contamination

The nature and extent of contamination in surface soil, subsurface soil, buried waste, vapor, surface water, sediment, and groundwater following completion of the NTRCA are described in the following subsections. Additional information pertaining to previous investigations and the nature and extent of contamination at FGGM 93 can be obtained in the Final FS, Revision 1 (ARCADIS, 2014c) or the Final RI Report Final Addendum (ARCADIS, 2014a).

Soil

Surface and subsurface soil samples were collected in 2003 and 2004 during the PA/SI and the RI to delineate the nature and extent of contaminated soil at FGGM 93.

For the purposes of this evaluation, the following soil intervals are defined:

- Surface Soil - defined as soil from 0 to 3 ft bgs, and
- Subsurface Soil - defined as soil deeper than 3 ft bgs.

The maximum depth sampled was 22 ft bgs.

The discussion below reflects current Site conditions, following completion of the NTCRA in 2012. Thus, the sample depth associated with soil samples collected from locations addressed by the NTCRA were altered to reflect current Site conditions (i.e., surface soil samples collected from within the overburden soil layer are regarded as subsurface soil because the overburden soil layer was excavated and placed beneath the clean fill).

Surface Soil

Results of the surface soil data screening are depicted on **Figure 6** for metals exceeding the regional screening level (RSL) and on **Figure 7** for non-metals (polynuclear aromatic hydrocarbons [PAHs] and volatile organic compounds [VOCs] that exceed the RSL).

- Metals – Arsenic was detected at a concentration above the RSL of 0.39 milligrams per kilogram (mg/kg). Arsenic is naturally occurring and a previous site investigation determined that the mean concentration of arsenic at FGGM is 3.62 mg/kg with a standard deviation of 1.63 mg/kg, and with a 95 percent upper confidence limit of 4.84 mg/kg (Malcolm Pirnie, 2001). In general, concentrations of arsenic observed in surface soil samples are consistent with the background values with seven of the 30 soil sample locations exceeding the 95 percent confidence limit of 4.84 mg/kg. Sample location TP-17 (see **Figure 6**) exceeded the RSL for iron (55,000 mg/kg) and arsenic (0.39 mg/kg) with reported concentrations of 130,000 mg/kg (duplicate sample concentration of 140,000 mg/kg) and 25 mg/kg, respectively. Additionally, arsenic was observed at

concentrations significantly exceeding the 95 percent upper confidence limit of 4.84 mg/kg at three locations in surface soil above the C&D waste layer located along the eastern portion of the Site with the highest concentration occurring at GP-22 (13 mg/kg). The iron and arsenic RSL exceedances are likely an isolated occurrence as only one of 30 sample locations exceeded the iron RSL and arsenic was observed at concentrations significantly less than that observed at TP-17 across the Site.

- Non-Metals – Multiple PAHs were observed at concentrations exceeding their associated RSLs, namely benzo(a)anthracene (maximum concentration: 1.6 mg/kg, RSL: 0.15 mg/kg), benzo(a)pyrene (maximum concentration: 1.9 mg/kg, RSL: 0.015 mg/kg), benzo(b)fluoranthene (maximum concentration: 2.2 mg/kg, RSL: 0.15 mg/kg), dibenz(a,h)anthracene (maximum concentration: 0.076 mg/kg (estimated), RSL: 0.015 mg/kg), and indeno(1,2,3-cd)pyrene (maximum concentration: 0.88 mg/kg, RSL: 0.15 mg/kg). Exceedances occurred in samples from seven of the 30 soil sample locations.

Subsurface Soil

The subsurface soil samples resulted in exceedances of metals, VOCs and PAHs similar to those detected in the surface soil, with the addition of trichloroethene (TCE) and vinyl chloride (VC).

- Metals [**Figure 8** depicts metals that exceed the RSL] – Arsenic was consistently detected in subsurface soil samples from nearly all of the sampling locations. The mean subsurface soil concentration of arsenic at FGGM is 1.14 mg/kg with a standard deviation of 0.702 mg/kg; with a 95 percent upper confidence limit of 1.67 mg/kg (Malcolm Pirnie, 2001). In general, concentrations of arsenic observed in subsurface soil samples are consistent with the background value. Higher concentrations were observed at depths consistent with buried debris. Similarly, mercury and iron were detected at concentrations exceeding the RSL in one subsurface soil boring (GP-44) at depths consistent with the possible tapering of known waste layers (between 4-10 ft bgs).
- Non-Metals [**Figure 9** depicts PAHs and VOCs that exceed the RSL] – TCE and VC were the only VOCs that exceeded applicable screening criteria in subsurface soil. TCE was observed exceeding the RSL of 0.91 mg/kg in one surface soil sample (GP-39, 0-2 ft bgs); however, following completion of the NTCRA this location was covered with approximately 2 ft of clean fill and is evaluated as a subsurface soil location in the HHRA. VC was observed at an estimated concentration of 0.14 mg/kg, exceeding the RSL of 0.06 mg/kg in one sample (GP-24, 12 ft bgs). Multiple PAHs were observed at concentrations exceeding their associated RSLs, namely benzo(a)anthracene (maximum concentration: 15 mg/kg [estimated result, duplicate sample resulted in an estimated concentration of 2.4 mg/kg], RSL: 0.15 mg/kg), benzo(a)pyrene (maximum concentration: 13 mg/kg, RSL: 0.015 mg/kg), benzo(b)fluoranthene (maximum concentration: 12 mg/kg, RSL: 0.15), benzo(k)fluoranthene (maximum concentration: 9.6 mg/kg, RSL: 1.5 mg/kg), dibenz(a,h)anthracene (maximum concentration: 1.7 mg/kg, RSL: 0.015 mg/kg), and indeno(1,2,3-cd)pyrene (maximum concentration: 9 mg/kg, RSL: 0.15 mg/kg). These typically low-level non-metal exceedances occurred sporadically in samples from six of the 22 sub-surface soil boring locations.

Buried Waste

The wastes encountered within the Site are classified into two general categories: MGW and C&D debris. The MGW formerly occupied approximately a one-acre area confined to the western portion of the Site (the MGW was excavated and removed during the 2012 NTCRA), which is bounded to the east by an unnamed north/south oriented drainage swale and to the north and west by the Potomac Place Housing Area. The remaining nine acres of the Site located east of the unnamed drainage swale contain buried C&D debris. **Figure 4** depicts the approximate horizontal extent of the former MGW and the C&D debris.

There currently is a soil cover ranging in thickness of between 2 ft and 8 ft over the remaining buried waste. The soil cover consists of a medium grained sandy silt vegetated top soil underlain by yellow to brown silts and sands with trace gravels. The buried waste is typically encountered between 2 and 15 ft bgs. The buried waste is typically encountered between 2 and 15 ft bgs. Since the typical depth to the water table at the Site is 50 ft bgs, the remaining buried waste is not in contact with the aquifer.

Vapor

Four investigations were conducted as part of the RI to assess levels and sources of methane and other vapor constituents in ambient and indoor air at FGGM 93. The results of each investigation are presented below.

Soil Gas Survey

Four sampling events were conducted from October 2004 through October 2005, and a total of 93 soil gas samples were collected (SG-1 to SG-92 and MV-14). Sample depths for the first 31 samples were selected to target dry, sandy soil above the waste layer where contaminants would likely exist in the vapor phase. If methane was detected, the remaining samples were collected at 5 ft bgs to minimize the breakthrough of ambient air.

Samples were analyzed for methane and VOCs. From October 2004 through October 2005, methane was detected at greater than or equal to 10 percent of the LEL for methane (5,000 parts per million by volume [ppmv]) at 17 of 93 locations. VOCs were detected above reporting limits in 32 of the 93 soil gas sampling locations, primarily in locations near the buried MGW. Sample procedures, locations, and results are included in the RI Report (URS, 2008).

Ambient Air Investigation

Ambient air samples were collected in May 2005 around the Manor View Elementary School grounds, in the footprint of the former MGW waste near the residential area, and at off-Site background locations. Sample procedures, locations, and results are included in the RI Report (URS, 2008).

While methane and VOCs were detected in all of the ambient air samples, the concentrations detected in both the Site and background samples were at comparable levels. The maximum methane concentration of 2.1 ppmv was equal to outdoor background levels and four orders of magnitude less than the LEL of 50,000 ppmv.

Indoor Air Investigation

Indoor air samples were collected inside the Manor View Elementary School and a separate “background" school in February 2005. Details of indoor air and subslab air sampling procedures and results are presented in the RI Report (URS, 2008).

VOCs and methane were detected in all the indoor air samples from both schools. The maximum methane concentration of 2.7 ppmv was similar to outdoor background levels and four orders of magnitude less than the LEL of 50,000 ppmv. The VOCs within indoor air were compared against the USEPA Vapor Intrusion Screening Level (VISL) concentrations protective of indoor air. Within the indoor air samples collected at the Manor View Elementary School, ten constituents exceeded the VISL; they are as follow:1,2,4-trimethylbenzene; 1,2-dibromoethane; 1,3,5-trimethylbenzene; 1,4-dichlorobenzene; 1,4-dioxane; benzene; ethylbenzene; isopropyl alcohol; methyl N-butyl ketone; and TCE. The concentrations of constituents exceeding the VISL at the Manor View Elementary School are comparable to the concentrations of these same constituents within the indoor air obtained from the control school (Bodkin Elementary School).

Vacuum Extraction Testing

Six soil vapor extraction tests (VE-A through VE-F) were conducted in September 2005 at vapor extraction wells to assess the potential radius of influence in the subsurface within and around the buried waste. Additionally, three subslab vapor extraction tests were conducted in February 2005 to assess the vacuum influence potential in the subslab materials beneath the Manor View

Elementary School foundation. Detailed testing procedures and results of the vapor extraction testing are included in the RI Report (URS, 2008).

Based on the low concentrations of methane and VOCs detected in the subslab air samples, the RI concluded that vapors from the buried waste do not appear to be accumulating in the gravel layer beneath the building slab foundation.

Surface Water and Sediment

Two surface water sampling events were conducted during the RI (2004 and 2005). Samples were collected at the northern inlet culvert of the stormwater detention pond directly from the discharge pipe during a rain event, since flow is intermittent. The pond receives stormwater from inlets along the base of the slope north of the school and from the runoff from two paved parking areas south of the school building. In addition to the surface water samples, one sample from sediment accumulated at the edge of the culvert was also collected during the November 2004 groundwater sampling event.

Low concentrations of metals and organic compounds were detected in the first round of surface water samples. Pesticides and herbicides were detected in the second round of surface water samples. Based on the low levels of detected compounds, surface water was not considered to be significantly impacted. Chromium was detected at a concentration of 240 mg/kg in the sediment sample which was slightly above the screening level of 230 mg/kg. Sampling locations and analytical results are presented in the RI Report (URS, 2008) and on **Figure 10**.

Due to the elevated chromium concentration and limited extent of sediment sample coverage in the RI, an additional four sediment samples were collected and analyzed for chromium in April 2010. The samples were collected from the end of the culvert where the original sediment sample was collected. The additional chromium results were observed an order of magnitude lower than the RI sample result, with concentrations ranging from 11 to 15 mg/kg, well below the RI Report screening level of 230 mg/kg.

Groundwater

Groundwater samples were collected in 2004, 2005, 2009, 2011 and 2012 from 11 monitoring wells and resulted in the collection of approximately 74 parent and duplicate samples. Groundwater data were compared against the relevant USEPA Maximum Contaminant Levels (MCLs), or reporting limits or risk-based screening levels, where MCLs were not available. **Figures 11** through **13** depict the groundwater monitoring wells and the analytical results. A comprehensive summary of detected constituents within groundwater is presented in the FS. Results of groundwater sampling are as follow:

- VOCs [**Figure 11** depicts VOCs that exceed their respective MCLs] – Only two VOCs exceeded their respective USEPA MCLs: TCE and VC. These exceedances were primarily observed during the 2004 and 2005 sampling events. TCE was observed in one monitoring well (MW-5) exceeding the MCL of 5 micrograms per liter (µg/L) with a maximum detected concentration of 21 µg/L during 2004. TCE has not been detected above the MCL at any other sample locations since 2005. The more recent groundwater sampling conducted during 2009, 2011, and 2012 yielded one location with consistent VOC MCL exceedances: VC in MW-9.

  Notably, the VC concentration at MW-9 exhibits a strongly decreasing trend. The most recent sampling data collected during April 2012 indicate that the VC concentration from MW-9 (2.8 µg/L) only slightly exceeded the MCL of 2.0 µg/L.

- Metals [**Figure 12** depicts metals that exceed their respective MCLs] – Over the course of the sampling program, seven metals were observed at concentrations exceeding their respective USEPA MCLs during one or more sampling event (antimony, arsenic, cadmium, chromium, lead, selenium, and thallium). The majority of the metals MCL exceedances were sporadic and/or isolated occurrences.

Arsenic is the only metal that has consistently exceeded the MCL. A majority of the arsenic exceedances were observed in unfiltered samples. Only one filtered sample (MW-7 collected during 2009) exhibited an arsenic MCL exceedance with a measured concentration of 11.3 µg/L. Furthermore, arsenic is naturally occurring and MCL exceedances have also occurred in upgradient wells, in both filtered and unfiltered samples (e.g. MW-1 and MW-7).

- Semi-volatile organic compounds (SVOCs) [**Figure 13** depicts SVOCs that were detected] - Explosives, herbicides, pesticides, polychlorinated biphenyls, PAHs, and total petroleum hydrocarbons were analyzed in 2004 and 2005. Select PAHs at MW-11 and dieldrin at MW-5 were analyzed in 2009, 2011, and 2012. Dieldrin was detected at MW-5 in 2004, 2011, and 2012; and, dibenz(a,h)anthracene was detected at MW-11 in 2004. Dieldrin was detected at an estimated concentration of 0.013 at MW-5 in 2004 and 0.023 µg/L in 2011 and 2012. Dieldrin was not detected elsewhere at the Site. Dibenz(a,h)anthracene was detected at 0.85 µg/L in 2004 and was not detected during the 2005, 2009, 2011, and 2012 sampling events.

In summary, most constituent detections and/or MCL exceedances were sporadic and isolated throughout the Site. Only two constituents were detected above the USEPA MCL: TCE and VC. TCE concentrations have subsequently fallen below the MCL.

VC was consistently observed exceeding the MCL at MW-9 during all groundwater sampling events conducted to date. Monitoring well MW-9 is located in the western portion of the Site and is hydraulically downgradient of the area where MGW was formerly buried (removed during the 2012 NTCRA). The maximum concentration of VC was observed during 2004 at 51.0 µg/L. However, the VC concentrations at this well have exhibited a strong downward trend, likely degrading aerobically under natural conditions, with VC concentrations declining during each subsequent groundwater sampling event to the current (April 2012) concentration of 2.8 µg/L.

It is anticipated that VC concentrations will continue to decline at this location for primarily two reasons: (1) the NTCRA conducted during 2012 has likely removed the VC source; and (2) groundwater aquifer conditions are conducive to the aerobic biodegradation of VC within groundwater. The aerobic biodegradation of residual VC at MW-9 is expected to continue, provided that the aquifer conditions remain aerobic.

2.6 CURRENT AND POTENTIAL FUTURE LAND USE

The western one acre portion of the Site is currently a vacant field with restricted access; however, it is designated as community space per the FGGM Real Property Master Plan (ATKINS, 2011). Sections of the chain link fence encompassing the western portion of the Site are anticipated to be removed in 2014. The eastern portion of the chain linked fence, associated with the Manor View Elementary playground (located adjacent to the unnamed drainage swale), will remain in place bisecting the Site into east and west parcels with distinctly different land uses: Community Recreational (e.g., an open community space) and Community Educational (i.e., activities associated with the operations of the Manor View Elementary School) (See **Figure 5**). The eastern portion of the Site occupies approximately nine acres and is located adjacent to the Manor View Elementary School. Land use of the eastern portion of the Site is associated with community activities and future residential land use is not anticipated (ATKINS, 2011).

There is currently no designated use for groundwater at the Site. Under existing conditions, it is anticipated that chlorinated solvents and their degradation products will decrease below their respective Remediation Goals (RGs) within 2 years following remedy implementation. Once groundwater RGs are achieved, groundwater at FGGM 93 will be available for beneficial use.

2.7 SUMMARY OF SITE RISKS

2.7.1 Summary of the Human Health Risk Assessment

This section presents a summary of the HHRA and the Ecological Pathway Evaluation conducted for FGGM 93. The original HHRA performed in support of the RI (2005) is outdated

and no longer applicable as site conditions have changed as a result of the NTCRA. The revised HHRA is presented as a separate report (ARCADIS, 2014a) which serves as an RI addendum in order to finalize the original RI (and HHRA) for CERCLA documentation purposes. The HHRA was completed in accordance with the NCP (40 CFR 300.430(d)(4)) and USEPA Risk Assessment Guidance for Superfund (USEPA, 1989, 1991, and 2004).

Current and potential future exposures were evaluated based on the potential risk of developing cancer and the potential for non-cancer health hazards. The likelihood of an individual developing cancer is expressed as a probability. For example, a 10^{-4} (also commonly expressed as 1E-04) cancer risk means a one-in-ten-thousand excess cancer risk; or one additional cancer may be seen in a population of 10,000 people as a result of exposure to site contaminants. Current Superfund guidelines for acceptable exposures are an individual lifetime excess cancer risk in the range of 1E-04 to 1E-06 (corresponding to a one-in-ten-thousand to a one-in-one-million excess cancer risk). For non-cancer health effects, a hazard index (HI) is calculated. An HI represents the sum of the exposure levels for individual contaminants compared to their corresponding reference doses at which no adverse health effects are expected to occur. The key concept for a non-cancer HI is that a threshold level (measured as an HI of less than 1) exists below which non-cancer health effects are not expected. Additional information on human health risk and how it is calculated is provided in the inset below:

WHAT IS HUMAN HEALTH RISK AND HOW IS IT CALCULATED?

A Superfund baseline human health risk assessment is an analysis of the potential adverse health effects caused by hazardous substance releases from a site in the absence of any actions to control or mitigate these releases under current- and future-land uses. A four-step process is utilized for assessing site-related human health risks for reasonable maximum exposure scenarios.

Hazard Identification: In this step, the contaminants of concern at the site in various media (i.e., soil, groundwater, surface water, and air) are identified based on such factors as toxicity, frequency of occurrence, fate and transport of the contaminants in the environment, concentrations of the contaminants in specific media, mobility, persistence, and bioaccumulation.

Exposure Assessment: In this step, the different exposure pathways through which people might be exposed to the contaminants identified in the previous step are evaluated. Examples of exposure pathways include incidental ingestion of and dermal contact with contaminated soil. Factors relating to the exposure assessment include, but are not limited to, the concentrations that people might be exposed to and the potential frequency and duration of exposure. Using these factors, a reasonable maximum exposure scenario, which portrays the highest level of human exposure that could reasonably be expected to occur, is calculated.

Toxicity Assessment: In this step, the types of adverse health effects associated with chemical exposures, and the relationship between magnitude of exposure (dose) and severity of adverse effects (response) are determined. Potential health effects are chemical-specific and may include the risk of developing cancer over a lifetime or other non-cancer health effects, such as changes in the normal functions of organs within the body (e.g., changes in the effectiveness of the immune system). Some constituents are capable of causing both cancer and non-cancer health effects.

Risk Characterization: This step summarizes and combines exposure information and toxicity assessments to provide a quantitative assessment of site risks. Exposures are evaluated based on the potential risk of developing cancer and the potential for non-cancer health hazards. The likelihood of an individual developing cancer is expressed as a probability. For example, a 10^{-4} cancer risk means a one-in-ten-thousand excess cancer risk; or one additional cancer may be seen in a population of 10,000 people as a result of exposure to site contaminants under the conditions explained in the Exposure Assessment. Current Superfund guidelines for acceptable exposures are an individual lifetime excess cancer risk in the range of 10^{-4} to 10^{-6} (corresponding to a one-in-ten-thousand to a one-in-one-million excess cancer risk). For non-cancer health effects, a hazard index (HI) is calculated. An HI represents the sum of the exposure levels for individual contaminants compared to their corresponding reference doses at which no adverse health effects are expected to occur. The key concept for a non-cancer HI is that a threshold level (measured as an HI of less than 1) exists below which non-cancer health effects are not expected.

A summary of exposure pathways and associated risks identified at FGGM 93 is presented below:

- **Current Student and Teacher (eastern portion of site only)** – Using the revised Exposure Point Concentrations (EPCs) and updated toxicity values, cancer risks are within the USEPA acceptable risk range of 1E-04 to 1E-06 and the non-cancer hazards are below the target HI of 1.
- **Future Student and Teacher (eastern portion of site only)** – Using the revised EPCs and updated toxicity values, cancer risks are within the USEPA's acceptable risk range of 1E-04 to 1E-06. Non-cancer hazards exceed the target HI of 1. This is due to a potential future exposure to TCE in indoor air for the future student and teacher and exposure to 2,3,7,8-TCDD, benzo(a)pyrene, and dibenzo(a,h)anthracene in subsurface soil for the future student on the eastern portion of the Site only.
- **Current Trespasser and Future Recreation User (western portion of the Site only)** – Using the revised EPCs and updated toxicity values, cancer risks are within the USEPA's acceptable risk range of 1E-04 to 1E-06 and the non-cancer hazards are below the target HI of 1.
- **Future Construction Worker (eastern portion of the Site)** – Using the revised EPCs and updated toxicity values, cancer risks are within the USEPA's acceptable risk range of 1E-04 to 1E-06 and the non-cancer hazards are below the target HI of 1.
- **Future Construction Worker (western portion of the Site)** – Using the revised EPCs and updated toxicity values, cancer risks are within the USEPA's acceptable risk range of 1E-04 to 1E-06 and the non-cancer hazards are at the target HI of 1. The HI was 1 and therefore did not exceed USEPA threshold values. However, pursuant to the USEPA's request, TCE in subsurface soil was retained for further evaluation as it contributed to the majority of the hazard.
- **Future Hypothetical Resident (eastern portion of the Site only)** – Although residential use of the eastern portion of the Site is not anticipated pursuant to the FGGM Real Property Master Plan (ATKINS, 2011) and was not evaluated by the U.S. Army as part of the HHRA presented in the Final RI Report Addendum (ARCADIS 2014a), the hypothetical future resident scenario was evaluated by USEPA. Using the revised EPCs and updated toxicity values, the USEPA identified cancer risks that exceed the acceptable risk range and non-cancer hazards that exceed the target HI of 1. This is due to a future exposure to 2,3,7,8-TCDD, benzo(a)pyrene, dibenzo(a,h)anthracene, and mercury in subsurface soil, and arsenic, cobalt, thallium, and VC n groundwater.
- **Future Hypothetical Resident (western portion of the Site only)** – Using the revised EPCs and updated toxicity values, cancer risks exceed the acceptable risk range and non-cancer hazards exceed the target HI of 1. This is due to potential future exposure to benzo(a)pyrene and dibenzo(a,h)anthracene in subsurface soil, and arsenic, cobalt, thallium, and VCin groundwater. Based on the USEPA's evaluation of the HHRA for FGGM 93, TCE in subsurface soil was also identified as a risk driver under the future hypothetical resident on the western portion of the Site land use scenario.
- **Future Adjacent Off-Site Resident (western portion of the Site only)** – Using the revised EPCs and updated toxicity values, risks are at the upper end of the acceptable risk range and hazards exceed the target HI of 1. This is due to exposure to arsenic, cobalt, thallium, and VC in groundwater.
- **Evaluation of Indoor Air** – The previous version of the HHRA didn't include the assessment of indoor air data obtained from the crawl space of the Manor View Elementary School (sample location MV-13). Therefore, the revised HHRA includes this data point within the indoor air data set under a future exposure scenario to complete the analysis of indoor air. The cancer risk and non-cancer hazard estimates for current teacher and student receptors are within the USEPA acceptable risk range and hazard

limit. Only if one assumes a future use scenario where the crawl space is occupied on a regular basis is there a condition of unacceptable non-cancer hazard to the future student and teacher based solely on TCE in crawl space air.

2.7.2 Ecological Pathway Evaluation

The RI concluded that the Site does not provide significant habitat for wildlife because it is highly maintained and heavily trafficked. To confirm this assumption, an ecological pathway evaluation was conducted at FGGM 93.

An ARCADIS biologist visited the Site on September 4, 2012 to assess the habitat. The assessment concluded that the Site provides minimal canopy cover required for nesting by birds and mammals. The eastern parcel consists of a fenced schoolyard with heavy human foot traffic which limits access for wildlife. The western parcel contains small manmade stormwater “ponds” that are ephemeral in nature, only filling with surface runoff water from the storm drainage system during significant rain events. Thus, these areas do not provide suitable aquatic habitat. They are also lined with rip-rap, preventing any transient wildlife from coming into direct contact with sediment. Based on this evaluation, the exposure pathways to ecological receptors were considered incomplete and no additional ecological evaluation was deemed necessary.

2.7.3 Conclusion

The response action selected in this ROD is necessary to protect the public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment.

2.8 IDENTIFICATION OF CONSTITUENTS OF CONCERN AND SITE CLEANUP LEVELS

As part of the FS for FGGM 93, the constituents detected in impacted media were screened to identify constituents of concern (COCs). Details of the screening process are presented in Section 4 of the FS (ARCADIS, 2014c). In summary, COCs are defined as contaminants that contribute to the majority of Site-specific cancer risk or non-cancer hazards to human health based on the calculations performed in the HHRA or as requested by the USEPA based on their review and evaluation of the HHRA for FGGM 93. The following table identifies the constituents that were identified as COCs in the HHRA and the contaminated media through which the exposure could occur:

Scenario	Total Cancer Risk	Total Non-Cancer HI	COC	Media
Future Teacher (eastern portion of the Site only)	8.00E-05	2	TCE	Indoor Air
Future Student (eastern portion of the Site only)	4.00E-05	3	TCE	Indoor Air
			2,3,7,8-TCDD benzo(a)pyrene dibenzo(a,h)anthracene	Soil
Future Construction Worker (western portion of the Site only)[1]	2.00E-06	1	TCE	Soil
Future Hypothetical Resident (western portion of the Site only)	3.00E-04	8 (child) 4 (adult)	TCE[2] benzo(a)pyrene dibenzo(a,h)anthracene	Soil
			arsenic cobalt thallium vinyl chloride	Groundwater
Future Adjacent Off-Site Resident (western portion of the Site only)	2.00E-04	7 (child) 4 (adult)	arsenic cobalt thallium vinyl chloride	Groundwater
Future Hypothetical Resident (eastern portion of the Site only)[3]	Not Available	Not Available	2,3,7,8-TCDD benzo(a)pyrene dibenzo(a,h)anthracene mercury	Soil
			arsenic cobalt thallium vinyl chloride	Groundwater

Notes:

1. Under the future construction worker (western portion of the Site only) scenario, cancer risks were identified within the USEPA's acceptable risk range of 1E-04 to 1E-06 and the non-cancer hazards are at the target HI of 1. The HI was 1 and therefore did not exceed USEPA threshold values. However, pursuant to the USEPA's request, TCE was retained as a COC in subsurface soil.
2. Pursuant to the USEPA's request, TCE was retained as a COC for the future hypothetical resident (western portion of the Site only) land use scenario.
3. The HHRA presented in the Final RI Report Addendum did not evaluate future residential use of the eastern portion of the Site as the current and foreseeable future land use is a school (Atkins, 2011). This scenario was evaluated by the USEPA and unacceptable cancer risk and non-cancer hazards were identified. Pursuant to the USEPA's request, the hazard drivers were retained as COCs.

The NCP establishes general expectations for the response action "to return usable ground waters to their beneficial uses wherever practicable" (40 CFR 300.430(a)(1)(iii)(F)). Furthermore, the NCP states that "maximum contaminant level goals (MCLGs) that are set above zero…shall be attained by remedial actions…where the MCLGs are relevant and appropriate…If an MCLG is determined not to be relevant and appropriate, the corresponding MCL shall be attained…" (40 CFR 300.430(e)(2)(i)(B) and (C)).

Although the HHRA only identified arsenic, cobalt, thallium, and VC as COCs in groundwater, additional constituents exceeded the MCL or non-zero MCLG during one or more of the previous

groundwater sampling events (cadmium, chromium, lead, selenium and TCE). Therefore, these constituents have been identified and retained as COCs.

Furthermore, Site-specific risk-based Preliminary Remediation Goals (PRGs), calculated in the HHRA, were compared to other applicable screening levels, background values, and enforceable standards for the selection of RGs or Site Clean-up Levels (SCLs) for FGGM 93. Details of the risk-based PRG calculations are provided in the HHRA (ARCADIS, 2014a). The selection of RGs is presented by media, below:

Groundwater

For groundwater, USEPA MCLs and non-zero MCLGs were identified as potential applicable or relevant and appropriate requirements (ARARs). A detailed discussion of ARAR evaluation and analysis is provided in the FS (ARCADIS, 2014c).

- Arsenic – the MCLG for arsenic is 0 µg/L, the calculated PRG for arsenic is 0.04 µg/L and the MCL is 10 µg/L; however, the PRG is less than the Practical Quantitation Limit (PQL) for arsenic and it is not technically feasible to achieve quantitation at this level; therefore, the MCL of 10 µg/L will be established as the RG for arsenic.
- Cadmium – the MCL and MCLG for cadmium are both 5 µg/L; therefore, the RG for cadmium will be 5 µg/L;
- Chromium – the MCL and MCLG for chromium are both 100 µg/L; therefore, the RG for chromium will be 100 µg/L;
- Cobalt – the calculated PRG for cobalt is 5 µg/L. An MCL and/or MCLG is not established for cobalt; therefore, the PRG of 5 µg/L will be used as the RG.
- Lead – the MCLG for lead is 0 µg/L and the USEPA action level established for treatment of corrosiveness in drinking water for lead is 15 µg/L; therefore, the RG for lead will be 15 µg/L;
- Selenium – the MCL and MCLG for selenium are both 50 µg/L; therefore, the RG for selenium will be 50 µg/L;
- Thallium – a PRG could not be calculated for thallium as no toxicity value has been identified that is suitable for evaluating potential exposures or deriving a risk-based PRG. The MCL is 2 µg/L, whereas the MCLG is 0.5 µg/L; therefore, the RG for thallium will be established at the MCLG of 0.5 µg/L.
- TCE – the MCL is 5 µg/L, whereas the MCLG is 0 µg/L; therefore, the RG for TCE will be established at the MCL of 5 µg/L; and
- VC – the PRG calculated in the HHRA for VC is 0.02 µg/L. The MCL is 2 µg/L, whereas the MCLG is 0 µg/L; however, the PRG is less than the PQL for VC and it is not technically feasible to achieve quantitation at this level; therefore, the RG for VC will be established at the MCL of 2 µg/L.

Subsurface Soil

The HHRA presented in the RI Report Addendum (ARCADIS, 2014a) identified three soil COCs: benzo(a)pyrene and dibenzo(a)anthracene that posed unacceptable risk to the future hypothetical resident on the western portion of the Site and 2,3,7,8-TCDD that posed unacceptable cancer risk and non-cancer hazards to the future student on the eastern portion of the Site. Additionally, pursuant to the USEPA's request, TCE and mercury in subsurface soil were also retained as COCs. For simplicity, all of the above mentioned COCs were applied across the Site and the PRGs calculated in the HHRA were evaluated to determine the most appropriate RG, protective under current and future land use. A summary of RGs for soil COCs is presented below:

- Benzo(a)pyrene – the lowest risk-based PRG calculated in the HHRA using the target risk of 1E-06 for benzo(a)pyrene is 0.24 mg/kg; therefore, the RG for benzo(a)pyrene is 0.24 mg/kg.
- Dibenzo(a,h)anthracene - the lowest risk-based PRG calculated in the HHRA using the target risk of 1E-06 for dibenzo(a,h)anthracene is 0.24 mg/kg; therefore, the PRG for dibenzo(a,h)anthracene is 0.24 mg/kg.
- 2,3,7,8-TCDD - the lowest risk-based PRG calculated in the HHRA using the target risk of 1E-06 for 2,3,7,8-TCDD is 4E-05 mg/kg; therefore, the RG for 2,3,7,8-TCDD is 4E-05 mg/kg.
- TCE – the lowest PRG calculated in the HHRA using the target risk of 1E-06 for TCE is 2 mg/kg; therefore, the RG for TCE is 2 mg/kg.
- Mercury – the lowest PRG calculated in the HHRA using the target hazard index of 1 for mercury is 8 mg/kg; therefore, the RG for mercury is 8 mg/kg.

Indoor Air

Based on the HHRA (ARCADIS, 2014a), the cancer risk and non-cancer hazard estimates for the current teacher and student receptors posed by indoor air are within the USEPA acceptable risk range and hazard limit. However, under a future use scenario where the crawl space is occupied on a regular basis there is a condition of unacceptable risk/hazard to the future student and teacher based solely on TCE in crawl space air. Therefore, TCE was retained as a COC and the RG was set equal to the USEPA Indoor Air Screening Level of 1.0 microgram per cubic meter ($\mu g/m^3$).

Buried Waste

No COCs are identified specifically for the buried C&D waste located beneath the eastern parcel. However, the buried C&D waste within the eastern parcel can pose a physical hazard if exposed. Therefore, an RG of controlling the exposure of buried waste was retained for evaluation of the remedial alternatives.

Soil Gas

Methane formerly posed a physical hazard at the western parcel of the Site within soil gas which triggered the NTCRA. The selected removal action was documented in the EE/CA (ARCADIS, 2011a) and approved by the USEPA and MDE within the Action Memorandum (ARCADIS, 2011b). The NTCRA was conducted in 2012 (ARCADIS, 2012) to address methane above the LEL. An RG to ensure the continued effectiveness of the NTCRA was retained for evaluation of the remedial alternatives.

The following table summarizes the numeric RGs developed for Site COCs as discussed above:

Constituent	Media	RG
TCE	Indoor Air ($\mu g/m^3$)	1
Benzo(a)pyrene	Subsurface Soil (mg/kg)	0.24
Dibenzo(a,h)anthracene		0.24
2,3,7,8 - TCDD		0.00004
TCE		2
Mercury		8
Arsenic	Groundwater (µg/L)	10
Cadmium		5
Chromium		100

Constituent	Media	RG
Cobalt	Groundwater (µg/L)	5
Lead		15
Selenium		50
Thallium		0.5
TCE		5
Vinyl Chloride		2

2.9 REMEDIAL ACTION OBJECTIVES

Remedial action objectives (RAOs) for FGGM 93 were developed based on the criteria outlined in Section 300.430(e)(2) of the NCP and Section 121(b) of CERCLA with the objective to protect human health and the environment.

The RAOs for the Site are:

1. To prevent human exposure to groundwater until contaminant levels in groundwater have been reduced to levels that allow for unlimited use and unrestricted exposure;
2. To protect human health and the welfare of the surrounding community from the safety hazard posed by methane gas through ensuring the continued effectiveness of the NTCRA;
3. To prevent the exposure of buried waste and constituents in soil that may pose a physical or chemical hazard; and
4. To protect the occupants of the school from the potential vapor intrusion via the crawl space.

2.10 DESCRIPTION OF REMEDIAL ALTERNATIVES

Remedial alternatives for FGGM 93 were developed and evaluated in the FS (ARCADIS, 2014c). The remedial alternatives considered during the evaluation presented in the FS included:

- Alternative 1 – No Action;
- Alternative 2 – Maintenance of Existing Soil Cover, LUCs, and LTM;
- Alternative 3 – Installation of Low Permeability Cap, LUCs, and LTM.

The remedial alternatives are described below with their respective estimated capital costs, estimated cost for operation and maintenance (O&M) activities, and an estimate of the present worth costs for each alternative.

2.10.1 Alternative 1: No Action

Estimated Capital Cost: ***$0***
Estimated O&M (cost over 30 years): ***$0***
Estimated Present Worth Cost: ***$0***

Under Alternative 1, no corrective action of any kind would be employed. This alternative would not adequately control the physical hazards posed by the potential exposure to buried waste; nor would it verify that groundwater is restored to its beneficial use at FGGM 93. However, the no action alternative must be evaluated (per 40 CFR 300.430(e)(6)) to establish a baseline of comparison regarding future performance and risk for the remaining alternatives, even though this alternative is not a viable option itself.

2.10.2 Alternative 2: Maintenance of Existing Soil Cover, LUCs, and LTM

Estimated Capital Cost: ***$ 94,600***
Estimated O&M (cost over 30 years): ***$309,600***
Estimated Present Worth Cost: ***$241,000***

Alternative 2 involves a combination of maintenance of the existing soil cover, implementation of LUCs, and LTM of soil gas (methane), groundwater, and indoor air to verify that the RAOs and RGs are achieved.

Maintenance of Existing Soil Cover

Under this alternative, the existing vegetated soil cover currently in place over Site would be inspected and maintained. The existing vegetated soil cover is 2 ft to 8 ft thick across the entire eastern portion of the Site, and no less than 2 ft thick across the western parcel, and is protective of human health under the current and reasonably anticipated future land uses for the Site. The existing soil cover prevents direct contact with and exposure to buried waste and subsurface soil which may pose a physical or chemical hazard. The existing soil cover has demonstrated long-term stability with minimal maintenance. Maintenance activities for this cover would include maintenance of grass (e.g., mowing, fertilizing, re-establishment of grass on bare spots) and repair of erosion or subsidence of the soil cover, as necessary.

Utilizing the existing soil cover over the eastern parcel of the Site where buried waste is still present is permissible under a regulatory variance from the State of Maryland's cap design criteria in Code of Maryland Regulations (COMAR) 26.04.07.21. The requirements of COMAR 26.04.07.21 dictate the specific design components required for the closure cap. The Army, USEPA, and MDE agree that the existing cover provides a level of protection equivalent to that provided by the cap specified in COMAR 26.04.07.21, and, therefore, that it qualifies for a variance as provided for in COMAR 26.04.07.26.

Land Use Controls

LUCs would include a combination of engineering and administrative controls designed to mitigate risks identified at the Site in the HHRA. LUCs would be documented in the Real Property Master Plan. A summary of LUCs is provided below.

Engineering controls would include the following:

- Installation of signage prohibiting unauthorized intrusive activities at the Site;
- Installation of warning signs at various conspicuous locations at the Site including common entrances and exits informing Site visitors of environmental concerns at the Site; and
- Retention of the fence bisecting the Site into eastern and western parcels.

Administrative controls would be implemented to achieve the following:

- Restrict intrusive activities to authorized personnel only;
- Prohibit residential use of the eastern and western portion of the Site;
- Prohibit groundwater use throughout the Site until contaminants in groundwater decrease to levels that allow for unlimited use and unrestricted exposure;
- Prohibit full time occupancy of the crawl space at the Manor View Elementary School;
- Ensure the retention and maintenance of the existing methane monitors in the Manor View Elementary School and housing units adjacent to the western parcel; and
- Develop and enforce provisions for the construction of buildings proposed within 100 ft of the Site to prevent vapor intrusion.

Long Term Monitoring

In addition to the inspection of the vegetated soil cover, LTM at the Site would be conducted for soil gas (methane), groundwater, and indoor air. The LTM program would consist of four main components, including:

- Semi-annual soil gas monitoring for methane;
- Semi-annual groundwater sampling for VOCs, total metals, and water quality parameters as specified by MDE in accordance with COMAR 26.04.07.09F (See Section 2.8 for RGs);
- Annual indoor air sampling for TCE and its daughter products in the crawl space at the Manor View Elementary School; and
- Annual Site inspections.

The following paragraphs discuss each of these four components in further detail.

Soil gas monitoring is currently being implemented across the Site as described within the Interim Removal Action Report (IRAR) (ARCADIS, 2013). The soil gas monitoring is conducted to ensure the continued effectiveness of the NTCRA in eliminating or minimizing the hazard posed by methane above the LEL. Soil gas samples would be collected semi-annually from existing monitoring points and analyzed for methane. If needed, the duration and frequency of monitoring could be modified based upon evaluation of data collected and agreement by the Army, USEPA, and MDE. The requirements for the cessation of LTM would be evaluated during the CERCLA five year review process. Methane monitors would remain in the school and nearby homes as part of this alternative.

Groundwater monitoring would consist of semi-annual groundwater sampling consistent with the requirements specified by MDE in accordance with COMAR 26.04.07.09F to ensure that the remaining buried waste is not contributing to groundwater contamination and that the concentrations of chlorinated solvents and their degradation products continue to decline. Under existing conditions, it is anticipated that chlorinated solvents and their degradation products will decrease below their respective RGs within 2 years following remedy implementation. Concentrations of metals have been observed sporadically and are not detected in a manner consistent with a cohesive plume; thus, it is expected that these concentrations are a result of naturally occurring conditions, and it would not be appropriate to estimate a timeframe for metal COCs to meet their associated RGs.

Indoor air monitoring would be conducted to verify that the Site conditions are not adversely affecting air quality in the crawl space at the Manor View Elementary School and the designated use of the crawl space would be monitored to confirm that it is not being used full-time. Indoor air sampling would be conducted annually for TCE and its daughter products in the crawl space in a manner consistent with previous sampling events.

Annual inspections and maintenance of the soil cover would be performed and documented to ensure that the integrity and continued effectiveness of the existing soil cover is maintained. Annual inspections would also ensure that the on-Site LUCs are in good condition and confirm that the Site land use has not changed. An annual report would document the inspection findings and also present the annual soil gas, groundwater, and indoor air sampling data.

2.10.3 Alternative 3: Installation of a Low Permeability Cover, LUCs, and LTM

Estimated Capital Cost: ***$6,566,105***
Estimated O&M (Cost over 30 years): ***$ 137,000***
Estimated Present Worth Cost: ***$6,641,000***

Alternative 3 would include the installation of a low permeability cap across the eastern parcel in accordance with COMAR 26.04.07.21, the implementation of LUCs, and LTM.

Installation of a Low Permeability Cap

Under Alternative 3, a low permeability soil cap would be installed over the eastern parcel of the Site where buried C&D wastes remain (approximately nine acres) and the vegetative soil cover over the western portion of the Site would remain in place.

The low permeability cap would be constructed of a minimum of one foot of clay or other natural fine-grained material having an in-place permeability less than or equal to 1×10^{-5} centimeters per second (cm/sec). The cap would be installed with a minimum slope of four percent to facilitate drainage of percolate. A drainage layer with a minimum thickness of 6 inches would be emplaced immediately above the low permeability cap and would consist of clean sand or other natural coarse grained material with an in-place permeability greater than 1×10^{-3} cm/sec. Finally, an earthen cover would be placed over the drainage layer and would have a minimum thickness of 2 ft. The final earthen cover would be graded to a minimum slope of four percent to facilitate surface drainage from the Site and would contain sufficient organic material to sustain vegetative growth.

Modification to the existing stormwater controls and/or installation of new stormwater controls would be necessary to accommodate the additional surface water run-off generated by the cap.

Land Use Controls

Similar to Alternative 2, Alternative 3 includes implementation of LUCs to control exposure pathways and eliminate the risks posed by impacted media and buried waste at the Site. LUCs would be documented in the Real Property Master Plan. Refer to the description under Alternative 2 for additional detail. A summary of LUCs is provided below.

Engineering controls would include the following:

- Installation of signage prohibiting unauthorized intrusive activities at the Site;
- Installation of warning signs at various conspicuous locations at the Site including common entrances and exits informing Site visitors of environmental concerns at the Site; and
- Retention of the fence bisecting the Site into eastern and western parcels.

Administrative controls would be implemented to achieve the following:

- Restrict intrusive activities to authorized personnel only;
- Prohibit residential use of the eastern and western portion of the Site;
- Prohibit groundwater use throughout the Site until contaminants in groundwater decrease to levels that allow for unlimited use and unrestricted exposure;
- Prohibit full time occupancy of the crawl space at the Manor View Elementary School;
- Ensure the retention and maintenance of existing methane monitors in the Manor View Elementary School and housing units adjacent to the eastern parcel; and
- Develop and enforce provisions for the construction of buildings proposed within 100 ft of the Site to prevent vapor intrusion.

Long Term Monitoring

Similar to Alternative 2, in addition to maintenance of the existing soil cover on the western portion of the Site, maintenance of the low permeability cap on the eastern portion of the Site and LTM at the Site would be conducted. Refer to the description under Alternative 2 for additional detail. The LTM program would consist of four main components:

- Semi-annual soil gas monitoring for methane;

- Semi-annual groundwater sampling for VOCs, total metals, and water quality parameters as specified by MDE in accordance with COMAR 26.04.07.09F (See Section 2.8 for RGs);
- Annual indoor air sampling for TCE and its daughter products in the crawl space at the Manor View Elementary School; and
- Annual inspections and routine maintenance of the low permeability cap.

Following remedy implementation, long-term inspection and maintenance of the impermeable cap would be conducted in perpetuity. Long-term maintenance would include performing and documenting annual inspections and maintaining the impermeable cap to ensure integrity and effectiveness. Maintenance would include mowing of the vegetation, erosion/subsidence repairs, and inspection of LUCs to ensure that the on-Site land use controls are in good condition and confirm that the Site land use has not changed. An annual report would document the inspection findings; and also present and interpret the annual groundwater sampling data.

Soil gas, groundwater, and indoor air monitoring would be conducted consistent with the descriptions for Alternative 2.

Under existing conditions (i.e., retention of the existing soil cover proposed in Alternative 2), it is anticipated that chlorinated solvents in groundwater and their daughter products will decrease below their respective RGs within 2 years following remedy implementation. Installation of a low permeability cap is expected to hamper the natural degradation of chlorinated solvents occurring under aerobic aquifer conditions by inhibiting the transfer of oxygen to the aquifer; thus, the length of time for chlorinated solvents to decrease below their respective RGs would be similar to but greater than that of Alternative 2 (2 years) under Alternative 3. Concentrations of metals have been observed sporadically and are not detected in a manner consistent with a cohesive plume; thus, it is expected that these concentrations are a result of naturally occurring conditions and it would not be appropriate to estimate a timeframe for metal COCs to meet their associated RGs.

2.11 COMPARATIVE ANALYSIS OF REMEDIAL ALTERNATIVES

The advantages and disadvantages of each of the remedial alternatives were compared using the nine CERCLA evaluation criteria established by the USEPA in Section 300.430(e)(9)(iii)(A)-(I) of the NCP. The detailed comparative analysis of all the remedial alternatives is provided in the FS (ARCADIS, 2014c) and includes an evaluation of the expected performance of each alternative relative to the other alternatives with respect to the five balancing criteria. The nine criteria are as follow:

<u>Threshold Criteria</u> – Must be met for the alternative to be eligible for selection as a remedial option.

1. Overall Protection of Human Health and the Environment – Determines whether an alternative adequately eliminates, reduces, or controls threats to public health and the environment through treatment, engineering controls, or LUCs.
2. Compliance with ARARs – Evaluates whether the alternative meets the requirements set forth in Federal and State environmental or facility siting statutes and regulations, or whether a waiver is justified. Identification of ARARs is dependent on site risks and the hazardous substances present at the Site, site characteristics, the Site location, and the actions selected to remediate the Site. Thus, requirements may be chemical-, location-, or action-specific. Please refer to Section 4.3 of the FS (ARCADIS, 2014c) for a more detailed discussion of ARARs.

<u>Primary Balancing Criteria</u> – Used to weigh major trade-offs among alternatives.

3. Long-term Effectiveness and Permanence – Considers the ability of an alternative to maintain protection of human health and the environment over time.

4. Reduction of Toxicity, Mobility, or Volume of Contaminants through Treatment – Evaluates an alternative's use of treatment to reduce the harmful effects of principal contaminants, their ability to move in the environment, and the amount of contamination present.
5. Short-term Effectiveness – Considers the length of time needed to implement an alternative and the risks the alternative poses to workers, residents, and the environment during implementation.
6. Implementability – Considers the technical and administrative feasibility of implementing the alternative, including factors such as the relative availability of goods and services.
7. Cost – Includes estimated capital and annual O&M costs, as well as present worth cost. Present worth cost is the total cost of an alternative over time in terms of today's dollar value. Cost estimates are expected to be accurate within a range of –30 to +50 percent.

Modifying Criteria – May be considered to the extent that information is available during the FS, but can be fully considered only after public comment is received on this PP.

8. State/Support Agency Acceptance – Considers whether the State agrees with the Army's analysis and recommendations, as described in the FS and PP.
9. Community Acceptance – Considers whether the local community agrees with the Army's analysis and preferred alternative. Comments received on the PP are an important indicator of community acceptance.

The following sections summarize the comparative analysis of alternatives for FGGM 93 as presented in the FS (ARCADIS, 2014c). Additionally, this evaluation is summarized qualitatively in **Table 3** and quantitatively in a scoring matrix provided in **Table 4**. For the quantitative analysis presented in **Table 4** and summarized in the sections below, each alternative is scored from 0 (being the least effective) to 5 (being the most effective) for each of the balancing criteria. The scores are then summed for each alternative. Threshold Criteria (i.e., Overall Protection of Human Health and the Environment and Compliance with ARARs) were not assigned a numeric score as alternatives either meet or do not meet the criteria.

2.11.1 Threshold Criteria

2.11.1.1 Overall Protection of Human Health and the Environment

Alternative 1 is not protective of human health because it does not include any LUCs to prevent residential land use, groundwater use, or digging in the buried waste at the Site. Therefore, since it does not satisfy this threshold criterion, Alternative 1 will not be considered further in this analysis. Both Alternatives 2 and 3 would control exposure to COCs in groundwater through LUCs and provide for semi-annual monitoring of groundwater. They would also both mitigate the hazard posed by buried waste and subsurface soil through maintenance of a cover, either permeable or impermeable. The installation of a low permeability cap as described in Alternative 3 would not yield a significant and quantifiable reduction in risk/hazards and, in fact, might contribute to an increase in risk should the aerobic degradation of the VC be halted by the changed conditions. Alternatives 2 and 3 are, therefore, judged to adequately provide overall protectiveness of human health and the environment. However, it is noted that Alternative 3 might change the groundwater conditions detrimentally.

2.11.1.2 Compliance with ARARs

Alternative 2 would not meet the cap design requirements specified in COMAR 26.04.07.21. However, the Army and USEPA believe, and MDE agrees, that the existing cover provides a level of protection equivalent to that provided by the cap specified in COMAR 26.04.07.21, and, therefore, that it qualifies for a variance as provided for in COMAR 26.04.07.26. Alternative 3 would meet action-specific ARARs without a variance.

Promulgated chemical-specific ARARs for groundwater COCs are the MCLs and MCLGs specific to those COCs. It is anticipated that the 2012 NTCRA, which removed the source of

groundwater contamination, will result in attainment of chemical-specific ARARs for chlorinated solvents in groundwater within 2 years. The LTM component of both Alternatives 2 and 3 would verify whether the contaminant concentrations in groundwater continue to decrease and meet Site-specific RGs within a reasonable timeframe. Thus, Alternatives 2 and 3 would be equivalent with regard to compliance with ARARs relevant to groundwater.

2.11.2 Balancing Criteria

2.11.2.1 Long-Term Effectiveness and Permanence

Alternatives 2 and 3 would both be effective in the long-term management of buried waste and impacted subsurface soil because they would prevent the uncontrolled exposure of this material which may pose a hazard. For Alternatives 2 and 3, LUCs would be required to prohibit residential land use over the western and eastern parcels. Both Alternatives 2 and 3 would require maintenance of a soil cover, with Alternative 2 requiring maintenance of the current soil cover and Alternative 3 requiring installation and maintenance of a low permeability soil cap on the eastern parcel in addition to the existing soil cover on the western parcel. To date, the present soil cover has required minimal maintenance and has an established vegetative cover, and, therefore, should provide an effective long-term remedy. The cap would require additional storm water control measures and maintenance but would not be any more effective that Alternative 2 in protecting human health and the environment.

Similarly, the long-term effectiveness of Alternatives 2 and 3 with regard to the control of exposure to contaminants in groundwater would be contingent upon the implementation and enforcement of the LUCs and LTM. Therefore, both Alternatives 2 and 3 would be similarly effective in the long term and were both scored a 4 out of a possible 5 within **Table 4**.

2.11.2.2 Reduction of Toxicity, Mobility, and Volume through Treatment

Neither Alternative 2 nor Alternative 3 would employ treatment as a remedial component. Therefore, neither of these alternatives would satisfy this criterion.

2.11.2.3 Short-Term Effectiveness

Alternative 2 would be effective in the short term (a quantitative score of 4). Alternative 2 would pose only minimal risks to the community, the workers, or the environment because it would involve minimal intrusive remedial activities. Furthermore, the soil cover is currently in place so the time required to achieve beneficial results under Alternative 2 would be less than for Alternative 3.

Alternative 3 would pose more significant short-term risks to the community and construction workers than Alternative 2 due to the construction activities to install the low permeability soil cap. These short-term risks would include additional traffic to import and place the fill material necessary for the construction of the low permeability cap, nuisance dust and noise resulting from a construction site, and potential impacts to surface water resulting from a nine acre disturbed site. In addition, the low permeability cap would be installed immediately adjacent to the Manor View Elementary School, and, therefore, would pose a risk to the students and faculty due to the proximity of the construction site to the school. Alternative 3 received a quantitative score of 3 because of the aforementioned short-term risks.

2.11.2.4 Implementability

Alternative 2 would be a readily implementable alternative as the remedial activities involve the upkeep of the already existing soil cover and long-term monitoring of methane in soil gas, indoor air, and groundwater. LUCs would be put into place through implementation of a remedial design with minimal engineering design and coordination to implement. Alternative 2 received a quantitative score of 4.

Alternative 3 would be the least implementable option (quantitative score of 2) as it would be the most difficult alternative from an engineering design and coordination aspect. Alternative 3 would require the design and approval of the engineered cap and then the subsequent planning and mobilization of a construction crew to complete the closure cap installation. The estimated time

frame to design an approved engineering remedial action work plan would be approximately three to six months. The construction of the low permeability cap and associated Site work (e.g., installation of erosion and sediment controls, Site preparation, design and construction of additional stormwater controls), would require the importation of approximately 30,000 cubic yards (or 2,000 to 3,000 truckloads) of fill material and would require approximately six to 12 months to install.

Furthermore, Alternative 3 would require significant logistical coordination with the Army and Anne Arundel County School System due to the inherent safety hazards posed by the construction within a residential community and adjacent to an elementary school. Examples of logistical coordination items that would have to be addressed prior to construction implementation include the following:

- Methods to minimize the impact of additional construction traffic to the surrounding community;
- Safety measures to be employed to protect the student population from additional construction traffic, especially because approximately 98 percent of the students at the Manor View Elementary School walk to campus;
- The means by which the construction schedule would not be significantly hampered by the Manor View Elementary School operations (i.e., if the Anne Arundel County School District insists that trucking of materials cease twice per day to allow the safe commute of students to/from school, then the effect on the construction schedule must be considered. Concomitantly, if the construction schedule is interrupted for the school commute, the potential impact on the surrounding community must be considered if early morning, late evening, and weekend construction work is added as a potential means of achieving the RAOs within a reasonable time frame); and
- The manner in which the Manor View Elementary School would compensate for losing access to significant portions of school property for the duration of a typical school year (i.e., the recreational facilities and playground are adjacent to the construction site).

2.11.2.5 Cost

Based on the present worth estimates of the probable costs for the alternatives, Alternative 3 would be the most costly (quantitative score of 2) as it requires the construction and maintenance of a low permeability landfill closure cap. Alternative 2 would be less costly (quantitative score of 4) as it utilizes the existing soil cover, requiring lower capital costs.

In summary, Alternatives 2 and 3 would both equally achieve the RAOs and RGs for the Site. Alternative 3, despite its additional cost, would provide no additional risk reduction and might actually detrimentally affect the groundwater quality by changing the subsurface conditions. Therefore, when considering risk reduction in relation to cost for these alternatives, Alternative 2 would be the most cost-effective remedy based on the evaluation of CERCLA criteria.

2.11.3 Modifying Criteria

2.11.3.1 State/Support Agency Acceptance

State representatives have reviewed the alternatives proposed in the decision documents for remedial action at FGGM 93. Based on a thorough review of the remedial response alternatives and public comments, the MDE concurs with Alternative 2.

2.11.3.2 Community Acceptance

No comments were received during the public comment period on the PP or during the public meeting. Community acceptance is addressed in the Responsiveness Summary (Section 3) of this ROD.

2.12 PRINCIPAL THREAT WASTE

The NCP establishes an expectation that USEPA will use treatment to address the principal threats posed by a site wherever practicable (NCP 300.430(a)(1)(iii)(A)). Identifying principal threat wastes combines concepts of both hazard and risk. In general, principal threat wastes are those source materials considered to be highly toxic or highly mobile that generally cannot be contained in a reliable manner or would present a significant risk to human health or the environment should exposure occur. Site related COCs and buried waste would not be considered a principal threat because they are not highly toxic or mobile; however, the potential risk to future site users from FGGM 93 requires a response action.

2.13 SELECTED REMEDIAL ACTION

This ROD presents the selected RA for FGGM 93 located at FGGM, Anne Arundel County, MD, developed in accordance with CERCLA, as amended, and consistent with the NCP. Based on the results of the comparative analysis and comments received from the public, the selected RA is: Alternative 2: Maintenance of the Existing Soil Cover LUCs, and LTM.

2.13.1 Summary of the Rationale for the Selected Remedial Action

The selected RA (Alternative 2: Maintenance of the Existing Soil Cover, LUCs, and LTM) was chosen to mitigate the physical hazards posed by buried waste and chemical hazards posed by COCs in subsurface soil, groundwater, and indoor air at FGGM 93. The selected RA was chosen over the other remedial alternatives considered, which included Alternative 1: No Action and Alternative 3: Installation of a Low Permeability Cap, LUCs, and LTM. The selection of the RA was made after considering the threshold, balancing, and modifying criteria, including, overall protection of human health and the environment; compliance with ARARs; reduction of toxicity, mobility, or volume through treatment; long- and short-term effectiveness; implementability; cost; and regulatory and community acceptance (40 CFR 300.430(e)(9)).

Alternative 2 is recommended because it meets the RAOs and RGs while providing the optimum balance with respect to the evaluation criteria. Specifically, under Alternative 2, it is anticipated that chlorinated solvents in groundwater and their daughter products will decrease below their respective RGs within 2 years following remedy implementation. Conversely, Alternative 3 is expected to hamper the natural degradation of chlorinated solvents occurring under aerobic aquifer conditions by inhibiting the transfer of oxygen to the aquifer; thus, the length of time for chlorinated solvents to decrease below their respective RGs would be greater than that of Alternative 2 (2 years). Furthermore, Alternative 2 is the most cost effective and readily implementable alternative.

2.13.2 Detailed Description of the Selected Remedial Action

The stated RAOs are: (1) to prevent human exposure to groundwater until contaminant levels in groundwater have been reduced to levels that allow for unlimited use and unrestricted exposure; (2) to protect human health and welfare of the surrounding community from the safety hazard posed by methane gas through ensuring the continued effectiveness of the NTCRA; (3) to prevent the exposure of buried waste and constituents in soil that may pose a physical or chemical hazard; and (4) to protect the occupants of the school from the potential of vapor intrusion via the crawl space. The selected RA includes a combination of maintenance of the existing soil cover, implementation of LUCs, and LTM of soil gas (methane), groundwater, and indoor air to achieve the RAOs and RGs.

<u>Maintenance of Existing Soil Cover</u>

Under this RA, the existing vegetated soil cover currently in place over the Site will be inspected and maintained. The existing vegetated soil cover is 2 ft to 8 ft thick across the entire eastern portion of the Site and no less than 2 ft thick across the western parcel and is protective of human health under the current and reasonably anticipated future land uses at the Site. The existing soil cover prevents the direct contact with and exposure to buried waste and subsurface soil which may pose a physical or chemical hazard. The existing soil cover has demonstrated long-term stability with minimal maintenance. Maintenance activities for this cover will include

maintenance of grass (e.g., mowing, fertilizing, re-establishment of grass on bare spots) and repair of erosion or subsidence of the soil cover as necessary.

Utilizing the existing soil cover over the eastern parcel of the Site where buried waste is still present is permissible under a regulatory variance from the State of Maryland's cap design criteria in COMAR 26.04.07.21. The requirements of COMAR 26.04.07.21 dictate the specific design components required for the closure cap. The Army and USEPA believe, and MDE agrees, that the existing cover provides a level of protection equivalent to that provided by the cap specified in COMAR 26.04.07.21, and, therefore, that it qualifies for a variance as provided for in COMAR 26.04.07.26.

Land Use Controls

LUCs will include a combination of engineering and administrative controls designed to mitigate risks identified at the Site in the HHRA. LUCs will be documented in the Real Property Master Plan. A LUC Remedial Design will be prepared as the land use component of the Remedial Design. In accordance with the schedule in the FFA, the Army shall prepare and submit to EPA for review and approval a LUC remedial design that shall contain implementation and maintenance actions, including periodic inspections. The Army will be responsible for implementing, maintaining, reporting on, and enforcing the LUCs. Although the Army may later transfer these procedural responsibilities to another party by contract, property transfer agreement, or by other means, the Army shall retain ultimate responsibility for remedy integrity. A summary of LUCs is provided below.

Engineering controls will include the following:

- Installation of signage preventing unauthorized intrusive activities at the Site;
- Installation of warning signs at various conspicuous locations at the Site including common entrances and exits informing Site visitors of environmental concerns at the Site; and
- Retention of the fence bisecting the Site into eastern and western parcels.

Administrative controls will be implemented to achieve the following:

- Restrict intrusive activities to authorized personnel only;
- Prohibit residential use of the eastern and western portion of the Site;
- Prohibit groundwater use throughout the Site until contaminants in groundwater decrease to levels that allow for unlimited use and unrestricted exposure;
- Prohibit full time occupancy of the crawl space at the Manor View Elementary School;
- Ensure the retention and maintenance of the existing methane monitors in the Manor View Elementary School and housing units adjacent to the western parcel; and
- Develop and enforce provisions for the construction of buildings proposed within 100 ft of the Site to prevent vapor intrusion.

Long Term Monitoring

In addition to inspection of the vegetated soil cover, LTM at the Site will be conducted for soil gas (methane), groundwater, and indoor air. The LTM will consist of four main components, they are:

- Semi-annual soil gas monitoring for methane;
- Semi-annual groundwater sampling for VOCs, total metals, and water quality parameters as specified by MDE in accordance with COMAR 26.04.07.09F (See Section 2.8 for RGs);

- Annual indoor air sampling for TCE in the crawl space at the Manor View Elementary School; and
- Annual site inspections.

The following paragraphs discuss each of these four components in further detail.

Soil gas monitoring is currently being implemented across the Site as described within the IRAR (ARCADIS, 2013). The soil gas monitoring is conducted to ensure the continued effectiveness of the NTCRA. Soil gas samples will be collected semi-annually from existing monitoring points and analyzed for methane. If needed, the duration and frequency of monitoring may be modified based upon evaluation of data collected and agreement by the Army, USEPA, and MDE. The criteria for the cessation of LTM will be evaluated during the CERCLA five year review process.

Groundwater monitoring will be conducted semi-annually to verify that (1) the remaining wastes are not contributing to groundwater contamination and (2) the concentrations of constituents with an RG for groundwater continue to decline. Groundwater samples will be analyzed for Site COCs (See Section 2.8) and in accordance with the analyte list specified by MDE in accordance with COMAR 26.04.07.09F. Specifically, samples will be analyzed for VOCs, total metals, and water quality parameters including pH, total alkalinity, hardness, chloride, specific conductivity, nitrate, chemical oxygen demand, turbidity, ammonia, sulfate, and total dissolved solids. Under existing conditions, it is anticipated that chlorinated solvents and their degradation products will decrease below their respective RGs within 2 years following remedy implementation. Concentrations of metals have been observed sporadically and are not detected in a manner consistent with a cohesive plume; thus, it is expected that these concentrations are a result of naturally occurring conditions and it would not be appropriate to estimate a timeframe for metal COCs to meet their associated RGs. However, during the most recent sampling event (2012), arsenic, cadmium, chromium, lead, and selenium were not detected above their respective RGs.

Indoor air monitoring will be conducted annually to verify that the Site conditions are not adversely affecting air quality in the crawl space at the Manor View Elementary School and the designated use of the crawl space will be monitored to confirm that it is not being used fulltime. Indoor air sampling will be conducted annually for TCE and its daughter products in the crawl space in a manner consistent with previous sampling events.

Annual inspections and maintenance of the soil cover will be performed and documented to ensure that the integrity and continued effectiveness of the existing soil cover is maintained. Annual inspections will also ensure that the on-Site LUCs are in good condition and confirm that the Site land use has not changed. An annual report will document the inspection findings, and also present and interpret the annual soil gas, groundwater, and indoor air sampling data.

2.13.3 Summary of Estimated Remedial Action Costs

The costs associated with the implementation of the selected RA are provided in **Appendix A**. A summary of Alternative 2 costs is provided below:

Estimated Capital Cost: ***$94,600***
Estimated O&M Cost Over 30 Years: ***$309,600***
Estimated Present Worth Cost: ***$241,000***

The projected present worth cost to implement the selected RA at FGGM 93 is $241,000.

2.13.4 Expected Outcomes of the Selected Remedial Action

Following implementation of the selected RA, FGGM 93 will be available for uses consistent with those outlined in the FGGM Real Property Master Plan (ATKINS, 2011). Specifically, the eastern portion of the Site will remain an open field available to the Manor View Elementary School for school/community activities (i.e., playground, ball fields, and outdoor school activities). Following removal of the northern, western, and southern sections of the chain link fence, the western portion of the Site will be open to the public as an open urban space. LUCs will be implemented to prohibit residential use at the Site, groundwater use, and unauthorized intrusive activities that

may compromise the effectiveness of the vegetative cover. Under the selected RA, it is expected that chlorinated solvents in groundwater (TCE and VC) will decrease below their respective RGs within 2 years following remedy implementation. As previously discussed, metals in groundwater are expected to be a result of naturally occurring site conditions. During the most recent sampling event (2012), arsenic, cadmium, chromium, lead, and selenium were detected below their respective RGs. Once the groundwater RGs are achieved, the groundwater will be available for its beneficial use as a potable aquifer.

2.14 STATUTORY DETERMINATIONS

Under CERCLA § 121 and the NCP, the lead agency must select remedies that are protective of human health and the environment, comply with ARARs (unless a statutory waiver is justified), are cost effective, and utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. In addition, CERCLA includes a preference for remedies that employ treatment that permanently and significantly reduces the volume, toxicity or mobility of hazardous wastes as a principal element, and a bias against off-site disposal of untreated wastes. The following sections discuss how the selected RA meets these statutory requirements.

2.14.1 Protection of Human Health and the Environment

The selected RA for FGGM 93 will be protective of human health and the environment by maintaining the existing soil cover, implementing LUCs, and performing LTM. Impacted media will remain on-Site that pose unacceptable risks under future land use scenarios; however, the selected RA will mitigate risks by (1) eliminating direct contact with buried waste and COCs in subsurface soil, (2) preventing any future use of the Site or crawl space which could result in unacceptable risk, and (3) monitoring Site media to verify Site conditions remain protective of human health and the environment and that groundwater COCs decrease below their respective RGs. Concentrations of metals have been observed sporadically and are not detected in a manner consistent with a cohesive plume; thus, it is expected that these concentrations are a result of naturally occurring conditions and it would not be appropriate to estimate a timeframe for metal COCs to meet their associated RGs. However, during the most recent sampling event (2012), arsenic, cadmium, chromium, lead, and selenium were not detected above their respective RGs. Under existing conditions, it is expected that chlorinated solvents in groundwater (TCE and VC) will achieve their respective RGs within 2 years, following remedy implementation.

2.14.2 Compliance with Applicable or Relevant and Appropriate Requirements

Section 121(d) of CERCLA requires that remedial actions at CERCLA sites must attain (or must justify the waiver of) any federal or more stringent state environmental standards, requirements, criteria, or limitations determined to be legally applicable or relevant and appropriate.

The implementation of the selected RA will comply with ARARs either directly or through the application of a variance. The 2012 NTCRA, which removed the source of groundwater contamination, will result in attainment of chemical-specific ARARs for chlorinated solvents in groundwater within 2 years. Groundwater COCs will meet MCLs, MCLGs, or other site-specific criteria determined to be performance standards as detailed in Section 2.8. The chemical- and action-specific ARARs are presented in **Tables 1 and 2**.

Utilizing the existing soil cover over the eastern parcel of the Site where buried waste is still present is permissible under a regulatory variance from the State of Maryland's cap design criteria located in COMAR 26.04.07.21. The requirements of COMAR 26.04.07.21 dictate the specific design components required for the closure cap. The Army and USEPA believe, and MDE agrees, that the existing cover provides a level of protection equivalent to that provided by the cap specified in COMAR 26.04.07.21, and, therefore, that it qualifies for a variance as provided for in COMAR 26.04.07.26.

2.14.3 Cost Effectiveness

In the lead agency's judgment, the selected RA is cost-effective and represents a reasonable value for the money to be spent. In making this determination, the following definition was used: "A remedy shall be cost-effective if its costs are proportional to its overall effectiveness" (NCP §300.430(f)(1)(ii)(D)). This determination was accomplished by evaluating the "overall effectiveness" of those RAs that satisfied the threshold criteria (i.e., were both protective of human health and the environment and ARAR-compliant). Overall effectiveness was evaluated by assessing three of the five balancing criteria in combination (long-term effectiveness and permanence; reduction of toxicity, mobility, or volume through treatment; and short-term effectiveness). A comparison of the costs to the overall effectiveness was conducted to determine cost effectiveness. The relationship of the overall effectiveness of the selected RA was determined to be proportional to its costs; hence, the selected RA represents a reasonable value for the money to be spent. Specifically, the Selected RA (Alternative 2) was deemed more effective than Alternative 3 based on the determination that Alternative 3 may impede the continued naturally occurring degradation of VC in groundwater by inhibiting the transfer of oxygen to the aquifer and will introduce additional hazards during installation of the low permeability cap. Furthermore, implementation of Alternative 2 costs significantly less than Alternative 3 (approximately $6,400,000 of additional present worth costs).

2.14.4 Utilization of Permanent Solutions and Alternative Treatment (or Resource Recovery) Technologies to the Maximum Extent Practicable

The selected RA employs permanent solutions and alternative treatment or resource recovery technologies to the maximum extent practicable. The selected RA is effective in the long term in protecting future land users from hazards posed by buried waste, C&D debris, and contaminants in subsurface soil at the Site through continued maintenance of the existing soil cover. The selected RA does not employ treatment technologies to reduce the volume of contaminated media at FGGM 93 because contaminants identified within groundwater occur at relatively low concentrations which would limit the overall volume of contaminant mass for destruction via treatment; thus, treatment would not be an effective component of the remedy.

2.14.5 Preference for Treatment as a Principal Element

The selected RA does not satisfy the preference for treatment as a principal element at FGGM 93 through the use of active treatment technologies. As concluded in the HHRA, none of the contaminants at the Site meet the criteria of principal threat waste. The selected RA was chosen over the other alternatives after considering the balancing criteria which include short-term and long-term effectiveness; reduction of toxicity, mobility, and volume through treatment; implementability; and cost.

2.14.6 Five-Year Review Requirements

Because this remedy will result in hazardous substances, pollutants or contaminants remaining on-Site above levels that allow for unlimited use and unrestricted exposure, statutory reviews will be conducted every five years after RA initiation. Five-year reviews will ensure that the selected RA is, or will be, protective of human health and the environment.

2.15 DOCUMENTATION OF SIGNIFICANT CHANGES FROM PREFERRED REMEDIAL ALTERNATIVE FROM PROPOSED PLAN

The RA selected in this ROD does not differ from the preferred remedy presented in the PP.

3.0 PART 3: RESPONSIVENESS SUMMARY

The purpose of the Responsiveness Summary is to provide a summary of the stakeholders' comments, concerns, and questions about the PP for FGGM 93 and the Army's responses to these concerns.

The Site has been the topic of presentations at the FGGM RAB. A copy of the PP (ARCADIS, 2014b) was provided to the FGGM RAB members. The PP for FGGM 93 was completed and released to the public on March 20, 2014 at the information repositories listed in Section 2.3. A copy was also posted on the Fort Meade environmental website.

A newspaper notification was published to inform the public of the start of the PP comment period, to solicit comments from the public, and to announce the public meeting. The notification was published in the Capital Gazette on March 16, 2014 and the Soundoff! newspaper on March 13, 2014. A copy of the certificate of publication is provided in **Appendix B**. A public meeting was held on March 27, 2014, to inform the public about the proposed remedial alternatives for the Site and to seek public comments. At this meeting, representatives from the Army, USEPA, and MDE were present to answer questions about the Site and the remedial alternatives under consideration. A fact sheet was provided to the public as part of the meeting. A public comment period was held from March 20, 2014 to April 19, 2014.

No comments were received during the comment period; hence, no objections to the preferred alternative were received.

3.1 PUBLIC ISSUES AND LEAD AGENCY RESPONSES

No comments were received during the public comment period or during the public meeting. A transcript from the public meeting has been included in the Administrative Record (located at the information repositories listed in Section 2.3) and is included as **Appendix C**.

3.2 TECHNICAL AND LEGAL ISSUES

No technical or legal issues were raised that pertained to the selected RA.

4.0 PART 4: REFERENCES

ARCADIS U.S., Inc. (ARCADIS). 2014a Final Remedial Investigation Report Final Addendum. Revised Human Health Risk Assessment and Development of Preliminary Remediation Goals - Manor View Dump Site. March.

ARCADIS. 2014b. Draft Final Proposed Plan for FGGM 93, Manor View Dump Site. March.

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ARCADIS. 2011a. Final EE/CA for FGGM 93, Manor View Dump Site. February.

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URS. 2008. Remedial Investigation Report, Manor View Dump Site, Fort George G. Meade, Maryland. Prepared for U.S. Army Corps of Engineers. November.

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United States Environmental Protection Agency (USEPA). 1989. *Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual (Part A), Interim Final*. EPA/540/1-89/002. Office of Emergency and Remedial Response, Washington, DC.

USEPA. 1991. *Risk Assessment Guidance for Superfund. Volume I: Human Health Evaluation Manual* Supplemental Guidance "Standard Default Exposure Factors". Interim Final. Office of Solid Waste and Emergency Response Directive 9285.6-03.

USEPA. 2004. *Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment)*. Final. EPA/540/R/99/005. Office of Superfund Remediation and Technology Innovation, Washington, DC.

TABLES

Table 1
Chemical-Specific ARARs[1]
Manor View Dump Site, Fort Meade, Maryland

Media	Authority	Regulation	Synopsis	Application	Status
Groundwater	Federal Regulatory Requirement	Safe Drinking Water Act (SDWA) National Primary Drinking Water Regulations *40 CFR 141.62(b)(16)* *40 CFR 141.62(b)(4)* *40 CFR 141.62(b)(5)* *40 CFR 141.62(b)(10)* *40 CFR 141.51(b)* *40CFR141.61(a)(5)* *40CFR141.61(a)(1)*	These regulations set Maximum Contaminant Levels (MCLs), which are maximum allowable concentrations of specified contaminants, as enforceable standards for drinking water supplies. CERCLA Section 121(d) and the NCP at 40 CFR 300.430(e)(2)(i)(B)&(C) require that these standards be met in groundwater through remedial actions conducted under the Act.	MCLs are the RGs for a subset of the contaminants present in the groundwater at the Site.	ARAR
	Federal Regulatory Requirement	USEPA Maximum Contaminant Level Goals (MCLGs) *40CFR141.51(b)* 40CFR300.430(e)(2)(i)(B)	These values are threshold concentrations for chemical contaminants in drinking water below which there are no known or expected risks to health. MCLGs allow for a margin of safety and provide non-enforceable public health goals for drinking water supply systems. However, CERCLA requires that non-zero MCLGs be attained where relevant and appropriate in groundwater through remedial actions under the Act (See 40 CFR 300.430(e)(2)(i)(B)).	MCLGs are the RGs for a subset of the contaminants present in the groundwater at the Site.	ARAR
	State Regulatory Requirement	Regulation of Water Supply, Sewage Disposal, and Solid Waste *COMAR 26.04.07.09F*	Regulation states that if the MDE determines that contamination of waters of this State has occurred or is liable to occur as a result of operation of the landfill, the Approving Authority may require the permit holder to periodically collect and analyze ground water or surface water at the permitted site and to submit the results to the Approving Authority.	Provides provisions for MDE to specify requirements of the long term groundwater monitoring program	ARAR
		Disposal of Controlled Hazardous Substances, COMAR 26.13.05.06-2	This regulation provides general requirements for groundwater monitoring programs including guidance for the selection of a groundwater monitoring network.	Provides general requirements for long term groundwater monitoring program.	ARAR

Notes:
1. Chemical-specific applicable or relevant and appropriate requirements (ARARs) are the substantive requirements found in the above listed regulations.
CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act
CFR – Code of Federal Regulations
COMAR – Code of Maryland Regulations
MDE – Maryland Department of the Environment
RG – Remediation Goal
USEPA – United States Environmental Protection Agency

Table 2
Action-Specific ARARs[1]
Manor View Dump Site, Fort Meade, Maryland

Activity	Authority	Regulation	Synopsis	Application	Status
Containment	State Regulatory Requirement	Erosion and Sediment Control *COMAR 26.17.01.07 and 26.17.01.11*	This regulation is applicable when excavation, backfilling, and regrading of soil is contemplated. It establishes procedures to prevent erosion through run-off and discharge of sediment in water bodies.	Provides provisions for erosion and sediment control measures required during intrusive activities associated with the repair and/or maintenance of the existing soil cover.	ARAR
	State Regulatory Requirement	Stormwater Management Plans *COMAR 26.17.02.09E*	This regulation discusses the contents and submission of stormwater management plans applicable to the development or redevelopment of land for residential, commercial, industrial, or institutional use.	Provides provisions for the submittal of a stormwater management plan required during intrusive activities associated with repair and/or maintenance of the existing soil cover.	ARAR
	State Regulatory Requirement	Closure Requirements for Sanitary Landfills *COMAR 26.04.07.21 and .21.D; 26.04.07.26*	These regulations specify the closure requirements for sanitary landfills and promulgate specific engineering design criteria for the construction of a low permeability cap. In certain instances, a party performing site closure under COMAR 26.04.07.21 is not required to apply the promulgated closure standards. Instead, the regulations allow the party performing the landfill closure the discretion to develop alternative closure plans pursuant to COMAR 26.04.07.21.D. COMAR 26.04.07.26 provides the opportunity to obtain a variance from one or more of the provisions set forth in COMAR 26.06.07. The Approving Authority shall grant a variance when the design or method of operation proposed in the variance application has been shown to conserve and protect the public health, the natural resources, and environment of the State, and to control air, water, and land pollution to at least the same extent as would be obtained by compliance with the regulation.	The existing soil cover will be used at the Site to prevent exposure to buried waste and soil that may pose physical or chemical hazards. The existing soil cover deviates from the landfill closure requirements presented in COMAR 26.04.07.21; however, the MDE has concurred that the existing cover is adequate pursuant to the variance provisions provided under COMAR 26.04.07.26.	ARAR

Table 2
Action-Specific ARARs[1]
Manor View Dump Site, Fort Meade, Maryland

Activity	Authority	Regulation	Synopsis	Application	Status
Long-term Monitoring	State Regulatory Requirement	Post Closure Requirements for Sanitary Landfills *COMAR 26.04.07.22*	This regulation includes the post-closure requirements for sanitary landfills. Monitoring and maintenance are required for a period of time no less than 5 years. Monitoring includes semi-annual inspections to be conducted twice per year. The MDE considers the post closure requirements to include a groundwater monitoring detection program for parameters listed on Tables I and II as referenced from 40 CFR 258.54.	Applicable in the development of the long-term monitoring program.	ARAR
	State Regulatory Requirement	Identification and Listing of Hazardous Waste, Samples *COMAR 26.13.02.04-3*	This regulation provides provisions for the collection and shipment of soil, water, or air samples for analytical testing to determine its characteristics or composition.	Applicable during collection and shipment of groundwater and indoor air samples collected as part of the long-term monitoring program.	ARAR

Notes:

1. Action-specific applicable or relevant and appropriate requirements (ARARs) are the substantive requirements of the regulations presented above.
ARAR - Applicable or Relevant and Appropriate Requirement

CFR – Code of Federal Regulations
COMAR – Code of Maryland Regulations
MDE – Maryland Department of the Environment

Table 3
Qualitative Comparative Analysis of Remedial Alternatives
Manor View Dump Site, Fort Meade, Maryland

	Evaluation Criteria	**Alternative 1** No Action	**Alternative 2** Maintenance of Existing Soil Cover, LUCs, and LTM	**Alternative 3** Installation of Low Permeability Cap with Maintenance of Cap, LUCs, and LTM
Threshold Criteria				
(1)	Overall protection of human health and the environment	• Provides no control of exposure to buried waste and COCs in groundwater, soil, and indoor air at FGGM 93. • Provides no reduction in risk to human health or the environment. • Does not meet this criterion for overall protection of human health and the environment.	• Existing soil cover will continue to prevent exposure to buried waste and COCs identified in soil. Additionally, LUCs prohibiting unrestricted digging will be implemented to prevent exposure to buried waste and impacted soil. • Implementation of monitoring and maintenance of the existing soil cover would ensure protectiveness for the duration of the remedy. • Risk to human health for the hypothetical future resident is controlled by maintenance of the existing soil cover and implementation of LUCs prohibiting residential land use. • Unacceptable risk posed by groundwater at the Site will be controlled by implementation of LUCs prohibiting the use of groundwater and implementation of LTM to evaluate the attenuation of COCs. • Human exposure to TCE in the crawl space at Manor View Elementary school will be mitigated through LUCs prohibiting full time use of the space and LTM of TCE and its daughter products. • Does not pose an unacceptable risk to ecological receptors and the environment.	• A low permeability cap would prevent exposure to buried waste and soil COCs across the entire site. Further, protection would be provided through the implementation of LUCs to prohibit residential use, groundwater use, and unrestricted digging. • Unacceptable risk posed by groundwater at the Site will be controlled by implementation of LUCs to prohibit the use of groundwater and implementation of LTM to evaluate the attenuation of COCs. • Human exposure to TCE in the crawl space at Manor View Elementary school will be mitigated through LUCs prohibiting full time use of the space and LTM of TCE and its daughter products. • Does not pose an unacceptable risk to ecological receptors and the environment.
(2)	Compliance with ARARs	• ARARs are not met by Alternative 1.	• Chemical-specific ARARs for soil do not exist; however this remedy would meet the site specific RGs calculated for the COCs at this site by eliminating exposure pathways. • Chemical-specific ARARs for groundwater are expected to be met within 2 years following remedy implementation as contaminant concentrations continue to attenuate as a result of the removal action conducted at the western portion of the Site in 2012. Until LTM demonstrates that RGs have been achieved, LUCs prohibiting the use of groundwater would be implemented. • Action- specific ARARs would be met by this alternative, since the existing soil cover would qualify for a variance from the state's landfill closure regulations.	• Chemical-specific ARARs for soil do not exist; however this remedy would meet the site specific RGs calculated for the COCs at this site by eliminating exposure pathways. Under existing conditions, chemical-specific ARARs for groundwater are expected to be met within 2 years following remedy implementation. Installation of a low permeability cap may hamper the aerobic degradation of the VC; thus, the timeframe for COCs to attenuate below site-specific RGs would be greater than 2 years. Until LTM demonstrates that RGs have been achieved, LUCs prohibiting the use of groundwater would be implemented. • Action -specific ARARs would be met by this alternative through compliance with COMAR 26.04.07.21.
Balancing Criteria				
(3)	Long-term effectiveness and permanence	• Does not provide any monitoring for reduction of groundwater COCs and indoor air COC concentrations over time, cover maintenance to prevent potential exposure to buried waste and COCs in soil, or long-term management measures. • All current and potential future risks would remain the same under this alternative.	• Continued maintenance of the existing soil cover would eliminate risk to human health associated with exposure to buried waste and COCs in soil in the long term. • LUCs implemented to prohibit future residential land use, groundwater use, and fulltime occupancy of the crawl space at the Manor View Elementary school would control the unacceptable risks to human health identified in the HHRA. • LTM would monitor the reduction of COC concentrations in groundwater over time and LUCs would prohibit groundwater use to prevent human exposure to contaminants in groundwater until RGs are achieved.	• Continued maintenance of the low permeability cap would eliminate risk to human health associated with exposure to buried waste and COCs in soil in the long term. • LUCs implemented to prohibit future residential land use, groundwater use, and fulltime occupancy of the crawl space at the Manor View Elementary school would control the unacceptable risks to human health identified in the HHRA. • LTM would monitor the reduction of COC concentrations in groundwater over time and LUCs would prohibit groundwater use to prevent human exposure to contaminants in groundwater until RGs are achieved.
(4)	Reduction of mobility, toxicity, or volume through treatment	• Does not employ treatment as a component of the remedy; therefore, does not satisfy this criterion.	• Does not employ treatment as a component of the remedy; therefore, does not satisfy this criterion.	• Does not employ treatment as a component of the remedy; therefore, does not satisfy this criterion.
(5)	Short-term effectiveness	• Does not pose any additional risks to the community, the workers, or the environment since there are no remedial activities associated with this alternative. • Does not mitigate any existing or potential future risks.	• Does not pose any additional short-term risks to the community, the workers, or the environment since there are no heavily intrusive remedial activities associated with the remedy. • Requires minimal time and coordination of labor, materials, and resources for completion.	• Poses significant short-term risks to the community and construction workers during the installation of the low permeability cap. • Requires a significant amount of time and coordination of labor, materials, and resources for completion.

Table 3
Qualitative Comparative Analysis of Remedial Alternatives
Manor View Dump Site, Fort Meade, Maryland

	Evaluation Criteria	**Alternative 1** No Action	**Alternative 2** Maintenance of Existing Soil Cover, LUCs, and LTM	**Alternative 3** Installation of Low Permeability Cap with Maintenance of Cap, LUCs, and LTM
Balancing Criteria (continued)				
(6)	Implementability	• There are no implementability concerns posed by this option.	• Implementation would be conducted in accordance with an approved remedial design and would include installation of signage; implementation of administrative LUCs; collection of soil gas, groundwater and indoor air samples per the LTM program; and completion of a site inspection to ensure the integrity of the existing soil cover. • There are no implementability concerns posed by this option.	• Implementation would be conducted in accordance with an approved remedial design and would include the installation of a low permeability cap; implementation of LUCs; collection of soil gas, groundwater and indoor air samples; and routine inspections to ensure the integrity of the cap. • Additional logistical coordination with Manor View Elementary would be required. • The addition of nine additional acres of impermeable surface at the site would require planning and implementing more extensive stormwater and erosion controls.
(7)	Cost	• There are no present worth costs and capital costs because there would be no action taken.	• The estimated present worth cost to maintain the existing soil cover; implement LUCs; and implement an LTM program at FGGM 93 is **$241,000**.	• The estimated present worth cost to install a low permeability cap, maintain the cap through routine inspections and maintenance; and implement LUCs and an LTM program at FGGM 93 is **$6,641,000**.

Notes:

ARARs - Applicable or Relevant and Appropriate Requirements
COCs - Chemicals of Concern
HHRA - Human Health Risk Assessment
LUCs - Land Use Controls
RGs - Remediation Goals

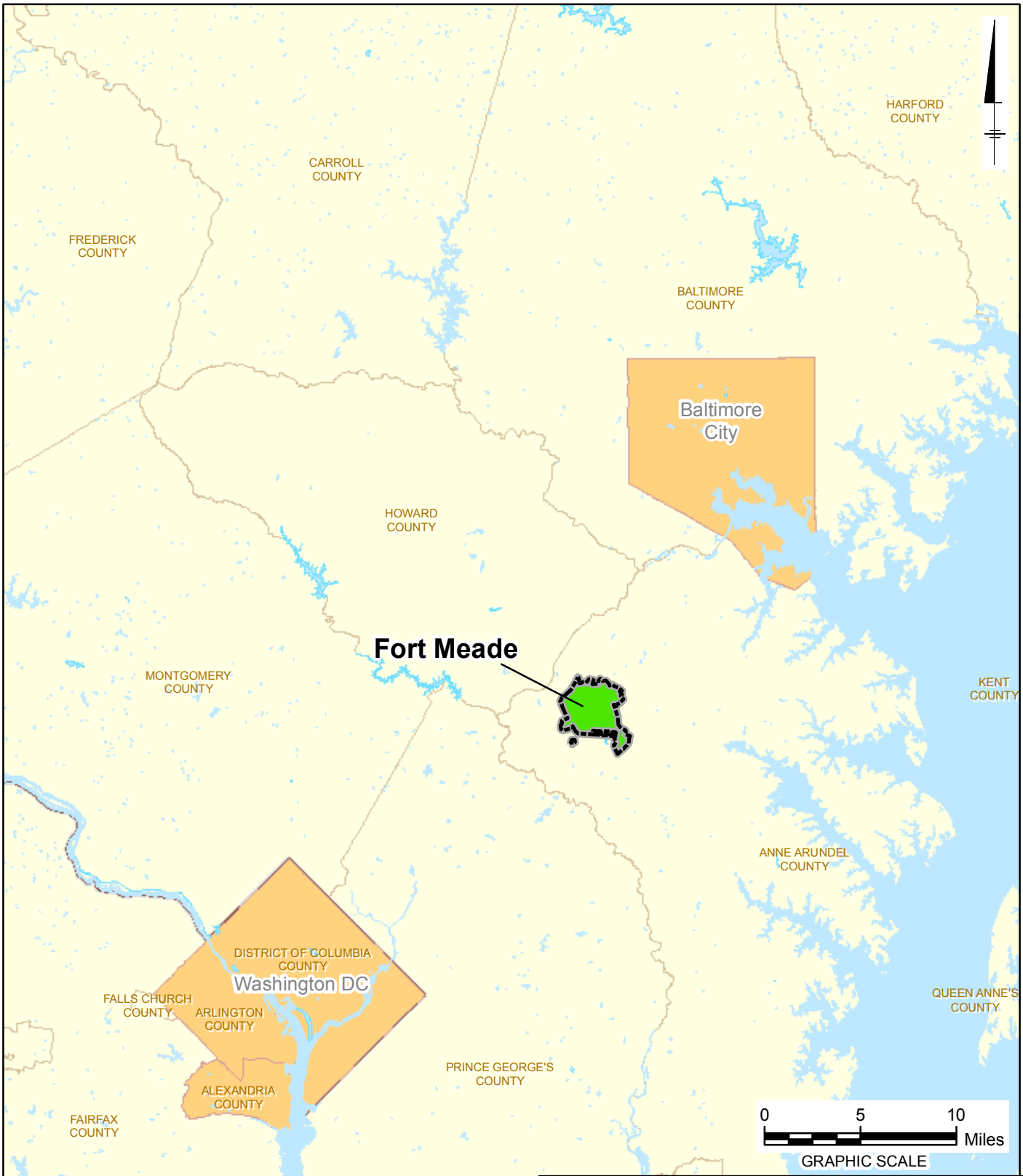
Table 4
Quantitative Comparative Analysis of Remedial Alternatives
Manor View Dump Site, Fort Meade, Maryland

	Evaluation Criteria	**Alternative 1** No Action	**Alternative 2** Maintenance of Existing Soil Cover, LUCs, and LTM	**Alternative 3** Installation of Low Permeability Cap with Maintenance of the Cap, LUCs, and LTM
Threshold Criteria				
(1)	Overall protection of human health and the environment	NO	YES	YES
(2)	Compliance with ARARs	NO	YES	YES
Balancing Criteria				
(3)	Long-term effectiveness and permanence	1	4	4
(4)	Reduction of mobility, toxicity, or volume through treatment	0	0	0
(5)	Short-term effectiveness	1	4	3
(6)	Implementability	5	4	2
(7)	Cost	5	4	2
Modifying Criteria				
(8)	State acceptance	NS	NS	NS
(9)	Community acceptance	NS	NS	NS
Total Balancing Criteria Score		**12**	**16**	**11**

Notes:

Criteria scored on a scale of 1 through 5, with 5 being the highest.
ARARs - Applicable or Relevant and Appropriate Requirements
LTM - Long Term Monitoring
LUCs - Land Use Concerns
NS - Not Scored

FIGURES



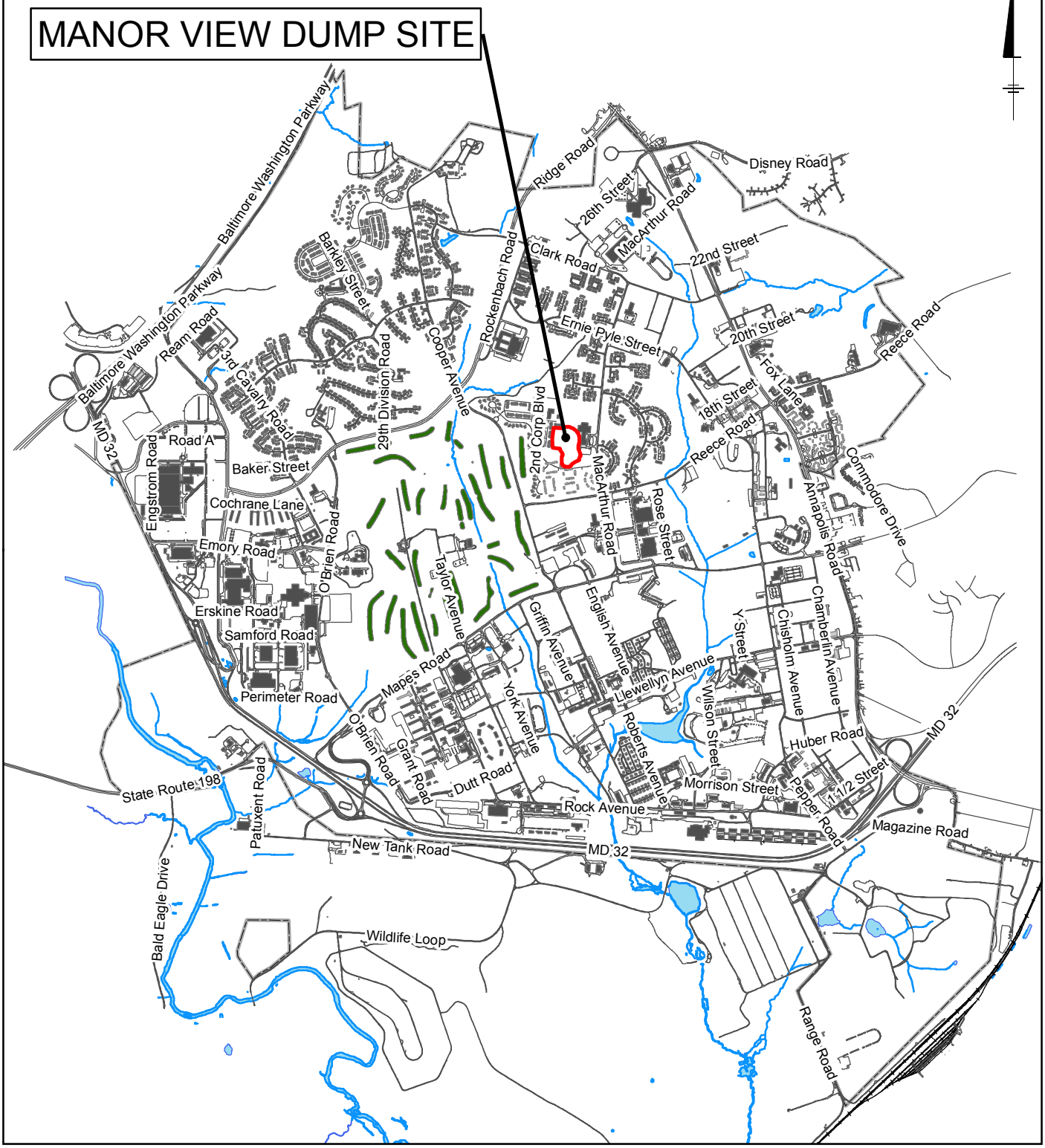
FORT GEORGE G. MEADE, MARYLAND
MANOR VIEW DUMP SITE

SITE LOCATION MAP

ARCADIS

FIGURE
1

CITY: MPLS DIV/GROUP: IM DB: MG
FORT GEORGE G. MEADE
G:\GIS\Projects\Fort_Meade\ArcMap\Manor_View\FS_Figures\Drafts_201211\Site_Location_20121129.mxd - 11/29/2012 @ 7:55:21 AM



LEGEND:

MANOR VIEW SITE BOUNDARY

0 1,500 3,000 Feet

GRAPHIC SCALE

FORT GEORGE G. MEADE, MARYLAND
MANOR VIEW DUMP SITE

MANOR VIEW DUMP SITE
SITE LOCATION MAP

ARCADIS

FIGURE
2

CITY: MPLS DIV/GROUP: IM DB: MG LD: A. DUGGINS
FORT MEADE
G:\GIS\Projects\Fort_Meade\ArcMap\Manor_View\Manor_View_Loc_20111128.mxd - 11/28/2011 @ 9:33:50 AM

LEGEND:

SITE BOUNDARY

0 200 400 Feet

GRAPHIC SCALE

NOTE:

IMAGERY ACCESSED THROUGH BING MAPS AERIAL VIA ARCGIS ONLINE LAYER PACKAGES BY ESRI (12/1/2010) (C) 2010 MICROSOFT CORPORATION AND ITS DATA SUPPLIERS ACCESSED ON 6/12/2013 THROUGH ARCGIS 10.

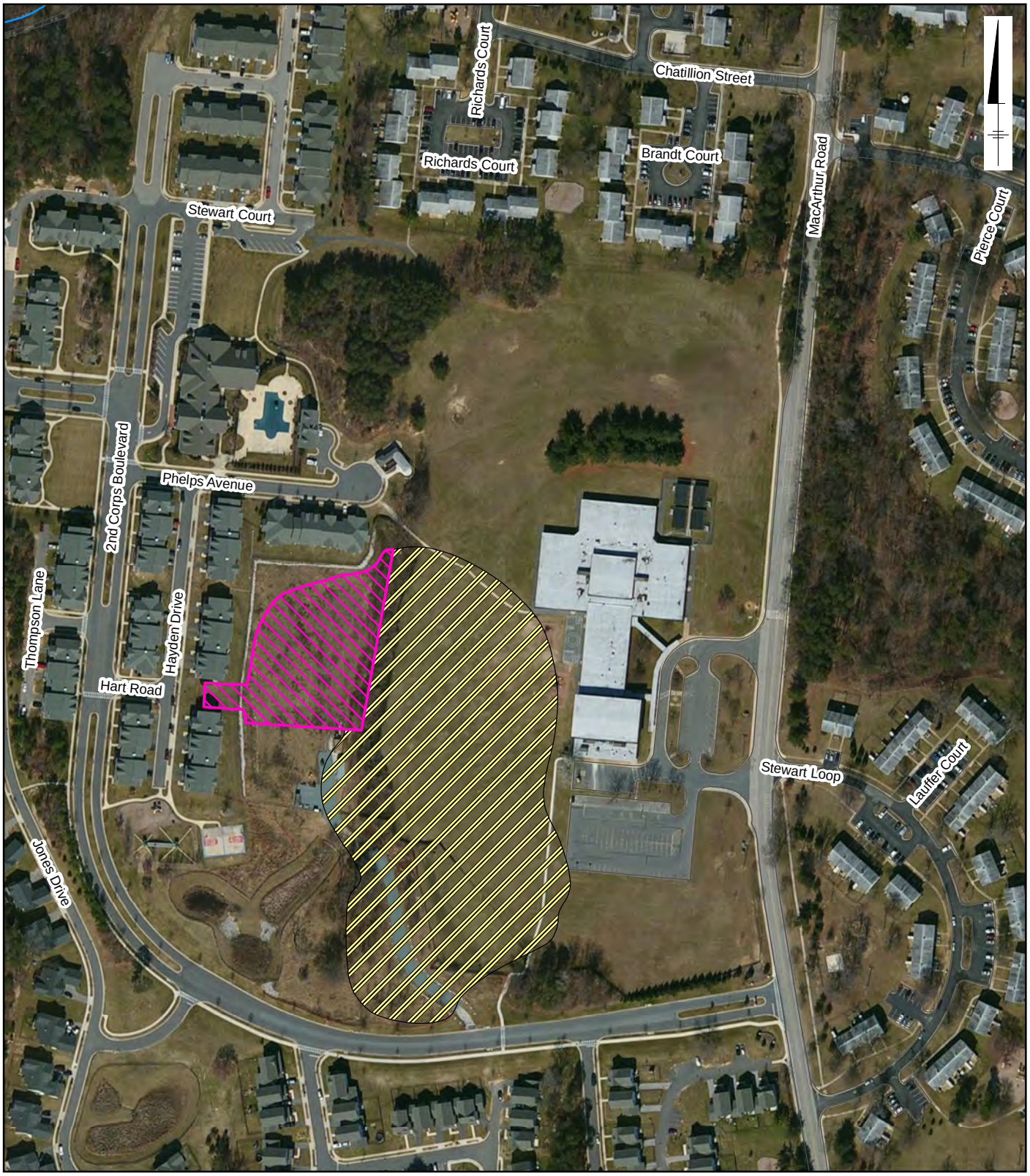
FORT GEORGE G. MEADE, MARYLAND
MANOR VIEW DUMP SITE

MANOR VIEW DUMP SITE SITE MAP

ARCADIS

FIGURE
3

CITY: MPLS DIV/GROUP: IM DB: MG LD: HA
FORT MEADE
Path: G:\GIS\Projects\Fort_Meade\ArcMap\Manor_View\2013-06\SiteMap_20130612.mxd



LEGEND:

DEBRIS/FILL FOOTPRINT

METHANE GENERATING WASTE FOOTPRINT REMOVED DURING THE 2012 NON-TIME CRITICAL REMOVAL ACTION (LOCATION IS APPROXIMATE)

0 200 400 Feet

GRAPHIC SCALE

NOTE:

IMAGERY ACCESSED THROUGH BING MAPS AERIAL VIA ARCGIS ONLINE LAYER PACKAGES BY ESRI (12/1/2010) (C) 2010 MICROSOFT CORPORATION AND ITS DATA SUPPLIERS ACCESSED ON 6/13/2013 THROUGH ARCGIS 10.

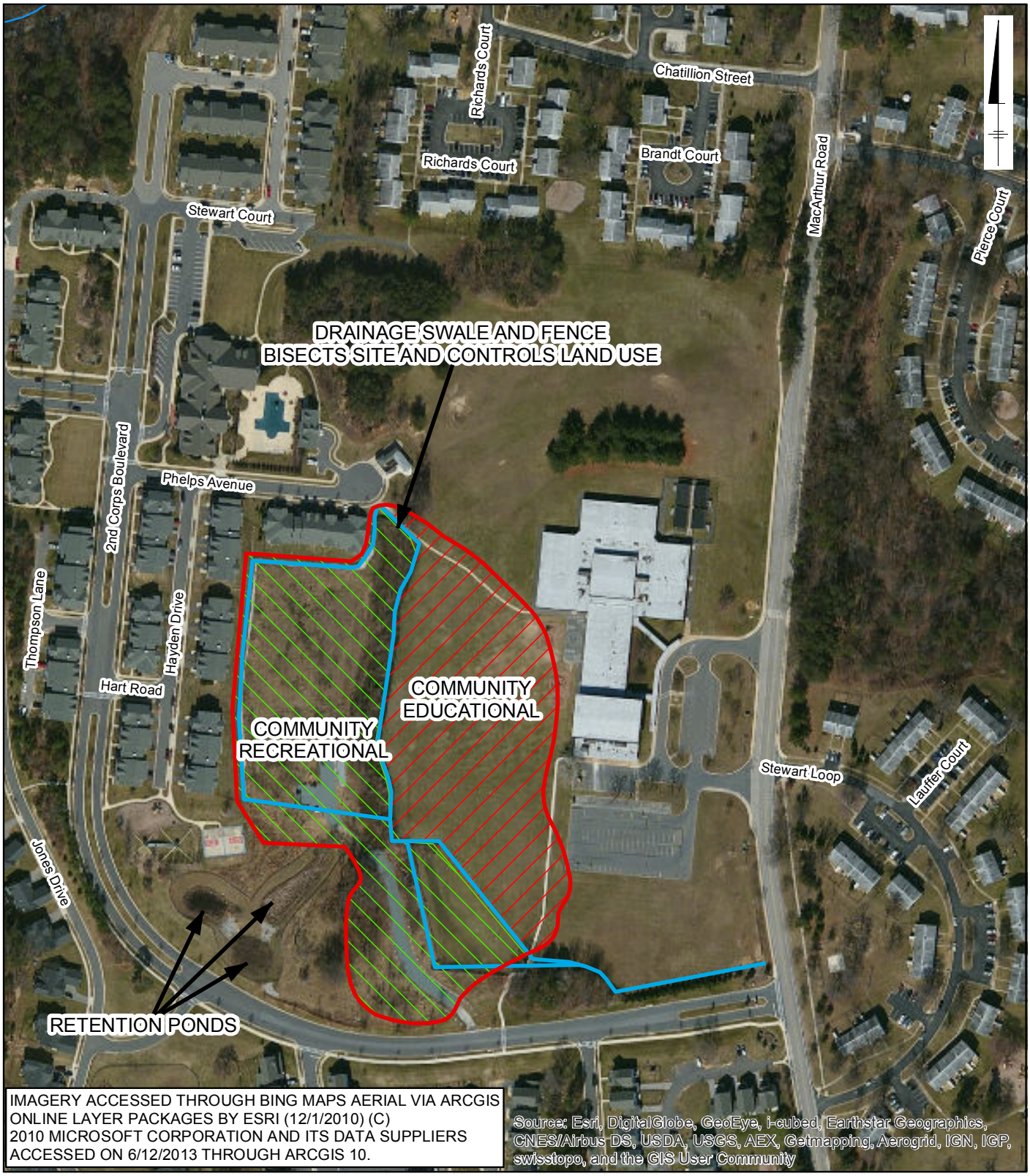
FORT GEORGE G. MEADE, MARYLAND
MANOR VIEW DUMP SITE

DEBRIS/FILL FOOTPRINT

ARCADIS

FIGURE
4

CITY: MPLS DIV/GROUP: IM DB: MG LD: HA
FORT MEADE
Path: G:\GIS\Projects\Fort_Meade\ArcMap\Manor_View\2013-06\Waste_Footprint_20130613.mxd



LEGEND:

- SITE BOUNDARY
- COMMUNITY EDUCATIONAL
- COMMUNITY RECREATIONAL
- CURRENT ENGINEERING CONTROL / FENCE

0 200 400 Feet

GRAPHIC SCALE

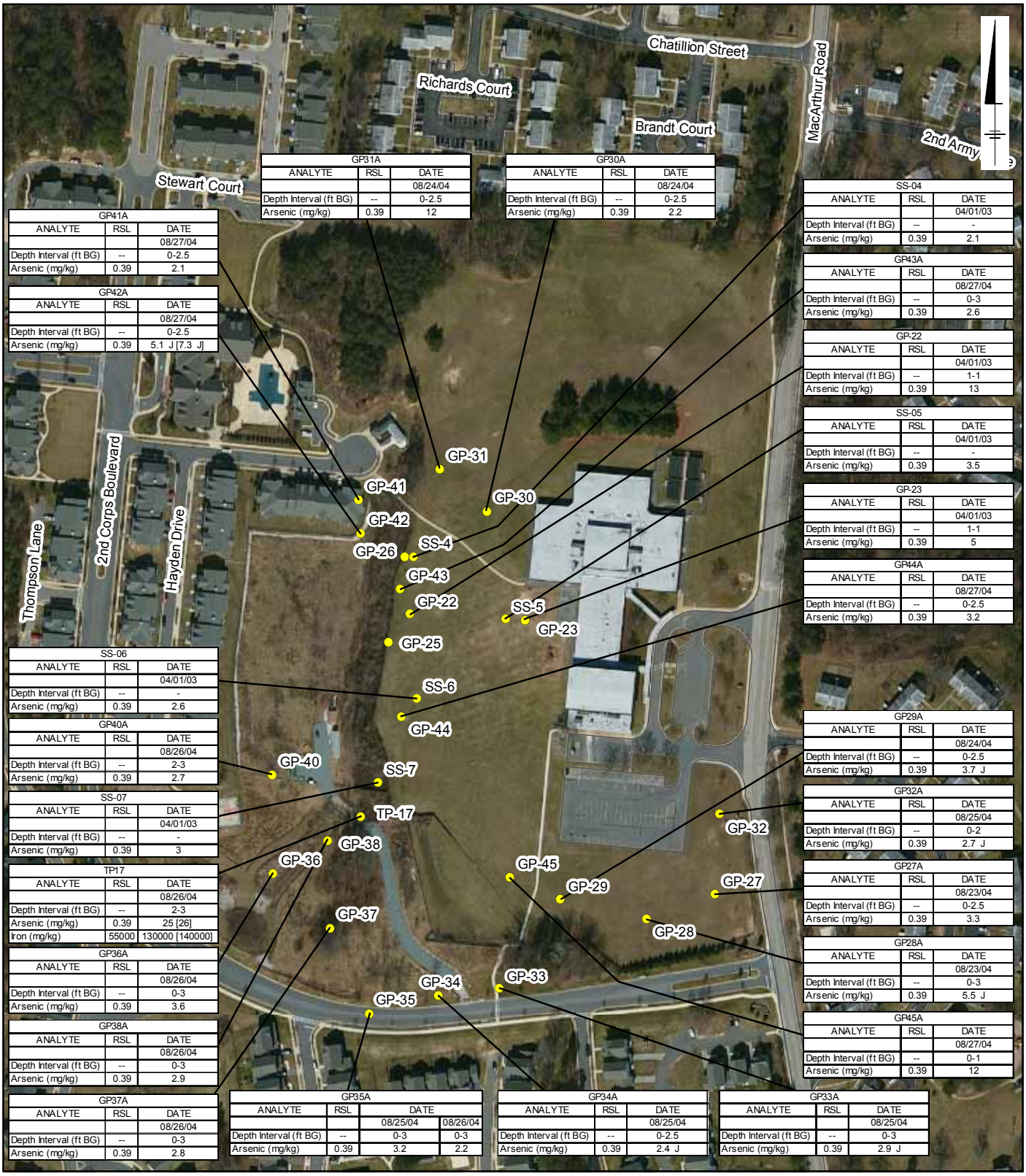
FORT GEORGE G. MEADE, MARYLAND
MANOR VIEW DUMP SITE

MANOR VIEW DUMP SITE CURRENT LAND USE

ARCADIS

FIGURE 5

CITY: MPLS DIV/GROUP: IM DB: MG LD: HA
FORT MEADE
Path: Z:\GISPROJECTS_ENV\Fort_Meade\ArcMap\Manor_View\2014-08\LandUse_20130813.mxd



GP31A		
ANALYTE	RSL	DATE
		08/24/04
Depth Interval (ft BG)	--	0-2.5
Arsenic (mg/kg)	0.39	12

GP30A		
ANALYTE	RSL	DATE
		08/24/04
Depth Interval (ft BG)	--	0-2.5
Arsenic (mg/kg)	0.39	2.2

GP41A		
ANALYTE	RSL	DATE
		08/27/04
Depth Interval (ft BG)	--	0-2.5
Arsenic (mg/kg)	0.39	2.1

GP42A		
ANALYTE	RSL	DATE
		08/27/04
Depth Interval (ft BG)	--	0-2.5
Arsenic (mg/kg)	0.39	5.1 J [7.3 J]

SS-06		
ANALYTE	RSL	DATE
		04/01/03
Depth Interval (ft BG)	--	-
Arsenic (mg/kg)	0.39	2.6

GP40A		
ANALYTE	RSL	DATE
		08/26/04
Depth Interval (ft BG)	--	2-3
Arsenic (mg/kg)	0.39	2.7

SS-07		
ANALYTE	RSL	DATE
		04/01/03
Depth Interval (ft BG)	--	-
Arsenic (mg/kg)	0.39	3

TP17		
ANALYTE	RSL	DATE
		08/26/04
Depth Interval (ft BG)	--	2-3
Arsenic (mg/kg)	0.39	25 [26]
Iron (mg/kg)	55000	130000 [140000]

GP36A		
ANALYTE	RSL	DATE
		08/26/04
Depth Interval (ft BG)	--	0-3
Arsenic (mg/kg)	0.39	3.6

GP38A		
ANALYTE	RSL	DATE
		08/26/04
Depth Interval (ft BG)	--	0-3
Arsenic (mg/kg)	0.39	2.9

GP37A		
ANALYTE	RSL	DATE
		08/26/04
Depth Interval (ft BG)	--	0-3
Arsenic (mg/kg)	0.39	2.8

SS-04		
ANALYTE	RSL	DATE
		04/01/03
Depth Interval (ft BG)	--	-
Arsenic (mg/kg)	0.39	2.1

GP43A		
ANALYTE	RSL	DATE
		08/27/04
Depth Interval (ft BG)	--	0-3
Arsenic (mg/kg)	0.39	2.6

GP-22		
ANALYTE	RSL	DATE
		04/01/03
Depth Interval (ft BG)	--	1-1
Arsenic (mg/kg)	0.39	13

SS-05		
ANALYTE	RSL	DATE
		04/01/03
Depth Interval (ft BG)	--	-
Arsenic (mg/kg)	0.39	3.5

GP-23		
ANALYTE	RSL	DATE
		04/01/03
Depth Interval (ft BG)	--	1-1
Arsenic (mg/kg)	0.39	5

GP44A		
ANALYTE	RSL	DATE
		08/27/04
Depth Interval (ft BG)	--	0-2.5
Arsenic (mg/kg)	0.39	3.2

GP29A		
ANALYTE	RSL	DATE
		08/24/04
Depth Interval (ft BG)	--	0-2.5
Arsenic (mg/kg)	0.39	3.7 J

GP32A		
ANALYTE	RSL	DATE
		08/25/04
Depth Interval (ft BG)	--	0-2
Arsenic (mg/kg)	0.39	2.7 J

GP27A		
ANALYTE	RSL	DATE
		08/23/04
Depth Interval (ft BG)	--	0-2.5
Arsenic (mg/kg)	0.39	3.3

GP28A		
ANALYTE	RSL	DATE
		08/23/04
Depth Interval (ft BG)	--	0-3
Arsenic (mg/kg)	0.39	5.5 J

GP45A		
ANALYTE	RSL	DATE
		08/27/04
Depth Interval (ft BG)	--	0-1
Arsenic (mg/kg)	0.39	12

GP35A			
ANALYTE	RSL	DATE	
		08/25/04	08/26/04
Depth Interval (ft BG)	--	0-3	0-3
Arsenic (mg/kg)	0.39	3.2	2.2

GP34A		
ANALYTE	RSL	DATE
		08/25/04
Depth Interval (ft BG)	--	0-2.5
Arsenic (mg/kg)	0.39	2.4 J

GP33A		
ANALYTE	RSL	DATE
		08/25/04
Depth Interval (ft BG)	--	0-3
Arsenic (mg/kg)	0.39	2.9 J

LEGEND:

SOIL SAMPLE LOCATION

0 200 400 Feet

GRAPHIC SCALE

Notes:
1) All results in milligrams per kilogram (mg/kg)
2) The site specific background value for arsenic in surface soils at this site is 4.84 mg/kg.
3) [26] - Duplicate Sample
4) J - Estimated concentration.
5) Imagery accessed through BING Maps Aerial via ArcGIS online layer packages by ESRI (12/1/2012) (c) 2010 Microsoft Corporation and its data suppliers. Accessed on 9/17/2012 through ArcGIS 10.

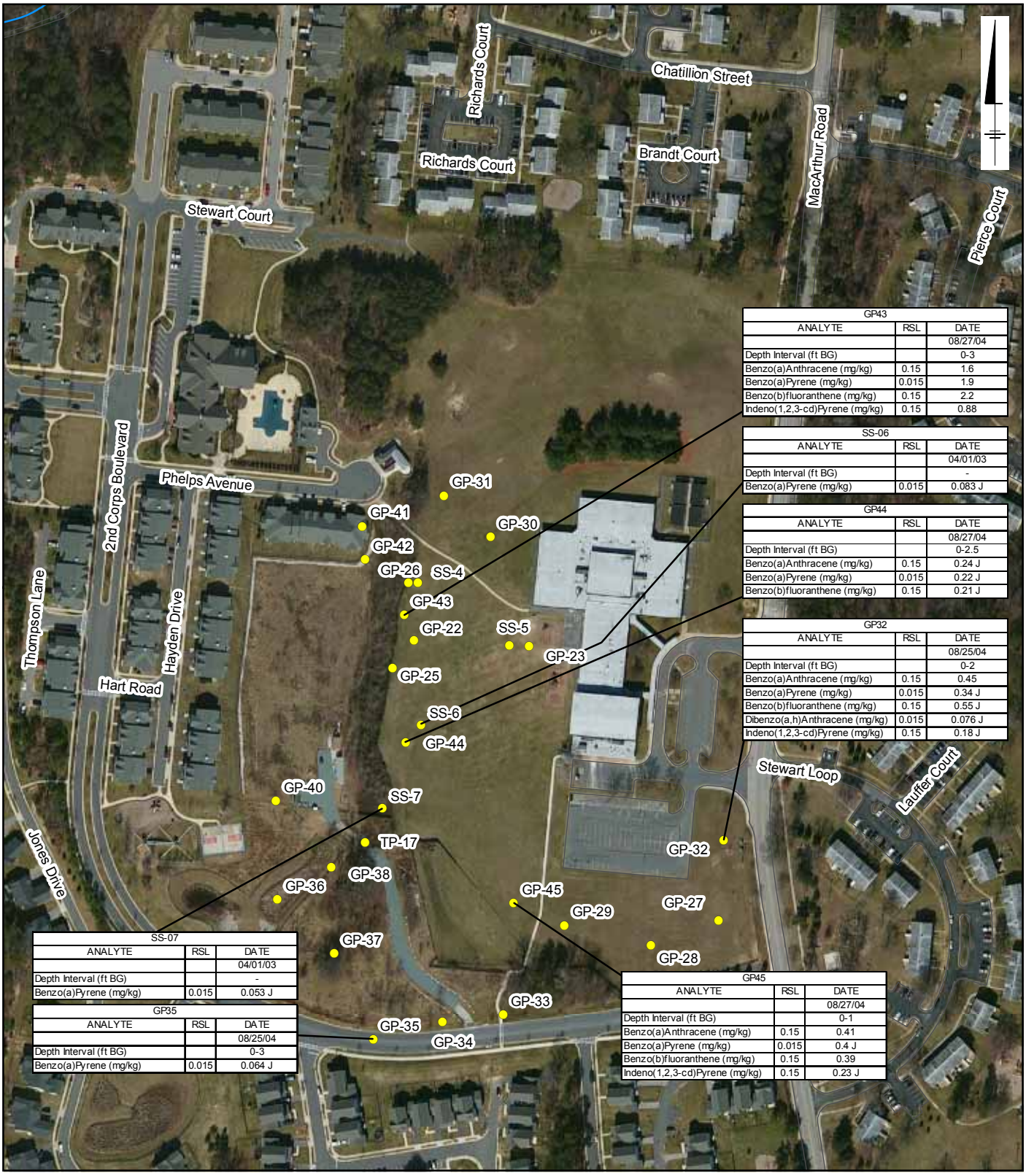
FORT GEORGE G. MEADE, MARYLAND
MANOR VIEW DUMP SITE

SOIL SAMPLE METALS EXCEEDANCES
SURFACE SOIL
(0 TO 3 FT BELOW GROUND SURFACE)

ARCADIS

FIGURE
6

CITY: MPLS DIV/GROUP: IM DB: MG LD: HA
FORT MEADE
Path: G:\GIS\Projects\Fort_Meade\ArcMap\Manor_View\2014-04\SurfaceSoil_Metals_20140416.mxd



GP43		
ANALYTE	RSL	DATE
		08/27/04
Depth Interval (ft BG)		0-3
Benzo(a)Anthracene (mg/kg)	0.15	1.6
Benzo(a)Pyrene (mg/kg)	0.015	1.9
Benzo(b)fluoranthene (mg/kg)	0.15	2.2
Indeno(1,2,3-cd)Pyrene (mg/kg)	0.15	0.88

SS-06		
ANALYTE	RSL	DATE
		04/01/03
Depth Interval (ft BG)		-
Benzo(a)Pyrene (mg/kg)	0.015	0.083 J

GP44		
ANALYTE	RSL	DATE
		08/27/04
Depth Interval (ft BG)		0-2.5
Benzo(a)Anthracene (mg/kg)	0.15	0.24 J
Benzo(a)Pyrene (mg/kg)	0.015	0.22 J
Benzo(b)fluoranthene (mg/kg)	0.15	0.21 J

GP32		
ANALYTE	RSL	DATE
		08/25/04
Depth Interval (ft BG)		0-2
Benzo(a)Anthracene (mg/kg)	0.15	0.45
Benzo(a)Pyrene (mg/kg)	0.015	0.34 J
Benzo(b)fluoranthene (mg/kg)	0.15	0.55 J
Dibenzo(a,h)Anthracene (mg/kg)	0.015	0.076 J
Indeno(1,2,3-cd)Pyrene (mg/kg)	0.15	0.18 J

SS-07		
ANALYTE	RSL	DATE
		04/01/03
Depth Interval (ft BG)		-
Benzo(a)Pyrene (mg/kg)	0.015	0.053 J

GP35		
ANALYTE	RSL	DATE
		08/25/04
Depth Interval (ft BG)		0-3
Benzo(a)Pyrene (mg/kg)	0.015	0.064 J

GP45		
ANALYTE	RSL	DATE
		08/27/04
Depth Interval (ft BG)		0-1
Benzo(a)Anthracene (mg/kg)	0.15	0.41
Benzo(a)Pyrene (mg/kg)	0.015	0.4 J
Benzo(b)fluoranthene (mg/kg)	0.15	0.39
Indeno(1,2,3-cd)Pyrene (mg/kg)	0.15	0.23 J

LEGEND:

SOIL SAMPLE LOCATION

0 200 400 Feet

GRAPHIC SCALE

FORT GEORGE G. MEADE, MARYLAND
MANOR VIEW DUMP SITE

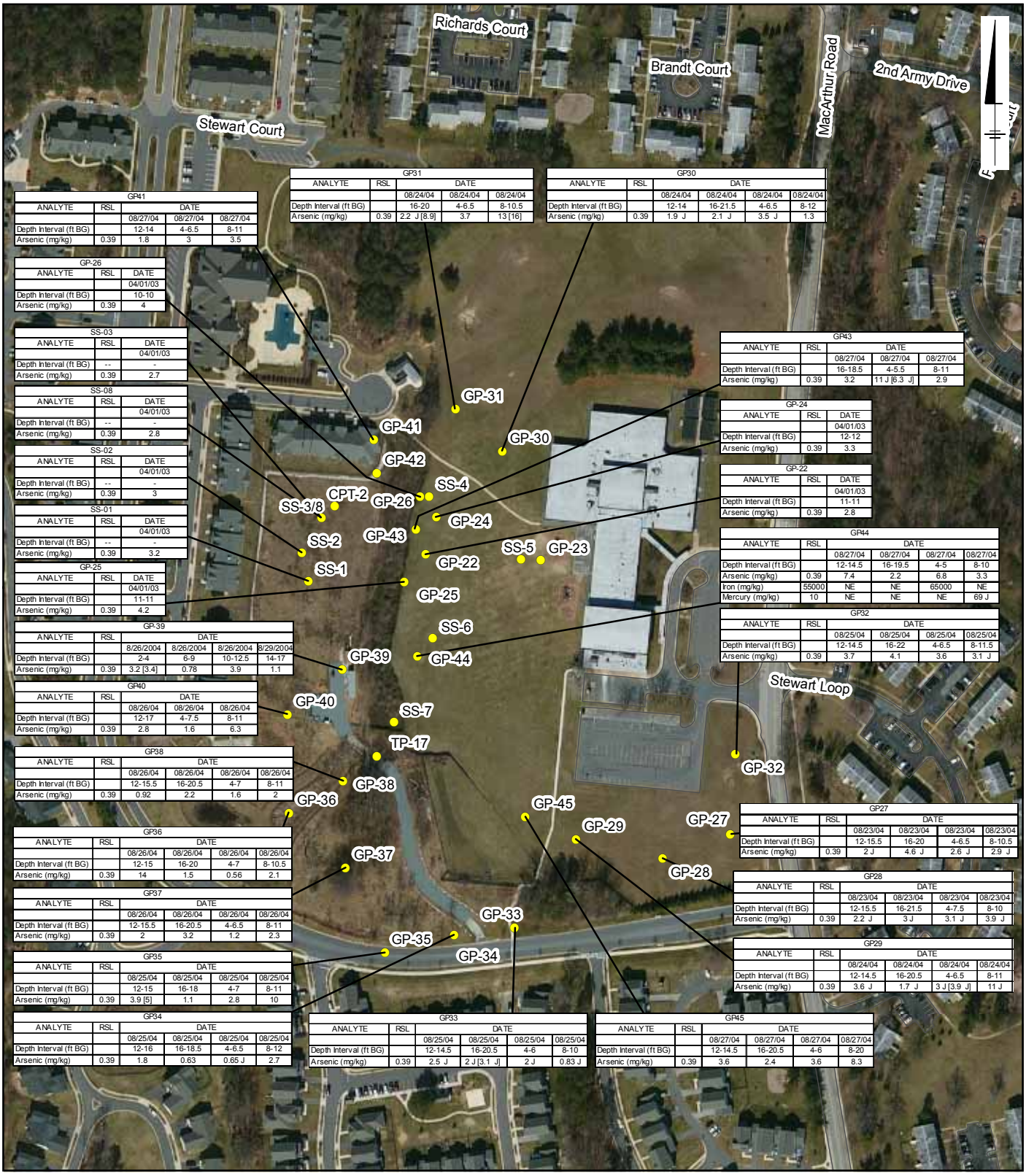
SOIL SAMPLE PAHS AND VOCS EXCEEDANCES
SURFACE SOIL
(0 TO 3 FT BELOW GROUND SURFACE)

Notes:
1) All results in milligrams per kilogram (mg/kg)
2) [7.3] - Duplicate Sample
3) J - Estimated concentration.
4) Imagery accessed through BING Maps Aerial via ArcGIS online layer packages by ESRI (12/1/2012) (c) 2010 Microsoft Corporation and its data suppliers. Accessed on 9/17/2012 through ArcGIS 10.

ARCADIS

FIGURE
7

CITY: MPLS DIV/GROUP: IM DB: MG LD: HA
FORT MEADE
Path: G:\GIS\Projects\Fort_Meade\ArcMap\Manor_View\2014-04\SurfaceSoil_VOCPAH_20140416.mxd



GP31				
ANALYTE	RSL	DATE		
		08/24/04	08/24/04	08/24/04
Depth Interval (ft BG)		16-20	4-6.5	8-10.5
Arsenic (mg/kg)	0.39	2.2 J [8.9]	3.7	13 [16]

GP30					
ANALYTE	RSL	DATE			
		08/24/04	08/24/04	08/24/04	08/24/04
Depth Interval (ft BG)		12-14	16-21.5	4-6.5	8-12
Arsenic (mg/kg)	0.39	1.9 J	2.1 J	3.5 J	1.3

GP41				
ANALYTE	RSL	DATE		
		08/27/04	08/27/04	08/27/04
Depth Interval (ft BG)		12-14	4-6.5	8-11
Arsenic (mg/kg)	0.39	1.8	3	3.5

GP-26		
ANALYTE	RSL	DATE
		04/01/03
Depth Interval (ft BG)		10-10
Arsenic (mg/kg)	0.39	4

SS-03		
ANALYTE	RSL	DATE
		04/01/03
Depth Interval (ft BG)	--	-
Arsenic (mg/kg)	0.39	2.7

SS-08		
ANALYTE	RSL	DATE
		04/01/03
Depth Interval (ft BG)	--	-
Arsenic (mg/kg)	0.39	2.8

SS-02		
ANALYTE	RSL	DATE
		04/01/03
Depth Interval (ft BG)	--	-
Arsenic (mg/kg)	0.39	3

SS-01		
ANALYTE	RSL	DATE
		04/01/03
Depth Interval (ft BG)	--	-
Arsenic (mg/kg)	0.39	3.2

GP-25		
ANALYTE	RSL	DATE
		04/01/03
Depth Interval (ft BG)		11-11
Arsenic (mg/kg)	0.39	4.2

GP39					
ANALYTE	RSL	DATE			
		8/26/2004	8/26/2004	8/26/2004	8/29/2004
Depth Interval (ft BG)		2-4	6-9	10-12.5	14-17
Arsenic (mg/kg)	0.39	3.2 [3.4]	0.78	3.9	1.1

GP40				
ANALYTE	RSL	DATE		
		08/26/04	08/26/04	08/26/04
Depth Interval (ft BG)		12-17	4-7.5	8-11
Arsenic (mg/kg)	0.39	2.8	1.6	6.3

GP38					
ANALYTE	RSL	DATE			
		08/26/04	08/26/04	08/26/04	08/26/04
Depth Interval (ft BG)		12-15.5	16-20.5	4-7	8-11
Arsenic (mg/kg)	0.39	0.92	2.2	1.6	2

GP36					
ANALYTE	RSL	DATE			
		08/26/04	08/26/04	08/26/04	08/26/04
Depth Interval (ft BG)		12-15	16-20	4-7	8-10.5
Arsenic (mg/kg)	0.39	14	1.5	0.56	2.1

GP37					
ANALYTE	RSL	DATE			
		08/26/04	08/26/04	08/26/04	08/26/04
Depth Interval (ft BG)		12-15.5	16-20.5	4-6.5	8-11
Arsenic (mg/kg)	0.39	2	3.2	1.2	2.3

GP35					
ANALYTE	RSL	DATE			
		08/25/04	08/25/04	08/25/04	08/25/04
Depth Interval (ft BG)		12-15	16-18	4-7	8-11
Arsenic (mg/kg)	0.39	3.9 [5]	1.1	2.8	10

GP34					
ANALYTE	RSL	DATE			
		08/25/04	08/25/04	08/25/04	08/25/04
Depth Interval (ft BG)		12-16	16-18.5	4-6.5	8-12
Arsenic (mg/kg)	0.39	1.8	0.63	0.65 J	2.7

GP33					
ANALYTE	RSL	DATE			
		08/25/04	08/25/04	08/25/04	08/25/04
Depth Interval (ft BG)		12-14.5	16-20.5	4-6	8-10
Arsenic (mg/kg)	0.39	2.5 J	2 J [3.1 J]	2 J	0.83 J

GP45					
ANALYTE	RSL	DATE			
		08/27/04	08/27/04	08/27/04	08/27/04
Depth Interval (ft BG)		12-14.5	16-20.5	4-6	8-20
Arsenic (mg/kg)	0.39	3.6	2.4	3.6	8.3

GP43				
ANALYTE	RSL	DATE		
		08/27/04	08/27/04	08/27/04
Depth Interval (ft BG)		16-18.5	4-5.5	8-11
Arsenic (mg/kg)	0.39	3.2	11 J [6.3 J]	2.9

GP-24		
ANALYTE	RSL	DATE
		04/01/03
Depth Interval (ft BG)		12-12
Arsenic (mg/kg)	0.39	3.3

GP-22		
ANALYTE	RSL	DATE
		04/01/03
Depth Interval (ft BG)		11-11
Arsenic (mg/kg)	0.39	2.8

GP44					
ANALYTE	RSL	DATE			
		08/27/04	08/27/04	08/27/04	08/27/04
Depth Interval (ft BG)		12-14.5	16-19.5	4-5	8-10
Arsenic (mg/kg)	0.39	7.4	2.2	6.8	3.3
Iron (mg/kg)	55000	NE	NE	65000	NE
Mercury (mg/kg)	10	NE	NE	NE	69 J

GP32					
ANALYTE	RSL	DATE			
		08/25/04	08/25/04	08/25/04	08/25/04
Depth Interval (ft BG)		12-14.5	16-22	4-6.5	8-11.5
Arsenic (mg/kg)	0.39	3.7	4.1	3.6	3.1 J

GP27					
ANALYTE	RSL	DATE			
		08/23/04	08/23/04	08/23/04	08/23/04
Depth Interval (ft BG)		12-15.5	16-20	4-6.5	8-10.5
Arsenic (mg/kg)	0.39	2 J	4.6 J	2.6 J	2.9 J

GP28					
ANALYTE	RSL	DATE			
		08/23/04	08/23/04	08/23/04	08/23/04
Depth Interval (ft BG)		12-15.5	16-21.5	4-7.5	8-10
Arsenic (mg/kg)	0.39	2.2 J	3 J	3.1 J	3.9 J

GP29					
ANALYTE	RSL	DATE			
		08/24/04	08/24/04	08/24/04	08/24/04
Depth Interval (ft BG)		12-14.5	16-20.5	4-6.5	8-11
Arsenic (mg/kg)	0.39	3.6 J	1.7 J	3 J [3.9 J]	11 J

LEGEND:

SOIL SAMPLE LOCATION

0 200 400 Feet

GRAPHIC SCALE

Notes:
1) All results in milligrams per kilogram (mg/kg)
2) The site specific background value for arsenic in subsurface soils at this site is 4.84 mg/kg.
3) [8.9] - Duplicate Sample
4) J - Estimated concentration.
5) NE - No exceedance.
6) Imagery accessed through BING Maps Aerial via ArcGIS online layer packages by ESRI (12/1/2012) (c) 2010 Microsoft Corporation and its data suppliers. Accessed on 9/17/2012 through ArcGIS 10.

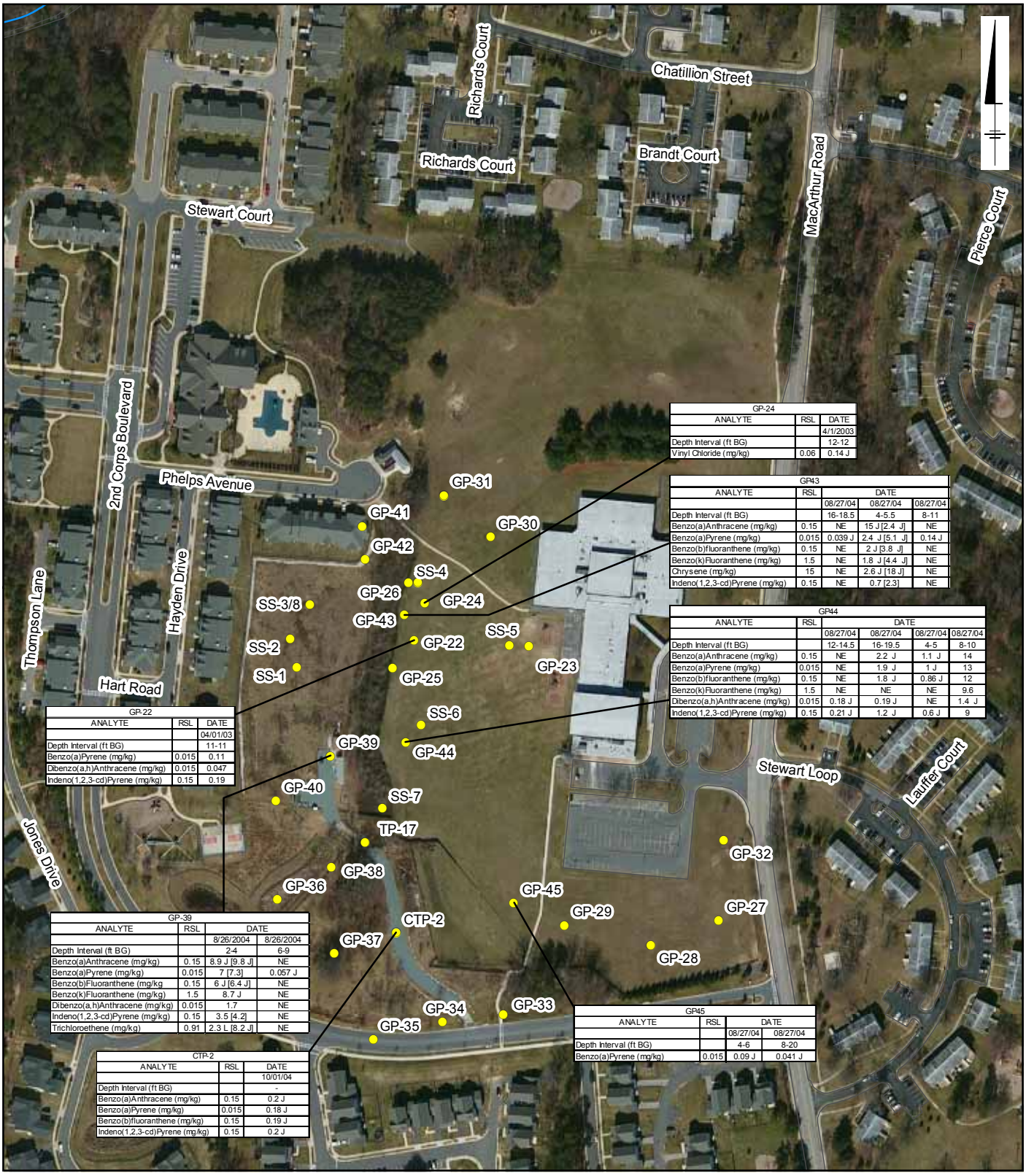
FORT GEORGE G. MEADE, MARYLAND
MANOR VIEW DUMP SITE

SOIL SAMPLE METALS EXCEEDANCES SUBSURFACE SOIL

ARCADIS

FIGURE
8

CITY: MPLS DIV/GROUP: IM DB: MG LD: HA
FORT MEADE
Path: G:\GIS\Projects\Fort_Meade\ArcMap\Manor_View\2014-04\SubSurfaceSoil_Metals_20140416.mxd



GP-24		
ANALYTE	RSL	DATE
		4/1/2003
Depth Interval (ft BG)		12-12
Vinyl Chloride (mg/kg)	0.06	0.14 J

GP43				
ANALYTE	RSL	DATE		
		08/27/04	08/27/04	08/27/04
Depth Interval (ft BG)		16-18.5	4-5.5	8-11
Benzo(a)Anthracene (mg/kg)	0.15	NE	15 J [2.4 J]	NE
Benzo(a)Pyrene (mg/kg)	0.015	0.039 J	2.4 J [5.1 J]	0.14 J
Benzo(b)fluoranthene (mg/kg)	0.15	NE	2 J [3.8 J]	NE
Benzo(k)Fluoranthene (mg/kg)	1.5	NE	1.8 J [4.4 J]	NE
Chrysene (mg/kg)	15	NE	2.6 J [18 J]	NE
Indeno(1,2,3-cd)Pyrene (mg/kg)	0.15	NE	0.7 [2.3]	NE

GP44					
ANALYTE	RSL	DATE			
		08/27/04	08/27/04	08/27/04	08/27/04
Depth Interval (ft BG)		12-14.5	16-19.5	4-5	8-10
Benzo(a)Anthracene (mg/kg)	0.15	NE	2.2 J	1.1 J	14
Benzo(a)Pyrene (mg/kg)	0.015	NE	1.9 J	1 J	13
Benzo(b)fluoranthene (mg/kg)	0.15	NE	1.8 J	0.86 J	12
Benzo(k)Fluoranthene (mg/kg)	1.5	NE	NE	NE	9.6
Dibenzo(a,h)Anthracene (mg/kg)	0.015	0.18 J	0.19 J	NE	1.4 J
Indeno(1,2,3-cd)Pyrene (mg/kg)	0.15	0.21 J	1.2 J	0.6 J	9

GP-22		
ANALYTE	RSL	DATE
		04/01/03
Depth Interval (ft BG)		11-11
Benzo(a)Pyrene (mg/kg)	0.015	0.11
Dibenzo(a,h)Anthracene (mg/kg)	0.015	0.047
Indeno(1,2,3-cd)Pyrene (mg/kg)	0.15	0.19

GP-39			
ANALYTE	RSL	DATE	
		8/26/2004	8/26/2004
Depth Interval (ft BG)		2-4	6-9
Benzo(a)Anthracene (mg/kg)	0.15	8.9 J [9.8 J]	NE
Benzo(a)Pyrene (mg/kg)	0.015	7 [7.3]	0.057 J
Benzo(b)Fluoranthene (mg/kg	0.15	6 J [6.4 J]	NE
Benzo(k)Fluoranthene (mg/kg)	1.5	8.7 J	NE
Dibenzo(a,h)Anthracene (mg/kg)	0.015	1.7	NE
Indeno(1,2,3-cd)Pyrene (mg/kg)	0.15	3.5 [4.2]	NE
Trichloroethene (mg/kg)	0.91	2.3 L [8.2 J]	NE

CTP-2		
ANALYTE	RSL	DATE
		10/01/04
Depth Interval (ft BG)		-
Benzo(a)Anthracene (mg/kg)	0.15	0.2 J
Benzo(a)Pyrene (mg/kg)	0.015	0.18 J
Benzo(b)fluoranthene (mg/kg)	0.15	0.19 J
Indeno(1,2,3-cd)Pyrene (mg/kg)	0.15	0.2 J

GP45			
ANALYTE	RSL	DATE	
		08/27/04	08/27/04
Depth Interval (ft BG)		4-6	8-20
Benzo(a)Pyrene (mg/kg)	0.015	0.09 J	0.041 J

LEGEND:

SOIL SAMPLE LOCATION

0 200 400 Feet

GRAPHIC SCALE

FORT GEORGE G. MEADE, MARYLAND
MANOR VIEW DUMP SITE

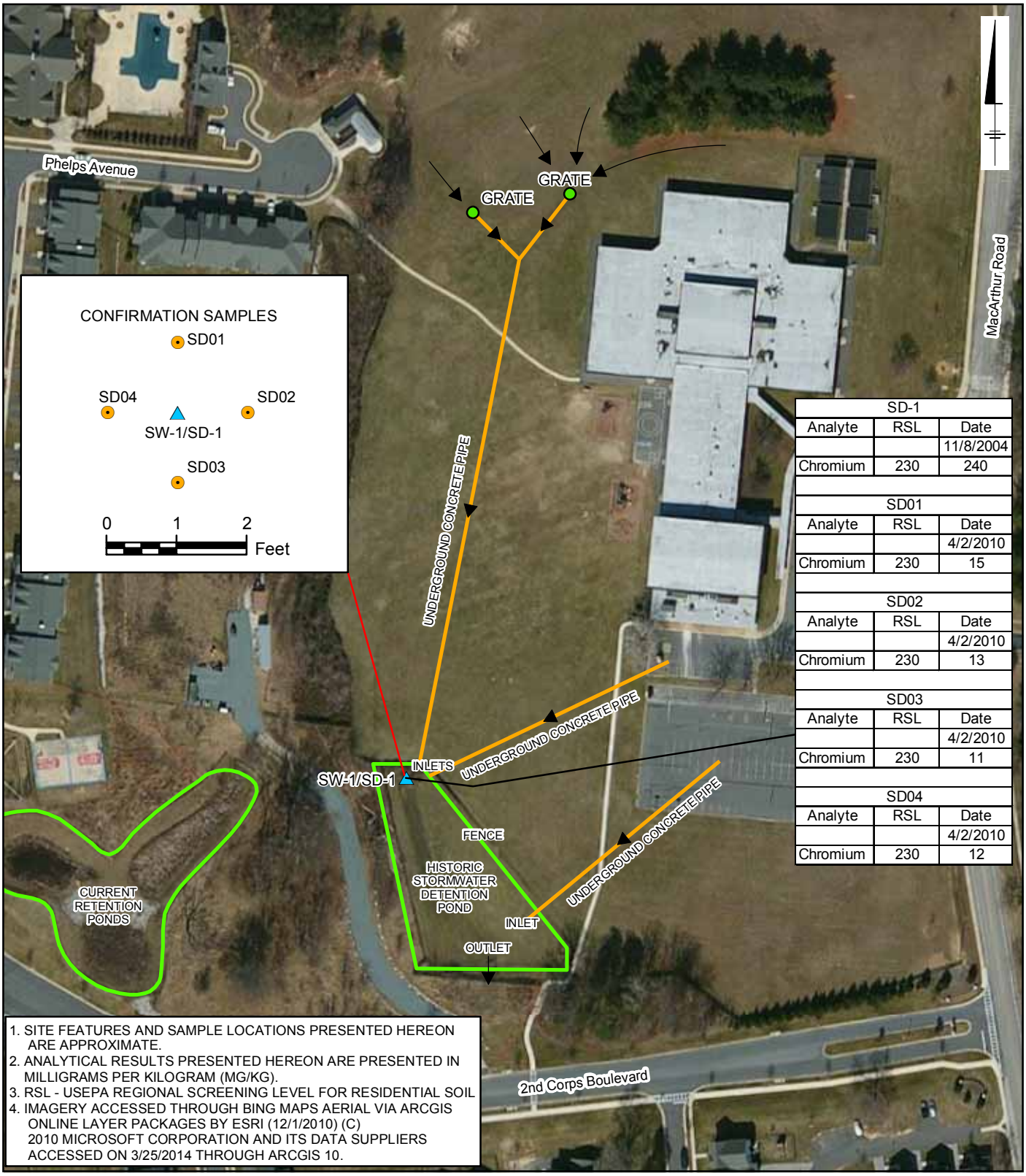
SOIL SAMPLE PAHS AND VOCS EXCEEDANCES SUBSURFACE SOIL

Notes:
1) All results in milligrams per kilogram (mg/kg)
2) [2.3] - Duplicate Sample
3) J - Estimated concentration.
4) NE - No exceedance.
5) Imagery accessed through BING Maps Aerial via ArcGIS online layer packages by ESRI (12/1/2012) (c) 2010 Microsoft Corporation and its data suppliers. Accessed on 9/17/2012 through ArcGIS 10.

ARCADIS

FIGURE
9

CITY: MPLS DIV/GROUP: IM DB: MG LD: HA
FORT MEADE
Path: G:\GIS\Projects\Fort_Meade\ArcMap\Manor_View\2014-03\SubSurfaceSoil_VOCPAH_20140327.mxd



SD-1		
Analyte	RSL	Date
		11/8/2004
Chromium	230	240

SD01		
Analyte	RSL	Date
		4/2/2010
Chromium	230	15

SD02		
Analyte	RSL	Date
		4/2/2010
Chromium	230	13

SD03		
Analyte	RSL	Date
		4/2/2010
Chromium	230	11

SD04		
Analyte	RSL	Date
		4/2/2010
Chromium	230	12

1. SITE FEATURES AND SAMPLE LOCATIONS PRESENTED HEREON ARE APPROXIMATE.
2. ANALYTICAL RESULTS PRESENTED HEREON ARE PRESENTED IN MILLIGRAMS PER KILOGRAM (MG/KG).
3. RSL - USEPA REGIONAL SCREENING LEVEL FOR RESIDENTIAL SOIL
4. IMAGERY ACCESSED THROUGH BING MAPS AERIAL VIA ARCGIS ONLINE LAYER PACKAGES BY ESRI (12/1/2010) (C) 2010 MICROSOFT CORPORATION AND ITS DATA SUPPLIERS ACCESSED ON 3/25/2014 THROUGH ARCGIS 10.

LEGEND:

- HISTORIC SURFACE WATER/SEDIMENT SAMPLE LOCATION (URS, 2008)
- CONFIRMATION SEDIMENT SAMPLE LOCATION (ARCADIS, 2010)
- GRATE
- STORMWATER FLOW DIRECTION THROUGH PIPE
- FENCE
- OVERLAND FLOW DIRECTION

0 75 150 Feet
GRAPHIC SCALE

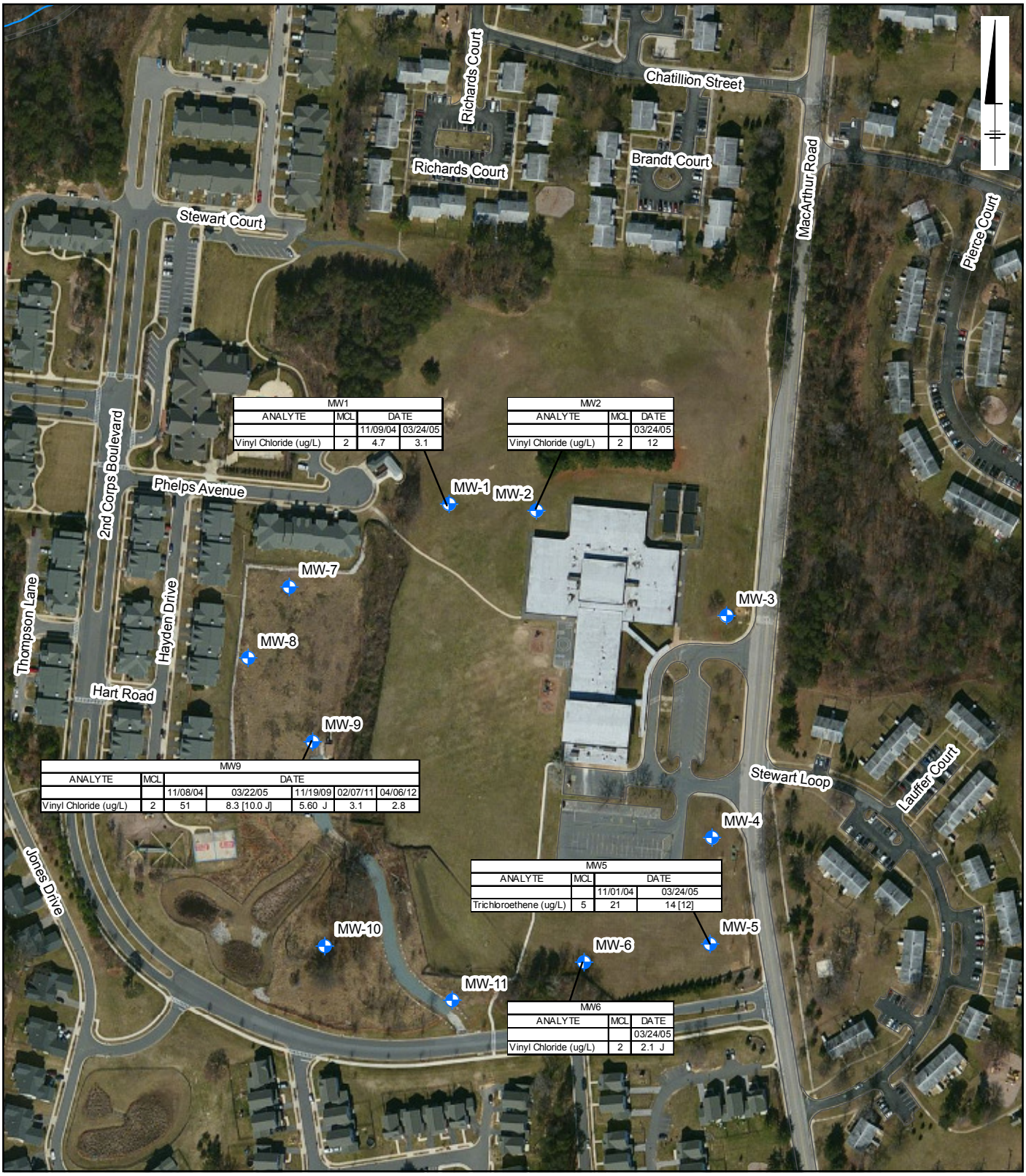
FORT GEORGE G. MEADE, MARYLAND
MANOR VIEW DUMP SITE

SURFACE WATER/SEDIMENT SAMPLE LOCATION AND SEDIMENT CHROMIUM RESULTS

ARCADIS

FIGURE
10

CITY: MPLS DIV/GROUP: IM DB: MG LD: HA
FORT MEADE
Path: G:\GIS\Projects\Fort_Meade\ArcMap\Manor_View\2014-03\SW_SE_Sample_Locs_20140325.mxd



MW1			
ANALYTE	MCL	DATE	
		11/09/04	03/24/05
Vinyl Chloride (ug/L)	2	4.7	3.1

MW2		
ANALYTE	MCL	DATE
		03/24/05
Vinyl Chloride (ug/L)	2	12

MW9						
ANALYTE	MCL	DATE				
		11/08/04	03/22/05	11/19/09	02/07/11	04/06/12
Vinyl Chloride (ug/L)	2	51	8.3 [10.0 J]	5.60 J	3.1	2.8

MW5			
ANALYTE	MCL	DATE	
		11/01/04	03/24/05
Trichloroethene (ug/L)	5	21	14 [12]

MW6		
ANALYTE	MCL	DATE
		03/24/05
Vinyl Chloride (ug/L)	2	2.1 J

LEGEND:

MONITORING WELL

0 200 400 Feet

GRAPHIC SCALE

Notes:
1) All results in micrograms per liter (µg/L)
2) MCL - Maximum Contaminant Level
3) [12] - Duplicate Sample
4) J - Estimated concentration.
5) Imagery accessed through BING Maps Aerial via ArcGIS online layer packages by ESRI (12/1/2012) (c) 2010 Microsoft Corporation and its data suppliers. Accessed on 9/17/2012 through ArcGIS 10.

FORT GEORGE G. MEADE, MARYLAND
MANOR VIEW DUMP SITE

GROUNDWATER VOCS MCL EXCEEDANCES

ARCADIS

FIGURE
11

CITY: MPLS DIV/GROUP: IM DB: MG LD: HA
FORT MEADE
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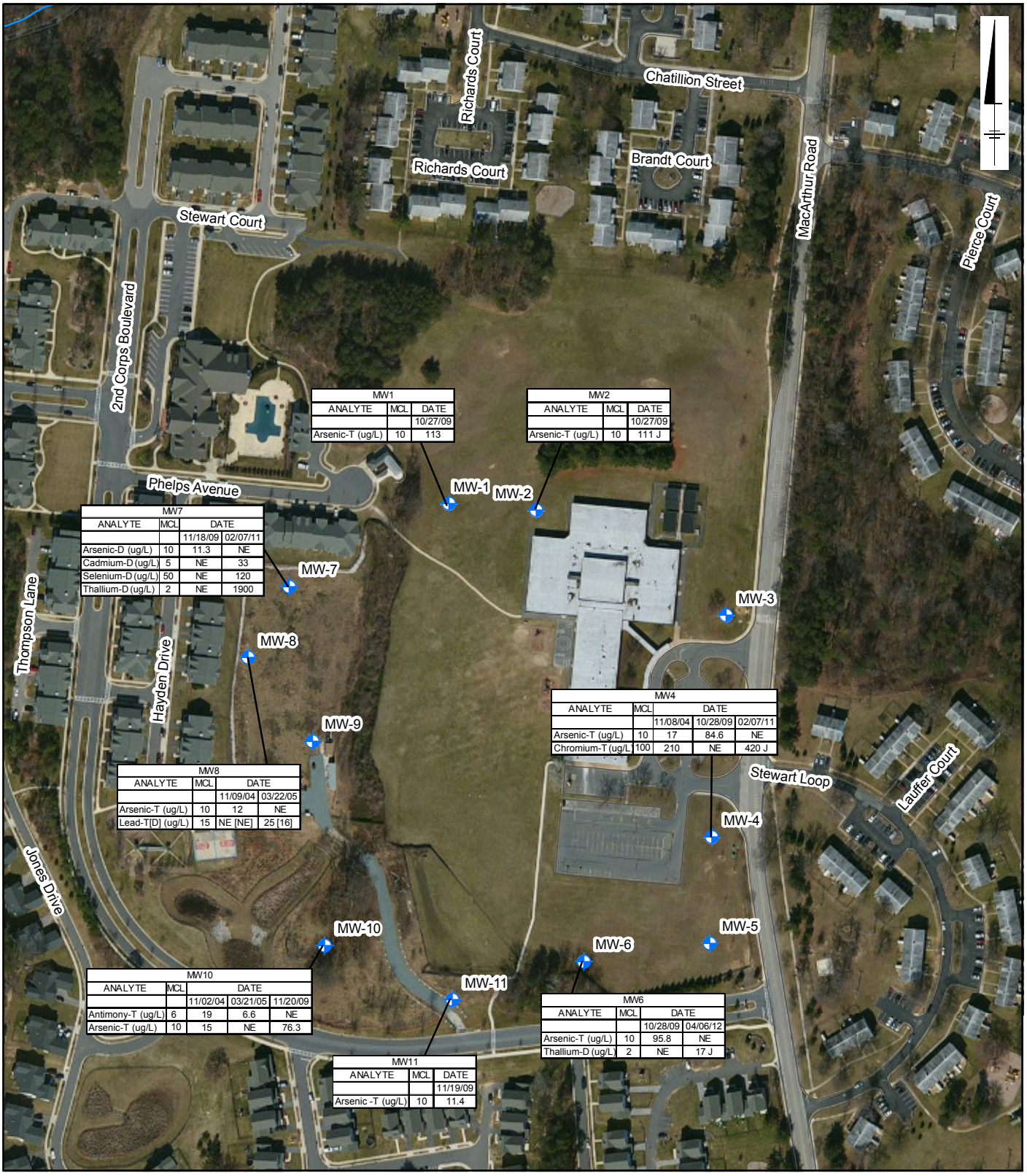

MW1		
ANALYTE	MCL	DATE
		10/27/09
Arsenic-T (ug/L)	10	113

MW2		
ANALYTE	MCL	DATE
		10/27/09
Arsenic-T (ug/L)	10	111 J

MW7			
ANALYTE	MCL	DATE	
		11/18/09	02/07/11
Arsenic-D (ug/L)	10	11.3	NE
Cadmium-D (ug/L)	5	NE	33
Selenium-D (ug/L)	50	NE	120
Thallium-D (ug/L)	2	NE	1900

MW4				
ANALYTE	MCL	DATE		
		11/08/04	10/28/09	02/07/11
Arsenic-T (ug/L)	10	17	84.6	NE
Chromium-T (ug/L)	100	210	NE	420 J

MW8			
ANALYTE	MCL	DATE	
		11/09/04	03/22/05
Arsenic-T (ug/L)	10	12	NE
Lead-T[D] (ug/L)	15	NE [NE]	25 [16]

MW10				
ANALYTE	MCL	DATE		
		11/02/04	03/21/05	11/20/09
Antimony-T (ug/L)	6	19	6.6	NE
Arsenic-T (ug/L)	10	15	NE	76.3

MW6			
ANALYTE	MCL	DATE	
		10/28/09	04/06/12
Arsenic-T (ug/L)	10	95.8	NE
Thallium-D (ug/L)	2	NE	17 J

MW11		
ANALYTE	MCL	DATE
		11/19/09
Arsenic -T (ug/L)	10	11.4

LEGEND:

MONITORING WELL

0 200 400 Feet

GRAPHIC SCALE

Notes:
1) All results in micrograms per liter (µg/L)
2) MCL - Maximum Contaminant Level
3) D - Dissolved
4) J - Estimated concentration.
5) NE - No exceedance
6) T - Total
7) Imagery accessed through BING Maps Aerial via ArcGIS online layer packages by ESRI (12/1/2012) (c) 2010 Microsoft Corporation and its data suppliers. Accessed on 9/17/2012 through ArcGIS 10.

FORT GEORGE G. MEADE, MARYLAND
MANOR VIEW DUMP SITE

GROUNDWATER METALS MCL EXCEEDANCES

ARCADIS

FIGURE
12

CITY: MPLS DIV/GROUP: IM DB: MG LD: HA
FORT MEADE
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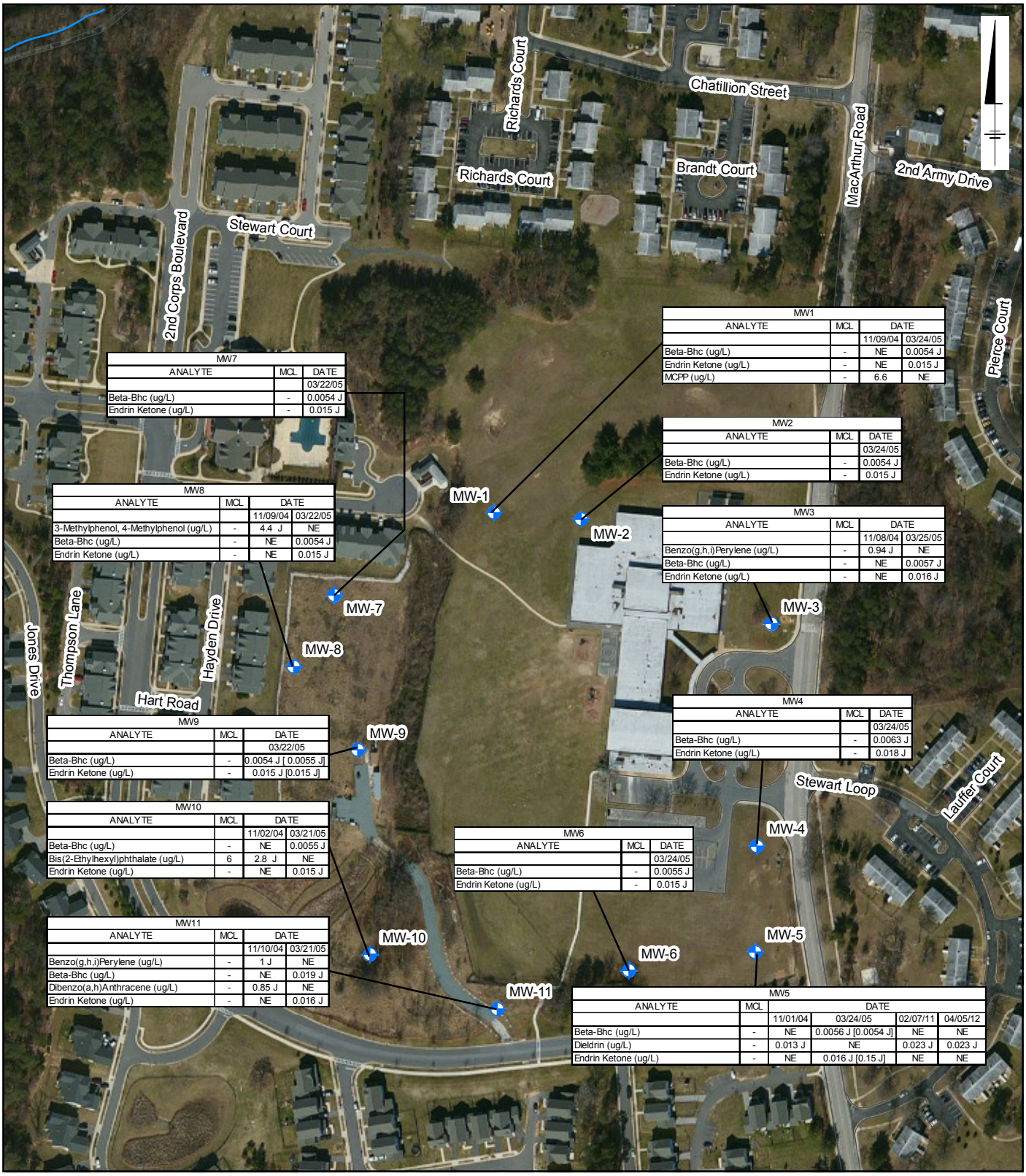

MW1			
ANALYTE	MCL	DATE	
		11/09/04	03/24/05
Beta-Bhc (ug/L)	-	NE	0.0054 J
Endrin Ketone (ug/L)	-	NE	0.015 J
MCPP (ug/L)	-	6.6	NE

MW2		
ANALYTE	MCL	DATE
		03/24/05
Beta-Bhc (ug/L)	-	0.0054 J
Endrin Ketone (ug/L)	-	0.015 J

MW3			
ANALYTE	MCL	DATE	
		11/08/04	03/25/05
Benzo(g,h,i)Perylene (ug/L)	-	0.94 J	NE
Beta-Bhc (ug/L)	-	NE	0.0057 J
Endrin Ketone (ug/L)	-	NE	0.016 J

MW4		
ANALYTE	MCL	DATE
		03/24/05
Beta-Bhc (ug/L)	-	0.0063 J
Endrin Ketone (ug/L)	-	0.018 J

MW5					
ANALYTE	MCL	DATE			
		11/01/04	03/24/05	02/07/11	04/05/12
Beta-Bhc (ug/L)	-	NE	0.0056 J [0.0054 J]	NE	NE
Dieldrin (ug/L)	-	0.013 J	NE	0.023 J	0.023 J
Endrin Ketone (ug/L)	-	NE	0.016 J [0.15 J]	NE	NE

MW6		
ANALYTE	MCL	DATE
		03/24/05
Beta-Bhc (ug/L)	-	0.0055 J
Endrin Ketone (ug/L)	-	0.015 J

MW7		
ANALYTE	MCL	DATE
		03/22/05
Beta-Bhc (ug/L)	-	0.0054 J
Endrin Ketone (ug/L)	-	0.015 J

MW8			
ANALYTE	MCL	DATE	
		11/09/04	03/22/05
3-Methylphenol, 4-Methylphenol (ug/L)	-	4.4 J	NE
Beta-Bhc (ug/L)	-	NE	0.0054 J
Endrin Ketone (ug/L)	-	NE	0.015 J

MW9		
ANALYTE	MCL	DATE
		03/22/05
Beta-Bhc (ug/L)	-	0.0054 J [0.0055 J]
Endrin Ketone (ug/L)	-	0.015 J [0.015 J]

MW10			
ANALYTE	MCL	DATE	
		11/02/04	03/21/05
Beta-Bhc (ug/L)	-	NE	0.0055 J
Bis(2-Ethylhexyl)phthalate (ug/L)	6	2.8 J	NE
Endrin Ketone (ug/L)	-	NE	0.015 J

MW11			
ANALYTE	MCL	DATE	
		11/10/04	03/21/05
Benzo(g,h,i)Perylene (ug/L)	-	1 J	NE
Beta-Bhc (ug/L)	-	NE	0.019 J
Dibenzo(a,h)Anthracene (ug/L)	-	0.85 J	NE
Endrin Ketone (ug/L)	-	NE	0.016 J

LEGEND:

MONITORING WELL

0 200 400 Feet

GRAPHIC SCALE

Notes:
1) All results in micrograms per liter (µg/L)
2) MCL - Maximum Contaminant Level
3) - No MCL Established
4) [0.15 J] - Duplicate Sample
5) J - Estimated concentration.
6) NE - No exceedance.
7) Imagery accessed through BING Maps Aerial via ArcGIS online layer packages by ESRI (12/1/2012) (c) 2010 Microsoft Corporation and its data suppliers. Accessed on 9/17/2012 through ArcGIS 10.

FORT GEORGE G. MEADE, MARYLAND
MANOR VIEW DUMP SITE

GROUNDWATER PAH AND PESTICIDES RESULTS

ARCADIS

FIGURE
13

CITY: MPLS DIV/GROUP: IM DB: MG LD: HA
FORT MEADE
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APPENDIX A
COST ESTIMATE FOR RESPONSE ACTION

Table A-1
Cost Estimate for Selected Response Action
Alternative 2
Maintenance of Existing Soil Cover, LTM, and LUCs
Manor View Dump Site, Fort Meade, Maryland

ITEM		QUANTITY	UNITS	UNIT COST	CAPITAL COST	ANNUAL O&M COST	PRESENT WORTH COST	ASSUMPTIONS
I. ADMINISTRATIVE ACTIONS								
1. Land-Use Restrictions		1	LS	$7,500	$7,500	$0	---	Engineering estimate for signs ($1500), fencing ($5000), and staff (10 hrs x $100/hr) to reinforce existing LUCs for restriction of future residential land use
2. Permitting		1	LS	$10,000	$10,000	$0	---	Engineering estimate for staff (100 hrs x $100/hr) to complete permits required by local, state, and federal governing agencies to conduct remedial activities
3. Design		1	LS	$20,000	$20,000	$0	---	Engineering estimate for staff (100 hrs x $200/hr) to draft, submit, and finalize the remedial design and remedial action work plan
4. Public Outreach and School Coordination		1	LS	$10,000	$10,000	$0	---	Engineering Estimate for staff (100 hrs x $100/hr) to perform public outreach and coordination of remedial activities with Manor View Elementary School
SUBTOTAL					$47,500	$0	$0	
II. LONG-TERM MAINTENANCE, MONITORING & REVIEW								
1. Cover Inspection and Maintenance		30	Years	$7,000	$0	$210,000	$86,900	Engineering estimate to inspect (4 hrs x $100/hr), report (12 hrs x $100/hr), and maintain ($5000) the existing soil cover annually
2. Five Year Review Reporting		1	LS	$15,000	$0	$15,000	$10,700	Engineering estimate to compile the Draft, Draft Final, and Final versions of the Five Year Review Report for the Manor View Dump Site
3. Methane, Groundwater, and Indoor Air LTM								
A. Sampling Labor		1	LS	$11,200	$0	$11,200	$8,000	Engineering estimate to sample groundwater and soil gas semi-annually and indoor air annually.
B. Lab Analytical		1	LS	$3,000	$0	$3,000	$2,800	Engineering estimate to collect groundwater samples, quality control samples, and indoor air samples.
C. Reporting of Long Term Monitoring Results		1	LS	$30,000	$0	$30,000	$21,400	Engineering estimate to compile the Draft, Draft Final, and Final versions of semi-annual LTM Reports
SUBTOTAL					$0	$269,200	$129,800	
SUBTOTAL (I, and II)					$47,500	$269,200	$129,800	
III. IMPLEMENTATION COSTS								
1. Administration and Legal	5% of Capital Costs	1	LS	$2,400	$2,400	$0	---	
2. Procurement	5% of Capital Costs	1	LS	$2,400	$2,400	$0	---	
3. Construction Management	12% of Capital Costs	1	LS	$5,700	$5,700	$0	---	
4. Completion Report		1	LS	$20,000	$20,000	$0	---	Engineering estimate to compile the Draft, Draft Final, and Final versions of the Completion Report for the Manor View Dump Site
5. Cost Contingency	35% of Capital Costs	1	LS	$16,600	$16,600	$0	---	
6. O&M Contingency	15% of O&M Costs	1	LS	$40,400	$0	$40,400	$16,700	
SUBTOTAL					$47,100	$40,400	$16,700	
SUBTOTAL (I, II and III)					$94,600	$309,600	$146,500	
A. TOTAL CAPITAL COSTS					$94,600			
B. TOTAL ANNUAL COSTS						$309,600		
C. TOTAL PRESENT WORTH OF ANNUAL COSTS							$146,500	
TOTAL PRESENT WORTH OF CAPITAL AND ANNUAL COSTS (A + C)							**$241,000**	

Notes:
/hr - per hour
LF - Linear Foot
LS - Lump Sum
LTM - Long Term Monitoring
LUC - Land Use Control
O&M - Operation and Maintenance
VOC - Volatile Organic Compound
Present worth costs are calculated using 7% interest and year 2013 dollars

APPENDIX B
CERTIFICATES OF PUBLICATION

OFFICE OF

The Capital

Published by

Capital Gazette Communications, Inc.

HOLDER OF CONTRACT FOR ANNE ARUNDEL COUNTY ADVERTISING

CERTIFICATE OF PUBLICATION

Annapolis, MD, March 16, 20 14

We hereby certify that the annexed

Manor View Dump Site

was published in The Capital, a newspaper published in the City of

Annapolis, Anne Arundel County, MD

once a week for one ~~successive~~ weeks

before the 20th day of March, 20 14.

The insertions being made the 16th

day of March, 20 14.

Capital Gazette Communications, Inc.

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PUBLIC NOTICE

U.S. ARMY INVITES PUBLIC COMMENT ON PROPOSED PLAN FOR MANOR VIEW DUMP SITE FORT GEORGE G. MEADE, MARYLAND

The U.S. Army at Fort George G. Meade (Fort Meade) invites the public to comment on a Proposed Plan that evaluates proposed final remedial action alternatives to control and mitigate exposure pathways at the Manor View Dump Site (Site) at Fort George G. Meade, Maryland. The approximately 10-acre site is near the intersection of MacArthur Road and 2nd Corps Boulevard in the north-central portion of Fort Meade. The site is surrounded by residential housing (Potomac Place) to the north along Phelps Avenue, to the west along Hayden Drive, and to the south along 2nd Corps Boulevard. Manor View Elementary School is to the east.

SITE BACKGROUND

The Site was discovered during construction activities at Potomac Place in 2003 and was found to contain waste from the 1940s. Because some of the waste was found to generate methane, approximately 20 homes in Potomac Place were evacuated. The Army initially installed a system to control the methane and began monitoring methane levels. Following a comprehensive investigation, the Army excavated approximately 30,000 tons of methane generating waste in 2012, disposed of the waste off-post, and placed a soil cover over the Site.

ALTERNATIVES EVALUATED

The Proposed Plan evaluates the following remedial action alternatives:

Alternative 1: No Further Action.

Alternative 2: Maintenance of Existing Soil Cover, Land Use Controls, and Long-Term Monitoring.

Alternative 3: Installation of a Low Permeability Cap, Land Use Controls, and Long-Term Monitoring.

As required by law, a formal review of the effectiveness of the selected alternative will be conducted every five years.

PREFERRED RESPONSE ACTION

Alternative 2 is the Preferred Response Action for the Site. This Alternative provides an optimum balance between the selection criteria and is protective of human health and the environment. The Preferred Response Action may be modified or a new alternative may be developed based on public input. The Final Response Action selected will be documented in a Record of Decision that summarizes the decision-making process. The Army will summarize and respond to comments received during the comment period as part of the Record of Decision.

PUBLIC COMMENT PERIOD

Starting March 20, 2014, copies of the Proposed Plan will be available for review at:

www.ftmeade.army.mil/environment (click the links for Cleanup Program, Program Sites, and Manor View Dump Site)
or for a paper copy go to:

Fort Meade Environmental Division Office
4215 Roberts Ave., Room 320, Fort Meade, Maryland 20755
(301)-677-9854
Hours: 8 a.m.-4 p.m. Mon-Fri
(photo I.D. required to gain access onto Fort Meade)

or the

Anne Arundel County Library
West County Area Branch
1325 Annapolis Road
Odenton, MD 21113
(410)-222-6277
Hours: 9 a.m. - 9 p.m. Mon-Thurs,
9 a.m. - 5 p.m. Fri and Sat, and
1 p.m. - 5 p.m. Sunday

The public may submit written comments during the 30-day comment period (March 20 to April 19, 2014). Comments must be postmarked by April 19, 2014, and sent to Ms. Mary Doyle, U.S. Army Garrison Public Affairs Office, 4409 Llewellyn Avenue, Fort Meade, MD, 20755-7058. Following the 30-day public comment period, written responses will be prepared and included within the Administrative Record.

PUBLIC MEETING

The U.S. Army invites the public to attend a meeting on **March 27, 2014, 7:00 p.m., at McGill Training Center, Classroom 6, 8452 Zimborski Avenue, Fort Meade, MD 20755** to discuss the Proposed Plan and the U.S. Army's plan to remediate the Site. Please use the visitor's gate on Reece Road to enter Fort Meade; you will need identification such as a driver's license.

Community members are also invited to attend the Fort Meade Restoration Advisory Board (RAB) meetings held bi-monthly. The next RAB meeting will be held on March 20, 2014, at the Holiday Inn Express, 7481 Ridge Road, Hanover, MD, 21076.

For additional project information, please visit Fort Meade's Environmental Management System website at www.ftmeade.army.mil/environment (click the links for Cleanup Program, Program Sites, and Manor View) or contact the **Fort Meade Public Affairs Office at (301)-677-1361**.

588585 3/16

APPENDIX C
PUBLIC MEETING TRANSCRIPT

Fort George G. Meade Installation Restoration Program
Proposed Plan Public Meeting for Manor View Dump Site
Thursday, March 27, 2014
McGill Training Center – Fort George G. Meade, Maryland

The meeting opened at 7:10 p.m.

Introduction by Mr. Mick Butler

Good evening everyone and welcome. I'm Mick Butler, Chief of Fort Meade's Environmental Office. Tonight's presentation on the Manor View Dump Site represents many years of work, study, and action. The site was discovered during military housing construction by Picerne which is now known as Corvias. I'd like to introduce Mr. George Knight who will be taking over the reins from Mr. Paul Fluck of the environmental cleanup program and who will moderate tonight's meeting.

Overview by Mr. George Knight

Good evening and thank you for coming. As you came in, there is a sign-in sheet, and we would ask everyone to sign in so we have a record of everyone who attended. We do have a record-keeper who will be taking notes. Before we get started, I want to point out exits and restrooms. I would also ask everyone to mute their cell phones.

Tonight's presentation is on the Manor View Dump Site. The Army's Proposed Plan for the site will be given by Mr. Tom Crone of ARCADIS. Please hold your questions and comments until the end of the presentation.

Presentation by Mr. Tom Crone

(Note: The Power Point presentation made by Mr. Crone is incorporated as part of the transcript.)

Hi, my name is Tom Crone with ARCADIS, and I'll be presenting the slides tonight on this project which started in 2003. We'll talk about the history and where we go from here.

This slide (slide 2) shows the purpose of the public meeting. The main purpose is to solicit public comment on the remedy proposed. There is a public comment period open right now. There was a public notice in The Capitol and the Soundoff notifying the public of this meeting and the public comment period. You can see the details there, and the public comment period ends April 19. We do have additional information on how to submit comments; there are fact sheets and comment forms on the table in the back.

Manor View Dump Site has been investigated, characterized, and studied under the CERCLA [Comprehensive Environmental Restoration, Compensation and Liability

Act] process. This slide (slide 3) shows the CERLCA process from top to bottom. It is a linear process where you complete one step and move to the next.

The Preliminary Assessment/Site Investigation would have started in 2003 when a construction project found buried debris and waste at the Manor View Site. With the identification complete, the next step was the Remedial Investigation. During that step the site is characterized, and samples are collected and analyzed so it is understood what contamination is present at the site. The Feasibility Study takes that information and evaluates alternatives that would address that contamination. The Feasibility Study evaluates alternatives against each other to identify the best alternative for the site. With that completed, it moves to the Proposed Plan, the stage we are at right now. There is a copy of the Proposed Plan on the front table, and it is also available at several public places for you to review; I'll have information on that later. The Proposed Plan communicates the preferred remedy to the public so the public can have input into the process. The public meeting tonight is part of that process. We'll take that input and draft a Record of Decision which is the legal document which binds the Army to implement the action. Once the Record of Decision is complete, Remedial Design is required before actually proceeding with the remedy.

So, what does a Proposed Plan do? The Proposed Plan takes all the information evaluated in the Feasibility Study and summarizes it in a condensed version for public consumption and review. We have a fact sheet available which is a condensed version of the Proposed Plan to try and make it easier for the public to comment on.

This is the agenda for tonight. We're going to start with site information and make sure everyone is familiar with the site location and history. We'll talk about the field investigations, the data collected, and the current understanding of contamination present in groundwater, soil and air. I'll review the remedial alternatives we considered, there were a total of three, and then present the preferred alternative the Army is recommending. Last, I'll review the public comment information and the ways for you to interact with this part of the process.

For those of you not familiar with Manor View, it is located here in the center of Fort Meade.

In 2011, we held a public meeting in the Manor View Elementary School library. The meeting in 2011 discussed a non-time critical removal action which we'll be talking about in more detail tonight. That meeting was to discuss an action to address a specific hazard posed by methane at the site. There was a poster session where the plan was presented and reviewed. The meeting tonight is to address the site as a whole.

Since that meeting in 2011, the Army excavated 30,000 tons of municipal solid waste and transported it to a landfill in Virginia, the King George Landfill. The extraction system that was at the site and pulling methane out of the ground has been turned off, and methane concentrations have decreased. The removal action occurred in the summer of 2012 and was the subject of an Earth Day exhibit and a local news

broadcast. Many cultural items were excavated dating back to the 1940s or earlier. Some of them were labeled "United States Army Medical Department."

In 2012, 30,000 tons of material was excavated, loaded on dump trucks, and transported to a proper landfill facility. This is a picture of what the decomposed waste looked like. The site was backfilled with an orange fabric layer to mark the separation between existing soils and clean imported soils. Methane monitoring has continued.

I'll explain how the meeting in 2011 and all that work that was done in 2012 fits into the process. The Army, the U.S. Environmental Protection Agency, and the Maryland Department of the Environment got to the Feasibility Study stage and decided a non-time critical removal action was needed to address the methane hazard. Under CERCLA, you can step out of the process and take a non-time critical removal action. The process requires these steps (Mr. Crone showed the steps on a slide [slide 10]). That process also included a 30-day public notice, and the meeting that was held at Manor View Elementary School. With the non-time critical removal action complete, we went back to the CERCLA process to do the Feasibility Study, evaluate the site after the removal of 30,000 tons of waste, and continue to the Proposed Plan stage where we find ourselves today talking about the proposed remedy for the Site.

This is a closer view of Manor View Dump Site with the Elementary School on the right and housing on the left. The pink shape indicates the area excavated in 2012; the yellow-hatched area represents approximately nine acres of inert construction demolition debris still buried at the site. We'll be talking about how the alternative addresses any hazards that debris may pose.

This is a timeline of how all the events we talked about fit into a time sequence. The waste was buried pre-1940s or during the 1940s using practices accepted at the time for how waste was disposed of. The site was covered over and reforested with trees established. In 2003, the housing project started and the waste was discovered. We started the CERLCA process with the Preliminary Assessment/Site Investigation and interim measures to control the methane that was identified. In 2005, the gas control system was upgraded to an active system so the methane that was known to be there was actively pulled out of the ground. From 2008 to 2010, the Remedial Investigation was completed so all the samples and data were collected. During the 2010 to 2012 timeframe, the non-time critical removal action was conducted to remove the methane-generating waste. From 2013 to today, we have updated the Feasibility Study to evaluate alternatives and to proceed with the Proposed Plan and eventually the Record of Decision.

The current site conditions are a western portion which is vacant field that is fenced off and not used by the school; it is designed as community space in the master plan. There are nine acres on the east side which are currently used by Manor View Elementary School as playground and play fields. There are some stormwater ponds on the site. There is no current use of groundwater.

This is a photograph showing site conditions shortly after the 2012 the excavation looking north on the western portion. This is a photograph standing with your back to the school looking out at the field; the buried debris would be under the soil cover and grass. The western portion is visible in the background of the picture, beyond the fence and vegetation.

I'll talk a little about the field investigations, and the data that was collected. Since 2003, there have been 270 points, probes, augers, and holes dug into the Manor View Dump Site to find out what is going on under the surface. We wanted to find out things such as where is the methane coming from and how thick was the soil cover. There are 11 monitoring wells completely encircling the site for monitoring the groundwater, and five sampling events have occurred since 2004 at those locations. Surface water and sediment samples have been collected, as well as ambient air (the air we breathe), indoor air, and sub-slab air at Manor View Elementary. Sub-slab air is the air that would accumulate in the gravel underneath the concrete pad. We had the initial interim action taken to address the methane hazard in 2004. The Remedial Investigation and Feasibility Study were completed. The removal action was taken in 2012 as I described earlier. The investigations and monitoring have continued as recently as early March 2014 when methane sampling was completed.

Here is a map showing the 270 points. The investigation extended well beyond the perimeter, looking for waste or methane.

What did we find and what do we know about Manor View? The bottom of the waste is about 15 feet below ground surface. The existing soil cover is two to eight feet thick. Methane generation occurred on the western side, prior to the 2012 removal action. The inert construction demolition debris is present on the eastern side and remains buried today. There are volatile organic compounds (VOCs), metals, PAHs and dioxins present in sub-surface soil and debris at depths of eight to ten feet below ground surface.

I mentioned there is a soil cover over the top of the waste, and it varies in depth. This map shows how much it varies. On the western portion, I've talked about the removal action in 2012 when methane-generating waste was removed to address the methane hazard. Some residual contamination did reside in the soil, and on that part of the site, there was a two-foot soil cover installed as part of the non-time critical removal action. This is a photograph from the 2013 excavation. You can see some dark staining and waste here, and then a mixture of sand and topsoil that range from two to eight feet thick.

The depth to groundwater is 50 feet below ground surface, and groundwater flows to the southeast. This is a list of chemicals--VOCs, semi-VOCs, metals--that have been detected in the groundwater. Some of those contaminants have been detected above the Maximum Contaminant Level (MCL). The most prevalent detections have been vinyl chloride and trichloroethylene (TCE); the metal detections are sporadic, sometimes you

see them and sometimes you don't. The concentrations of vinyl chloride and TCE have decreased since 2004.

Again, we go back to the site map, and see the 11 monitoring wells. These four wells show the vinyl chloride exceedances of the Maximum Contaminant Levels at the Site. The only location where we have seen an exceedance since 2005 is directly downgradient of the removal action. Groundwater flow is to the southeast. TCE was also detected at this location in 2005, but has not been detected above the Maximum Contaminant Level since that time. Concentrations have been decreasing over time with vinyl chloride dropping from 51 parts per billion to 2.8 parts per billion (the Federal Maximum Contaminant Level for vinyl chloride is 2 parts per billion), and TCE has dropped from 21 parts per billion to below the Maximum Contaminant Level for the three sampling events in 2009, 2010, and 2012.

Air samples were collected--soil gas, ambient, indoor, and sub-slab. The methane has been below the lower explosive limit which is five percent by volume at all 43 sample locations. Beginning shortly after 2003, upwards of 50 sample points were monitored on a weekly basis. With the non-time critical removal action in 2012 and the subsequent decrease in methane production, that sampling frequency is now at twice a year. Following the removal action, methane was monitored every week, and then decreased to monthly, every other month, and then quarterly until we were confident in the pattern of the data.

Methane and VOCs were detected in the ambient air samples, about equal to outdoor background values. It would be no different if you were standing on the Manor View playground or standing outside this building or other background locations identified in the study.

VOCs were detected above screening levels for indoor air but were comparable to a control school. VOCs can be generated by things like dry erase markers and paint. The detections at Manor View Elementary were found to be similar to another school. TCE was detected in the crawl space at the southern end of Manor View Elementary. TCE was not detected in indoor air or in the sub-slab, but just in the approximately four foot by five foot crawl space where there was a detection of TCE above the screening level.

This figure shows Manor View Elementary and the 13 indoor air sampling locations--one from each classroom, the library, cafeteria, the crawl space underneath the kitchen, and maintenance storage/offices. This is the sub-slab sampling; this portion of the building is built on slab, holes were drilled through the slab, and air was sampled from underneath that space beneath the school. There was no detection of TCE in those samples.

These are pictures of the crawl space. This is the access to the crawl space, a four-foot long hatch that leads into approximately a four-foot high crawl space. In the crawl space there is a methane alarm that works similar to a smoke detector or carbon

monoxide alarm and would sound an audible alarm if methane were ever detected. Like many crawl spaces in homes, this crawl space is also passively vented to the outside.

How can we wrap that all up as far as the findings and understandings of the Remedial Investigation? Buried waste on Manor View was producing methane on the western portion of the site that likely was the source of VOCs in the groundwater, given where the groundwater detections were seen. There is some PAH contamination remaining in subsurface soils. The buried inert debris on the eastern side is the likely source of the metals, PAHs and dioxins in the subsurface soils. Vapor intrusion is not occurring in occupied spaces of the school. Contaminants above the Maximum Contaminant Levels were found in the groundwater but are sporadic and decreasing. There is not much sediment or surface water at the site, but the four samples from that media (stormwater ponds) had some low detections and does not represent a significant impact.

That is what we know about the chemicals and the concentrations present at Manor View. The next step under CERCLA is to perform a risk assessment which is a quantitative way to take the data and understand if it presents a hazard or risk to any ecosystem or current user of the site. The first step is a hazard assessment. Any chemicals above a certain screening level are automatically carried forward. We then figure out what populations could be exposed to those chemicals and how. Is it by working in the building or taking a shower in your home? How are you potentially exposed to the soils and groundwater and other contaminants?

At Manor View, we evaluated current teachers and students in the building, a recreational user on the fields, a trespasser, and construction workers. Although there are no homes on the Manor View site, we evaluated what would happen if someone built a home on the site, drilled a well, and used the groundwater. We evaluated the potential for a teacher and student to occupy the crawl space, seems unlikely but we evaluate the "what if's" and the worse-case scenarios during this process. The last step is the ecological assessment where we look at what animals could be exposed to the contaminants in the soil.

Once you have your population identified, the toxicity assessment evaluates the possible health effect of being exposed to a particular chemical over a specific period of time. Residents are going to be exposed to a chemical much longer because they live there versus a temporary construction worker. All that information is factored into the risk assessment. The risk assessment for Manor View found that none of the contaminants pose a threat to the current users which are the teachers, students, recreational users, and trespassers. There are no unacceptable hazards or risk to the ecological receptors. There were some risk and hazards identified for future users. The unlikely scenario of a teacher and students occupying the crawl space would face an unacceptable risk from the TCE. If a house were to be built on the Manor View Site and occupied, and the resident disturbed the soil, although highly unlikely, that future resident would have an unacceptable risk or hazard posed by the contaminants listed on the slide (slide 29). So because the study identified potential future risks, controls need to be put

in place to mitigate those risks. Hence, we moved into the Feasibility Study phase to evaluate alternatives to make sure those risks are controlled.

We considered three remedial actions that were evaluated in the Feasibility Study. The Feasibility Study was completed in 2013 and was updated following the completion of the removal action in 2012 to reflect current site conditions. The Feasibility Study establishes the objectives for the remedy--what does this remedy need to accomplish. The first objective is to protect the occupants of the school from the potential of vapor intrusion via the crawl space. The second objective is to prevent the exposure of buried waste and constituents in soil that may pose a physical or chemical hazard. The third objective is to ensure the action taken in 2012 remains protective in the future. And the last objective is to prevent human exposure to groundwater, preventing someone from installing a well and drinking or showering with the groundwater.

The first of the three alternatives evaluated was No Action which is required by CERCLA to be evaluated and sets a baseline for evaluating other alternatives against it.

Remedial Alternative No. 2 is maintenance of the existing soil cover, which means going out and inspecting the soil cover and making sure it has not eroded, making sure there is no uncontrolled excavation or anything that may bring contaminants to the surface and thereby creating an exposure pathway. There would also be land use controls such as restricting residential use. The Army would continue monitoring groundwater and indoor air inside the crawl space for methane.

Remedial Alternative No. 3 is the installation of a low permeability cap over the eastern parcel of the Site, in addition to the land-use controls and monitoring just described for Remedial Alternative No. 2.

The Feasibility Study evaluates the alternatives against nine criteria. The first two are threshold criteria which have to be met--does the alternative protect human health and the environment and does the alternative comply with applicable or relevant and appropriate requirements, the laws that govern or force a certain requirement on the action. As an example, a Federal Maximum Contaminant Level might require that groundwater has to meet that law. There are five balancing criteria: long-term effectiveness and permanence--25 years down the road can we count on that remedy to be there; reduction of toxicity, mobility and volume through treatment; effectiveness in the short-term--in the first year how effective is the remedy at protecting the occupants at Fort Meade, the community members, the students, and workers; implementability; and, cost effectiveness. The final two are modifying criteria. The final alternative can be modified based on state acceptance from Maryland Department of the Environment or based on input from the community. Those nine criteria are used to evaluate the remedy and also to make recommendations.

Alternative No. 1, No Action, nothing is done. It is not protective of that potential future user, does not meet the regulations, and is not protective in the long-term. There is no cost associated with this alternative.

Under Alternative 2, we would maintain the existing soil cover, add land-use controls and long-term monitoring. This alternative controls human health risk by eliminating exposure to the subsurface contaminants, provides land use controls to control future risks posed by the groundwater and soil, it complies with regulations, and it is effective in the long-term. It is effective in the short-term because not much is required as the existing soil cover is there and can be easily maintained through annual inspections. It is relatively low cost at $241,000.

Alternative 3 is similar to Alternative 2 but includes installing a low permeability cap over the eastern parcel of the site. It would control human health by limiting exposure and eliminating the pathways, it is effective in the long-term, and it is effective in the short-term. It is more complex to implement and may introduce risk to workers and the community as it is a big construction project, but proper controls can be put in place to mitigate those risks. It has the highest cost of $6.6 million.

The proposed alternative is Alternative 2. The existing cover would be inspected annually and maintained to make sure it is effective in the long term. The Army, the Environmental Protection Agency, and the Maryland Department of the Environment agree that the cover satisfies the requirement for a variance for capping requirements for a landfill under Maryland Department of the Environment regulations. The land use controls would include many things already there such as signs, prohibiting residential use, prohibiting groundwater use at the site, prohibiting full-time occupancy of the crawl space, and maintaining the methane monitors in the schools and nearby military housing. Long-term monitoring would include the soil gas monitoring, soil monitoring, and groundwater monitoring. Indoor air sampling would be conducted of the crawl space. Site inspections of the existing cover would also be performed. Part of any CERCLA remedy is a five-year review, a process which ensures that every five years the remedy is reviewed to be sure it is still performing as expected and examining whether there are any new signs of toxicity or contaminants and whether any additional action is required.

A copy of the Proposed Plan is available tonight for review. You can also find a copy on Fort Meade's web site, in Fort Meade's Environmental Office, and in the Anne Arundel County Library, West County Branch, where you will also find other documents which are part of the Administrative Record. All comments from the public will be considered before we finalize a remedy which will be documented in the Record of Decision. We have comment forms and you can send comments to any of the individuals listed on the slide (slide 43) or in the fact sheet.

Comments/Questions/Closing

Mr. George Knight invited comments and questions. No comments or questions were offered. Mr. Knight thanked everyone for attending. He encouraged all to take fact sheets and comment forms. He also invited all to stop by the Environmental Office or the County Library to review the documents.

The meeting was adjourned at 7:57 p.m.

Katrina A. Harris
Bridge Consulting Corp.
Meeting Recorder

Fort George G. Meade

Proposed Plan
Manor View Dump Site

Public Meeting

March 27, 2014

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Public Meeting Purpose

- U.S. Army is inviting the public to comment on the proposed environmental actions for the Manor View Dump Site
- The opening of a 30-day public comment period was posted in the Soundoff and Capital Gazette and started March 20th and will end April 19th, 2014
  - This public meeting is scheduled to be mid-way through that period
- Additional information on how to submit comments will be provided at the conclusion of this presentation

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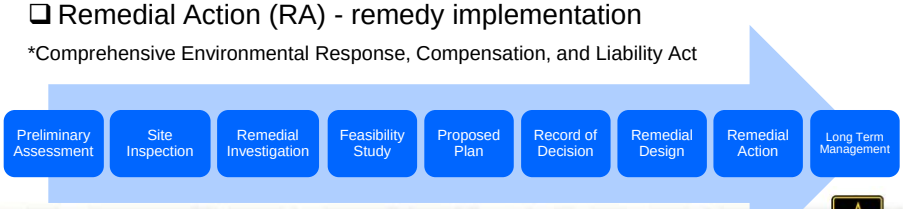
Status of CERCLA* Process

- ✓ Preliminary Assessment/Site Investigation (SI) - identification of site
- ✓ Remedial Investigation (RI) - characterization of site
- ✓ Feasibility Study (FS) - assessment of possible remedies
- ✓ Proposed Plan (PP) - solicit public input on preferred remedy
- ❑ Record of Decision (ROD) - legal documentation of remedy selection
- ❑ Remedial Design (RD) - remedy implementation plan
- ❑ Remedial Action (RA) - remedy implementation

*Comprehensive Environmental Response, Compensation, and Liability Act



3

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Proposed Plan

- Provides information necessary to allow the public to participate in selecting the appropriate remedial alternative for Manor View Dump Site
- The Proposed Plan
  - Summarizes site history, investigations, and results of human health and ecological risk assessments
  - Describes remedial alternatives considered
  - Provides a comparative analysis of remedial alternatives based upon United States Environmental Protection Agency (USEPA) established criteria
  - Presents the preferred remedial alternative
  - Contains information on community participation
- Fact Sheets are available tonight

4

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Presentation Agenda

- Site Information
  - History and Location
- Field Investigations
  - Summary of Findings
- Remedial Alternatives
- Preferred Alternative
- Public Comment Period Information

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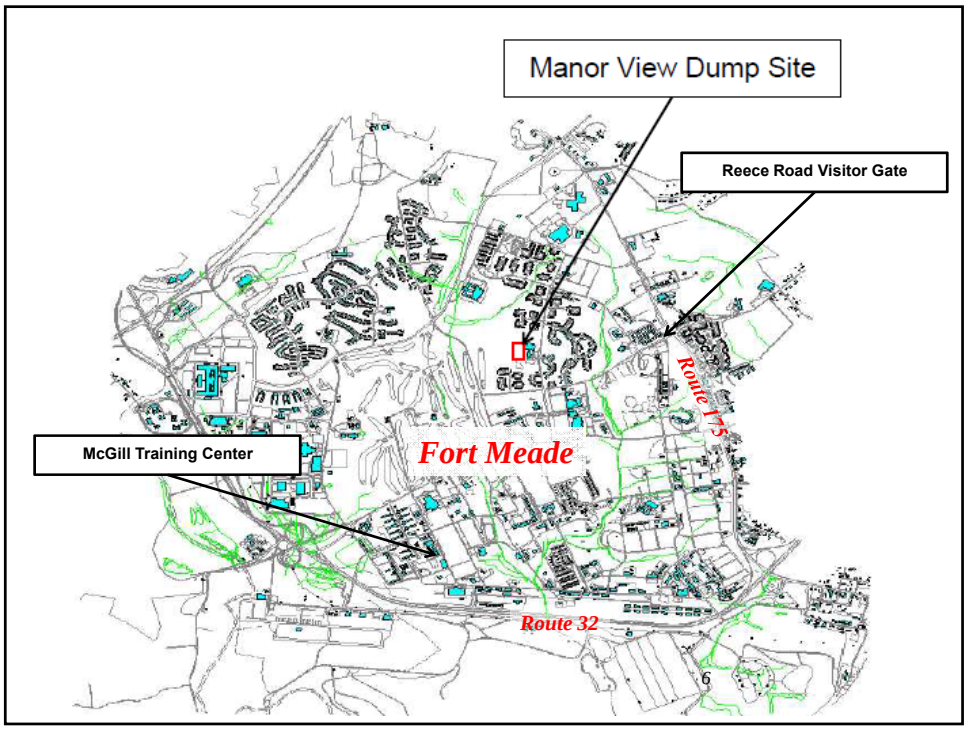
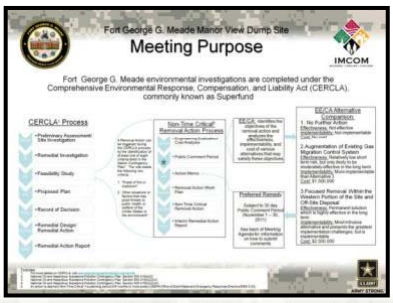


6

Sound Familiar?

- Public meeting held on November 9, 2011 at Manor View Elementary
- Reviewed Plan for Non-Time Critical Removal Action to address <u>a specific methane hazard</u> at the site



7

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Since That Meeting…

- 30,000 tons of waste excavated and transported to a landfill
- Extraction system turned off and methane concentrations have decreased
- Site has been used as Earth Day Exhibit, removal featured on local news broadcasts and cultural items from the 1940's were recovered and preserved

8

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Since That Meeting…

Summer 2012: Clockwise from top left: Excavation of waste, loading of waste, typical waste observed, backfilling excavation, and methane monitoring.

9

NTCRA* Process and Integration into CERCLA Process

PA/SI
RI
FS
NTCRA
FS
PP
ROD
RD/RA
RAR**

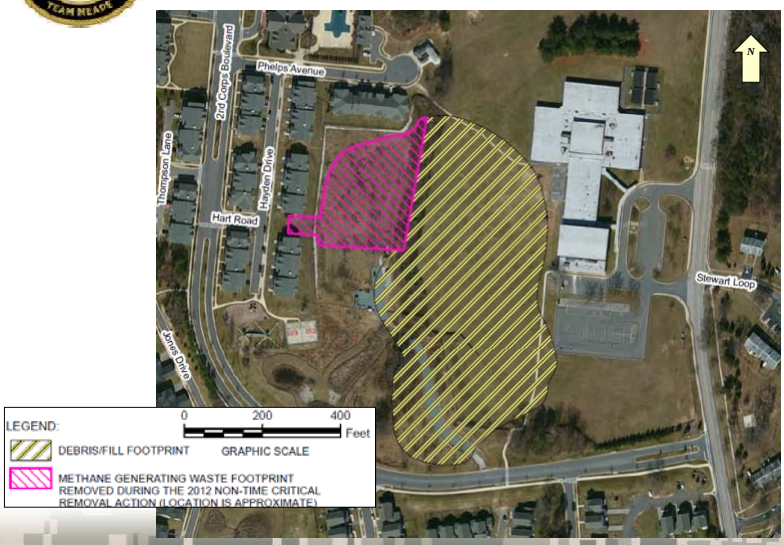
1. *Determine Removal Action is appropriate*
2. *Approval Memorandum*
3. *Engineering Evaluation/Cost Analysis*
4. *30 Days Public Notice Period (11/9/11)*
5. *Action Memorandum (ROD equivalent)*
6. *Remedial Design/Remedial Action*
7. *Interim Remedial Action Report*

Today (3/27/14) we are here

**NTCRA = non-time critical removal action*
***RAR=Remedial Action Report*

10

Manor View Dump Site



11

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Site History

1940s	……	2003	2004	2005	2006	2007
		Site Identification	Preliminary Site Investigation		Site Investigation	

- Site was used as a landfill. Disposal in such a manner was consistent with waste disposal practices and regulations at the time
- Buried waste discovered during Potomac Place construction
- Studies show methane gas in soil
- Gas migration control system installed
- Immediately adjacent housing units on Phelps Avenue and Hayden Drive vacated
- Gas control system upgraded to active gas recovery

2008	2009	2010	2011	2012	2013-2014
Additional Site Characterization & Clean-Up Alternatives Evaluated		Initiate and Complete Non-Time Critical Removal Action			Site Documentation and Closure

- Remedial Investigation Report
- Engineering Evaluation/Cost Analysis Report
- Non-Time Critical Removal Action Work Plan
- Conduct Non-Time Critical Removal Action
- Gas control system shut down
- Update Risk Assessment/FS
- Proposed Plan and ROD

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Current Site Conditions

- Western portion of site is a vacant field with restricted access. Designated community space in Master Plan
- 9 acres of buried inert construction debris remain at the site
  - Eastern portion is adjacent to Manor View Elementary School and used for playgrounds and recreational fields
- Surface water runoff managed in stormwater retention ponds
- There is currently no designated use for groundwater

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Presentation Agenda

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  - History and Location
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Previous Investigations/Actions

Investigations have been on-going since 2003

- Over 270 investigative soil locations:
  - Characterized the nature of buried debris, areas of methane generation, thickness of existing soil cover
- 11 monitoring wells sampled in 2004, 2005, 2009, 2011, and 2012
- Surface water and sediment samples
- Ambient air, indoor air, subslab air samples collected
- Interim action to initially control methane in 2004
- Full RI/FS was initiated in 2004 and all work has been overseen by the USEPA and the Maryland Dept. of the Environment (MDE)
- Removal action to remove methane hazard in 2012
- Investigations and monitoring have continued through 2014

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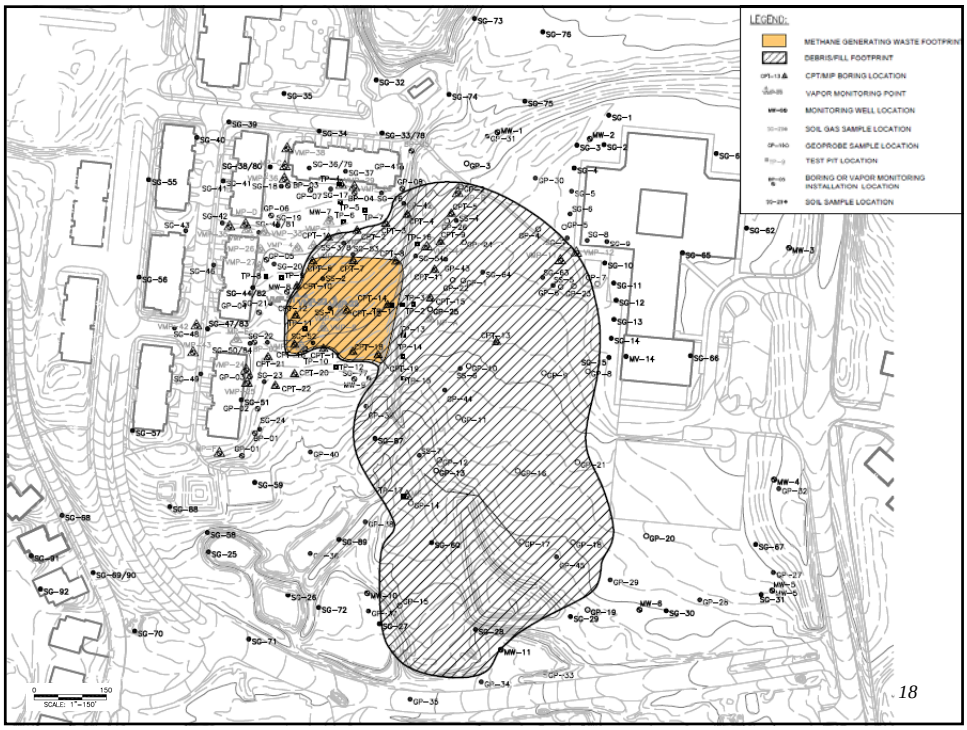

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Findings

- Soil/Subsurface Soil Samples
  - Bottom of waste is 15 feet below ground surface
  - Existing cover is 2 to 8 feet thick
  - Methane generation occurred on the western side
  - Inert construction and demolition debris present on eastern side and remains buried in place
  - Volatile organic compounds (VOCs), metals, polyaromatic hydrocarbons (PAHs), and dioxins are present in subsurface soil/debris

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Findings

- Groundwater Samples
  - Depth to groundwater is 50 feet below ground surface
  - Groundwater flow direction is to the southeast
  - VOCs, semi-volatile organic compounds, and metals have been detected in groundwater
  - Maximum contaminant level (MCL) exceedances are sporadic and isolated; some have not been repeated since 2005
  - Trichloroethene (TCE) and vinyl chloride have decreased significantly since 2004

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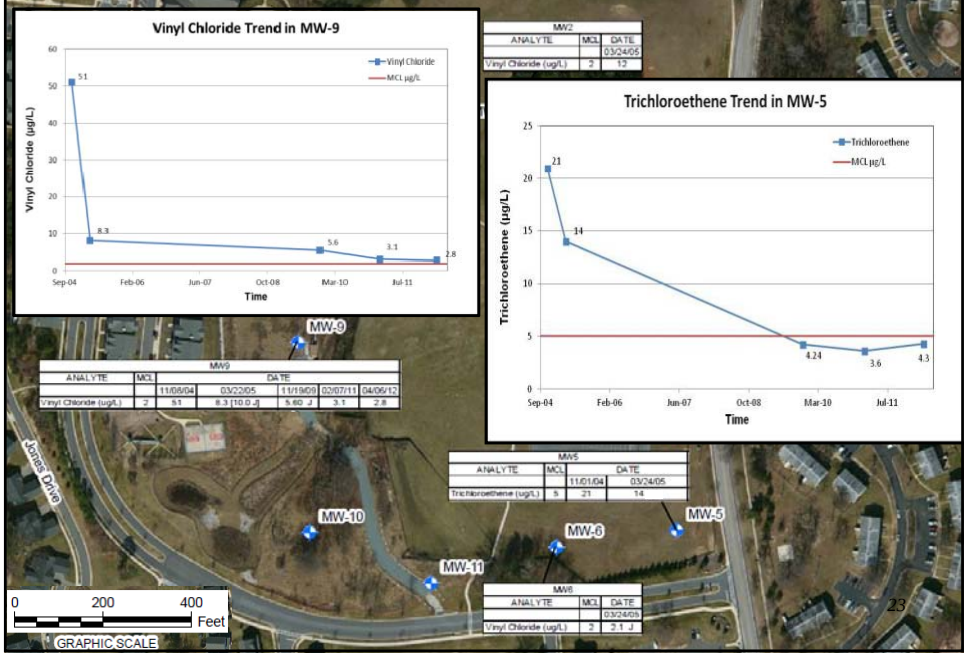
VOCs Above the MCL in Groundwater



MW2		
ANALYTE	MCL	DATE
		03/24/05
Vinyl Chloride (ug/L)	2	12

MW9						
ANALYTE	MCL	DATE				
		11/08/04	03/22/05	11/19/09	02/07/11	04/06/12
Vinyl Chloride (ug/L)	2	51	8.3 [10.0 J]	5.60 J	3.1	2.8

MW5			
ANALYTE	MCL	DATE	
		11/01/04	03/24/05
Trichloroethene (ug/L)	5	21	14

MW6		
ANALYTE	MCL	DATE
		03/24/05
Vinyl Chloride (ug/L)	2	2.1 J

23

Findings

- Air Samples (soil gas, ambient, indoor, subslab)
  - Methane below lower explosive limit at all 43 sample locations (sampled semi-annually)
  - Methane and VOCs detected in ambient air samples equal to outdoor background levels
  - VOCs detected above screening levels for indoor air comparable to control school
  - TCE detected above screening level in crawl space
    - TCE was not detected in indoor air or subslab air samples

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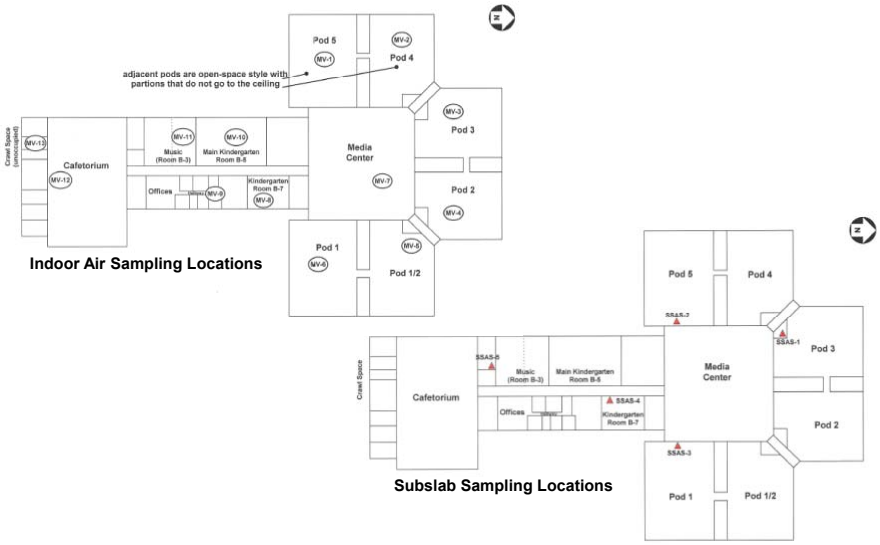
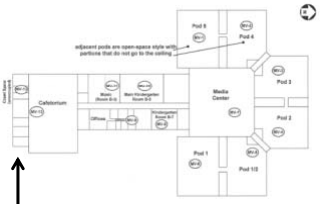
Indoor Air and Subslab Samples



Indoor Air Sampling Locations

Subslab Sampling Locations

Manor View Elementary Crawl Space



Crawl space underneath kitchen, maintenance office, and storage

Crawl Space Access

Passive Vents to Outside

Methane Alarm

Dirt Floor, 4 Feet High

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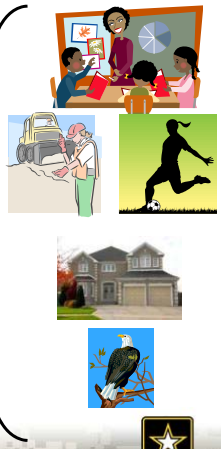
Summary of Findings

- Buried waste was producing methane on western potion of site
  - Likely was the source of VOCs in groundwater
  - Some PAH contamination remains in subsurface soils
- Buried inert debris on eastern portion
  - Likely source of metals, PAH and dioxin contaminants in subsurface soil
- Vapor intrusion is not occurring into the occupied spaces of school
- Contaminants in groundwater found above the MCL are sporadic or declining
- Four sediment and surface water samples exhibited low concentrations of detected compounds and media is not considered to be significantly impacted

Risk Assessments

- USEPA approved quantitative method to assess possible health risks based on:
  - A hazard assessment—chemicals above minimum health screening levels are carried into the risk assessment
  - An exposure assessment—will populations be exposed to these chemical and how (residential use, industrial use, trespasser etc), including the 'what ifs'
  - A toxicity assessment—what is the possible health effect based on the chemicals concentration and toxicity



Risk Assessment Results

- Based on the CERCLA process none of the contaminants pose an unacceptable health for the CURRENT user (teacher, student, and trespasser)
- No unacceptable ecological risks
- Risks and/or hazards were identified for FUTURE users
  - Teachers/students occupying the crawl space: TCE
  - Future Resident: dioxin, mercury, and PAHs in eastern subsurface soil; PAHs in western portion; and arsenic, cobalt, thallium, and vinyl chloride in groundwater
- Thus remedial alternatives must focus on eliminating future risks and/or hazards

Presentation Agenda

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Feasibility Study

- An FS was conducted in 2013 to evaluate the ability of remedial alternatives to meet site clean up objectives
- The site objectives are:
  - To protect the occupants of the school from the potential of vapor intrusion via the crawl space
  - To prevent the exposure of buried waste and constituents in soil that may pose a physical or chemical hazard
  - Protect human health and welfare of the surrounding community from the safety hazard posed by methane gas through ensuring the continued effectiveness of the NTCRA
  - To prevent human exposure to groundwater until such time that the groundwater is restored to beneficial reuse

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Feasibility Study

- The following remedial alternatives were developed:
  - **Remedial Alternative 1** - No Action
  - **Remedial Alternative 2** – Maintenance of Existing Soil Cover, Land Use Controls (LUCs) and Long Term Monitoring (LTM)
  - **Remedial Alternative 3** – Installation of a Low Permeability Cap, LUCs, and LTM

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Remedial Alternative Evaluation

As required by law, the alternatives were evaluated against nine criteria:

1. **Overall protection of human health and the environment**. Determines if the alternative provides adequate protection and describes how the alternative eliminates, reduces or controls risks.
2. **Compliance with applicable or relevant and appropriate requirements (ARARs).** Determines if the alternative meets all Federal and State environmental laws.
3. **Long-term effectiveness and permanence.** Determines the alternative's ability to provide reliable protection of human health and the environment over time.
4. **Reduction of toxicity, mobility, and volume through treatment.** Refers to the preference for an alternative that reduces health hazards, the movement of harmful substances, or the quantity of harmful substances at the site.

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Remedial Alternative Evaluation

5. **Short-term effectiveness.** Addresses time needed to complete the alternative, and any adverse effects to human health or the environment during implementation.
6. **Implementability.** Addresses the technical and administrative feasibility of an alternative, including the availability of materials and services.
7. **Cost effectiveness.** Evaluates the estimated capital, operating and maintenance costs of each alternative in comparison to other, equally protective alternatives (30 years).
8. **State/Support agency acceptance.** Indicates whether the State agrees with, opposes, or has no comment on the preferred alternative.
9. **Community acceptance.** Assessed after the public comment period. Includes components of the alternatives that the public supports, has reservations about, or opposes.

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Alternative 1 - No Action

- Not protective
- Does not meet applicable regulations
- No long-term effectiveness or permanence
- No reduction in toxicity or mobility
- Effective in short-term because there is no risk under current land use
- Readily implemented
- No cost ($0)

35

Alternative 2 – Maintenance of Existing Soil Cover, LUCs, LTM

- Human health risk controlled by eliminating potential exposure to contaminants in subsurface soil, indoor air, and groundwater by LUCs
- Complies with applicable regulations
- Long-term effectiveness through LUCs and LTM
- Existing soil cover would reduce mobility of buried debris. NTCRA and further attenuation will reduce toxicity and volume of groundwater contaminants. Does not utilize treatment
- Effective in short-term because existing cover is in place and protective
- Readily implemented through documenting LUCs and initiating monitoring
- Relatively low cost ($241,000)

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Alternative 3 – Installation of a Low Permeability Cap, LUCs and LTM

- Human health risk controlled by eliminating potential exposure to contaminants in subsurface soil, indoor air, and groundwater by LUCs
- Complies with applicable regulations
- Long-term effectiveness through LUCs and LTM
- Existing soil cover would reduce mobility of buried debris. NTCRA and further attenuation will reduce toxicity and volume of groundwater contaminants. Does not utilize treatment
- Effective in short-term because controllable risks to workers implementing remedy and community
- Complex to implement
- Highest cost ($6,641,000)

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Preferred Alternative

- **Alternative 2 – Maintenance of Existing Soil Cover, LUCs, LTM**
  - The existing soil cover would be inspected and maintained to eliminate future exposure to subsurface soil contaminants and debris
    - » 2-8 feet thick. The Army, USEPA, and MDE agree that this cover satisfies the criteria to qualify for a variance from the MDE capping requirements as it will provide the same degree of protection
  - Land Use Controls
    - » Signs to notify site users/visitors of environmental concerns at the site
    - » Maintain the fence between the eastern/western parcels
    - » Prohibit residential use of the site
    - » Prohibit groundwater use of the site
    - » Prohibit full time occupancy of the crawl space
    - » Maintain methane monitors in school and houses

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Preferred Alternative

- **Alternative 2 – Maintenance of Existing Soil Cover, LUCs, LTM**
  - Long Term Monitoring
    - » Soil gas monitoring for methane
    - » Groundwater sampling
    - » Indoor air sampling in the crawl space at Manor View Elementary
    - » Site Inspections
  - CERCLA Five Year Reviews
    - » Assessment if the remedy continues to be protective of human health and the environmental or whether the implementation of additional remedial action is appropriate

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Presentation Agenda

- Site Information
  - Location
  - History
- Field Investigations
  - Summary of Findings
- Remedial Alternatives
- Preferred Alternative
- Public Comment Period Information

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Proposed Plan

- The PP will be available for public review from March 20th to April 19th in the Administrative Record located:

Fort Meade Environmental Division
4215 Roberts Avenue, Room 320
Fort Meade, MD 20755
Monday – Friday: 8 am to 4 pm

http://www.ftmeade.army.mil/environment/cleanup/programsites/manorview/index.html

Anne Arundel County Library
West County Area Branch
1325 Annapolis Road
Odenton, MD 21113
Mon-Thu: 9 am to 9 pm; Fri & Sat: 9am to 5 pm; Sun: 1 pm to 5 pm

- Public comments will be reviewed and considered before remedy selection is finalized and documented in the ROD

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Written Comments

- Comments will be accepted until April 19th, 2014
- Comment forms available tonight
- Send comments to any of the following:

Mary Doyle
U.S. Army Garrison- Fort George G. Meade
Public Affairs Office
4409 Llewellyn Ave.
Fort Meade, MD 20755
mary.l.doyle14.civ@mail.mil

Dr. Elisabeth Green
Maryland Department of Environment
1800 Washington Blvd, Suite 625
Baltimore, MD 21230-1719
elisabeth.green@maryland.gov

Mr. John Burchette
USEPA
1650 Arch Street
Philadelphia, PA 19103-1719
burchette.john@epa.gov

Additional Information Repositories

Administrative Record located at:
Anne Arundel County Library
West County Area Branch
1325 Annapolis Road
Odenton, MD 21113

Fort Meade Environmental Division Office
4215 Roberts Avenue, Room 320
Fort Meade, Maryland 20755
www.ftmeade.army.mil/environment

Questions/Comments?

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Acronyms

ARAR	Applicable or Relevant and Appropriate Requirements
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
FS	Feasibility Study
LTM	Long Term Monitoring
LUC	Land Use Control
MCL	Maximum Contaminant Level
MDE	Maryland Department of the Environment
NTCRA	Non-Time Critical Removal Action
PAH	Polyaromatic Hydrocarbons

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Acronyms (Cont'd)

PP	Proposed Plan
RA	Remedial Action
RD	Remedial Design
RI	Remedial Investigation
ROD	Record of Decision
SI	Site Investigation
TCE	Trichloroethene
USEPA	United States Environmental Protection Agency
VOC	Volatile Organic Compound

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Glossary

Administrative Record: This is a collection of documents (including plans, correspondence and reports) generated during site investigation and remedial activities. Information in the Administrative Record is used to select the preferred remedial alternative and is available for public review.

Applicable or Relevant and Appropriate Requirements (ARARs): The requirements found in federal and State environmental statutes and regulations that a selected remedy must attain. These requirements may vary among sites according to the remedial actions selected.

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA): This federal law was passed in 1980 and is commonly referred to as the Superfund Program. It provides for liability, compensation, cleanup, and emergency response in connection with the cleanup of inactive hazardous waste disposal sites that endanger public health and safety or the environment.

Feasibility Study (FS): This CERCLA document reviews the risks to humans and the environment at a site, and evaluates multiple remedial technologies for use at the site. Finally, it identifies the most feasible Response Actions.

Long Term Monitoring (LTM): LTM is conducted to monitor the performance of the remedy over time. LTM includes groundwater sampling and reporting.

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Glossary (Cont'd)

Land Use Controls (LUCs): LUC are physical, legal, or administrative mechanisms that restrict use of or limit access to, real property, to manage risks to human health and the environment. Physical mechanisms encompass a variety of engineered remedies to contain or reduce contamination and/or physical barriers to limit access to real property, such as fences or signs.

Maximum Contaminant Level (MCL): established by the USEPA the MCL is the highest level of a contaminant allowed in drinking water.

Preferred Remedy: The remediation approach that appears to best meet acceptance criteria; the remedial option proposed for implementation in the ROD.

Remedial Investigation (RI): An investigation under CERCLA that involves sampling environmental media such as air, soil, and water to determine the nature and extent of contamination and human health and environmental risks that result from the contamination.

Record of Decision (ROD): This legal document is signed by the Army and the USEPA and will be reviewed by the MDE for concurrence. It provides the cleanup action or remedy selected for a site, the basis for selecting that remedy, public comments, responses to comments, and the estimated cost of the remedy.

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