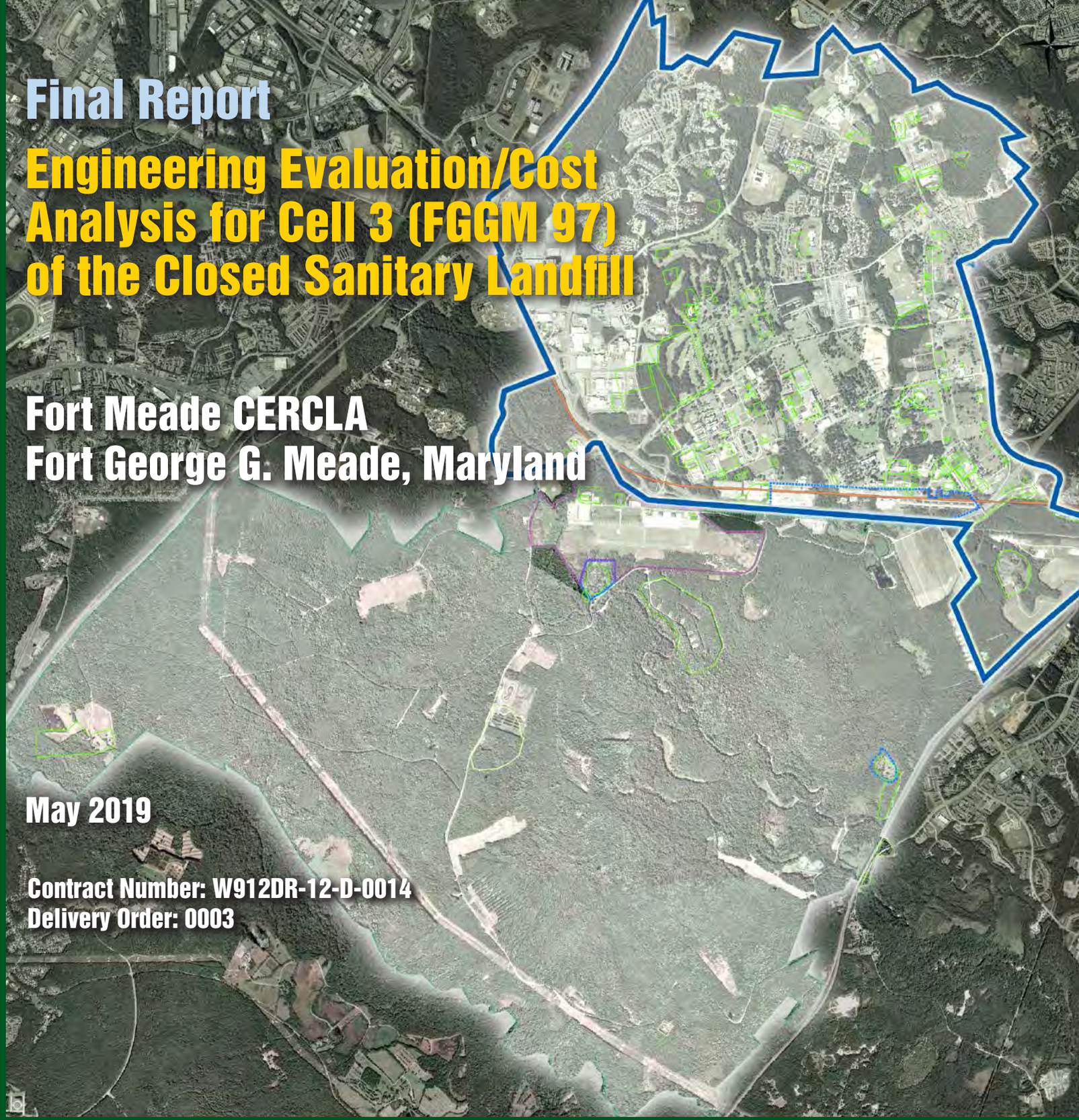
Final Report

Engineering Evaluation/Cost Analysis for Cell 3 (FGGM 97) of the Closed Sanitary Landfill

Fort Meade CERCLA
Fort George G. Meade, Maryland



May 2019

Contract Number: W912DR-12-D-0014
Delivery Order: 0003

Prepared for:

US Army Corps of Engineers ®
Baltimore District

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Baltimore, MD 21201

Prepared by:

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May 20, 2019

Environmental Division

Mr. Robert Stroud
NPL/BRAC/Federal Facilities Branch
U.S. Environmental Protection Agency
701 Mapes Road
Fort Meade, MD 20755

Dear Mr. Stroud:

Enclosed please find the *Final Engineering Evaluation/Cost Analysis for Cell 3 (FGGM 97) of the Closed Sanitary Landfill, Fort George G. Meade, MD* (EE/CA). This Final version incorporates comments provided on the Draft Report by the Maryland Department of the Environment (MDE) on April 5, 2019. The Environmental Protection Agency approved the Draft EE/CA on April 25, 2019. Responses to comments and the approval letter are included in Appendix A of the Final EE/CA.

Copies of the EE/CA have been furnished to Elisabeth Green (MDE), Timothy Peck (Baltimore District, USACE), Fran Coulters (U.S. Army Environmental Command), and the Fort George G. Meade Restoration Advisory Board.

Per the Federal Facility Agreement, please provide approval within 30 calendar days. Written letters of concurrence should be addressed to Fort George G. Meade, Attention: IMME-PWE (George B. Knight), 4216 Roberts Ave, Suite 5115, Fort Meade, Maryland 20755-7068 or george.b.knight7.civ@mail.mil.

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

Sincerely,

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

Enclosure

FINAL

AECOM

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Fort George G. Meade
Anne Arundel County, Maryland

U.S. Army Corps of Engineers
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Acronyms and Abbreviations

AECOM	AECOM Technical Services, Inc.
AEHA	United States Army Environmental Hygiene Agency
ARARs	applicable or relevant and appropriate requirements
bgs	below ground surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COMAR	Code of Maryland Regulation
CSL	Closed Sanitary Landfill
CSM	Conceptual Site Model
EE/CA	Engineering Evaluation / Cost Analysis
EM Federal	EM Federal Corporation
EPA	U.S. Environmental Protection Agency
FGGM	Fort George G. Meade
FS	Feasibility Study
ft	feet
LUCs	Land Use Controls
LTM	Long-Term Monitoring
MDE	Maryland Department of the Environment
NCP	National Contingency Plan
NTCRA	Non-Time-Critical Removal Action
O&M	operation & maintenance
RAB	Restoration Advisory Board
RAOs	Removal action objectives
RI	Remedial Investigation
ROD	Record of Decision
Site	the western 6.2 acres of Cell 3
USACE	U.S. Army Corps of Engineers

Executive Summary

The Baltimore District of the U.S. Army Corps of Engineers (USACE) contracted AECOM Technical Solutions, Inc. (AECOM) under Contract number W912DR-12-D-0014, Delivery Order 0003 to conduct a Remedial Investigation/Feasibility Study (RI/FS) at Cell 3 of the Closed Sanitary Landfill (CSL) at Fort George G. Meade (FGGM), Maryland. The Draft Cell 3 RI/FS (AECOM, 2018) identified:

> "Direct contact with landfill wastes at the surface due to erosion, in part posed by unstable slopes, is the prime threat. Therefore, action is necessary to address the potential for direct contact with exposed landfill wastes by human receptors."

The Army is the lead Agency for FGGM under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and has determined that a Non-Time-Critical Removal Action (NTCRA) is necessary because waste is exposed at or near the surface of Cell 3. The area addressed by this action is the western 6.2 acres of Cell 3; the eastern 31.6 acres of Cell 3 is being managed under a separate contract. The NTCRA process places emphasis on conducting an Engineering Evaluation / Cost Analysis (EE/CA).

The basis for drafting this EE/CA and proceeding with a removal action is the National Contingency Plan (NCP). Section 300.415(b)(2) of the NCP lists eight criteria to determine whether a removal action is appropriate. The factor most applicable to current site conditions is 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*. The situation at Cell 3 is the threat to human health and welfare from surface and near surface trash on the western 6.2 acres of Cell 3. Although fencing surrounds the CSL, the gate is not manned when it is open and workers are accessing the site.

NTCRAs are not meant to take the place of a complete site remedial response, including an RI/FS that takes a complete look at a site and arrives at a final Remedial Action that protects human health and the environment. The objective of this NTCRA is to protect the general public from the physical hazards associated with waste disposed of at Cell 3 while the RI/FS for Cell 3 proceeds to determine if a more permanent remedial action is needed.

Cell 3 is located in the southeast corner of FGGM, in the northern section of the CSL. The landfill was covered with 2-feet of final cover material in 1976, and Cell 3 has been inactive since; however, due to erosion and human activity on Cell 3, trash is now exposed at or near the surface.

The following removal action objectives (RAOs) were developed for the western 6.2 acres of Cell 3: 1) to prevent direct contact by current and future human receptors with waste materials and 2) to control surface water runoff and erosion.

Three removal alternatives are evaluated in the EE/CA: Alternative 1: no action; Alternative 2: Repair and Maintenance of the Existing Two-Foot Soil Cover; and Alternative 3: Installation of an Impermeable Cap.

Based on a comparison of effectiveness, implementability, and cost, the recommended alternative for the NTCRA for the western 6.2 acres of Cell 3 is Alternative 2: Repair and Maintenance of the Existing Two-Foot Soil Cover. Alternative 2 provides the best permanence and long term effectiveness in meeting the RAOs; it has less technical implementation challenges than Alternative 3; it will require less labor, equipment, material, and time than Alternative 3; and it is easier to implement and less expensive than Alternative 3.

1. Introduction

The Baltimore District of the U.S. Army Corps of Engineers (USACE) contracted AECOM Technical Solutions, Inc. (AECOM) under Contract number W912DR-12-D-0014, Delivery Order 0003 to conduct a Remedial Investigation/Feasibility Study (RI/FS) of Cell 3 (FGGM-97) at the Closed Sanitary Landfill (CSL) at Fort George G. Meade (FGGM), Maryland. The Draft Cell 3 RI/FS (AECOM, 2018) identified:

“Direct contact with landfill wastes at the surface due to erosion, in part posed by unstable slopes, is the prime threat. Therefore, action is necessary to address the potential for direct contact with exposed landfill wastes by human receptors.” The Army is the lead Agency for FGGM under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and has determined that a Non-Time-Critical Removal Action (NTCRA) is necessary because waste is exposed at or near the surface of the western 6.2 acres of Cell 3. The area addressed by this action is the western 6.2 acres of Cell 3; the eastern 31.6 acres of Cell 3 is being managed under a separate contract. The western 6.2 acres of Cell 3 will alternatively be called the “Site.” Work on the eastern 31.6 acres of Cell 3 is being performed under a separate contract and is not part of this EE/CA. The eastern portion of Cell 3 contains active soil stockpiles used to stockpile clean soil for use in other areas of FGGM and includes surficial land disturbances to maintain the soil stockpiles. Soil stockpile construction activities are being performed in accordance with the National Pollution Discharge Elimination System Permit MDRCBF02X and Sediment and Erosion Control Plan 15-SF-0207. A stormwater management pond and associated features are located within the eastern portion of Cell 3.

The NTCRA process places emphasis on conducting an Engineering Evaluation / Cost Analysis (EE/CA). Section 1.2 of the U.S. Environmental Protection Agency (EPA) NTCRA guidance (USEPA, 1993) states: "The goals of the EE/CA are to identify the objectives of the removal action and to analyze the effectiveness, implementability, and cost of various alternatives that may satisfy these objectives." Thus, an EE/CA serves an analogous function to, but is more streamlined than, the RI/FS conducted for remedial actions. The results of the EE/CA and EPA’s response decision are summarized in an Action Memorandum. This EE/CA evaluates proposed actions to remove the threat to human health and welfare from exposed waste.

The basis for drafting this EE/CA and proceeding with a removal action is the National Contingency Plan (NCP). Section 300.415(b)(4) of the NCP states that “Whenever a planning period of at least six months exists before on-site activities must be initiated, and the lead agency determines, based on a site evaluation, that a removal action is appropriate: (i) The lead agency shall conduct an EE/CA or its equivalent.” Section 300.415(b)(2) of the NCP lists eight criteria to determine whether a removal action is appropriate. The factor most applicable to current Site conditions is 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*. The situation at Cell 3 is the threat to human health and welfare from waste exposed at or near the surface of Cell 3. CERCLA and the NCP require removal actions, to the extent practicable, contribute to

the efficient performance of any anticipated long-term remedial action with respect to the release or threatened release concerned.

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.

2. Site Characterization

This section provides a description of the Site and related background information including: site location; landfill operation; topography; surrounding land use; and previous removal actions conducted at the Site. This section also includes a discussion of the nature and extent of the contamination and a streamlined risk evaluation.

2.1 Site Description and Background

FGGM is located midway between the cities of Baltimore, Maryland, and Washington D.C. in Anne Arundel County, Maryland, as shown in **Figure 2-1**. FGGM became an Army installation in 1917, and at present the installation is 5,067 acres. The current installation boundaries encompass the area previously referred to as the cantonment area, which is used for administrative, recreational, and housing facilities. With over 115 partner organizations, FGGM supports a wide array of organizations including the Army, Navy, Air Force, Marines, Coast Guard, National Security Agency, and the U.S. Cyber Command with fulfilling their missions. FGGM contains approximately 65.5 miles of paved roads, 3.3 miles of secondary roads, and about 1,300 buildings.

Cell 3 is 37.8 acres in size and is located in the southeast corner of FGGM, in the northern section of the CSL (**Figure 2-1**). The CSL is comprised of Cell 1, Cell 2, and Cell 3. Cells 1 and 2 are located south of Cell 3 (**Figure 2-1**). Cell 1 and Cell 2 cover approximately 46 and 24 acres, respectively. Cell 3 encompasses approximately 38 acres. This EE/CA focuses on the western 6.2 acres of Cell 3 (**Figure 2-2**). The eastern portion of Cell 3 contains active soil stockpiles and is being managed under a separate contract. The majority of the eastern 31.6 acres of Cell 3 is overlain with up to 20 feet of soil from various soil stockpiles, the remainder is overlain by erosion and sediment control measures, including stormwater retention basins. Two unpaved roadways are located in the eastern portion of Cell 3, one of those roadways extends through the western 6.2 acres and is paved throughout the western extent where the roadway exits the CSL. Portions of the western 6.2 acres of Cell 3 are overlain by construction debris (concrete and asphalt), trees, and brush. The remainder is open and undeveloped. The western 6.2 acres of Cell 3 is bounded to the north by a power line right-of-way and woods, to the east by the remaining 31.6 acres of Cell 3, to the south by woods, and to the west by woods and wetlands (**Figure 2-2**).

Landfill operations at the CSL began in 1958 using the trench and fill method (EM Federal Corporation [EM Federal], 2007). Unlined trenches extended approximately 10 to 12 feet below ground surface (ft bgs), 600 ft in length and 20 ft in width. Mixed residential, commercial, and nonhazardous wastes were disposed of at the landfill. Refuse was deposited, compacted, and covered with daily cover material. Cell 3 was covered with 2-ft of final cover material in 1976 (United States Army Environmental Hygiene Agency [AEHA], 1990). The area was either seeded with grass or winter wheat, or it was reforested (AEHA, 1990). However, erosion and human activity on Cell 3 has exposed trash at or near the surface. Sanitary landfilling continued at Cells 1 and 2 under a Refuse Disposal Permit (Permit No. 80-02-00-08-A) issued by the Maryland Department of Health and Mental Hygiene (now Maryland Department of the

Environment [MDE]) in 1980. At the time, landfilling operations transitioned from trench and fill to the area fill method (i.e., waste is placed and compacted above the ground surface). The landfill ceased operations in 1996, at which time it began to be referred to as the CSL. Cell 1 was capped and closed between 1995 and 1997, and Cell 2 was capped and closed between 1997 and 1998 (EM Federal, 2007). Cell 3 was closed in 1976 with the placement of a 2-foot soil cover (USAEHA, 1990). Issues strictly associated with the post-closure care of Cells 1 and 2, including landfill cap maintenance and associated groundwater quality monitoring, are being administered by the MDE Division of Solid Waste. A state mandated landfill monitoring program was initiated in March 1994 for Cells 1 and 2 and is ongoing.

2.2 Previous Environmental Studies

There have been several investigations of the CSL or surrounding area that included Cell 3. The portions of those studies relevant to the western 6.2 acres of Cell 3 are described below.

1989 Description of Solid Waste Management Units

As part of Groundwater Quality Survey No. 38-26-1383-90 (AEHA 1990), the AEHA identified, described, and evaluated all solid waste management units at FGGM to determine which areas required further sampling, investigation, or corrective action. The CSL was identified as FGGM 17 – Sanitary Landfill in the assessment and it was documented as including three cells separated by small east-west orientated streams. The total area of the CSL was documented as 130 acres. The survey also confirmed the landfill was covered with 2 ft of clean fill material prior to restoration (i.e., seeding and reforestation), following the transition from the trench fill method to area fill in 1976.

2007 Groundwater Remedial Investigation

Six 25-foot long trenches with depths between four and seven feet below ground surface were installed in the central and eastern portions of Cell 3 during the 2007 CSL Groundwater RI to assess the nature of Cell 3 waste (EM Federal, 2007). None of the trenches were located in the western portion of cell 3.

2009 Methane Investigation

A methane study of the CSL, which included Cell 3, was completed in November 2008 (Plexus Scientific Corporation 2009). Soil gas was monitored in-situ at depths of approximately 5 ft bgs at approximately 50 locations across Cell 3, as well as additional locations throughout the rest of the CSL. Samples were analyzed in the field using a landfill gas meter. Five samples (10-12, 10-11, 10-10, 10-9, 9-8) were located in or near the western portion of Cell 3 (**Figure 2-2**).

Weekly CSL Landfill Gas Monitoring

As part of the CSL Landfill Gas Monitoring Plan (FGGM, 2012), 18 gas monitoring probes were installed at the CSL. One of those probes (MP-14) is located within the western portion of Cell 3 (**Figure 2-2**). Methane readings are recorded weekly. MP-14

has monitored soil gas since 2000 and over that time, there have been sporadic detections of methane that exceeded the lower explosive limit. However, no permanent structures are planned for this part of Cell 3 and MP-14 is over 2,325 feet from the nearest site boundary. Additional methane gas investigations will be performed under a separate contract, which may also include remedial action, if warranted.

2016 Preliminary Data Collection Site Activities at Cell 3

Preliminary data collection activities were completed by AECOM in 2016 and 2017 to help guide the RI/FS of Cell 3 and to help scope a maintenance plan for the Cell 3 soil cover (AECOM, November 2016 and July 2017). Field activities included the following:

- Completion of a geophysical survey using electromagnetics and magnetics methods to delineate the lateral extent of buried waste at Cell 3; and
- Excavation of 75 test pits and eight trenches to confirm the presence of landfill material and to delineate the Cell 3 waste boundary. Test pit locations were selected both inside and outside the inferred landfill boundary.

Portions of the geophysical survey, 19 of the test pits, and one of the trenches were located in the western portion of Cell 3. **Figure 2-2** shows the locations of all current and past data collections points, along with the 19 test pits. **Table 2-1** presents a summary of thickness of soil overburden over trash and the soil, trash, or debris encountered at each test pit location.

Test pitting activities confirmed three different types of debris including household trash, construction debris, and unburied surface debris. The household trash was characterized by paper, glass and ceramic bottles, metal, and miscellaneous organic waste. The construction debris contained mostly concrete, brick, ground asphalt, rebar, tile, metal cables, lumber, and other construction materials. At some locations debris was visible on the ground surface, but subsequent test pits revealed no buried debris. The surface debris contained a mixture of construction debris and household trash. It was noted that the household trash observed at the surface was more recent in nature and contained Styrofoam packing materials and a higher abundance of plastic than the buried waste observed at the Site.

Trash and/or construction debris was observed at or near the ground surface at 14 locations in the western 6.2 acres of Cell 3 (**Figure 2-3** and **Table 2-2**). The trash consisted of fabric, paper, barbed wire, spark plugs, scrap metal, and plastic; and the construction debris consisted of concrete, brick, lumber, tile, metal, cinder block, and asphalt.

2018 Cell 3 RI/FS

The Cell 3 RI field effort was conducted between December 2016 and April 2017. Field activities that occurred on the western 6.2 acres of Cell 3 included the following: excavation of test pits and soil borings to visually document the nature and extent of buried waste and to collect surface and subsurface soil samples; installation and sampling of temporary soil gas monitoring points; installation and development of new monitoring wells and collection of groundwater samples from monitoring wells (**Figure**

2-2). The Draft Cell 3 RI/FS (AECOM, 2018) included a Baseline Human Health Risk Assessment for Cell 3 and a Screening-Level Ecological Risk Assessment for the entire CSL

The Draft Cell 3 RI/FS Report (AECOM, 2018) is currently being reviewed by the stakeholders.

2.3 Source, Nature, and Extent of Contamination

Source, nature, and extent of contamination are discussed in the Draft Cell 3 RI/FS (AECOM, 2018) and summarized in this section. The Draft Cell 3 RI/FS (AECOM, 2018) concluded that action is necessary to address the potential for direct contact with exposed landfill wastes by human receptors; therefore, this section focuses the discussion on trash exposed at or near the ground surface.

Buried waste is present at Cell 3 and surficial trash and debris were identified during implementation of preliminary data collection activities conducted by AECOM (2016, 2017). The type of trash at or near the surface was discussed in Section 2.2 and consists of household trash (fabric, paper, plastic) or construction debris (concrete, asphalt, tile, brick, cinder block, and metal). **Figure 2-3** and **Table 2-2** present the nature and extent of the various types of trash and debris. A fence with a gate surrounds the majority of the CSL. The gate is open and unmanned during the day because there is daily activity at the CSL (weekly methane gas monitoring, semi-annual monitoring well sampling, periodic injection well inspections, and periodic soil stockpile work). Therefore, there is potential human exposure to surficial and near surface trash on the western 6.2 acres of Cell 3. Also, beyond the entrance gate, the perimeter fence is not considered a security feature.

2.4 Analytical Data

Analytical data are discussed in the Draft Cell 3 RI/FS (AECOM, 2018).

2.5 Streamlined Risk Evaluation and Conceptual Site Model

The surface and near surface trash in the western 6.2 acres of Cell 3 pose a risk to human receptors. A Conceptual Site Model (CSM) was developed in order to identify potential exposure pathways and routes of exposure by which receptors may be potentially exposed to surficial and near surface trash. The CSM also evaluates the likelihood, magnitude, and frequency of exposure. The identification of potentially exposed populations (or receptors) is based on knowledge of land-use patterns, available information concerning the activities of nearby populations, and professional judgment regarding typical behavior patterns.

Trash and debris are exposed at or near the surface in the western 6.2 acres of Cell 3, and the CSL has frequent human traffic. The western 6.2 acres of Cell 3 is at the access point to the remainder of the CSL, so all human traffic must traverse the western 6.2 acres of Cell 3 to gain access to the remainder of the CSL. Therefore, there is potential for human exposure to trash on the western 6.2 acres of Cell 3. As indicated in Section

2.3, the gate providing access to the CSL is open and unmanned during the day allowing unlimited access.

The Draft Cell 3 RI/FS (AECOM, 2018) applied the municipal landfill presumptive remedy (USEPA, 1993) for military landfills (USEPA, 1996) to the development of remedial alternatives for Cell 3. USEPA found that certain technologies are routinely and appropriately screened out on the basis of effectiveness, feasibility, or cost (NCP Section 300.430(e)(7)). Based on this analysis, USEPA determined that the alternatives analyzed for a municipal landfill may be limited to the components of a containment remedy (USEPA, 1996):

> "EPA established source containment as the presumptive remedy for municipal landfill sites regulated under CERCLA… The municipal landfill presumptive remedy should also be applied to all appropriate military landfills."

For Cell 3, this includes capping. The application of the municipal landfill presumptive remedy for Cell 3 is appropriate for the wastes handled and disposed of at the CSL; the characteristics of the wastes at Cell 3 are similar to wastes at municipal landfills.

3. Identification of Removal Action Objectives

Removal action objectives (RAOs) are designed to protect human health and the environment. The development of RAOs is the first step in the formulation and development of removal alternatives.

The following RAOs were developed for the western 6.2 acres of Cell 3: 1) to prevent direct contact by current and future human receptors with waste materials and 2) to control surface water runoff and erosion.

The Draft Cell 3 RI/FS (AECOM, 2018) utilized the municipal landfill presumptive remedy during the development of remedial alternatives for Cell 3 in accordance with the Application of the CERCLA Municipal Landfill Presumptive Remedy to Military Landfills (USEPA, 1996). The presumptive remedy process includes streamlining the FS by developing a focused FS that analyzes only alternatives consisting of appropriate components of the presumptive remedy.

3.1 Statutory Limits on Removal Actions

This is a DoD-funded removal action and therefore, no statutory limits are applicable.

3.2 Determination of Removal Scope

To achieve the RAOs, the scope of the removal action alternatives evaluation will focus on trash at or near the ground surface. The scope of the removal action is to add soil cover in areas of the western 6.2 acres of Cell 3 where trash or debris is exposed within the upper 2-feet of the ground surface. This is not inconsistent with the potential long-term remediation of the Site. The Draft Cell 3 RI/FS (AECOM, 2018) has evaluated an option to maintain the existing 2-foot soil cover on Cell 3 by adding soil in areas where the cover has eroded and contains less than 2-feet and to slope the cover to allow for drainage. EPA's EE/CA guidance states that appropriate federal or state applicable or relevant and appropriate requirements (ARARs) should be identified as part of defining the scope of work for the removal action. Since the Draft Cell 3 RI/FS (AECOM, 2018) indicated there is no chemical risk at the site (there are direct contact risks), there are no chemical-specific ARARs. No known historic, archaeological, or cultural resources are present on the site; therefore, no potential location-specific ARARs were identified on the basis of these resources. **Table 3-1** summarizes applicable federal and state action-specific ARARs. .

The objective of taking a removal action at the western portion of Cell 3 is to protect the general public from the physical hazards associated with waste disposed of in Cell 3 while the preparation of the RI/FS, Proposed Plan, and Record of Decision (ROD) for Cell 3 proceeds. The Draft Cell 3 RI/FS (AECOM, 2018) showed that waste has been found exposed at and near the surface of Cell 3.

The goal of this removal action, in accordance with 40 CFR 300.415(b)(2)(i),(iii), and (viii) is to:

- minimize the potential contact with trash at or near the land surface on the western 6.2 acres of Cell 3 by human receptors who traverse across the Site, and
- contribute to the efficient performance of any anticipated long-term remedial action at Cell 3.

A removal action is intended to expeditiously mitigate risks to human health and the environmental, but is not required, or necessarily intended, to be the final action. The action implemented as a result of this EE/CA will be evaluated in the ongoing Cell 3 RI/FS (AECOM, 2018), to determine if additional, or different, actions are needed to permanently mitigate the risks identified.

3.3 Determination of Removal Schedule

The key components of the removal action are anticipated to occur as follows (see **Figure 3-1** for a detailed schedule):

- Announcement within a local newspaper declaring that the EE/CA is available for review and comment on or near – 5/22/2019 and 5/29/2019;
- Public Comment Period on or near – 5/22/2019 to 6/22/2019;
- Final Action Memorandum on or near – 9/13/2019;
- Final Design for Repair of 2-ft Soil Cover on or near – 9/3/2019;
- Start of Fieldwork – fourth quarter 2019;
- Substantial completion of field work – first quarter 2020; and
- Final Submission of Interim Removal Action Report – second quarter 2020.

4. Identification and Analysis of Removal Action Alternatives

This section presents the identification and screening of potentially applicable removal technologies for addressing the exposed waste in the western 6.2 acres of Cell 3. The following factors were determined be the most relevant and likely have the greatest impact at the Site: (i) to prevent actual or potential exposure to nearby human populations~~,~~ from exposed trash, and (ii) to prevent actual or potential exposure to exposed trash that may pose a threat of release until a final remedy is chosen and implemented.

Three removal 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.

This EE/CA is not a detailed design document. The exact locations and site specific details of the selected Alternative will be determined and finalized in the subsequent design and construction documents.

4.1 Identification of Possible Removal Alternatives

This section presents removal alternatives for the western portion of Cell 3.

4.1.1 Alternative 1: No Action

Under Alternative 1, no corrective action would be employed. This alternative would not address direct contact with waste materials by current and future human receptors. 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.

4.1.2 Alternative 2: Repair and Maintenance of the Existing Two-Foot Soil Cover

Alternative 2 includes the repair of the existing cover over the western 6.2 acres of Cell 3 to confirm a 2-foot thick soil cover is present over the western 6.2 acres of Cell 3; promote positive drainage; control erosion; and manage surface water infiltration, run-on, and runoff. The details of the cover repair are provided in the cost summary **Table 4-1**.

The FS will evaluate whether land use controls (LUCs), annual inspections and periodic repair as part of the operation & maintenance (O&M), and long-term monitoring (LTM) of groundwater and surface water will be required.

4.1.3 Alternative 3: Installation of an Impermeable Cap

Alternative 3 consists of installation of an impermeable cap on the western 6.2 acres of Cell 3. The details of the cap are provided in the cost summary **Table 4-2**. Similar to

Alternative 2, the FS will evaluate whether LUCs, annual inspections and periodic repair as part of the O&M, and LTM of groundwater and surface water will be required.

4.2 Analysis Criteria of Possible Removal 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 RAOs 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 removal 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 RAOs have been met. This criterion considers the residuals following completion of the Alternative, expected duration of the Alternative, and the degree of controls required to ensure protectiveness of the Alternative.

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. The implementability evaluation criteria are defined in the NCP [40 CFR 300 (e)(7)(ii)].

Technical feasibility is evaluated based on constructability, reliability (e.g., demonstrated performance and operation), maintenance, and timeliness/schedule of implementation.

Administrative feasibility considers the degree of coordination required by the regulatory agencies. It considers permits required, easements or right-of-ways required, impact on adjoining property, ability to impose institutional controls, and likelihood of obtaining an exemption from statutory limits (if needed).

This availability of services and materials is evaluated based on the availability of necessary equipment and specialists and the availability of prospective technologies.

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 2019 costs. The cost

estimates were developed based on vendor rates, professional experience, and accumulation of cost for similar projects.

4.3 Individual Analysis of Possible Removal 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

The no-action alternative would not reduce, mitigate, or otherwise prevent direct contact with waste materials by current and future receptors. No action-specific ARARs would be triggered under the no-action alternative. Buried waste would remain in place, and no actions would be implemented to mitigate or prevent direct contact by current and future human receptors with waste materials. This alternative would not employ any treatment that would reduce the toxicity, mobility, or volume of buried waste.

4.3.1.2 Implementability

There are no technical implementability concerns posed by this option, because no actions would be undertaken. However, it is unlikely that project stakeholders (including regulatory authorities) would administratively approve a no-action alternative, as waste would remain in place and no controls would be employed to prevent direct contact with waste materials or control erosion of the existing cover. Implementation of this alternative does not pose additional risks to the community, the workers, or the environment because there are no removal activities associated with it. However, it does not mitigate any existing or potential future risks.

4.3.1.3 Cost

There are no costs associated with Alternative 1.

4.3.2 Alternative 2 – Repair and Maintenance of Existing Soil Cover

Alternative 2 includes repairs of the existing cover so that at least 2 feet of soil covers the western portion of Cell 3 and the cover is sloped so that precipitation can drain off the cover.

4.3.2.1 Effectiveness

Alternative 2 would be protective of human health and the environment. Repair of the existing soil cover over the western 6.2 acres of Cell 3 would eliminate direct contact with waste materials and by controlling erosion and conducting routine inspections, prevent future contact with waste material.

Several action-specific ARARs would be triggered under this alternative (refer to **Table 3-1**). Because the surface area of the Limit of Disturbance (the area that would be disturbed by earth moving activity, it is the boundary within which all construction, materials storage, grading, landscaping and related activities shall occur) will be greater than 5,000 square feet and the volume of soil to be managed on-site exceeds the 100 cubic yard threshold per Code of Maryland Regulation (COMAR) 26.17.01.05, erosion and sediment control ARARs will be triggered. These ARARs would be met through implementation of erosion and sediment controls, as warranted, and specified in COMAR 26.17.11. Dust control measures would also be employed during completion of maintenance activities, in accordance with the requirements outlined in COMAR 26.11.06.03(D).

Under Alternative 2, buried waste would remain in place but contained beneath a 2-foot soil cover. Long-term effectiveness and permanence will be addressed in the FS (AECOM, 2018).

Implementation of Alternative 2 would not reduce the toxicity or volume of buried waste at the site. It does provide sufficient measures to contain buried waste at the site, thus, providing a reduction in the physical mobility of buried waste. No measures would be employed to prevent mobilization of impacts from buried waste via groundwater or surface water runoff. This alternative does not satisfy the statutory preference for employing treatment as a principal element.

Alternative 2 would pose moderate short-term risks to current site workers and construction workers due to increased traffic through FGGM and on to the site during construction of the cap (i.e., during the delivery of equipment and materials). Risks would be mitigated during the design phase though development of a traffic control plan, application of dust suppression techniques, and development of a health and safety plan. The duration of construction activities is anticipated to be one to two months.

4.3.2.2 Implementability

Alternative 2 is technically feasible and would utilize standard construction equipment and methods for the repair and maintenance of the existing two-foot soil cover. There are no technical implementability concerns associated with cover construction at Cell 3, as there are no topographic expressions or other site conditions present that would pose design challenges. Installation of erosion and sediment controls would be required. Significant administrative coordination with FGGM and other entities would be required during design, site preparation, and installation of the impermeable cap.

4.3.2.3 Cost

The estimated present worth cost to implement Alternative 2 would be $1,090,931. The cost estimate and detailed assumptions associated with the implementation of Alternative 2 are presented in **Table 4-1**.

4.3.3 Alternative 3 - Installation of an Impermeable Cap

Alternative 3 would include installation of an impermeable cap across the western 6.2 acres of Cell 3.

4.3.3.1 Effectiveness

Alternative 3 would be protective of human health and the environment. Installation of an impermeable cap over the western 6.2 acres of Cell 3 would eliminate direct contact with waste materials and by controlling erosion and conducting routine inspections, prevent future contact with waste materials.

Two action-specific ARARs would be triggered under this alternative (refer to **Table 3-1**). Cap installation would disturb, at a minimum, the western 6.2 acres (270,072 square feet), thus, Maryland's erosion and sediment control ARARs would be triggered, as greater than 5,000 square feet would be disturbed during cap installation. These ARARs would be met through implementation of erosion and sediment controls, as warranted, and specified in COMAR 26.17.11. Dust control measures would also be employed during installation of the cap, in accordance with the requirements outlined in COMAR 26.11.06.03(D).

Under Alternative 3, buried waste would remain in place but contained beneath an impermeable cap. Long-term effectiveness and permanence will be addressed in the FS.

Alternative 3 would not reduce the toxicity or volume of buried waste at the site. It does provide a reduction in the physical mobility of buried waste. No measures would be employed to prevent mobilization of impacts from buried waste via groundwater or surface water runoff. This alternative does not satisfy the statutory preference for employing treatment as a principal element.

Alternative 3 would pose moderate short-term risks to current site workers and construction workers due to increased traffic through FGGM and on to the site during construction of the cap (i.e., during the delivery of equipment and materials). Risks would be mitigated during the design phase though development of a traffic control plan, application of dust suppression techniques, and development of a health and safety plan. The duration of construction activities is anticipated to be one to two months.

4.3.3.2 Implementability

Alternative 3 is technically feasible and would utilize standard construction equipment and methods for the installation of the impermeable cap. There are no technical implementability concerns associated with cap construction at Cell 3, as there are no topographic expressions or other site conditions present that would pose design challenges. Installation of erosion and sediment controls would be required. Significant administrative coordination with FGGM and other entities would be required during design, site preparation, and installation of the impermeable cap.

4.3.3.3 Cost

The estimated present worth cost to implement Alternative 3 is $5,034,100. The costs and detailed assumptions associated with the implementation of Alternative 3 are presented in **Table 4-2**.

5. Comparative Analysis of Removal Action Alternatives

Consistent with EE/CA guidance, each alternative is evaluated with respect to its effectiveness, implementability, and cost.

5.1 Effectiveness

None of the alternatives satisfy the statutory preference for employing treatment as a principal element. Under each of the alternatives, buried waste would remain in place, and no measures would be employed to reduce the toxicity or volume of buried waste at the site.

Alternative 1 would be the least effective of the three alternatives. It would not reduce, mitigate, or otherwise prevent direct contact with waste materials by current and future receptors. The no-action alternative would not provide any mechanisms to achieve RAOs. Therefore, this No-Action alternative is not effective in the long-term.

The effectiveness of Alternatives 2 and 3 is comparable with respect to the following:

- Protection of human health and the environment, they both would prevent direct contact with waste materials.
-
- Both would trigger erosion and sediment control ARARs specified in COMAR 26.17.11.
- ARAR Dust control measures would be employed in accordance with the requirements outlined in COMAR 26.11.06.03(D).
- Both would pose moderate short-term risks to current site workers and construction workers due to increased traffic through FGGM and on to the site during construction.
- Both would reduce the physical mobility of buried waste through containment measures coupled with routine inspections, repair, and implementation of LUCs to restrict intrusive activities and ensure the continued protection of human health.

While Alternatives 2 and 3 would include different containment measures, the ROD will determine effectiveness in the long term. Alternatives 2 and 3 are equally effective in preventing direct contact with waste materials.

5.2 Implementability

For Alternatives 2 and 3, significant administrative coordination with FGGM and other entities would be required during design, site preparation, and installation of the cover or cap. Alternative 1 is more administratively implementable; however, it is unlikely that project stakeholders would administratively approve a no-action alternative, as no controls would be employed to prevent direct contact with waste materials.

Alternative 1 is the most technically implementable because there are no actions associated with the alternative. Both Alternatives 2 and 3 would utilize standard construction equipment and methods. Alternative 3 presents the greatest technical implementation challenges since it would require the installation of several layers of low permeability material and drainage layers.

While there are no technical implementation challenges with Alternative 1, it is not implementable because it is administratively an untenable alternative. Alternative 3 is the least implementable; it will require more labor, equipment, material, and time. Thus, Alternative 2 is the most implementable alternative.

5.3 Cost

Based on the present worth estimates of the opinion of probable costs for the removal alternatives (**Tables 4-1** and **4-2**), Alternative 3 would be the costliest alternative, followed by Alternative 2. The additional costs associated with Alternative 3 would not increase the degree of protection offered by this alternative. Alternative 3 would offer the same reduction and prevention of direct contact with waste materials by current and future receptors as Alternative 2.

As is indicated in Section 4.3, Alternative 1 is the lowest cost alternative at $0. Alternative 2 is the next lowest cost, followed by Alternative 3 which is the highest cost. Alternative 2 is approximately $4M less than Alternative 3.

While there would be no costs associated with Alternative 1, this zero-cost alternative would not employ any mechanisms to prevent direct contact with waste materials. Consequently, Alternative 2 is the lowest cost alternative that satisfies the RAOs.

6. Recommended Removal Action Alternative

The recommended alternative for the NTCRA for the western 6.2 acres of Cell 3 is Alternative 2: Repair and Maintenance of the Existing Two-Foot Soil Cover. Alternative 2 provides the best permanence and long term effectiveness in meeting the RAOs, it has less technical implementation challenges than Alternative 3; it will require less labor, equipment, material, and time than Alternative 3; and it is easier to implement and less expensive than Alternative 3. Alternative 2 provides the best balance of all options considering the overarching mandate to protect human health and the environment, and achieve the best combination of effectiveness, implementability, and cost effectiveness. In addition, Alternative 2 is likely not incompatible with the final Cell 3 RI/FS remedy selected.

The proposed Alternative is the repair/maintenance of the existing 2-foot soil cover on the western 6.2 acres of Cell 3. This will consist of adding soil to areas where trash is exposed and the existing cover is less than 2-feet thick and assuring that the cover slopes adequately so that precipitation can drain off the cover. Prior to adding soil to the existing cover, surficial debris (e.g., concrete and asphalt) that cannot be repurposed as base material will be removed and disposed offsite.

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 Interim Removal Action Report.
- Thirty-day public comment period – The Final EE/CA will be reproduced in full and placed within the Anne Arundel County Public Library, Odenton Regional Branch, 1325 Annapolis Road, Odenton, Maryland 21113. 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 (RAB) meetings are held for FGGM. 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 RAB. Significant comments generated during the RAB meetings will also be documented and addressed within the written response to public comments. Additionally, this document will be posted on the FGGM website; https://www.ftmeade.army.mil/directorates/dpw/environment/cleanup/siterecord/index.html.

8. References

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CLIENT	USACE, Baltimore District			
NOTES	Outlines of sites are arbitrary. Map Source: MD iMAP, DoIT			
REVISION NO	0	GIS BY	MS	1/23/2019
SCALE	1:33,600	CHK BY	JK	1/23/2019
		PM	JK	1/23/2019

Location of Cell 3 and Closed Sanitary Landfill on Fort George G. Meade

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure 2-1

Q:\Projects\ENV\GEARS\GEO\MAES 2012 Unrestricted\Fort Meade\E. Data Management\GIS\MXDs\Chisholm_6th\March2017\ Fig_1_FGGM_CSL_and_Cell3.mxd

Legend

- Existing Monitoring Well
- Weekly Methane Monitoring Point
- Boundary of Western Portion of Cell 3
- U.S. Jurisdictional Wetlands
- 2016 AECOM Test Pit
- 2017 AECOM Trench
- 2017 RI Test Pit*
- 2017 RI Soil Boring/ Soil Gas Sample Location*
- 2009 Methane Investigation*
- Ft. Meade Wetlands

*Location is approximate

N

SCALE 1:1200

0 100 200 400 ft

TITLE **Sample Locations on or Near the Western Portion of Cell 3**

LOCATION Cell 3 Landfill, Ft. Meade, MD

CLIENT U.S. Army Corps of Engineers

NOTES

AECOM
12420 Milestone Center Drive
Germantown, MD 20876
301-820-3000

Figure 2-2

Q:\Projects\ENV\GEARS\GEO\MAES 2012 Unrestricted\Fort Meade\E. Data Management\Surfer\Plots\Cell 3\Cell 3 2018\Figure 2-2_Cell 3 Western Portion.srf

Legend

- 2016 AECOM Test Pit
- 2016 AECOM Test Pit - Trash Near Ground Surface
- 2017 AECOM Trench - Trash Near Ground Surface
- Boundary of Western Portion of Cell 3

N

SCALE 1:1200

0 100 200 400 ft

TITLE	**Location of Trash and/or Debris on or Near the Ground Surface in the Western Portion of Cell 3**
LOCATION	Cell 3 Landfill, Ft. Meade, MD
CLIENT	U.S. Army Corps of Engineers
NOTES	

AECOM
12420 Milestone Center Drive
Germantown, MD 20876
301-820-3000

Figure 2-3

Q:\Projects\ENV\GEARS\GEO\MAES 2012 Unrestricted\Fort Meade\E. Data Management\Surfer\Plots\Cell 3\Cell 3 2018\Figure 2-3_Cell 3 Trash Near Ground.srf

Figure 3-1 Anticipated Removal Action Schedule for the Western Portion of Cell 3

	Preparation or Field Work			Draft [1]			Draft Final [2]			Final [3]			Publict Comment [4]		
	From	Dura-tion	To	From	Dura-tion	To	From	Dura-tion	To	From	Dura-tion	To	From	Dura-tion	To
Prepare an Engineering Evaluation / Cost Analysis (EE/CA)				02/22/19	42	04/05/19				05/16/19	1	05/17/19	05/22/19	30	06/21/19
Prepare an Action Memo				06/21/19	40	07/31/19	08/01/19	32	09/02/19	09/03/19	10	09/13/19			
Prepare design plan for 2-foot soil cover repairs.				05/29/19	70	07/28/19				08/24/19	10	09/03/19			
Prepare Erosion and Sediment Control Plan				05/29/19	70	07/28/19				08/24/19	10	09/03/19			
Install Erosion and Sediment Control measures	09/13/19	14	09/27/19												
Clear and grub trees and brush.	09/27/19	14	10/11/19												
Survey site for control for soil placement	10/11/19	2	10/13/19												
Spread and grade soil and construct drainage structures.	10/13/19	90	01/11/20												
Add topsoil, seed, and straw to disturbed areas.	01/11/20	21	02/01/20												
Final topographic survey of Cell 3.	02/01/20	7	02/08/20												
Remove and properly dispose of any remaining erosion and sediment controls.	02/08/20	7	02/15/20												
Prepare and get approval of a Interim Removal Action Report				04/20/20	70	06/29/20	06/30/20	40	08/09/20	08/10/20	10	08/20/20			

(1) Will recommend 30 day Regulator review for EE/CA and AM. 60-day review for all other documents. Includes 10 days to respond to comments

(2) Includes 30 days for Regulator review and 10 days to respond to comments

(3) Includes 10 days for Regulator to give final approval

(4) Includes 30 days for public review and 20 days to address comments

Table 2-1: Summary of Thickness of Soil Overburden and Trash Encountered at Each 2016 Test Pit and 2017 Trench Location on The Western Portion of Cell 3

Test Pit/ Trench ID	Date	Soil Cover Thickness (ft)	Notes	Location in Trench
TP-01	3/15/2016	N/A	Native soil - silty sand to sand	
TP-02	3/15/2016	3.58	Mound with topsoil	
TP-03	3/15/2016	**1.42**	Fabric and paper trash	
TP-04	3/15/2016	**1.33**	Fill on top of trash	
TP-05	3/15/2016	2	Fill on top of trash	
TP-06	3/15/2016	2.5	Fill on top of native soil	
TP-07	3/15/2016	**0.13**	Trash near surface	
TP-08	3/15/2016	**1**	Edge of landfill, trash on south side of excavation	
TP-36	3/16/2016	2	Fill on top of trash, asphalt road base at 24"	
TP-37	3/16/2016	**0.67**	Concrete and brick construction debris at 8"	
TP-38	3/16/2016	**0.67**	Concrete constuction debris at 8"	
TP-39	3/16/2016	**0**	Concrete and asphalt construction debris	
TP-40	3/16/2016	**0**	Concrete, lumber, and asphalt construction debris	
TP-41	3/16/2016	3.25	Fill on top of native-appearing sand	
TP-42	3/16/2016	**1**	Concrete constuction debris	
TP-43	3/17/2016	N/A	Native soil	
TP-44	3/17/2016	**1.92**	Concrete, asphalt, tile, and metal construction debris	
TP-45	3/17/2016	N/A	Native soil	
TP-46	3/17/2016	N/A	Native soil	
TP-47	3/17/2016	**0**	Fill material mixed with rock, soil, concrete, and plastic	
TP-48	3/17/2016	**1.17**	Fill on top of concrete, asphalt, brick, and cinder block debris	
TP-49	3/17/2016	3	Fill on top of trash	
TP-50	3/17/2016	**0**	Fill mixed with asphalt construction debris	
TP-51	3/17/2016	**1.58**	Fill on top of asphalt and concrete construction debris	
TP-68	3/18/2016	N/A	Native soil	
TP-69	3/18/2016	N/A	Native soil	
TP-70	3/18/2016	4.58	Ground asphalt, sand, and gravel fill on top of trash	
TP-75	3/18/2016	2.5	Fill on top of trash	
TR-01	1/24/2017	4.5	Fill on top of native soil characteristic of Upper Patapsco Sand (poorly-graded sand with silt)	North
	1/24/2017	5	Landfill boundary	4 feet South of North Sidewall
	1/24/2017	**1.7**	Fill on top of trash (barbed wire, spark plugs, scrap metal, paper)	South

Notes: All units measured in feet below ground surface unless otherwise specified
ft = feet Bold numbers are less than 2-foot thick soil cover

Table 2-2: Summary of 2016 Test Pit and 2017 Trench Locations on The Western Portion of Cell 3 That Encountered Trash

Test Pit/ Trench ID	Date	Soil Cover Thickness (ft)	Notes	Location in Trench
TP-03	3/15/2016	**1.42**	Fabric and paper trash	
TP-04	3/15/2016	**1.33**	Fill on top of trash	
TP-07	3/15/2016	**0.13**	Trash near surface	
TP-08	3/15/2016	**1**	Edge of landfill, trash on south side of excavation	
TP-37	3/16/2016	**0.67**	Concrete and brick construction debris at 8"	
TP-38	3/16/2016	**0.67**	Concrete constuction debris at 8"	
TP-39	3/16/2016	**0**	Concrete and asphalt construction debris	
TP-40	3/16/2016	**0**	Concrete, lumber, and asphalt construction debris	
TP-42	3/16/2016	**1**	Concrete constuction debris	
TP-44	3/17/2016	**1.92**	Concrete, asphalt, tile, and metal construction debris	
TP-47	3/17/2016	**0**	Fill material mixed with rock, soil, concrete, and plastic	
TP-48	3/17/2016	**1.17**	Fill on top of concrete, asphalt, brick, and cinder block debris	
TP-50	3/17/2016	**0**	Fill mixed with asphalt construction debris	
TR-01	1/24/2017	**1.7**	Fill on top of trash (barbed wire, spark plugs, scrap metal, paper)	South

Notes: All units measured in feet below ground surface unless otherwise specified
ft = feet Bold numbers are less than 2-foot thick soil cover

Table 3-1: Action-Specific ARARs and TBC Guidance
for the NTCRA at the Western 6.2 Acres of Cell 3 of the Closed Sanitary Landfill, Fort Meade, Maryland

Activity	Authority	Regulation	Synopsis	Status
Containment of Buried Waste (Cap/Cover Placement)	State Regulatory Requirement	Erosion and Sediment Control, Code of Maryland Regulations (COMAR) 26.17.01.11	This regulation is applicable when excavation, backfilling, and regrading of soil is contemplated. It establishes procedures to prevent erosion through runoff and discharge of sediment in water bodies. Construction projects that disturb in excess of 5,000 square feet or more than 100 cubic yards of earth must prepare (and apply controls in accordance with) an erosion and sediment control (E&SC) plan and retain a copy of the E&SC plan at the construction site [COMAR 26.17.01.05(2)]. The substantive requirements for standards and specifications for the design and implementation of E&SC and stormwater management are provided in the handbook titled 2011 Maryland Standards and Specifications for Soil Erosion and Sediment Control as identified in COMAR 26.17.01.11(A). The Maryland Department of the Environment (MDE) designed the standards and specifications presented in the handbook to comply with 40 CFR 450.21(a)(1 through 8), (b), and (f). Further, construction projects that disturb greater than 1.0 acre, but less than 150 acres, must meet the substantive requirements of the General Permit for Stormwater Associated with Construction Activities.	Relevant and Appropriate
	State Regulatory Requirement	Particulate Matter from Materials Handling and Construction, COMAR 26.11.06.03(D)(1 through 2, 4 through 6)	This regulation mandates that reasonable precautions (e.g., dust control measures) to prevent particulate matter from becoming airborne must be undertaken during construction.	Relevant and Appropriate

Acronyms:
ARAR- Applicable or Relevant and Appropriate Requirement
CFR - Code of Federal Regulations
COMAR - Code of Maryland Regulations
E&SC - Erosion and Sediment Control
MCL - Maximum Contaminant Level
MCLG - Maximum Contaminant Level Goal
MDE - Maryland Department of the Environment
mg/L - milligram per liter
OSHA - Occupational Safety and Health Administration RCRA - Resource Conservation and Recovery Act
TBC - To Be Considered
U.S.C. - United States Code
USEPA - United States Environmental Protection Agency

Table 4-1: Planning Cost Estimate Summary for Alternative 2: Repair and Maintenance of the Existing Two-Foot Soil Cover on the Western 6.2 Acres of Cell 3 of the Closed Sanitary Landfill, Fort Meade, Maryland

Summary : This alternative consists of the repair and maintenance of the existing two-foot soil cover.

Approximate Timeframe : 8 months for plan approval, 4 months for implementation, and 1 year for performance monitoring.

Alternative Description

Under Alternative 2, the existing soil cover on the western 6.2 acres of Cell 3 will be repaired.

Clean soil will be added to areas where less than 2-feet of cover exist and the soil will be sloped a minimum of 4 degrees to promote drainage off the cover.

The existing wooded area and vegetation would be removed.

Surface water runoff generated from the cover repair and maintenance would be managed in a manner that prevents erosion and minimizes impacts to existing site tributaries. Management features include vegetated swales and retention areas, which will provide erosion control, water quality control, and stormwater runoff rate control.

Perimeter stormwater management features would be constructed to provide conveyance to the detention basin for stormwater quality and rate control of stormwater runoff from the cover area.

Assumptions:

Area of Western Portion of Cell 3 = 270,072 square feet (SF) = 30,008 square yards (SY) = 6.2 acres; cover perimeter = 3,000 linear feet (LF).

Vegetated stormwater management swales would be constructed along the perimeter of the cover with riprap energy dissipaters. Vegetated swales would convert runoff to stormwater detention basins.

Based on aerial photographs and site visits, 5.5 acres of the western portion of Cell 3 would need to be cleared of vegetation in order to complete the 2-foot soil cover maintenance.

The swelling factor for soils is assumed to be 30%.

All imported fill required to repair and maintain the cover would be obtained from FGGM's soil stockpiles.

DESCRIPTION	QUANTITY	UNIT	RATE	TOTAL COST	ESTIMATE/SOURCE NOTES
CAPITAL COSTS					
Planning, Survey, and Mobilization					
Topographic survey	4	day	$1,500	$6,000	Assumes detailed field survey to determine current grades and conditions, based on professional experience of similar projects.
Mobilization (10% of cost for field tasks)	1	Lump Sum	$57,793	$57,793	Mobilization of materials, equipment, and staff to the site. Accounts for 10% of capital costs, excluding planning, reporting, and contingency costs.
Subtotal				$63,793	
Site Preparation					
Utility Locate to clear site prior to field work	1	Day	$1,600	$1,600	Vendor Rate; utility locate necessary to break ground and begin work at site.
Stabilized construction entrance	1	Each	$5,000	$5,000	Professional experience and accumulation of cost for similar projects.
Temporary Access Road	500	Linear Feet (LF)	$17	$8,500	Assumes 20-foot wide access road consisting of woven geotextile overlain with 6-inch dense graded aggregate
Silt fence	3000	LF	$5	$15,000	Perimeter super silt fence installed as E&S control. Assume site perimeter length and 10% waste.
Establish Staging and Laydown Area	1	Lump Sum	$10,000	$10,000	Based on professional experience and accumulation of cost for similar projects.
Clear and Grub	5.5	acre	$5,000	$27,500	Assume approximately 5.5 acres, which consist of 2.8 acres of trees and 2.7 acres of brush based on aerial photos; unusable vegetation/stumps will be disposed of offsite at a C&D landfill.
Clean Fill Sampling	3	Each	$750	$2,250	Based on professional experience and accumulation of cost for similar projects. 1 sample per 2000 cubic yards (CY) of soil.
Subtotal				$69,850	
Repair and Maintenance of Existing Cover					
Certified Clean Fill	25007	Cubic Yard	$1.50	$37,510	Based on an 18-inch-thick layer over the cap surface area. Account for swell factor and assumes procurement and installation. Fill obtained from FGGM stockpile.
Compaction	25007	Cubic Yard	$1.50	$37,510	Compaction of imported fill to achieve design subgrades. Assumes fill is obtained at no cost from FGGM stockpiles. Compact in approximately 1 foot lifts with 1 or 2 passes of sheepsfoot roller.
Vegetated Topsoil	5001	Cubic Yard	$35	$175,047	Based on an 6-inch-thick layer over the cap surface area. Account for swell factor and assumes procurement and installation.
Hydroseed	270072	Square Foot	$0.20	$54,014	Assumes hydroseeding of cover area. The entire site would be restored with permanent grass seed within the growing season.
Subtotal				$304,081	
Stormwater Management Features					
Perimeter Swale Construction	3000	Linear Foot	$7	$21,000	Assumes grading of 12-feet wide feature for stormwater attenuation and drainage.
Energy Dissipater Construction	1	Each	$5,000	$5,000	Outlet structure for stormwater management basins.
Erosion Matting	1000	Square Yard	$10	$10,000	Assumes perimeter drainage features lined with permanent erosion control matting.
Rip Rap	400	Cubic Yard	$45	$18,000	Riprap for energy dissipation and drainage features erosion resistant lining.
Stormwater Detention Basins	2	Each	$75,000	$150,000	Construction of water quality and rate control basins for discharge to wetland areas.
Subtotal				$204,000	
Subtotal of Field Tasks				$577,931	
Contingency	25%	Percent	$641,724	$160,431	
Subtotal				$160,431	
Project Management	10%	Percent	$802,155	$80,216	
Remedial Design	15%	Percent	$802,155	$120,323	
Construction Management	8%	Percent	$802,155	$64,172	
Information/Database Management	3%	Percent	$802,155	$24,065	
TOTAL CAPITAL COSTS				$1,090,931	

Table 4-1: Planning Cost Estimate Summary for Alternative 2: Repair and Maintenance of the Existing Two-Foot Soil Cover on the Western 6.2 Acres of Cell 3 of the Closed Sanitary Landfill, Fort Meade, Maryland

DESCRIPTION	QUANTITY	UNIT	RATE	TOTAL COST	ESTIMATE/SOURCE NOTES
ANNUAL OPERATION AND MAINTENANCE (O&M) COSTS					
Total Annual Operation and Maintenance (O&M) Costs				N/A	
PERIODIC ANNUAL COSTS					
Total Periodic Annual Costs				N/A	

PRESENT VALUE ANALYSIS (calculated up to year 30)

Cost Type	Year	Total Cost	Total Cost per Year	Discount Factor at 2.8%	Net Present Value
Capital Cost	0	$1,090,931	$1,090,931	1.0000	$1,090,931
Performance Monitoring Cost	1	$0.00	$0	4.6060	$0
Annual O&M Cost	2-30	$0.00	$0	15.5110	$0
Periodic Cost	5	N/A	N/A	0.8710	$0
Periodic Cost	10	N/A	N/A	0.7587	$0
Periodic Cost	15	N/A	N/A	0.6609	$0
Periodic Cost	20	N/A	N/A	0.5756	$0
Periodic Cost	25	N/A	N/A	0.5014	$0
Periodic Cost	30	N/A	N/A	0.4367	$0
TOTAL PRESENT VALUE OF ALTERNATIVE					$1,090,931

Notes:

Lump Sum Unit Costs are based on AECOM project experience of similar size and nature and engineering judgment. Additional costs associated with specific project location and working calendar were accounted for.

Individual Unit Costs (i.e. each, tons, cubic yards) based on executed construction bid documents (for other AECOM recent projects), vendor quotes and costing tools (e.g., RS Means).

Thirty-Year Real Discount Rate obtained from OMB Circular No. A-94, Last Revision November 2016.

Acronyms:

% - percent
CY - cubic yard
FGGM - Fort George G. Meade
LF - linear feet
MDE - Maryland Department of the Environment
MS/MSD matrix spike/matrix spike duplicate
O&M = operation and maintenance
SF = square feet
SY = square yard

Table 4-2
Planning Cost Estimate Summary for Alternative 3: Impermeable Cap on the Western 6.2 Acres of Cell 3 of the Closed Sanitary Landfill, Fort Meade, Maryland

Summary : This alternative consists of the installation of an impermeable cap

Approximate Timeframe : 12 months for plan approval, 7 months for implementation, and 1 year for performance monitoring

Alternative Description

Under Alternative 3, a Code of Maryland Regulations (COMAR)-compliant impermeable cap would be installed on the western 6.2 acres of Cell 3.

The impermeable cap would consist of: an imported fill grading layer, a geotextile cushion layer, a geomembrane liner system, a 6-inch-thick granular drainage layer, and a 2-foot-thick soil layer, which will include a vegetated surface cover.

The existing wooded area and vegetation would be removed, and imported general fill would be placed to achieve the cap subgrades and provide a minimum slope of 4%.

Surface water runoff generated from the cap installation would be managed in a manner that prevents erosion and minimizes impacts to existing site tributaries. Management features include vegetated swales and retention areas, which will provide erosion control, water quality control, and stormwater runoff rate control.

Perimeter stormwater management features would be constructed to provide conveyance to the detention basin for stormwater quality and rate control of stormwater runoff from the cap area.

Assumptions:

Area of Western Portion of Cell 3 = 270,072 square feet (SF) = 30,008 square years (SY) = 6.2 acres; cap perimeter = 3,000 LF.

Vegetated stormwater management swales would be constructed along the perimeter of the cap with riprap energy dissipaters. Vegetated swales would convert runoff to stormwater detention basins.

Based on aerial photographs and site visits, 5.5 acres of the western portion of Cell 3 would need to be cleared of vegetation in order to complete the 2-foot soil cover maintenance.

The swelling factor for soils is assumed to be 30%.

All imported fill required to install the cap would be obtained from FGGM's soil stockpiles.

DESCRIPTION	QUANTITY	UNIT	RATE	TOTAL COST	ESTIMATE/SOURCE NOTES
CAPITAL COSTS					
Planning, Survey, and Mobilization					
Topographic survey	4	day	$1,500	$6,000	Assumes detailed field survey to determine current grades and conditions, based on professional experience of similar projects.
Mobilization (10% of cost for field tasks)	1	Lump Sum	$268,390	$268,390	Mobilization of materials, equipment, and staff to the site. Accounts for 10% of capital costs, excluding planning, reporting, and contingency costs.
Subtotal				$274,390	
Site Preparation					
Utility Locate to clear site prior to field work	1	Day	$1,600	$1,600	Vendor Rate; utility locate necessary to break ground and begin work at site.
Stabilized construction entrance	1	Each	$5,000	$5,000	Professional experience and accumulation of cost for similar projects.
Temporary Access Road	500	Linear Feet (LF)	$17	$8,500	Assumes 20-foot wide access road consisting of woven geotextile overlain with 6-inch dense graded aggregate
Silt fence	3000	LF	$5	$15,000	Perimeter super silt fence installed as E&S control. Assume site perimeter length and 10% waste.
Establish Staging and Laydown Area	1	Lump Sum	$10,000	$10,000	Based on professional experience and accumulation of cost for similar projects.
Clear and Grub	5.5	acre	$5,000	$27,500	Assume approximately 5.5 acres, which consist of 2.8 acres of trees and 2.7 acres of brush based on aerial photos; unusable vegetation/stumps will be disposed of offsite at a C&D landfill.
Clean Fill Sampling	3	Each	$750	$2,250	Based on professional experience and accumulation of cost for similar projects. 1 sample per 2000 cubic yards (CY) of soil.
Subtotal				$69,850	
Subgrade Preparation					
Soil Pickup/Delivery/Spread	55000	Cubic Yard	$25	$1,375,000	Excavate, transport, and dump clean fill from the FGGM stockpile to attain 4% slope. Dump soil in working area, push with dozer.
Compaction	55000	Cubic Yard	$1.50	$82,500	Compaction of imported fill to achieve design subgrades. Assumes fill is obtained at no cost from FGGM stockpiles. Compact in approximately 1 foot lifts with 1 or 2 passes of sheepsfoot roller.
Subtotal				$1,457,500	
Installation of COMAR Cap					
Cushion Geotextile	310583	Square Foot	$0.60	$186,350	16-oz. nonwoven cushion geotextile. Includes 15% additional for waste/trenching/drainage flap. Cost includes procurement, import, and installation.
Geomembrane Liner	310583	Square Foot	$1	$310,583	Based on 60-mil HDPE, includes 15% additional for waste/trenching/drainage flap. Cost includes procurement, import, and installation.
Granular Drainage Layer	5001	Cubic Yard	$30	$150,040	Based on an 6-inch-thick layer over the cap surface area. Account for swell factor and assumes procurement and installation.
Certified Clean Fill	15004	Cubic Yard	$1.50	$22,506	Based on an 18-inch-thick layer over the cap surface area. Account for swell factor and assumes procurement and installation. Fill obtained from FGGM stockpile.
Vegetated Topsoil	5001	Cubic Yard	$35	$175,047	Based on an 6-inch-thick layer over the cap surface area. Account for swell factor and assumes procurement and installation.
Hydroseed	270072	Square Foot	$0.20	$54,014	Assumes hydroseeding of cap area only. Additional restoration considered below.
Subtotal				$898,540	
Stormwater Management Features					
Perimeter Swale Construction	3000	Linear Foot	$7	$21,000	Assumes grading of 12-feet wide feature for stormwater attenuation and drainage.
Energy Dissipater Construction	1	Each	$5,000	$5,000	Outlet structure for stormwater management basins.
Erosion Matting	1000	Square Yard	$10	$10,000	Assumes perimeter drainage features lined with permanent erosion control matting.
Rip Rap	400	Cubic Yard	$45	$18,000	Riprap for energy dissipation and drainage features erosion resistant lining.
Stormwater Detention Basins	2	Each	$75,000	$150,000	Construction of water quality and rate control basins for discharge to wetland areas.
Subtotal				$204,000	

Table 4-2
Planning Cost Estimate Summary for Alternative 3: Impermeable Cap on the Western 6.2 Acres of Cell 3 of the Closed Sanitary Landfill, Fort Meade, Maryland

DESCRIPTION	QUANTITY	UNIT	RATE	TOTAL COST	ESTIMATE/SOURCE NOTES
Site Restoration					
Hydroseed	270072	Square Foot	$0.20	$54,014	The entire site would be restored with permanent grass seed within the growing season.
Subtotal				$54,014	
Subtotal of Field Tasks				$2,683,904	
Contingency	25%	Percent	$2,958,294	$739,574	
Subtotal				$739,574	
Project Management	10%	Percent	$3,697,868	$369,787	
Remedial Design	15%	Percent	$3,697,868	$554,680	
Construction Management	8%	Percent	$3,697,868	$295,829	
Information/Database Management	3%	Percent	$3,697,868	$110,936	
Institutional Controls					
Institutional Controls Plan	1	Each	$5,000	$5,000	Institutional controls will be employed using FGGM processes already in-place. An institutional control plan will be developed to document formalization of the institutional controls to be employed (e.g., restriction of digging and development within the cap boundaries).
Subtotal				$5,000	
TOTAL CAPITAL COSTS				$5,034,100	
OPERATION AND MAINTENANCE (O&M) COSTS					
Total Annual Operation and Maintenance (O&M) Costs				N/A	
PERIODIC ANNUAL COSTS					
Total Periodic Annual Costs				N/A	

PRESENT VALUE ANALYSIS (calculated up to year 30)

Cost Type	Year	Total Cost	Total Cost per Year	Discount Factor at 2.8%	Net Present Value
Capital Cost	0	$5,034,100	$5,034,100	1.0000	$5,034,100
Performance Monitoring Cost	1	$0.00	$0	4.6060	$0
Annual O&M Cost	2-30	$0.00	$0	15.5110	$0
Periodic Cost	5	N/A	N/A	0.8710	$0
Periodic Cost	10	N/A	N/A	0.7587	$0
Periodic Cost	15	N/A	N/A	0.6609	$0
Periodic Cost	20	N/A	N/A	0.5756	$0
Periodic Cost	25	N/A	N/A	0.5014	$0
Periodic Cost	30	N/A	N/A	0.4367	$0
TOTAL PRESENT VALUE OF ALTERNATIVE					$5,034,100

Notes:

Lump Sum Unit Costs are based on AECOM project experience of similar size and nature and engineering judgment. Additional costs associated with specific project location and working calendar were accounted for.

Individual Unit Costs (i.e. each, tons, cubic yards) based on executed construction bid documents (for other AECOM recent projects), vendor quotes and costing tools (e.g., RS Means).

Thirty-Year Real Discount Rate obtained from OMB Circular No. A-94, Last Revision November 2016.

Acronyms:

% - percent
COMAR - Code of Maryland Regulations
CY - cubic yard
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LF - linear feet
MDE - Maryland Department of the Environment
O&M = operation and maintenance
SF = square feet
SY = square yard

Appendix A
Response to Comments on Draft EE/CA

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
1650 Arch Street
Philadelphia, Pennsylvania 19103-2029

April 25, 2019

George Knight
Installation Restoration Manager
Dept. of Army DPW - Environmental Division
4216 Roberts Ave,
Suite 5115
Fort George G. Meade, MD. 20755-7068

Subject: Draft EE/CA Analysis for Cell 3 (FGGM-97) of the CSL, dated February, 2019

Dear Mr. Knight:

EPA has reviewed the above referenced document and has no comment at this time. The RTCs for the MDE comment letter dated April 5, 2019 are acceptable but that determination should be made by MDE. No additional EPA comments will be submitted and we look forward to the submittal of the final version.

EPA reserves all rights and authorities relating to information not contained or referenced in this document whether or not such information was known when this document was issued or discovered after such issuance. If you have any questions, or need any additional information please contact me at 410-305-2748.

Sincerely,

Robert W. Stroud, RPM

cc: Elisabeth Green, Ph.D., MDE

Response to comments on Draft Engineering Evaluation/Cost Analysis for Ce11 3 (FGGM 97) of the Closed Sanitary Landfill, Fort Meade CERCLA, Fort George G. Meade, Maryland - February 2019

Comments received from the Federal Facilities Installation Restoration Program (FFIRP) of the Maryland Department of the Environment's Land Restoration Program dated April 5, 2019

General Comments:

1) The text regarding sediment and erosion controls for both alternatives 2 and 3 suggests that sediment and erosion controls are not required for projects where the disturbance is less than 5000 square feet. For projects whose disturbance exceeds 5000 square feet or 100 cubic yards, a Sediment and Erosion Control Plan must be approved by the Maryland Department of the Environment's Sediment and Stormwater Plan Review Division. However, even for projects that do not meet this minimum of ground disturbance, erosion and sediment control principles, methods, and practices described in the "2011 Maryland Standards and Specifications for Soil Erosion and Sediment Control" must be used where appropriate.

Response: Erosion and Sediment Control, Code of Maryland Regulations (COMAR) 26.17.01.11 is an ARAR and is included in ARAR Table 3-1. The text in sections 4.3.2.1 and 4.3.3.1 state: "*Because the surface area of the Limit of Disturbance (the area that would be disturbed by earth moving activity, it is the boundary within which all construction, materials storage, grading, landscaping and related activities shall occur) will be greater than 5,000 square feet and the volume of soil to be managed on-site exceeds the 100 cubic yard threshold per COMAR 26.17.01.05, erosion and sediment control ARARs will be triggered. These ARARs would be met through implementation of erosion and sediment controls, as warranted, and specified in COMAR 26.17.11*." No change will be made to the document.

2) Cell 3 was closed in 1976 in accordance with state regulations at the time, which required a two foot soil cover. Since the landfill was previously closed in accordance with state regulations, the current capping requirements (including both COMAR 26.04.07.21 and COMAR 26.04.07.26) are not applicable, and therefore are not considered Applicable or Relevant and Appropriate Requirements (ARARs). Please remove these COMAR citations from discussion of ARARs throughout the document.

Response: Reference to COMAR 26.04.07.21 and COMAR 26.04.07.26 has been eliminated from the document.

Specific Comments:

1) Page 1-1, ¶ 2

The text states that Cell 3 is 31.8 acres, but elsewhere in the text 31.6 acres is mentioned. Please correct the text as appropriate.

Response: The correct acreage is 31.6. The single occurrence of 31.8 in the second paragraph of Section 1 was changed to 31.6

2) Page 2-2, § "Weekly CSL Landfill Gas Monitoring"

The text states that MP-14 is within the western portion of Cell 3. This methane monitoring point has had detections of methane above the lower explosive limit within the last year. The impact of the repair of the two-foot cover on methane levels in and around Cell 3 needs to be discussed in

this document.

Response: MP-14 has monitored soil gas since 2000 and over that time, there have been sporadic detections of methane that exceeded the lower explosive limit. However, no permanent structures are planned for this part of Cell 3 and MP-14 is over 1,400 feet from the nearest site boundary. Additional methane gas investigations will be performed under a separate contract, which may also include remedial action, if warranted. This information has been added to Section 2.2.

3) Page 3-1, § "Determination of Removal Scope" ¶ 2

The text mentions that the removal action is also referred to as an "interim measure." However, the term "interim measure" appears nowhere else in the document. Please remove it.

Response: Reference to "interim measure" was removed from the last paragraph on page 3-1.

2) Table 4-2

This table lists "Operation and Maintenance Costs" as an entry. Typically, Operation and Maintenance is considered part of long-term remedial actions, not a part of removal actions. Please remove Operation and Maintenance Costs from the cost calculations for Alternative 3.

Response: "Operation and Maintenance Costs" were removed from the cost calculations for both Alternatives 2 and 3.