Northeast Maryland Waste Disposal Authority

August 6, 2012

Dr. Jonathan B. Brownstein, Ph.D.
Vice President
EA Engineering, Science and Technology
15 Loveton Circle
Sparks, Maryland 21152

Dear Dr. Brownstein:

I am writing to you today to present Work Order No. 100-II-JG (WO) under your Contract #13-5 with the Northeast Maryland Waste Disposal Authority (Authority). The contract is hereby incorporated by reference.

This WO is regarding the Assessment of Corrective Measures at the Gude Landfill (Phase II) under EA Proposal No. 0720123 – Revision 2 (dated July 24, 2012) for the Montgomery County Department of Environmental Protection (County). EA 'is to complete an Assessment of Corrective Measures (ACM) in association with the County's plan to assess and mitigate to the most practical and effective extent feasible: low-level groundwater contamination above Maximum Contaminant Levels (MCLs); landfill gas (i.e. methane) exceedences above the Lower Explosive Limit (LEL); and potential non-stormwater discharges (i.e. leachate seeps) at and in the vicinity of the Gude Landfill (the Landfill).' This Phase II has a not to exceed amount of $168,618 and ends June 30, 2013.

Please use Work Order No. 100-II-JG when billing the Authority for this work. As always, each invoice is to be accompanied by a description of the work. Andrew Kays will be your contact person with the Authority on this project. Please call if you have any questions.

Sincerely,

Christopher W. Skaggs
Executive Director

Attachment

cc: M. Catherine Coble, NMWDA, w/o Attachment
Peter Karasik, Montgomery County, w/o Attachment
Stephen Lezinski, Montgomery County, w/o Attachment
Mark Gutberlet, EA, w/Attachment
File: Montgomery County/Gude Landfill Remediation/Communications, w/Attachment

MCG10859KLU.DOC

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July 24, 2012

Northeast Maryland Waste Disposal Authority
Tower II - Suite 402
100 South Charles Street
Baltimore, MD 21201-2705
Attn: Mr. Andrew Kays

Subject: Gude Landfill, Phase 2, Assessment of Corrective Measures
EA Proposal No. 0720123 – Revision 2

Dear Mr. Kays:

EA Engineering, Science, and Technology, Inc. (EA) is pleased to offer this revised Proposal to the Northeast Maryland Waste Disposal Authority (the Authority) to provide environmental science and engineering services to Montgomery County (the County), Department of Environmental Protection (DEP). This Proposal incorporates revisions based on County/Authority comments on our original draft Proposal, including the ACM Report Draft Table of Contents.

The purpose of the Proposal is to complete an Assessment of Corrective Measures (ACM) in association with the County's plan to assess and mitigate to the most practical and effective extent feasible: low-level groundwater contamination above Maximum Contaminant Levels (MCLs); landfill gas (i.e. methane) exceedences above the Lower Explosive Limit (LEL); and potential non-stormwater discharges (i.e. leachate seeps) at and in the vicinity of the Gude Landfill (the Landfill). EA is well qualified to provide these services, having prepared the Phase 0 – Aerial Survey, Field Survey and Waste Delineation Study; the Phase 1 – Nature and Extent Study (NES); and the NES Amendment No.1 for the Landfill. EA has also provided similar services at various municipal solid waste landfills in recent years in Maryland.

EA key staff for this project will include Mark Gutberlet, P.E. as Project Manager, Barb Roeper, P.E. as Senior Technical Reviewer, Laura Jo Oakes, P.E. as Task Manager/Project Engineer, and Pete Lekas, P.G. as Project Geologist. The identified key staff members have worked with the Authority and the County on the above referenced Phase 0 and Phase 1 work and will provide continued support for Phase 2 work, the ACM.

The following Sections describe the project background, the proposed scope of work, schedule and cost for the Phase 2 work effort. This Proposal has been prepared in accordance with Contract #13-5 between the Authority and EA.

BACKGROUND

The Gude Landfill is the oldest formal landfill in the County. The Landfill was used for the disposal of municipal solid waste and incinerator residues from 1964 to 1982. The site encompasses approximately one hundred sixty-two (162) acres, of which approximately one hundred (100) acres were used for waste disposal. The Landfill is currently owned and maintained by the County DEP and is located at 600 East Gude Drive, Rockville, Maryland 20850.

The surrounding area and property border of the Landfill is primarily mixed use: industrial operations (east by southeast); Washington Suburban Sanitary Commission (WSSC) property and E. Gude Drive (south); a Transcontinental/Columbia Gas natural gas pipeline and the community of Derwood Station South (west); and M-NCPPC land (north by northeast). The Landfill is also bordered by surface water bodies: Crabbs Branch Stream (north by northeast) and Southlawn Branch Stream (south by southeast). Typical ground cover is generally open grassy fields with sporadic patches of trees.

The Landfill was constructed and operated prior to modern solid waste management disposal and facility design and closure standards that were implemented by the U.S. Environmental Protection Agency (EPA), under the Resource Conservation and Recovery Act (RCRA). Therefore, the Landfill was not originally constructed with a geosynthetic or compacted clay bottom liner, a leachate collection system, a landfill gas collection system, nor a stormwater management system. Soil was reportedly used as daily cover during waste filling, and a two-foot final layer of soil was reportedly placed over the waste mass during closure of the Landfill in 1982 to support the vegetative cover.

Since 1982, the County has voluntarily, or through regulatory mandates, implemented and maintained the following best management practices for pre-regulatory era landfills in compliance with COMAR requirements: cover system installation, cover system maintenance, leachate seep repairs, landfill gas collection system installation and maintenance, water quality and landfill gas monitoring, and stormwater infrastructure improvements. The County currently maintains an active landfill gas collection, flare, and gas-to-energy system; a network of on-site and offsite groundwater monitoring wells; environmental monitoring programs for groundwater, surface water and landfill gas; and stormwater management infrastructure at the Landfill.

At the advisement of the Maryland Department of the Environment (MDE), the County conducted a Waste Delineation Study to determine the horizontal extent of waste along the Landfill perimeter boundary, which identified approximately seventeen (17) acres of waste encroachment onto an adjacent property. MDE also directed the County to conduct a Nature and Extent Study (NES) of environmental impacts in the vicinity of, and potentially resulting from, the Landfill. The purpose of the NES was to characterize the nature and extent of potential Landfill impacts on groundwater, surface water, and surface and subsurface soils, and to conduct hydrogeologic and fate and transport assessments of potential Landfill contaminants. The NES

was completed in 2010, and the NES Report was submitted to MDE in November 2010. MDE provided comments to DEP, which were discussed in a meeting in February 2011. In order to fully address MDE's comments, DEP completed additional field investigations and prepared a NES Amendment No. 1 Report, which was submitted in November 2011.

The County received approval of the NES Amendment No.1 Report in a letter from MDE dated March 13, 2012. The letter requested that the County submit an ACM Work Plan within sixty (60) days with a schedule for submitting the final ACM Report. Additionally, a draft Consent Order from the MDE stipulates that an ACM Report is to be completed within two hundred and forty (240) days of the ACM Work Plan acceptance.

SCOPE OF WORK

This Proposal provides for the preparation of the ACM and the associated Report for the Landfill. As deemed appropriate, concepts of this Proposal may be used by the County as a technical resource for the preparation of the ACM Work Plan to be submitted for review and approval by MDE.

EA has provided a draft Table of Contents for the ACM Report as Attachment A to this Proposal, which presents the general information to be gathered, evaluated and presented in the ACM Report. Tasks defined herein are based on the Sections of the ACM Report. During the preparation of the ACM Report, key evaluations (e.g. alternative findings, criteria, and land reuse considerations) will be communicated to the County on a regular basis through telephone and e-mail correspondence as well as through project progress meetings.

Task 1 – Background (Section 1 of the ACM Report)

The County and the Authority will prepare this Section of the ACM Report from excerpts of previously prepared Landfill Reports (Waste Delineation, NES and NES Amendment No.1). The text will present a Site Description, the Site Environmental Setting and the Existing Site Environmental Monitoring Network at the Landfill.

EA will review the County and Authority prepared text for the ACM Report. Figures in this Section will include a Site Location Map, the Aerial/Topographic Map presenting the Delineated Limit of Waste, the updated Aerial/Topographic Map with the Landfill property boundary and the M-NCPPC Land Parcels from the Exchange of Land, and Maps regarding the final Groundwater Monitoring Well Locations (with Temporary Monitoring Locations), Surface Water Sampling Locations and Soil Sampling Locations.

Task-specific Assumptions:

1) Review time includes 6 hours of Project Engineer and 2 hours of Senior Technical Reviewer.
2) All information presented will originate from the above referenced Reports.

3) Referenced Figures will originate from the above referenced Reports.
4) No new figures will be created for this Section, except as noted in Item 5 below.
5) The updated Topographic Survey Drawings (to be prepared and provided under a separate authorization) will be used to reflect the revised Landfill property boundary and M-NCPPC land parcels resulting from the Exchange of Land.

Task 2 – Conceptual Landfill Site Model (Section 2 of the ACM Report)

The County and the Authority will prepare this Section of the ACM Report from excerpts of previously prepared Landfill Reports (NES and NES Amendment No.1). The text will present the Conceptual Site Model developed as part of the NES. The text will incorporate the findings of the Risk Evaluation performed as part of the NES, and will summarize the nature and extent of environmental impacts identified in the NES. This Section will include discussion regarding chemicals of potential concern and applicable or relevant and appropriate requirements for the site.

EA will review the County and Authority prepared text for the ACM Report. Figures will include the Human Health Conceptual Site Model, the Ecological Conceptual Site Model, the Inferred Groundwater Flow Map (August 2011), Isoconcentration and/or Compliance Extent Map(s) and Geologic Cross-Sections.

Task-specific Assumptions:

1) Review time includes 6 hours of Project Engineer and 2 hours of Senior Technical Reviewer.
2) All information presented will originate from the NES Report and/or NES Amendment No.1 Report.
3) Referenced Figures will originate from the NES Report or the NES Amendment No.1 Report.
4) No new figures will be created for this Section.
5) Groundwater elevation and chemical data collected after NES Report and the NES Amendment No.1 Report will not be evaluated.
6) No new risk evaluations will be performed.

Task 3 – Remedial Action Objectives and General Response Actions (Section 3 of the ACM Report)

The County and the Authority will prepare this Section of the ACM Report from excerpts of previously prepared Landfill Reports (NES, NES Amendment No.1 and Remediation Feasibility Memorandum). The text will present remedial action objectives (RAOs) based on the short term goal of minimized ecological and human health risks and the long term goal of compliance with MDE requirements, including groundwater concentrations less than the maximum contaminant levels (MCLs) at the compliance boundary (Landfill property boundary). This Section will also

present the media of concern at the site and provide a description of the general response actions to address mitigation for each media.

Task-specific Assumptions:

1) Review time includes 6 hours of Project Engineer and 2 hours of Senior Technical Reviewer.
2) The Remediation Feasibility Memorandum will be utilized in the development of the general response actions.
3) This Section will not include figures.

Task 4 – Development and Screening of Preliminary Corrective Measure Alternatives (Section 4 of the ACM Report)

A list of preliminary corrective measure alternatives will be developed based on the remediation alternatives identified in the Remediation Feasibility Memorandum, a review of published case study literature and EA's previous project experience. The potential list of preliminary corrective measures to be evaluated during the screening process may include:

- Waste Excavation (Selective and Extensive)
- Phytoremediation
- Monitored Natural Attenuation
- Landfill Cover System Improvements and Partial or Full Capping
- Bioremediation
- In-Situ Permeable Barriers
- Impermeable Barriers
- Groundwater Pump and Treat System

EA will obtain and review technical publications and case studies of proven corrective measure technologies for sites with similar contaminants and in similar conditions (geology, hydrology, topography, etc.), where available. EA will summarize the information in the ACM Report and will include the source information in an appendix to the ACM Report. Citations, interviews, references, published peer reviewed journals, etc. for three (3) to five (5) sites will be included for each corrective measure technology.

EA will present the screening process rationale and evaluate the individual preliminary corrective measure alternatives based on compliance with RAOs, implementability, effectiveness and cost. Some preliminary alternatives are not expected to address the RAOs by themselves. Therefore, after the screening, this analysis will include recommendations for combining preliminary alternatives that do not address the RAOs individually, but will address them when combined with other preliminary alternatives. The preliminary corrective measures or combination of preliminary corrective measures that exhibit the greatest potential for practical

and effective remedial impacts during the screening process will be designated as the "corrective measures" for more detailed analysis.

EA will perform specialized groundwater analysis to assess the degree to which natural attenuation of certain organic groundwater constituents is occurring in the subsurface at and in the vicinity of the Gude Landfill. The specialized analysis, known as Compound Specific Isotope Analysis (CSIA), will be conducted on groundwater samples collected from six (6) selected groundwater monitoring wells. The selected wells are MW-13A, OB03, OB04A, OB11, OB11A, and OB12. They have been selected because they have had concentrations of more than one (1) organic compound exceeding MCLs and it is anticipated they will be representative of the site for the purposes of this analysis.

CSIA is a method that measures the isotopic ratios of carbon in certain organic compounds, which can be used to quantitatively assess degradation processes. It should be noted that CSIA methods are not capable of assessing degradation of inorganic constituents or of all the organic constituents that exceeded MCLs at this site. Of the eleven (11) constituents identified as MCL exceedences with the NES Amendment No.1 Report, CSIA can be used to assess degradation of the chlorinated ethenes (tetrachloroethene, trichloroethene, 1,1-dichloroethene, and vinyl chloride) as well as benzene. In addition to these, cis-1,2-dichloroethene, which is an intermediate daughter product of tetrachloroethene and trichloroethene biodegradation, will be included in the analysis as part of the assessment.

Results of the CSIA, along with historical groundwater data, will be used to evaluate the nature and rate of natural attenuation that is occurring at and in the vicinity of the Landfill. Evaluation of trends in the historical data will be used to assess natural attenuation of all compounds, and will be the only evaluation method for compounds for which CSIA cannot be performed. Monitored natural attenuation (MNA) will only be accepted as a potential corrective measure or partial corrective measure if it is evident that natural attenuation is occurring and is expected to occur in a manner and rate that will achieve the RAOs.

Task-specific Assumptions:

1) The CSIA sampling effort will include one (1) EA employee sampling six (6) groundwater monitoring wells and submitting the samples to a laboratory for analysis.
2) This Section will contain the Groundwater Monitoring Well Location Map from the NES Amendment No.1 that will identify the six (6) selected monitoring wells.
3) MNA evaluation will consist of a weight of evidence approach using tools such as the Wiedemeier MNA analysis, BIOSCREEN, analysis of temporal trends, or similar.
4) No site visits to observe similar remedies at other sites are included in this Proposal, but can be added, if needed.

Task 5 – Detailed Analysis of Corrective Measure Alternatives, Comparative Analyses, Recommendations, and Summary/Conclusions (Sections 5 thru 11 of the ACM Report)

EA will prepare detailed analyses for each corrective measure alternative that exhibited the greatest potential for practical and effective remedial impacts during the screening process identified in Task 4 of this Proposal. These alternatives may be individual or combinations of appropriate methods and technologies. The alternatives will be discussed with the County, and a detailed analysis of these selected corrective measure alternatives will be completed and included in the ACM Report. Information provided in the Remediation Feasibility Memorandum will be utilized in evaluating the alternatives. The analysis will include an estimated timeframe to meet the short-term and long-term remedial action objectives. Each corrective measure alternative presented will be analyzed for the following:

- Compliance with Remedial Action Objectives
- Short-Term Effectiveness
- Long-Term Effectiveness and Permanence
- Implementability of Alternative and Contingency Plan
- Protection of Human and Ecological Health
- Source Treatment and Reduction of Toxicity, Mobility, and Volume
- Cost of Alternative
- Regulatory Acceptance of Alternative
- Community Acceptance of Alternative (including future land use)

The alternatives will also be compared in a tabular format and recommendations for a selected corrective measure alternative, which may include multiple methods or technologies, will be presented. A brief narrative will accompany the table that compares the alternatives.

The ACM Report will include a discussion on expected monitoring/assessment of the effectiveness of the corrective measure and will and identify a contingency plan to be implemented if the selected corrective measure is not performing as expected. The monitoring plan will include a description of the general methods for monitoring the site, but will not include details of monitoring protocols or standard operating procedures. The contingency plan will identify specific triggers from the monitoring activity that will require additional investigation or evaluation and potential enhancements to the corrective measure. For example, if selective waste relocation is part of the corrective measure, then an improvement in groundwater quality may be anticipated downgradient of the area where waste was removed. However, it will be difficult to quantify the improvement in groundwater quality. Therefore, MDE may only approve partial waste relocation as a corrective measure if a well-defined monitoring plan and contingency triggers are identified prior to implementation.

Initial short-term cost expenditures vs. annual long-term expenditures will be evaluated in the form of a Cost Forecast Comparison. EA will prepare recommendations for corrective measure

implementations for the alternatives selected for detailed review. The alternatives may include one method or technology or combinations of methods and technologies as described previously.

EA will prepare draft concept work plans for each corrective measure alternative that will include the following information:

- Brief narrative on implementation/major construction tasks
- Safety concerns and potential risks to human health or the environment
- Specific list of required permits and approval agencies
- Considerations for design/construction/operations
- Conceptual plan view drawing and one or two details or cross-sections to illustrate the primary remedy elements (If waste relocation is selected, up to three (3) plan views may be prepared to highlight project phasing. In plan view, a potential stockpile area, screening area, and load-out area will be identified.)
- Estimated material quantities and cost estimates for construction and operation and maintenance
- General schedule for work, including design, permitting, and construction

Task-specific Assumptions:

1) No more than four (4) corrective measure alternatives will be evaluated for the detail analysis in this Section of the ACM Report.
2) Monitored Natural Attenuation (MNA) will require detailed analysis as a corrective measure alternative. Based on experience at other landfills in Maryland, MDE requires a significant weight of evidence evaluation that MNA is an appropriate corrective measure.
3) Costs presented will be order of magnitude estimates used for comparison purposes only. Detailed cost estimates including capital and operations and maintenance costs will be provided.
4) Concept work plans will be approximately 5-10 pages of text plus drawings and details as described herein.

Initial Draft ACM Report

EA will submit an Initial Draft ACM Report to the Authority and the County for review. The Initial Draft ACM Report will include an Executive Summary of the ACM, discussing major findings and recommendations. The Initial Draft ACM Report will include summary information, maps, analyses, and narrative discussions developed during the execution of Tasks 1 through 5. Appendices to the Initial Draft ACM Report will include case study literature, references, analyses, and other relevant information related to the performance of these tasks.

The Initial Draft ACM Report shall be provided to the Authority and the County for review and comment at 30% and 60% completion stages and/or as individual Sections of the Report become available.

Assumptions:

1) The 30% Draft ACM Report submittal and/or individual Sections of the Report shall be transmitted by EA via electronic copy in Microsoft Word format for purposes of review and incorporating Authority and County comments. EA shall respond to one (1) round of Authority and County comments and incorporate the required revisions into the next document version.
2) Five (5) copies of the 60% Draft ACM Report submittal will be provided in 3-D-ring binders by EA for review by the Authority and the County. An electronic copy of the report text will be provided in Microsoft Word format for purposes of incorporating Authority and County comments. EA shall respond to one (1) round of Authority and County comments and incorporate the required revisions into the next document version.
3) The County (with assistance from EA during the regularly scheduled Monthly Meetings) will present the 60% Draft ACM Report to GLCC and members of the Community. The County and EA will address one (1) round of comments from the GLCC and the community on the 60% Draft ACM Report. This will be accomplished through the Monthly Meeting and Meeting Minutes, on which, the costs are allocated under a separate project Authorization.

Deliverables:
1) Draft ACM Report

Draft-Final and Final ACM Reports

After receiving review comments on the Initial Draft ACM Report from the Authority and the County, EA will prepare written responses to comments (comment/response document). EA will prepare a Draft-Final ACM Report for submission to MDE that incorporates comments received on the Initial Draft ACM Report from the County and the Authority and direction received from the Authority and County during the Initial Draft ACM review meeting.

After receiving comments on the Draft-Final ACM Report from MDE, EA will attend a review meeting with the County, Authority, and MDE and prepare written responses to comments (comment/response document). EA will integrate comments and issue a Final ACM Report for submittal to MDE for approval.

Assumptions:

1) EA will respond to one (1) round of Authority and County comments on the Initial Draft ACM Report and incorporate the required revisions into the Draft-Final ACM Report.
2) Six (6) copies of each report in 3-D-ring binders will be provided for review by the Authority, the County, and MDE. An electronic copy in M.S. Word Format of the Draft-

Final Report will also be provided for purposes of incorporating Authority and County comments.
3) An electronic PDF version of the Final ACM Report with bookmarks will be placed on CD, along with original document files.
4) EA will attend a Draft-Final ACM Report review meeting at MDE at the discretion of the Authority and County.
5) EA will respond to two (2) rounds of Authority, County and MDE comments on the Draft-Final ACM Report and incorporate the required revisions into the Final ACM Report.
6) Comments from the County, Authority, GLCC, and MDE will not require major rework of the ACM, such as changing selected alternatives for detailed analysis. The comments may require limited additional analysis, text preparation, figure preparation, changes to cost estimates, and justification of alternatives.

Deliverables:
1) Draft-Final ACM Report
2) Final ACM Report

Task 6 – Project Progress and Review Meetings

EA anticipates three (3) project progress or review meetings with the Authority and County during preparation of ACM Report to communicate the status of the ACM, discuss the preliminary findings, and discuss the potential impact of various corrective measures on the County's operations and potential future land reuses for the Landfill site. The meetings may also be held to review comments on the ACM Report and discuss how the comments will be addressed. To the extent feasible, these progress and review meetings will be coordinated and held before the monthly Gude Landfill Remediation Monthly Meetings. These meetings will provide focused and collaborative participation by EA and County staff to streamline the document review process and minimize comments regarding the ACM Report.

Task-specific Assumptions:

1) Two EA staff will attend three meetings each at the Shady Grove Transfer Station. Two of these meetings will be coupled with GLCC meetings and travel to the Transfer Station will be billed under another contract for GLCC meeting support. One meeting will not be coupled with a GLCC meeting.
2) Two EA staff will join each of the three meetings by teleconference.

PROJECT COMMUNICATIONS SUPPORT

The Gude Landfill Remediation is a complex and publicly visible project. As such, effective and frequent communication with the public, regulatory agencies, and other stakeholders will be a key project success factor. In support of this requirement, EA will provide various

communications support services to the County. This support is currently contracted under Phase 1 of the project and no additional effort is included in this proposal. The support scoped under Phase 1 is anticipated to include effort through 2012.

SCHEDULE

EA has prepared and attached a preliminary schedule to complete the Phase 2 work (ACM) of the Gude Landfill Remediation Project. EA estimates that the ACM Report can be submitted to MDE within approximately six (6) to eight (8) months from issuance of the notice-to-proceed. This schedule will comply with the allowable timeframe to submit the ACM as contained in the Draft Consent Order between MDE and the County.

COST

EA proposes to provide the services described above for a fixed price of **$168,618**. Cost details are attached. EA proposes to provide the scope of services under Contract #13-5 between the Authority and EA.

EA appreciates this opportunity to offer our services, and we look forward to supporting the Authority and the County on this important project. Please contact me at 410-329-5135 with any questions you have concerning this proposal. If this proposal is acceptable as presented, you may authorize EA to proceed by issuing a work order.

Sincerely,
EA Engineering, Science, and Technology, Inc.

Mark Gutberlet, P.E.
Project Manager

ATTACHMENT A

ACM REPORT - DRAFT TABLE OF CONTENTS

ATTACHMENT A

GUDE LANDFILL ASSESSMENT OF CORRECTIVE MEASURES
DRAFT TABLE OF CONTENTS