DEPARTMENT OF THE ARMY
US ARMY INSTALLATION MANAGEMENT COMMAND
HEADQUARTERS, UNITED STATES ARMY GARRISON
4551 LLEWELLYN AVENUE
FORT GEORGE G. MEADE, MARYLAND 20755-5000

REPLY TO
ATTENTION OF:

October 26, 2011

Directorate of Public Works

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

Re: Operable Unit 36/FGGM-93 (Manor View Dump Site)

Dear Mr. Burchette:

This letter serves as notification that the *Draft Final Engineering Evaluation/Cost Analysis, FGGM-93, Manor View Dump Site, Fort George G. Meade* (Report) dated October 13, 2011, has been finalized (with the amendments listed below). The U.S. Environmental Protection Agency approved the Draft Final Report on October 14, 2011, and the Maryland Department of the Environment (MDE) approved the Draft Final Report on October 20, 2011. Copies of this Report have also been furnished to Mick Butler of the Environmental Division at Fort George G. Meade, Laurie Haines of the U.S. Army Environmental Command, Elisabeth Green of MDE, Dan LaHart of Anne Arundel County Public Schools, and the Fort George G. Meade Restoration Advisory Board.

The Final version of the Report is dated October 2011. The following revised pages are enclosed and will update the Draft Final binder to a Final: Cover and spine, Title page, Table of Contents, Page 22, and Appendix B.

If you have any questions, please feel free to contact Ms. Denise Tegtmeyer at (301) 677-9559 or me at (301) 677-9365.

Sincerely,

FOR:

Paul V. Fluck, P.G., REP
Installation Restoration Manager
Directorate of Public Works-Environmental Division

Enclosures

ARCADIS

Imagine the result

FINAL Engineering Evaluation/Cost Analysis

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

October 2011

Thomas E. Crone
Phase Manager

Tim Llewellyn
Project Manager

Final Engineering Evaluation/Cost Analysis FGGM 93, Manor View Dump Site

Fort George G. Meade, Maryland

Prepared for:
U.S. Army

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Our Ref.:
GP09MEAD.MANO

Date:
October 2011

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List of Acronyms and Abbreviations

ARAR	Applicable or Relevant and Appropriate Requirement
ARCADIS	ARCADIS U.S. Inc.
bgs	Below ground surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
COMAR	Code of Maryland Regulations
CPT	Cone Penetrometer Testing
CSM	Conceptual Site Model
cy	cubic yards
EE/CA	Engineered Evaluation/Cost Analysis
EMS	Environmental Management System
FGGM	Fort George G. Meade
FGGM 93	Fort Meade, Manor View Dump Site
FS	Feasibility Study
ft	feet
IRP	Installation Restoration Program
LEL	Lower Explosion Limit
MDE	Maryland Department of the Environment
MGW	Methane Generating Waste
MIP	Membrane Interface Probe
NCP	National Oil and Hazardous Substance Contingency Plan
NTCRA	Non-Time Critical Removal Action
O&M	Operations and Maintenance
OSWER	Office of Solid Waste and Emergency Response
PA/SI	Preliminary Assessment/Site Investigation
PPE	Personal Protective Equipment

List of Acronyms and Abbreviations (cont'd)

ppmv	parts per million by volume
RAO	Remedial Action Objective
RI	Remedial Investigation
SARA	Superfund Amendments and Reauthorization Act
SVE	Soil Vapor Extraction
TBC	To-Be-Considered
USEPA	U.S. Environmental Protection Agency

Executive Summary

This Engineering Evaluation / Cost Analysis (EE/CA) addresses the investigation of proposed removal action alternatives for the removal of methane generating waste (MGW) at the Manor View Dump Site (FGGM 93) on Fort George G. Meade, Maryland. The EE/CA evaluates three proposed remedial action alternatives and identifies the proposed response for conducting a Non-Time Critical Removal Action (NTCRA) for the removal of waste interned within the western portion of FGGM 93.

This EE/CA addresses a specific scope of work associated with the western portion of FGGM 93 and does not address the entire Site (i.e., the EE/CA focuses on only the portion of the Site that is located west of the unnamed drainage swale and adjacent to the Potomac Place housing area). Concurrent with the preparation of this EE/CA, a Feasibility Study (FS) is being conducted to develop remedial action objectives for specific constituents, affected media, and exposure pathways that pertain to the entirety of FGGM 93.

FGGM 93 was discovered in 2003 while moving earth for the housing privatization initiative at Fort Meade. Several investigations were conducted at FGGM 93 between 2003 and 2010. The investigations detected methane at concentrations exceeding its lower explosive limit (LEL) of 50,000 parts per million by volume (ppmv). These previous investigations were conducted consistent with Section 300.415 of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). Through these investigations, the origin of the methane was determined to be buried waste located within the western portion of the Manor View Dump Site.

Section 300.415(b)(2) of the NCP lists eight criteria to determine whether a removal action is appropriate. The two factors most applicable to current Site conditions are as follows:

- Section 300.415(b)(2)(vi) - Threat of fire or explosion.
- Section 300.415(b)(2)(viii) - Other situations or factors that may pose threats to public health or welfare of the United States or the environment.

Historical and continued methane monitoring at the Manor View Dump Site indicate that there are elevated levels of methane within the Potomac Place residential area located west of the Manor View Dump Site. Concentrations of methane were sufficient to warrant the precautionary evacuation of the residential properties. Although methane gas is not listed or designated as a hazardous substance under any of the statutory provisions in Section 101(14) or Section 104(a)(2) of the Comprehensive

Environmental Response, Compensation, and Liability Act (CERCLA); Office of Solid Waste and Emergency Response (OSWER) Directive #9360.0-8 indicates that methane gas may otherwise meet the definition of a pollutant or contaminant under Section 104(a)(2) provided that there is an "imminent and substantial danger to the public health or welfare". Thus, the Manor View Dump Site is eligible for response under Section 104(a)(1) of CERCLA and the three remedial action alternatives were developed and selected for evaluation are:

1. Alternative 1 - No Further Action;

2. Alternative 2 - Augmentation of Existing Methane Extraction System;

3. Alternative 3 - Focused Removal Within the Western Portion of the Site and Off-Site Disposal.

Each of the alternatives was evaluated based on the merits of the individual and comparative analyses in regards to implementability, effectiveness, and cost. Based on this evaluation the recommended alternative for the NTCRA at FGGM 93 is Alternative 3: Focused Removal Within the Western Portion of the Site and Off-Site Disposal. Alternative 3 was selected because it will most effectively attain the following Remedial Action Objective (RAO):

"To eliminate or minimize the hazard posed by methane above its LEL that is being generated from wastes buried within the Manor View Dump".

1. Introduction

ARCADIS U.S. Inc. (ARCADIS) has been retained by the U.S. Army Environmental Command to perform Installation Restoration Program (IRP) activities at Fort George G. Meade (FGGM), located in Anne Arundel County, Maryland. This work is being conducted under a Performance Based Contract associated with the environmental restoration program at FGGM. The full scope of services for this contract is defined in Contract W91ZLK-05-D-0015: Task 0005.

The IRP activities at FGGM operate principally under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) as amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986 and National Oil and Hazardous Substances Pollution Contingency Plan (NCP) [40 Code of Federal Regulations (CFR) 300]. Coordination and input are provided by the U.S. Environmental Protection Agency (USEPA) Region III, and as appropriate, with the other signatories of the FGGM Federal Facilities Agreement. Coordination and input are also provided by the Maryland Department of the Environment (MDE).

ARCADIS prepared this Engineering Evaluation / Cost Analysis (EE/CA) to address safety hazards associated with methane gas above its Lower Explosive Level (LEL) from the former dump Site. The Manor View Dump Site (FGGM 93) contains varying types of debris, to include municipal waste with high carbon content capable of generating methane concentrations above the LEL. These municipal wastes are contained within an isolated portion of the dump in the northwestern corner. Therefore, this EE/CA has been prepared to address this portion of the Site via a Non-Time Critical Removal Action (NTCRA), in accordance to 40 CFR 300.415(b)(4)(i). The overall Site will be addressed by the final action enumerated within the Site-wide Feasibility Study (FS) and decision documents to be submitted in the future.

1.1 Purpose of Report

This EE/CA evaluates alternatives to address methane concentrations which exceed the LEL. The EE/CA identifies removal action objectives at FGGM 93; develops three remedial alternatives to address the safety hazard, analyzes effectiveness, implementability, and cost of the three alternatives; and recommends the best-suited remedial action alternative. This proposed action will eliminate the threat to human health and welfare from methane generated by the waste at FGGM 93.

The basis for drafting this report and proceeding with a removal action is the NCP. Section 300.415(b)(2) of the NCP lists eight criteria to determine whether a removal

action is appropriate. The two factors most applicable to current Site conditions are as follows:

- Section 300.415(b)(2)(vi) - Threat of fire or explosion.

- Section 300.415(b)(2)(viii) - Other situations or factors that may pose threats to public health or welfare of the United States or the environment.

Historical and continued methane monitoring at the Manor View Dump Site indicate that there are elevated levels of methane within the Potomac Place residential area located west of the Manor View Dump Site. Concentrations of methane were sufficient to warrant the precautionary evacuation of the residential properties. Although methane gas is not listed or designated as a hazardous substance under any of the statutory provisions in Section 101(14) or Section 104(a)(2) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA); Office of Solid Waste and Emergency Response (OSWER) Directive #9360.0-8 indicates that methane gas may otherwise meet the definition of a pollutant or contaminant under Section 104(a)(2) provided that there is an "imminent and substantial danger to the public health or welfare".

Thus, the Manor View Dump Site is eligible for response under Section 104(a)(1) of CERCLA and this EE/CA has been prepared with the guidance set forth in the NCP (40 CFR 300.415, Removal Action) and the USEPA guidance document on removal actions, *Guidance on Conducting Non-Time Critical Removal Actions Under CERCLA* (USEPA, 1993). These documents provide information on the procedures and activities to be followed while conducting NTCRAs under CERCLA and the NCP.

1.2 Report Organization

In addition to this introduction, the report is divided into eight sections as follows:

- Section 2 – Site Characterization: This section presents information pertaining to Fort Meade and FGGM 93 in regards to Site characteristics, description, and history. The scope and results of previous environmental investigations are summarized. Furthermore, a streamlined hazard assessment is also presented.

- Section 3 – Identification of Remedial Action Objectives: Remedial Action Objectives are identified for FGGM 93 and Applicable or Relevant and Appropriate Requirements (ARARs) are identified where applicable. Furthermore, this section provides information regarding the removal action scope and schedule.

- Section 4 – Identification and Analysis of Remedial Action Alternatives: Remedial Action Alternatives are developed and described based on effectiveness, implementability, and cost.

- Section 5 – Comparative Analysis of Remedial Action Alternatives: The Remedial Action Alternatives are compared against each other based on effectiveness, implementability, and cost.

- Section 6 – Recommended Removal Action Alternative: Based on the evaluation presented in the EE/CA, a recommended alternative to address the methane safety hazard at FGGM 93 is identified.

- Section 7– Plan for Public Participation: Describes the degree and responsibilities of stakeholder involvement during the remedial process.

- Section 8 – References: The references used to develop this report are presented.

2. Site Characterization

This section describes the Site, background, and the nature and extent of the waste.

2.1 Site Description and Background

Fort Meade is located midway between the cities of Baltimore, Maryland and Washington D.C. in Anne Arundel County, Maryland, as shown in **Figure 2-1**. Fort Meade became an Army installation in 1917 and encompassed 9,349 acres. The installation was originally named Camp Meade but changed to Fort George G. Meade on March 5, 1929. During World War I, over 100,000 soldiers passed through Fort Meade. The 79th, 92nd, and 11th Infantry Divisions trained at the installation and an Ordnance Supply School was established in 1918. When the war ended, Fort Meade served as a demobilization center for returning troops. Fort Meade became a permanent Army installation after World War II. At present the Installation is 5,067 acres in size. With 85 tenant units and organizations, Fort Meade supports a wide array of organizations including the US Army, US Marine Corps, National Security Agency and the US Cyber Command with fulfilling their missions.

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 2-2**, and an aerial map of the Site is presented in **Figure 2-3**. The Site is bounded by a group of residential housing and an open field to the north, 2nd Corps Boulevard to the south, Hayden Drive to the west, and MacArthur Road to the east. The residential area to the west of the Site is part of the Potomac Place Neighborhood.

FGGM 93 was discovered in 2003 while moving earth for the housing privatization initiative at FGGM. Municipal waste materials were uncovered on the property adjacent to the Manor View Elementary School at 2900 MacArthur Road. The materials were recovered and dated as originating from the 1940s. Further analysis indicated that the buried waste and debris extended beyond the planned limits of the housing area and onto the Manor View Elementary School property. Subsequent investigations revealed that FGGM 93 extended south to 2nd Corps Boulevard, west to the residential housing units, and east to the school playground.

Figure 2-4 outlines the approximate area of the buried waste. The buried waste can be classified into two general categories, methane generating waste (MGW) and debris/fill. The MGW typically consists of municipal waste and household debris capable of decomposition and methane production. As depicted in **Figure 2-5**, the municipal waste with the potential to generate methane occupies approximately a one-acre area confined to the western portion of the Site; bounded to the east by the

unnamed north/south oriented drainage swale and to the north and west by the Potomac Place Housing Area. Hereinafter, the portion of FGGM 93 that contains the municipal waste will be referred to as the "Western Portion". The remaining approximate nine acres of FGGM 93 contains debris/fill typically consists of construction debris, rubble, and burned material/ash which is more inorganic in nature and does not contribute to the methane generation through decomposition. FGGM has identified no records describing the operation or waste stream of the dump, however extensive subsurface investigations have categorized the types and locations of waste within the dump.

2.2 Previous Investigations

The scope and objectives of the environmental investigations performed previously at FGGM 93 are outlined in this section. These investigations include a Preliminary Assessment and Site Investigation (PA/SI), Remedial Investigation (RI) and a Supplemental Investigation consisting of Cone Penetrometer Tests (CPT) and Geoprobe borings.

The PA/SI was conducted in 2003 to assess the extent and nature of waste material uncovered during construction of new military family housing at the Site. The PA/SI included geophysical surveys, test pit excavations, and soil sampling. Electromagnetic and magnetic geophysical surveys were performed across the Site. There were 16 test pits excavated to a maximum depth of 15 feet (ft) to the north, south, east, and west of the original point of waste material discovery area to assess the extent of the buried waste. Surface soil samples were collected in the field west of the Manor View Elementary School and in the backfilled area where waste was originally discovered. In addition, subsurface soil borings were performed across FGGM 93. The results of the PA/SI were presented in the PA/SI Report (URS, 2003) and also incorporated into the RI.

The RI was initiated in 2004 and completed in 2005 (URS, 2008). The investigation addressed soils, buried waste, vapor, sediment, surface water, and groundwater. To delineate the buried waste, an additional test pit and 18 soil borings were conducted. The test pit was used to confirm the presence of buried waste. In addition to the test pit and soil borings, a soil gas survey and air samples were collected as part of the RI.

The soil gas survey was performed to investigate potential vapor intrusion within nearby buildings due to contaminant concentrations and to investigate the buried waste as the probable source area of methane. Ambient air samples were also collected around the Manor View Elementary School grounds, in the footprint of the waste near the residential area, and at off-Site background locations. Indoor air

samples were collected inside the Manor View Elementary School and from Bodkin Elementary School (Pasadena, Maryland) which was used to serve as a background control.

Because of the findings of the PA/SI Report, emergency corrective action was performed at the Site. This action consisted of constructing a landfill gas mitigation control system, located between the dump site and Potomac Place Housing Area. A 750 ft long by 15 ft deep trench was excavated and filled with gravel to serve as a passive cut off trench and allow methane to vent to the surface. Upon continued detection of elevated methane concentrations, the system was converted to an active soil vapor extraction system, with a vacuum applied trench. Also the system was expanded by converting several monitoring points to extraction points to increase the size of the methane capture zone. Weekly methane monitoring is performed at 52 points to benchmark performance and adjust the system to improve performance.

More recently (March 2010), a supplemental investigation was conducted to further refine the understanding of conditions at FGGM 93. The supplemental investigation consisted of performing 17 CPT and five Geoprobe borings to refine the vertical and horizontal distribution of the MGW. The CPT testing was conducted on a 50 ft interval and advanced the CPT to a depth of approximately 25 ft below ground surface (bgs). The five Geoprobe borings were visually logged by a geologist in order to correlate and validate the CPT data. In addition to the CPT, membrane interface probe (MIP) data was also collected to quantify methane and carbon dioxide concentrations and correlate with the CPT data.

2.3 Source, Nature and Extent of Methane, and Methane Generating Waste

Methane has historically been detected in soil gas samples at levels above the LEL of 50,000 parts per million by volume (ppmv) in the vicinity of buildings surrounding the buried waste. Methane has also been detected in preliminary Site data in and above the combustible range.

A soil gas survey was conducted to investigate potential vapor intrusion due to contaminant concentrations near buildings, and to investigate the buried waste as the probable source area of methane. The highest concentrations of methane detected within soil gas occurred within the western portion of the Site in soil above the municipal waste. Concentrations of methane within soil gas decrease rapidly when proceeding west of the Site (URS, 2008).

Ambient air samples were also collected during May 2005 around the Manor View Elementary School grounds, in the footprint of the waste near the residential area, and

at off-Site background locations. Methane was detected in all of the ambient air samples at or below background concentrations. The maximum detected 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. Furthermore, indoor air samples were collected inside the Manor View Elementary School and from Bodkin Elementary School (Pasadena, Maryland) which was used to serve as a background control. Methane was detected in all the indoor air samples from both schools. Based on a qualitative evaluation, the concentration of methane were comparable at 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 2010 CPT testing (previously discussed in Section 2.2) was utilized to refine and determine the dimensions of the waste within the western portion of the Site which were contributing to methane generation. This waste occupies a 200 by 200 ft area in the western portion of FGGM 93, as shown in **Figure 2-5.** This waste is covered with a 9 to 15 ft layer of overburden soil. This soil is free of waste and debris and the thickest sections of waste are 5 to 8 ft thick, with the thickness gradually tapering as the waste approaches the periphery of the waste mass. The in-place volume of waste contributing to methane generation is estimated to be 5,190 cubic yards (cy).

Furthermore, the 2010 CPT investigation yielded the following conclusions:

- The outer perimeter CPT locations, located on the north, west, and south sides, verified that the buried waste tapers out to a very thin layer near the edges.

- Methane is migrating away from the source area through more permeable natural sand layers. Methane and carbon dioxide detected in the perimeter CPT borings coincided with high flow or high permeability soils and did not coincide with waste or debris.

- The highest concentrations of methane coincided with locations where the thickness of the waste layer was greatest (5 to 8 ft in total thickness), and where the overlying soils were the most permeable.

Based on the previous investigations, it appears the south and west boundaries of the MGW align with the overall boundary of debris/fill as illustrated on **Figure 2-5**. Regarding the delineation of the northern and eastern edge of MGW, the following observations are used to define these sides:

- Consistently elevated methane concentrations have not been observed at the northern or eastern portions of FGGM 93, indicating that a continuous source of MGW is not present in these areas.

- The depths, thickness, and elevations determined through the completion of the CPT borings along the eastern edge are consistent with findings from previous investigations in the same areas.

- Minimal decomposition or biological activity is occurring at the northern and eastern edges of the MGW, as indicated:

    1. By the low levels of methane and carbon dioxide detected in those general areas;

    2. By the lack of methane accumulation within the buried waste layer, even though a confining layer of lower permeability soils was documented above the buried waste; and

    3. By the presence of elevated methane concentrations in high permeability soil layers rather than in confined buried waste layers.

Previous studies have documented largely inorganic materials buried in the remainder of the dump with little or no potential for methane generation (as further evidenced by the lack of methane gas detections).

The findings of the above mentioned Site investigations were combined to create the current Conceptual Site Model (CSM). This model is depicted in **Figure 2-6**. As illustrated in the CSM, FGGM 93 consists mostly of inert (i.e., inorganic debris not capable of producing methane) debris which occupies a majority of the Site (approximately 9.0 acres). Wastes capable of generating methane are located only on the western portion of the Site and are approximately 100 yards from the Manor View Elementary School. Methane migrates through the overburden soil above the waste as noted in the historical soil gas sampling. Furthermore, methane has been detected to the west of the Site waste within the Potomac Place Housing Area. It is suspected that sand layers within the soil allow for preferential flow pathways of the methane directed westward towards the Potomac Place Housing Area. The affected military housing has been evacuated.

2.4 Streamlined Risk and Hazard Assessment

The streamlined risk and hazard assessment focuses on the potential safety hazard posed by the methane gas. Methane generated at the Manor View Dump Site has

been detected at concentrations that have exceeded the LEL and thus constitute an "imminent and substantial danger to the public health or welfare" (Office of Solid Waste and Emergency Response [OSWER], [USEPA, 1986]). Although methane gas is not listed or designated as a hazardous substance by the statutory provisions of CERCLA Section 101(14), it may still be deemed a contaminant or pollutant by virtue of the methane LEL exceedances constituting an imminent and substantial danger.

The USEPA memorandum titled "CERCLA Removal Actions at Methane Release Sites" (OSWER Directive #9360.0-8) was drafted in January 1986 to clarify the Office of Emergency and Remedial Response's policy regarding removal actions at methane gas release sites under CERCLA authority. The memorandum states that response actions under CERCLA are not limited to hazardous substances, and further states that Section 104(a)(1) authorizes responses to actual or potential releases of "pollutants or contaminant". Therefore, because methane poses an imminent and substantial danger to the public health and welfare; and may be deemed a pollutant or contaminant as defined in Section 104(a)(2); a response action under CERCLA is appropriate.

2.5 Identification of Applicable or Relevant and Appropriate Requirements

This section describes the regulatory standards and guidance that may be applied to the NTCRA only. The complete ARAR analysis pertinent to the final action for the entire Site will be addressed in the Feasibility Study scheduled to be submitted after successful completion of the Non-Time Critical Removal Action should MDE regulations pertaining to closure of unpermitted rubble dumps in the State (Code of Maryland Regulations [COMAR] 26.04.07.21) be identified as an ARAR, then it is likely that a request for variance based on technical considerations will be submitted.

Regulatory standards and guidance are divided into three categories: chemical specific, location specific, and action specific requirements.

In order to be classified as an ARAR, the NCP states that federal and/or state laws must meet one of the following two requirements: (1) applicability or (2) relevance and appropriateness. Applicable requirements are "those cleanups standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under federal environmental, state environmental, or facility siting laws that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance found at CERCLA site" [40 CFR 300.5]. Relevant and appropriate requirements are "those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under federal environmental, state environmental, or facility siting laws that, while not 'applicable' to a hazardous

substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site, address problems or situations sufficiently similar to those encountered at the CERCLA site that their use is well suited to the particular site" [40 CFR 300.5].

The NCP identifies a third category, termed "information to-be-considered" (TBC). TBCs are guidelines or advisories that are issued by the federal or state government, but which are neither legally binding nor promulgated (USEPA, 1990). However, these guidelines may be used when they are necessary to ensure protection of public health and the environment (USEPA, 1990). If ARARs do not address a particular circumstance at a CERCLA site, then TBCs can be used to establish remedial guidelines or targets although their use is discretionary rather than mandatory. Even when TBCs are used, the requirements imposed on the response action, including cost-effectiveness, still apply [55 Federal Register 8745, March 9, 1990].

2.5.1 Chemical-Specific ARARs and TBC Guidance

Chemical-specific requirements establish health-based concentration limits, risk based criteria limits, or ranges for specific hazardous substances in different environmental media. These standards provide media cleanup levels or a basis for calculating cleanup levels. Chemical-specific standards are also used to indicate an acceptable level of discharge, to determine treatment and disposal requirements for a particular remedial activity, and to assess the effectiveness of a response action**. Table 2-1** presents the potential chemical-specific ARARs and TBC guidance identified for the NTCRA (removal of waste in the western portion) at FGGM 93.

2.5.2 Location-Specific ARARs and TBC Guidance

Location-specific requirements set restrictions on the types of remedial activities that can be performed based on specific site characteristics or location. Location-specific standards provide a basis for assessing restrictions during the formulation and evaluation of site specific remedies. Remedial actions may be restricted or precluded based on citing laws for hazardous waste facilities and based on proximity to wetlands, floodplains, or man-made features such as landfill, disposal area, and/or local historic buildings. **Table 2-2** presents the potential location-specific ARARs and TBC guidance identified for the NTCRA (removal of waste in the western portion) at FGGM 93.

2.5.3 Action-Specific ARARs and TBC Guidance

Action-specific requirements set controls or restrictions on the design, implementation, and performance of waste management actions. These standards specify performance levels, actions, or technologies and specific levels for discharge of

residual chemicals. They also provide a basis for assessing the feasibility and effectiveness of the Remedial Alternatives. The action-specific standards identified for the NTCRA (removal of waste in the western portion) at FGGM 93 are presented in **Table 2-3**.

3. Identification of Remedial Action Objectives

The objective of the FGGM 93 NTCRA will be discussed in the following sections. The evaluation of various federal and state regulations to determine the ARARs that will need to be achieved in order to meet the Remedial Action Objectives (RAOs) for the NTCRA were included in Section 2.5.

3.1 Identification of Safety Hazard

Methane gas present above its LEL is driving a safety hazard at this Site and could present an imminent and substantial danger to the public. As discussed in Section 2, the buried wastes present in the western portion of the dump site have been demonstrated to be the source of this gas and will therefore be removed under this NTCRA to address the elevated methane concentrations.

3.2 Remedial Action Objectives

The RAO for this NTCRA is based on the continued management of hazards associated with the methane producing waste. The RAO was developed based on the criteria outlined in Section 300.430(e)(2) of the NCP with the objective to protect human health. The RAO for the NTCRA at FGGM 93 is as follows:

> *To eliminate or minimize the hazard posed by methane above its LEL that is being generated from wastes buried within the Manor View Dump.*

3.3 Identification of Remedial Goals

In this EE/CA, preliminary remedial goals are developed for the NTCRA. Remedial goals for the final site-wide action for Manor View will be identified in the FS to be submitted at a later time.

The remedial goal is to effectively mitigate the physical hazards from methane gas for the current and reasonably anticipated future land users (recreational with adjoining military housing/student use). Verification of the effectiveness of the action will be conducted through continued monitoring following the action.

The RAO will provide the basis for evaluation of the remedial action alternatives and recommendations of the most viable alternative for FGGM 93, presented in Sections 4 and 5.

3.4 Determination of Removal Schedule

The key components of the removal action are anticipated to occur as follows:

- Announcement within a local newspaper declaring that the EE/CA is available for review and comment on or near – 09/15/2011 and 09/22/2011;
- Public Comment Period on or near – 09/30/2011 to 10/30/2011;
- Final Action Memorandum on or near – 11/30/2011;
- Start of Fieldwork –fourth quarter 2011;
- Substantial completion of field work – first quarter 2012; and
- Final Submission of Removal Action Report – second quarter 2012.

4. Identification and Analysis of Remedial Action Alternatives

Different remedial action alternatives have been developed for the FGGM 93 Removal Action utilizing the RAO and the specific NTCRA ARARs as their basis. This section presents the identification and screening of potentially applicable remedial technologies for addressing the source of methane at FGGM 93. Three remedial action alternatives are described and evaluated in this section based on the following criteria: implementability, effectiveness, and cost. The alternative determined to be the most effective to achieve the RAO is identified in Section 6.

4.1 Identification of Possible Remedial Alternatives

This section presents three remedial alternatives for addressing the source of methane at FGGM 93.

4.1.1 Alternative 1: No Further Action

Under Alternative 1, no further corrective action will be employed. Furthermore, the methane extraction system currently operating at the Site will be shutdown. This alternative will not mitigate the threat posed by the MGW at FGGM 93. However, under the NCP, the no further action alternative must be evaluated to establish a baseline of comparison regarding future performance for the remaining alternatives, even though this alternative is not a viable option itself.

4.1.2 Alternative 2: Augmentation of Existing Methane Extraction System

Under Alternative 2, the current methane extraction system would be augmented to increase the efficiency of methane capture and removal. The current system would be augmented by adding supplementary extraction points and increasing the level of vacuum that is currently applied by the system. This augmentation would reduce the physical hazard posed by methane accumulation at concentrations above the LEL and further control and contain methane migration. Because Alternative 2 entails leaving buried waste in place at FGGM 93, long-term monitoring activities would be necessary. A methane monitoring program would be implemented to ensure protectiveness is maintained. The monitoring program frequency and duration would be established in the NTCRA Work Plan.

4.1.3 Alternative 3: Focused Removal Within the Western Portion of the Site and Off-Site Disposal

Alternative 3 includes the removal and off-Site disposal of waste within the western portion of the Site. For the purpose of estimating cost for this alternative and the comparative analysis, the quantity of waste is estimated at 5,200 cy. The volume is based on the CSM. Prior to commencement of construction activities, erosion and sediment controls, such as silt fence, would be installed along the downgradient side of the area of disturbance to minimize sediment transport. Temporary stormwater controls would also be erected, as needed. Engineering controls would be used to reduce fugitive dust emissions, and air monitoring would be conducted throughout construction.

There is the potential that odors may be generated during waste excavation. The generation of odors will be minimized by conducting the work during cooler weather, using construction methods that minimize the area of exposed waste, and through the application of odor masking and/or odor neutralizing products as needed. Odor monitoring will be included in the perimeter air monitoring program. These products include using wind socks upstream or applying odor suppressing foam.

Approximately 7,690 cy of overburden soil that is free of waste and debris and currently overlies the waste would be excavated and stockpiled prior to excavation of the underlying waste. The waste would then be excavated and transported to an appropriate off-Site landfill permitted to accept the material for disposal. The receiving landfill would need to provide pre-acceptance approval of the material prior to off-Site transport and disposal. The excavated area will be backfilled using the stockpiled overburden and clean certified imported fill to achieve the final grade. It is assumed that 5,200 cy of imported fill material would be required to supplement the existing overburden material. The focused excavation would be timed to occur in the winter to coincide with reduced microbial activities that will minimize the generation of methane and odors during the excavation.

During Site restoration. the existing storm water ditch bisecting the western and eastern portions of the dump will be re-graded and stabilized to ensure the existing soil cover on the eastern side of the dump does not erode or deteriorate. The amount of regrading and stabilization will be determined using storm water modeling calculation such as TR-55 and certain design storm assumptions.

It is assumed that construction activities would be conducted in Level D personal protective equipment (PPE). However, Site conditions would be monitored during implementation and PPE levels adjusted accordingly.

The existing soil vapor extraction (SVE) trench would remain in place following the excavation in an operational status as a redundant safety measure that could be re-activated in the unlikely event that methane is detected during the post-action monitoring. Following completion of the selected remedial alternative, the post-action methane monitoring program would be implemented to confirm that concentration of methane above the LEL are not present. The frequency and ultimate duration, including an exit strategy, for the post-action monitoring program would be established in the NTCRA Work Plan.

After excavation and backfill, imported fill will be placed on top of a geotextile witness layer over the entire disturbed area and topped with six inches of certified clean topsoil. The chain link fence will be removed and the western portion of the Site will then be restored to a beneficial reuse for the surrounding community.

4.2 Analysis Criteria of Possible Remedial Alternatives

The NCP [40 CFR 300.430 (e)(7)] cites the general evaluation criteria of effectiveness, implementability, and cost. Each of these criteria is considered in the evaluation of alternatives. The types of specific considerations within each of these general criteria are listed below.

4.2.1 Effectiveness

Effectiveness may be evaluated as both short term and long term effectiveness. Short term effectiveness addresses the effects of the Alternative during construction and implementation until the corrective action objectives are met. This criterion considers the protection of the community and workers, including the air quality effects and hazards from excavation, transportation, and on-Site treatment. In addition, the expected length of time for completion of the remedial action is considered.

Long term effectiveness addresses the degree, extent, and manner in which the Alternative continues to protect human health and the environment in terms of residual hazard remaining at the Site after the corrective action objectives have been met. This criterion considers the residuals following completion of the actions, expected duration of the response action, and the degree of controls required to ensure protectiveness of the response action.

4.2.2 Implementability

Implementability is a measure of (1) technical feasibility; (2) administrative feasibility to construct, operate, and maintain a removal action alternative; and (3) availability of

services and materials. Technical feasibility is evaluated based on constructability, reliability (e.g., demonstrated performance and operation), maintenance, and timeliness/schedule of implementation. The implementability evaluation criteria are defined in the NCP [40 CFR 300 (e)(7)(ii)].

4.2.3 Cost

Cost involves developing the level of engineering detail and preparing a sufficiently accurate cost estimate for each alternative so that a relative and appropriate cost comparison can be made between competing alternatives. For purposes of this EE/CA, the cost estimates for construction were based on fiscal year 2011 costs. Other considerations in the evaluation of remedy selection include capital and annual Operations and Maintenance (O&M) costs as presented in the NCP [(40 CFR 300 (e)(7)(iii)].

4.3 Individual Analysis of Possible Remedial Alternatives

4.3.1 Alternative 1- No Further Action

Alternative 1 is not considered effective and does not require any further action. There is no cost associated with the No Further Action Alternative. The following sections present the analysis of this alternative in greater detail.

4.3.1.1 Effectiveness

Alternative 1 does not provide controls for monitoring reduction of methane concentrations over time, reduction of exposure, or long-term management measures. All current and potential future risks would remain the same under this alternative.

With the no further action alternative, operation of the system would cease and there would be no controls to ensure current use remains protective of human health. Implementation of this alternative does not pose additional risks to the community, the workers, or the environment because there are no remedial activities associated with it. However, it does not mitigate any existing or potential future risks.

4.3.1.2 Implementability

Alternative 1 does not require remedial action implementation. However, the no action alternative is not acceptable to the regulatory community and would not be administratively implementable.

4.3.1.3 Cost

There are no costs associated with Alternative 1.

4.3.2 Alternative 2 - Augmentation of Existing Methane Extraction System

Alternative 2 includes continuing to operate and augmenting the existing methane extraction system. The current methane extraction system would be augmented to increase the efficiency of methane capture and removal; by adding supplementary extraction points and increasing the level of vacuum that is currently applied by the system. This augmentation would eliminate the physical hazard posed by methane accumulation at, or above, the LEL and further control and contain methane migration. A methane monitoring program would be implemented to ensure protectiveness is maintained. The methane generating waste will remain in-place under this alternative.

4.3.2.1 Effectiveness

Implementation of this alternative does not pose any additional short-term risks to the community, the workers, or the environment because this is a minimally intrusive alternative and is in-place and running now. The only intrusive activities include additional drilling and/or trenching associated with augmenting the existing methane extraction system.

This alternative provides a minimum level of long-term effectiveness and permanence. The existing extraction system is limited in its effectiveness and is a relatively labor intensive system to operate. It is difficult to determine how to best augment the system to improve reliability and long-term effectiveness. This alternative does not include MGW removal. Because the source of methane is not addressed, Alternative 2 fails to be a permanent solution to the mitigation of methane generated by the waste.

4.3.2.2 Implementability

Due to the difficulties currently experienced with operating the extraction system effectively, there is uncertainty regarding the ability to upgrade the system to meet the RAO. As such, the long term implementability of Alternative 2 is uncertain.

4.3.2.3 Cost

The cost estimate for Alternative 2 is: $1,500,000. This estimate includes contractor costs for inspecting the Site, performing repair work and augmenting the vapor extraction system. Periodic inspections as repair works and long term monitoring and

operation are included in the estimate. **Table 4-1** contains detailed cost estimate for Alternative 2.

4.3.3 Alternative 3 - Focused Removal Within the Western Portion of the Site and Off-Site Disposal

The third alternative incorporates removal and off-Site disposal of waste to eliminate methane concentrations in excess of the LEL. This waste is present within the western portion of the Site. The western portion of the Site will be restored to a beneficial reuse following the removal action.

4.3.3.1 Effectiveness

Removal and off-Site disposal of waste provides a long-term and permanent solution to eliminate methane concentrations above the LEL at the Site. This alternative poses some short-term risks to the community and construction workers as the waste is excavated and transported to an off-Site facility. Short term risks would most likely be attributed to the following: (1) exposure of Site workers and the community to exposed waste and (2) increased traffic volume. The potential for exposures during construction would be reduced through the use of suitable protective clothing and equipment, monitoring of air, implementation of good construction practices, and standard dust suppression techniques. A temporary increase of traffic volume is also anticipated. Approximately 330 trucks would be required to transport the waste off of the Site for final disposal, in addition, trucks will also be required to import fill material to the Site necessary to achieve the final grade. To mitigate this risk resulting from the increased traffic volume, a traffic control plan will be implemented to (1) direct trucks onto and off of the Site and minimize routing of trucks nearby sensitive locations such as the elementary school, and playgrounds to the extent possible (2) control the speed of truck movement (3) the hours of truck movement (e.g., no trucks moving when students are being dropped off/picked up at the Manor View Elementary School, and (4) implement the necessary signage to guide/warn FGGM post traffic.

Although this alternative is not as effective in the short term, this alternative is fully effective in the long-term because of its permanence. In Alternative 3, the source of the methane, which drives the safety hazard, is removed from the Site. The advantages of removing the source of the methane include the following:

- There will be no need for long term operation of the methane extraction system, therefore the risks associated with a potential system malfunction are ameliorated;
- Allows for reoccupation of the evacuated military housing;

- Long term monitoring will not be required once the post-action monitoring verifies that the action was successful; and

- The western portion of the Site may be restored to a beneficial reuse.

4.3.3.2 Implementability

Alternative 3 can be implemented within a reasonable time frame. Because the removal action is relatively small, there are no significant construction considerations that would limit the implementability as this alternative will utilize standard construction equipment and methods. However additional safety precautions will be required because of the nature of the waste during excavation, loading, and transportation. Precautions are also needed as the Site is located in close proximity of military family housing and an elementary school. These precautions would include restricting access to and around the construction site and adapting a construction schedule to minimize the impact to the surrounding community.

4.3.3.3 Cost

The estimated cost for Alternative 3 is $2,500,000. This estimate includes contractor costs for performing the required Site work and disposal activities, professional reporting and oversight fees, and follow up evaluations. The detailed cost estimate is included as **Table 4-2.**

5. Comparative Analysis of Removal Action Alternatives

This section compares the alternatives against each other by ranking them based on effectiveness, implementability, and cost.

5.1 Effectiveness

Alternative 3 is the most effective in the long term because it meets the RAO by permanently removing the source of the methane gas causing the safety hazards at the Site. Thus, Alternative 3 is a permanent solution that will not require additional long term monitoring or maintenance beyond post-action verification monitoring. Although Alternative 3 would pose short-term risks to the community and construction workers resulting from the intrusive nature of the excavation; these short term risks can be effectively mitigated using standard administrative and engineering controls during the removal construction period.

Alternative 2 has a relatively low short term risk but is only likely to be moderately effective in the long term. As such, there is some doubt as to whether this alternative will be effective in the long term, will allow re-occupation of the military housing units, and it will not allow for beneficial re-use of the Site.

Alternative 1 is not effective and does not meet the RAO.

5.2 Implementability

Alternative 3 is the most intrusive alternative requiring a substantial volume of soil excavation and segregation, waste excavation and disposal, and Site restoration. As such it presents the greatest technical implementation challenges. Alternative 2 is more implementable than Alternative 3 but there are uncertainties associated with the effectiveness of upgrades to the existing system.

While there are no technical implementation challenges with Alternative 1, it is not implementable because it is administratively an untenable alternative as no action will be unacceptable to the regulatory agencies and community.

5.3 Cost

The estimated cost for Alternative 3 is $2,500,000 whereas Alternative 2 is $1,500,000. There is no cost associated for Alternative 1.

6. Recommended Remedial Action Alternative

The recommended alternative for the NTCRA at FGGM 93 is Alternative 3: Focused Removal Within the Western Portion of the Site and Off-Site Disposal. Alternative 3 was selected because the Army has operated a system similar to Alternative 2 for some time with partial success. Alternative 3 provides the best permanence and long term effectiveness in meeting the RAO. The long term effectiveness of Alternative 3 surmounts its short term risks, greater cost, and its greater implementability challenges; which results in selection of Alternative 3.

A detailed description of the selected response action for the western portion of the Site will be provided in a NTCRA Work Plan. However, a brief summary of components likely to be included as part of Alternative 3 includes the following:

- Removal and temporary on-Site stockpiling of approximately 7,690 cy of overburden soil;
- Removal, transportation, and disposal of approximately 5,190 cy of MGW;
- Restoration of the Site for beneficial reuse; and
- Methane monitoring prior to, during, and after the removal action to document the effectiveness of the removal action.

A project schedule is included as **Appendix B**.

7. Plan for Public Participation

Pursuant to Section 300.415(n) and 300.820 of the NCP the following actions will be initiated for public participation:

- Publish notice of availability for the administrative record file and availability of the EE/CA – Upon completion of the EE/CA, a public notice will be posted within the local newspapers attesting to the availability of the EE/CA for public review and comment. The notice will be posted within a local newspaper prior to the anticipated public comment period. An affidavit of publication will be included as part of the Remedial Action Report. 30-day public comment period – The Final EE/CA will be reproduced in full and placed within the Fort Meade Post Library located at 4418 Llewellyn Avenue, Fort George Meade, Maryland 20755. This document will be available for public review for a minimum of 30 days.

- Written Response to Significant Comments – Following the 30-day public comment period, written responses to significant comments will be prepared and included within the administrative record.

- Restoration Advisory Board – Periodic Restoration Advisory Board meetings are held at Fort Meade. During these meetings, an announcement will be made that the administrative record (specifically the EE/CA) will be available for review and public comment, and will be summarized in a presentation to the Board. Significant comments generated during the Restoration Advisory Board meetings will also be documented and addressed within the written response to public comments. Additionally, this document will be posted on the FGGM Environmental Management System (EMS) website; www.fortmeade-ems.org .

8. References

U.S. Environmental Protection Agency (USEPA), 1993. Guidance on Conducting Non-Time Critical Removal Actions Under CERCLA. Office of Emergency and Remedial Response. Washington D.C. EPA/ 540-R-93-057. Publication 9360.0-32. August.

U.S. Environmental Protection Agency (USEPA), 1990. National Oil and Hazardous Substances Pollution Contingency Plan. Final Rule. 40 CFR Part 300.

U.S. Environmental Protection Agency (USEPA), 1986. CERCLA Removal Actions at Methane Release Sites. Office of Solid Waste and Emergency Response. OSWER Directive 9360.0-8. Jan 23.

URS, 2003. Preliminary Investigation / Site Investigation Report, Manor View Dump Site, Fort George G. Meade, Maryland. Prepared for U.S. Army Corps of Engineers.

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

Tables

Table 2-1
Chemical-Specific ARARs and TBC Guidance
For the NTCRA at the Manor View Dump Site (Removal of MGW in the Western Portion), Fort Meade, Maryland

Media	Authority	Regulation	Synopsis	Status
Waste	Federal Criteria, Advisories, and Guidance	USEPA Regional Screening Levels, Residential Soil Supporting Table	The values from the *Regional Screening Level Tables* (USEPA, 2009) are suggested threshold concentrations for soil chemical contaminants that have been developed based on a combination of regional PRGs and similar regional risk-based screening levels to provide guidance for residential soil quality. Available at: http://www.epa.gov/region09/superfund/prg/	TBC
	State Regulatory Requirement	Disposal of Controlled Hazardous Substances *COMAR 26.13.01-.06, 26.13.08 and 26.13.10.*	This regulation provides for the prevention, abatement, and control of contamination by addressing the generation and disposal of hazardous substances, and it authorizes the regulation of storage, treatment, transportation, and disposal of hazardous materials, controlled hazardous substances, and low level nuclear waste.	Applicable and Appropriate
	State Criteria, Advisories, and Guidance	MDE Cleanup Standards for Soil and Groundwater	MDE has developed *Updated Cleanup Standards for Soil and Groundwater* (MDE, 2008) to represent chemical concentrations at which no further remedial action is required based on the harm posed to human health. The standards have been developed by incorporating applicable land uses, and they provide uniform and consistent human health based numerical standards for the most frequently encountered hazardous substances in soil and groundwater within the state.	TBC

Table 2-2
Location-Specific ARARs and TBC Guidance
For the NTCRA at the Manor View Dump Site (Removal of MGW in the Western Portion), Fort Meade, Maryland

Feature	Authority	Regulation	Synopsis	Status
Patuxent River Watershed	State Regulatory Requirement	Erosion and Sediment Control *COMAR 26.17.01*	This regulation is applicable when excavation or on-site storage of contaminated soil and waste is contemplated. It sets criteria and procedures to protect the lands and waters comprising the watersheds of the state and prohibits discharge of raw sewage or waste into the Patuxent or Severn rivers or their watersheds. The limits for phosphorus and nitrogen in wastewater effluent are set at 0.3 mg/L and 3.0 mg/L, respectively.	ARAR Relevant and appropriate

Table 2-3
Action-Specific ARARs and TBC Guidance
For the NTCRA at the Manor View Dump Site (Removal of MGW in the Western Portion), Fort Meade, Maryland

Activity	Authority	Regulation	Synopsis	Status
Consolidation and Capping	Federal Regulatory Requirement	RCRA Identification and Listing of Hazardous Waste *40 CFR 261.1 - 261.3*	This regulation provides guidance for classifying wastes as hazardous under RCRA.	ARAR Applicable
		RCRA Land Disposal Restrictions *40 CFR 268.20 - 268.39*	This regulation establishes restrictions for the burial of wastes and hazardous materials. Listed and characteristic hazardous wastes are required to meet Best Demonstrated Available Technology (BDAT) treatment standards.	ARAR Applicable
	State Regulatory Requirement	Erosion and Sediment Control *COMAR 26.17.01*	This regulation is applicable when excavation or on-site storage of contaminated soil and waste is contemplated. It sets criteria and procedures to protect the lands and waters comprising the watersheds of the state and prohibits discharge of raw sewage or waste into the Patuxent or Severn rivers or their watersheds. The limits for phosphorus and nitrogen in wastewater effluent are set at 0.3 mg/L and 3.0 mg/L, respectively.	ARAR Applicable
Excavation and Off-site Disposal	State Regulatory Requirement	Disposal of Controlled Hazardous Substances *COMAR 26.13.01-.06, 26.13.08 and 26.13.10.*	This regulation provides for the prevention, abatement, and control of contamination by addressing the generation and disposal of hazardous substances, and it authorizes the regulation of storage, treatment, transportation, and disposal of hazardous materials, controlled hazardous substances, and low level nuclear waste.	ARAR Applicable
General Remediation Activities	State Regulatory Requirement	Control of Noise Pollution *COMAR 26.02.03.03*	This regulation applies to activities that produce regular or continuous sound that exceeds or may exceed established limits. It restricts noise to a level that protects the health, general welfare, and property of the people of the state. It also establishes an Environmental Noise Advisory Council and authorizes standards for ambient noise levels and equipment noise performance levels to be promulgated by the Department of Environment.	ARAR Relevant and appropriate

Table 4-1
Alternative - 2 Cost Estimate
Augmentation of Existing Methane Extraction System
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	$50,000	$50,000	$0	---	Engineering estimate for staff (250 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 (200 hrs x $50/hr) to perform public outreach and coordination of remedial activities with Manor View Elementary School
SUBTOTAL					$77,500	$0	$0	
II. GENERAL ACTIONS AND SITE PREPARATION								
1. Mobilization / Demobilization		1	LS	$20,000	$20,000	$0	---	Engineering estimate to mobilize equipment and personnel to and from the site
2. Augmentation of the Methane Collection Trench		1	LS	$300,000	$300,000	$0	---	Engineering estimate to augment the existing methane collection trench system with additional extraction points and to increase the level of vacuum
3. Site Restoration		1	LS	$20,000	$20,000	$0	---	Engineering estimate to revegetate disturbed soil and conduct site clean-up as necessary
SUBTOTAL					$340,000	$0	$0	
SUBTOTAL (I and II)					$417,500	$0	$0	
III. LONG-TERM MAINTENANCE, MONITORING & REVIEW						$5,600		
1. Cover Inspection and Maintenance		30	Years	$2,000	$0	$60,000	$24,800	Engineering estimate to inspect (4 hrs x $100/hr), report (12 hrs x $100/hr), and maintain ($400) the remaining existing 2-ft-thick soil cover annually
2. Groundwater Monitoring & Reporting (Annual)		5	Years	$5,000	$0	$25,000	$20,500	RS Means(2010) 01 45 23.50 7700, for annual groundwater monitoring for VOCs and metals for five years
3. Groundwater Monitoring & Reporting (Every 5 Years)		5	Events	$5,000	$0	$25,000	$7,200	RS Means(2010) 01 45 23.50 7700, for annual groundwater monitoring for VOCs and metals every 5 years after the initial 5 years of annual monitoring
4. Methane Monitoring & Reporting (Weekly for Duration)		30	Years	$52,000	$0	$1,560,000	$645,300	Engineering estimate for weekly labor (8 hrs x $25/hr), materials ($50), and equipment ($750) for instrument calibration and deployment for 52 weeks annually
5. 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
SUBTOTAL					$0	$1,685,000	$708,500	
SUBTOTAL (I, II, and III)					$417,500	$1,685,000	$708,500	
IV. IMPLEMENTATION COSTS								
1. Administration and Legal	5% of Capital Costs	1	LS	$20,900	$20,900	$0	---	
2. Procurement	5% of Capital Costs	1	LS	$20,900	$20,900	$0	---	
3. Construction Management	12% of Capital Costs	1	LS	$50,100	$50,100	$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	$146,100	$146,100	$0	---	
6. O&M Contingency	15% of O&M Costs	1	LS	$252,800	$0	$252,800	$104,600	
SUBTOTAL					$258,000	$252,800	$104,600	
SUBTOTAL (I, II, III, and IV)					$675,500	$1,937,800	$813,100	
A. TOTAL CAPITAL COSTS					$675,500			
B. TOTAL ANNUAL COSTS						$1,937,800		
C. TOTAL PRESENT WORTH OF ANNUAL COSTS							$813,100	
TOTAL PRESENT WORTH OF CAPITAL AND ANNUAL COSTS (A + C)							**$1,489,000**	

CY - Cubic Yard
EA - Each
LF - Linear Foot
LS - Lump Sum
SY - Square Yard

MGW - Methane Generating Waste
All construction and sampling assumed to be conducted in Level D PPE
Present worth costs are calculated using 7% interest and year 2011 dollars

Table 4-2
Alternative - 3 Cost Estimate
Focused Removal Within the Western Portion of FGGM 93 and Off-Site Disposal of Municipal Waste
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	$20,000	$20,000	$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	$100,000	$100,000	$0	---	Engineering estimate for staff (500 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	$40,000	$40,000	$0	---	Engineering Estimate for staff (400 hrs x $50/hr) to perform public outreach and coordination of remedial activities with Manor View Elementary School
SUBTOTAL					$167,500	$0	$0	
II. GENERAL ACTIONS AND SITE PREPARATION								
1. Mobilization / Demobilization		1	LS	$20,000	$20,000	$0	---	Engineering estimate to mobilize equipment and personnel to and from the site
2. Erosion and Sediment Control		1	LS	$25,000	$25,000	$0	---	Engineering estimate for furnishing, installing, and maintaining silt fence or straw bales along the roughly 250-ft-square perimeter of the excavation site
3. Waste Characterization		15	EA	$1,500	$22,500	$0	---	Engineering estimate for 1 sample per 400 cy of MGW and analysis of TCLP and RCRA 8 metals, VOCs, SVOCs, PAH, PCBs, Pesticides, and Herbicides
4. Decommisioning Methane Collection Trench		1	LS	$60,000	$60,000	$0	---	Engineering estimate to decommision the existing methane collection trench system
5. Air Monitoring		1	LS	$25,000	$25,000	$0	---	Engineering estimate to perform perimeter air monitoring around the excavation site
6. Excavate and Stockpile Overburden		7,689	CY	$8.45	$64,972	$0	---	RS Means(2010) 31 23 16.13 0090
7. Excavate MGW		5,192	CY	$8.45	$43,872	$0	---	RS Means(2010) 31 23 16.13 0090
8. Transportation and Disposal of 75% of the MGW Off-Site as Non-Hazardous		5,841	Ton	$65	$379,665	$0	---	Estimate from waste transportation contractor, assuming 75% of the MGW can be disposed of as non-hazardous and assuming a bulk density of 1.5 ton/CY
9. Transportation and Disposal of 25% of the MGW Off-Site as Hazardous		1,947	Ton	$200	$389,400	$0	---	Estimate from waste transportation contractor, assuming 25% of the MGW can be disposed of as hazardous and assuming a bulk density of 1.5 ton/CY
10. Site Surveying		12	Days	$1,400	$16,800	$0	---	Estimate from surveying contractor for daily rate, assuming a total of 4 days to complete the necessary surveys
11. Backfill MGW Excavation (Overburden)		7,689	CY	$10	$76,890	$0	---	Engineering estimate to partially backfill the MGW excavation with the stockpiled overburden
12. Backfill MGW Excavation (Common Borrow)		7,788	Ton	$20	$155,760	$0	---	Engineering estimate to furnish and place common borrow to backfill the remaining MGW excavation, assuming a bulk density of 1.5 ton/CY
13. Backfill MGW Excavation (Topsoil 6" Deep)		3,640	SY	$6.65	$24,206	$0	---	RS Means(2010) 32 91 19.13 0080
14. Seeding		3,640	SY	$0.45	$1,638	$0	---	RS Means(2010) 32 92 19.13 1000
15. Site Restoration		1	LS	$50,000	$50,000	$0	---	Engineering estimate to revegetate disturbed soil, remove silt fence, and conduct site clean-up as necessary
SUBTOTAL					$1,355,703	$0	$0	
SUBTOTAL (I and II)					$1,523,203	$0	$0	
III. LONG-TERM MAINTENANCE, MONITORING & REVIEW								
1. Cover Inspection and Maintenance		30	Years	$2,000	$0	$60,000	$24,800	Engineering estimate to inspect (4 hrs x $100/hr), report (12 hrs x $100/hr), and maintain ($400) the remaining existing 2-ft-thick soil cover annually
2. Groundwater Monitoring & Reporting (Annual)		5	Years	$5,000	$0	$25,000	$20,500	RS Means(2010) 01 45 23.50 7700, for annual groundwater monitoring for VOCs and metals for five years
3. Groundwater Monitoring & Reporting (Every 5 Years)		5	Events	$5,000	$0	$25,000	$7,200	RS Means(2010) 01 45 23.50 7700, for annual groundwater monitoring for VOCs and metals every 5 years after the initial 5 years of annual monitoring
4. Methane Monitoring & Reporting (Weekly for 1 Month)		4	Weeks	$1,000	$0	$4,000	$4,000	Engineering estimate for weekly labor (8 hrs x $25/hr), materials ($50), and equipment ($750) for instrument deployment for 4 weeks
5. Methane Monitoring & Reporting (Monthly for 3 Months)		3	Months	$1,000	$0	$3,000	$3,000	Engineering estimate for monthly labor (8 hrs x $25/hr), materials ($50), and equipment ($750) for instrument deployment for 3 following months
6. Methane Monitoring & Reporting (Bi-Monthly for 8 Months)		4	Bi-Months	$1,000	$0	$4,000	$3,800	Engineering estimate for bi-monthly labor (8 hrs x $25/hr), materials ($50), and equipment ($750) for instrument deployment for remainder of first year
7. Five Year Review Reports		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
SUBTOTAL					$0	$136,000	$74,000	
SUBTOTAL (I, II and III)					$1,523,203	$136,000	$74,000	
IV. IMPLEMENTATION COSTS								
1. Administration and Legal	5% of Capital Costs	1	LS	$76,200	$76,200	$0	---	
2. Procurement	5% of Capital Costs	1	LS	$76,200	$76,200	$0	---	
3. Construction Management	12% of Capital Costs	1	LS	$182,800	$182,800	$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	$533,100	$533,100	$0	---	
6. O&M Contingency	15% of O&M Costs	1	LS	$20,400	$0	$20,400	$8,400	
SUBTOTAL					$888,300	$20,400	$8,400	
SUBTOTAL (I, II, III, and IV)					$2,411,503	$156,400	$82,400	

Table 4-2
Alternative - 3 Cost Estimate
Focused Removal Within the Western Portion of FGGM 93 and Off-Site Disposal of Municipal Waste
Manor View Dump Site, Fort Meade, Maryland

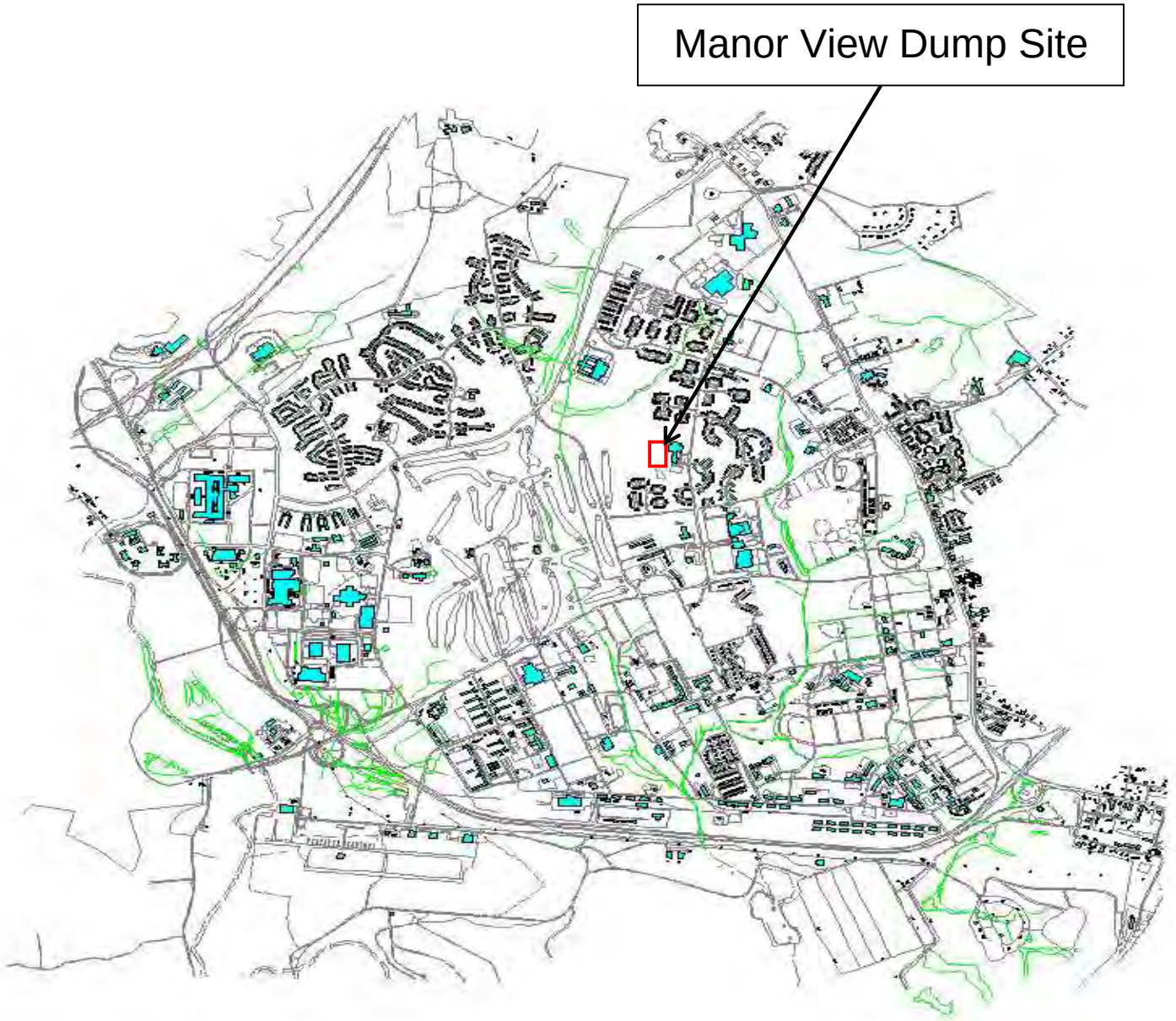
ITEM	QUANTITY	UNITS	UNIT COST	CAPITAL COST	ANNUAL O&M COST	PRESENT WORTH COST	ASSUMPTIONS
A. TOTAL CAPITAL COSTS				$2,411,503			
B. TOTAL ANNUAL COSTS					$156,400		
C. TOTAL PRESENT WORTH OF ANNUAL COSTS						$82,400	
TOTAL PRESENT WORTH OF CAPITAL AND ANNUAL COSTS (A + C)						**$2,494,000**	

CY - Cubic Yard
EA - Each
LF - Linear Foot
LS - Lump Sum
SY - Square Yard
MGW - Methane Generating Waste
All construction and sampling assumed to be conducted in Level D PPE
Present worth costs are calculated using 7% interest and year 2011 dollars

Figures

* Granite Nike Fire Control Site is shown for reference. It is not part of the PBA (Contract # W91ZLK-05-D-0015) Task 0005.

ARCADIS	**Fort George G. Meade Site Location Map**	Project Manager: TL	Dept Manager: JC
		Drafter: na	Checked: JC
1114 Benfield Boulevard, Suite A Millersville, Maryland 21108 Tel (410) 987-0032 Fax (410) 987-4392	**Fort George G. Meade, Maryland Manor View Dump Site**	Project Number: GP09MEAD.MANO	Drawing Number: 2-1



ARCADIS	**Manor View Dump Site** **Site Location Map**	Project Manager: TL	Dept Manager: JC
		Drafter: na	Checked: JC
1114 Benfield Boulevard, Suite A Millersville, Maryland 21108 Tel (410) 987-0032 Fax (410) 987-4392	**Fort George G. Meade, Maryland** **Manor View Dump Site**	Project Number: GP09MEAD.MANO	Drawing Number: 2-2

0 200 400 Feet

GRAPHIC SCALE

LEGEND:

SITE BOUNDARY

SWALE

FORT GEORGE G. MEADE, MARYLAND
MANOR VIEW DUMP SITE

MANOR VIEW DUMP SITE
SITE MAP

ARCADIS

FIGURE
2-3

CITY: MPLS DIV/GROUP: IM DB: MG LD: HA
FORT MEADE
G:\GIS\Projects\Fort_Meade\ArcMap\Manor_View\ManorView_Site_20110819.mxd - 8/19/2011 @ 11:29:06 AM

LEGEND:

DEBRIS/FILL FOOTPRINT

0 200 400 Feet

GRAPHIC SCALE

FORT GEORGE G. MEADE, MARYLAND
MANOR VIEW DUMP SITE

DEBRIS/FILL FOOTPRINT

ARCADIS

FIGURE
2-4

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

- SITE BOUNDARY
- METHANE GENERATING WASTE FOOTPRINT
- DEBRIS/FILL FOOTPRINT

0 200 400 Feet

GRAPHIC SCALE

FORT GEORGE G. MEADE, MARYLAND
MANOR VIEW DUMP SITE

METHANE GENERATING WASTE FOOTPRINT

ARCADIS

FIGURE 2-5

CITY: MPLS DIV/GROUP: IM DB: MG LD: HA
FORT MEADE
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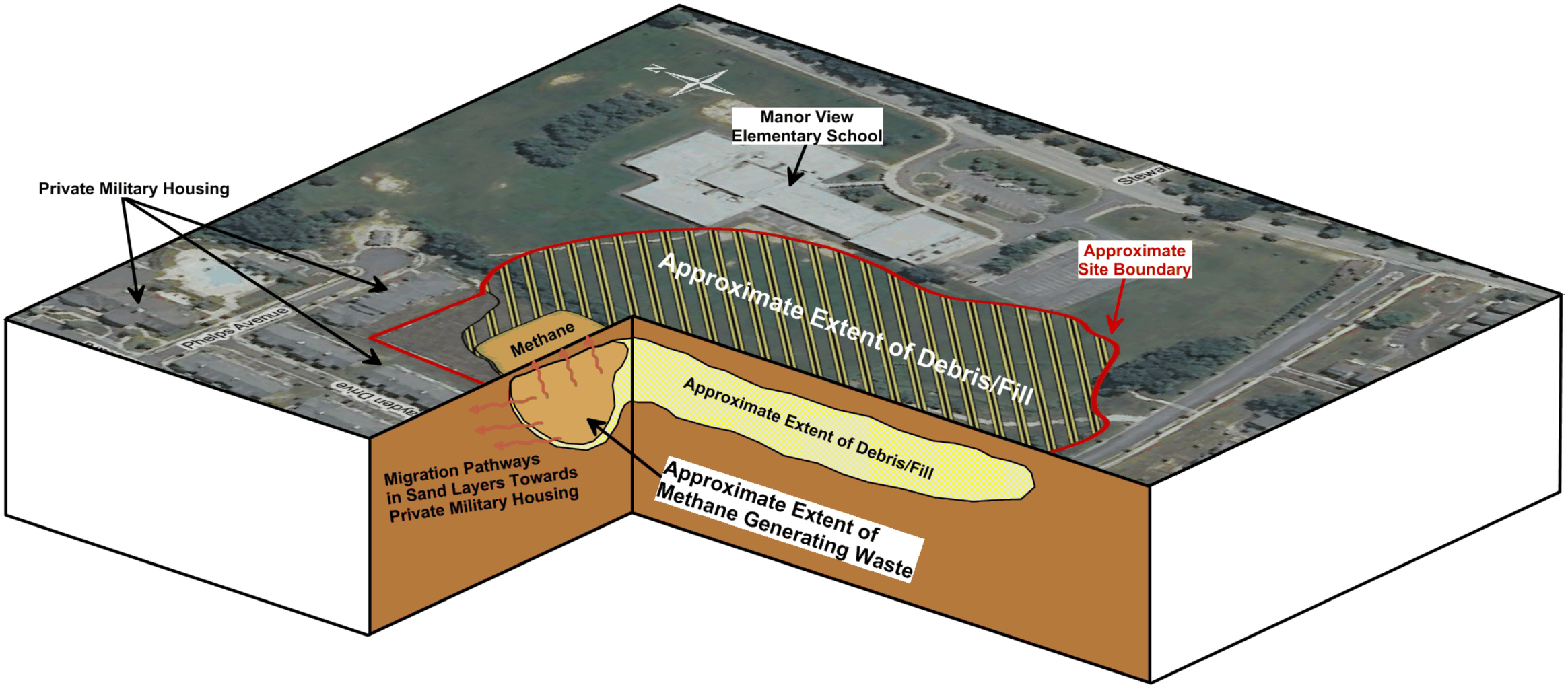
MANOR VIEW CONCEPTUAL SITE MODEL



Fort George G. Meade, Maryland
Manor View Dump Site

METHANE GENERATING WASTE
CONCEPTUAL SITE MODEL

ARCADIS

FIGURE
2-6

Appendix A

Response to Regulatory Comments

Comments and Responses on the Draft Engineering Evaluation/Cost Analysis
FGGM 93, Manor View Dump Site
Fort George G. Meade, Anne Arundel County, Maryland
August 2011

Commenter: John Burchette, EPA
Comments Dated: August 29, 2011

Item No.	Report Reference	Comment	*Response*
1.	EPA RPM General Comment 1: Throughout document.	Fill brought in to the site, particularly final grade materials, should be certified clean fill, especially considering the sensitive location of its placement (housing/elementary school).	*Concur. Inserted text on page 14, paragraph "… clean certified imported fill …". Specific information regarding the chemical and physical characteristics of the fill are included in the work plan.*
2.	EPA RPM Comment 1: Page 14.	Application of foam. The type of foam used at the site should not contain PFO and/or PFOA as these compounds have been found to cause environmental contamination and pose risk to human health and the environment.	*Concur. If foam is ultimately required for odor control the specified foam will not contain PFO nor PFOA. The work plan text will specify this requirement.*
3.	EPA RPM Comment 2:	If any potential hazardous materials are encountered during the excavation, characterization of the materials and subsurface soils (those that will be left in place) should take place.	*Concur. The work plan includes numerous contingency plans which include descriptions of procedures to follow when encountering potentially hazardous materials. Per these specific procedures, the material(s) will be identified and disposed adhering to local, state and federal regulations. Soils found in the vicinity of these hazardous materials will also be sampled and sufficiently characterized for disposal.*
4.	EPA RPM Comment 3: Page 20. Middle of the page.	Typo, should include a comma after "as such" and a double period. "…long term. . As such".	*Concur. Removed double period after:":…long term." and inserted a comma after "As such, ….".*

MARYLAND DEPARTMENT OF THE ENVIRONMENT
1800 Washington Boulevard • Baltimore MD 21230
MDE 410-537-3000 • 1-800-633-6101

September 21, 2011

US Army Garrison Fort Meade
Directorate of Public Works, Environmental Division
Attn: IMND-MEA-PWE (Mr. Paul Fluck)
2212 Chisholm Avenue, Suite 5115
Ft. Meade, MD 20755-7068

RE: Draft Engineering Evaluation / Cost Analysis, FGGM 93, Manor View Dump Site, Fort George G. Meade, Maryland, August 2011.

Dear Mr. Fluck:

The Federal Facilities Division of the Maryland Department of the Environment's Land Restoration Program has reviewed the referenced document and has no additional comments.

Should you have any questions, please contact me at (410) 537-3045.

Sincerely,

Kurt M. Scarbro
Remedial Project Manager
Federal Facilities Division

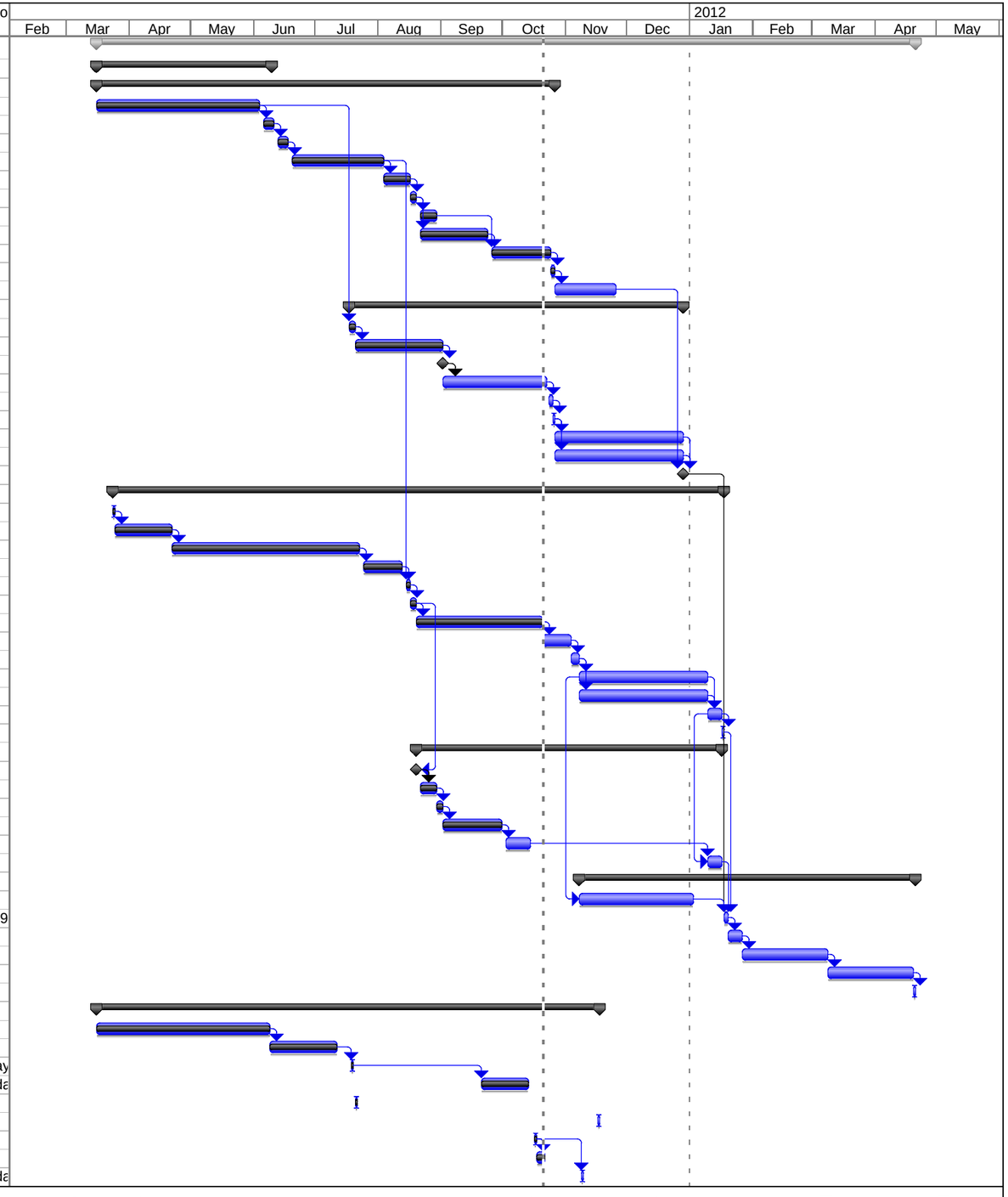
KMS:kms

cc: Mr. John Burchette
Mr. Horacio Tablada
Mr. James Carroll

Appendix B

Project Schedule

ID	Task Name	% Complete	Duration	Start	Finish	Predecesso
0	**Manor View Non-Time Critical Removal Action**	**55%**	**288 days**	**Wed 3/16/11**	**Fri 4/20/12**	
1	**EE/CA Approval Memo**	**100%**	**62 days**	**Wed 3/16/11**	**Thu 6/9/11**	
7	**EE/CA**	**100%**	**161 days**	**Wed 3/16/11**	**Wed 10/26/11**	
8	Prepare EE/CA	100%	58 days	Wed 3/16/11	Fri 6/3/11	2SS
9	Internal Review	100%	5 days	Mon 6/6/11	Fri 6/10/11	8
10	Submit to Army	100%	5 days	Mon 6/13/11	Fri 6/17/11	9
11	Army Review	100%	33 days	Mon 6/20/11	Wed 8/3/11	10
12	Submit RTCs and Revise EE/CA	100%	9 days	Thu 8/4/11	Tue 8/16/11	11
13	Sumbit to MDE and EPA	100%	3 days	Wed 8/17/11	Fri 8/19/11	12
14	EPA Review	100%	6 days	Mon 8/22/11	Mon 8/29/11	13
15	MDE Review	100%	25 days	Mon 8/22/11	Fri 9/23/11	13
16	Resolve Comments	100%	21 days	Mon 9/26/11	Mon 10/24/11	14,15
17	Submit Final EE/CA	100%	2 days	Tue 10/25/11	Wed 10/26/11	16
18	Public Notice Period	0%	30 edays	Wed 10/26/11	Fri 11/25/11	17
19	**Action Memorandum**	**12%**	**118 days**	**Mon 7/18/11**	**Wed 12/28/11**	
20	Prepare Memo	100%	3 days	Mon 7/18/11	Wed 7/20/11	8
21	Internal Review	100%	31 days	Thu 7/21/11	Thu 9/1/11	20
22	Submit Memo to Army	100%	0 days	Thu 9/1/11	Thu 9/1/11	21
23	Army Review	0%	51 edays	Thu 9/1/11	Sat 10/22/11	22
24	Revise Memo	0%	2 days	Mon 10/24/11	Tue 10/25/11	23
25	Sumbit to MDE and EPA	0%	1 day	Wed 10/26/11	Wed 10/26/11	24
26	EPA Review	0%	45 days	Thu 10/27/11	Wed 12/28/11	25
27	MDE Review	0%	45 days	Thu 10/27/11	Wed 12/28/11	25
28	Final Memo	0%	0 days	Wed 12/28/11	Wed 12/28/11	26,27,18
29	**Removal Action Work Plan**	**73%**	**214 days**	**Thu 3/24/11**	**Tue 1/17/12**	
30	Kick Off Meeting	100%	1 day	Thu 3/24/11	Thu 3/24/11	
31	Conceptual 30% Design	100%	20 days	Fri 3/25/11	Thu 4/21/11	30
32	Draft RAWP	100%	66 days	Fri 4/22/11	Fri 7/22/11	31
33	Internal Review of RAWP	100%	15 days	Mon 7/25/11	Fri 8/12/11	32
34	Resolve Internal Review	100%	2 days	Mon 8/15/11	Tue 8/16/11	33,11
35	Submit Draft RAWP	100%	3 days	Wed 8/17/11	Fri 8/19/11	34
36	Army Review	100%	62 edays	Fri 8/19/11	Thu 10/20/11	35
37	Revise RAWP	0%	10 days	Fri 10/21/11	Thu 11/3/11	36
38	Sumbit to MDE and EPA	0%	2 days	Fri 11/4/11	Mon 11/7/11	37
39	EPA Review	0%	45 days	Tue 11/8/11	Mon 1/9/12	38
40	MDE Review	0%	45 days	Tue 11/8/11	Mon 1/9/12	38
41	Resolve Comments	0%	5 days	Tue 1/10/12	Mon 1/16/12	39,40
42	Submit Final RAWP	0%	1 day	Tue 1/17/12	Tue 1/17/12	41
43	**E&S Permitting Package**	**67%**	**106 days**	**Fri 8/19/11**	**Mon 1/16/12**	
44	Submit to Army with Work Plan	100%	0 days	Fri 8/19/11	Fri 8/19/11	35FF
45	Receive Army Approval of Permitting Package	100%	6 days	Mon 8/22/11	Mon 8/29/11	44
46	Submit Package to MDE	100%	3 days	Tue 8/30/11	Thu 9/1/11	45
47	MDE Review	100%	21 days	Fri 9/2/11	Fri 9/30/11	46
48	Address MDE Comments	0%	10 days	Mon 10/3/11	Fri 10/14/11	47
49	Address MDE Comments and Finalize Permitting Pacage	0%	5 days	Tue 1/10/12	Mon 1/16/12	48,41SS
50	**Non-Time Critical Removal Action**	**0%**	**119 days**	**Tue 11/8/11**	**Fri 4/20/12**	
51	Pre-Mobilization Activites	0%	40 days	Tue 11/8/11	Mon 1/2/12	39SS
52	Mobilization	0%	2 days	Wed 1/18/12	Thu 1/19/12	51,42,28,49
53	Site Setup and Overburden Excavation	0%	5 days	Fri 1/20/12	Thu 1/26/12	52
54	Excavation	0%	30 days	Fri 1/27/12	Thu 3/8/12	53
55	Backfill and Site Restoration	0%	30 days	Fri 3/9/12	Thu 4/19/12	54
56	Demobilization	0%	1 day	Fri 4/20/12	Fri 4/20/12	55
57	**Public Outreach**	**98%**	**177 days**	**Wed 3/16/11**	**Thu 11/17/11**	
58	Initial Meeting with Army	100%	61 days	Wed 3/16/11	Wed 6/8/11	
59	Develop Initial Fact Sheet	100%	23 days	Thu 6/9/11	Mon 7/11/11	58
60	Env/DPW Brief Exec Committee	100%	1 day	Tue 7/19/11	Tue 7/19/11	59FS+5 day
61	Meet with other stakeholders (Picerne, School)	100%	17 days	Wed 9/21/11	Thu 10/13/11	60FS+45 da
62	September RAB Meeting	100%	1 day	Thu 7/21/11	Thu 7/21/11	
63	November RAB Meeting	0%	1 day	Thu 11/17/11	Thu 11/17/11	
64	Prepare Newspaper Article	100%	1 day	Mon 10/17/11	Mon 10/17/11	
65	Receive Army approval of Newspaper Notice	100%	4 days	Tue 10/18/11	Fri 10/21/11	64
66	Hold Public Relation Meeting at Community Center	0%	1 day	Wed 11/9/11	Wed 11/9/11	64FS+16 da



SCHEDULE
Date: Fri 10/21/11

Task
Progress
Milestone
Summary
Rolled Up Task
Rolled Up Milestone
Rolled Up Progress
Split
External Tasks
Project Summary
Group By Summary
Deadline