Appendix J

Work Plan for the Recommended Corrective Measure Alternative – 2016

Gude Landfill
Work Plan for the
Recommended Corrective Measure Alternative
Montgomery County, Maryland

Prepared for:

Department of Environmental Protection
Division of Solid Waste Services
Montgomery County, Maryland

Prepared by:

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EA Project No. 14982.01

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LIST OF ACRONYMS AND ABBREVIATIONS

ACM	Assessment of Corrective Measures
bgs	Below Ground Surface
BMP	Best Management Practice
CFR	Code of Federal Regulations
CGI	Combustible Gas Indicator
CMA	Corrective Measure Alternative
COMAR	Code of Maryland Regulations
DCE	Dichloroethene
EA	EA Engineering, Science, and Technology, Inc., PBC
EPA	U.S. Environmental Protection Agency
ft	Foot or Feet
G&SWMP	Groundwater and Surface Water Monitoring Plan
LEL	Lower Explosive Limit
MCL	Maximum Contaminant Level
MDE	Maryland Department of the Environment
M-NCPPC	Maryland-National Capital Park and Planning Commission
NAD	North American Datum
NAVD	North American Vertical Datum
NES	Nature and Extent Study

LIST OF ACRONYMS AND ABBREVIATIONS (continued)

PID	Photo-Ionization Detector

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1. PURPOSE

EA Engineering, Science, and Technology, Inc., PBC (EA) has prepared this Work Plan for the Recommended Corrective Measure Alternative (CMA) for the Gude Landfill (the Landfill) located in Montgomery County, Maryland. The Work Plan is intended to accompany the Assessment of Corrective Measures (ACM) Report for the Landfill (EA 2016). The purpose of this report is to present a Work Plan for implementing remediation, conducting additional monitoring, and implementing appropriate controls at the Landfill, along with a general schedule of the planned work.

The following information is included in this Work Plan:

- Brief background and description of historical information presented in the Nature and Extent Study (NES) and ACM documents;
- Approach for remediating groundwater maximum contaminant level (MCL) exceedances, landfill gas migration, and non-stormwater discharges;
- Proposed pre-design investigations;
- Methodologies to design, implement, and monitor the recommended CMA technologies; and
- A general proposed schedule of activities for design and implementation of each remedial technology.

A discussion of the remediation approach for the Landfill is presented in the following sections of this Work Plan.

2. BACKGROUND

This section presents a brief background and description of historical information which is presented in detail within the NES (EA 2010) and ACM (EA 2016) documents.

2.1 SITE DESCRIPTION

2.1.1 Site Location and Overview

The Landfill is located at 600 East Gude Drive, Rockville, Maryland 20850. The site has road access at two (2) locations: East Gude Drive and Southlawn Lane.

The Landfill is currently owned and maintained by the County Department of Environmental Protection. The Landfill was used for the disposal of municipal solid waste and incinerator residues from 1964 to 1982. The Landfill property encompasses approximately one hundred sixty-two (162) acres, of which approximately one hundred forty (140) acres were used for waste disposal.

2.1.2 Site and Surrounding Area Land Use

The typical ground cover across the Landfill site is open grassy fields with patches of brushy vegetation and trees on most side slopes and along the perimeter borders of the Landfill. The existing landfill gas collection system, including the gas extraction system well heads and gas conveyance piping, is situated above-grade on the Landfill's ground surface. The site also has a limited area on the top of the Landfill that is currently designated for flying model airplanes and a concrete pad near the Southlawn Lane facility entrance road that is used for managing storm-related debris.

The surrounding area and properties adjacent to the Landfill have mixed uses including parkland, industrial property, and residential development. Specifically, the adjacent land areas consist of:

- Maryland-National Capital Park and Planning Commission (M-NCPPC) land and Crabbs Branch Stream (north by northeast).
- Asphalt and cement production facilities, equipment storage yards, scrap metal recycling facilities, and Southlawn Lane (east by southeast).

- East Gude Drive, Washington Suburban Sanitary Commission (WSSC) property, County Coalition for the Homeless Men's Emergency Shelter, and Southlawn Branch Stream (southwest by south by southeast).

- Transcontinental (Williams Gas)/Columbia Gas natural gas pipeline right-of-way and the community of Derwood Station residential development (west by northwest).

2.1.3 Site History

The Landfill was initially permitted by the County in 1963. The Landfill was subsequently operated and closed under several facility names and refuse disposal permits from 1964 to 1982. The facility name of the Gude-Southlawn Landfill was modified by reference to the Gude Landfill. There is no current refuse disposal permit that is applicable to the Landfill.

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. Therefore, the Landfill was not originally constructed with a geosynthetic liner or compacted clay bottom liner, a leachate collection system, a landfill gas collection system, or a stormwater management system. Reportedly, soil was used as daily cover during waste filling, and a two (2) foot (ft) (minimum) 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 Best Management Practices (BMPs) for pre-regulatory era landfills to ensure compliance with Code of Maryland Regulations (COMAR) requirements. These BMPs include: soil and vegetative 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 system including: flares, a gas-to-energy system, over one hundred (100) gas extraction wells, and horizontal gas conveyance piping. A network of on-site and off-site groundwater monitoring wells; a network of on-site landfill gas monitoring wells; environmental monitoring programs for groundwater, surface water, and landfill gas; and stormwater management infrastructure are also maintained at and for the Landfill site.

2.2 SITE ENVIRONMENTAL SETTING

2.2.1 Topography

The site topography of the Landfill is plateau-like and consists of gentle relief (i.e., slope) along the top of the waste-mass and sharp relief along the perimeter property boundary. The elevation along the top of the plateau gently slopes to the south, with localized mounds and depressions throughout. The side-slope falls sharply from the top of the waste-mass to elevations ranging from fifty-five (55) to ninety (90) ft below the plateau.

A general summary of approximate topographic elevations across the Landfill measured to the toe of slope of the waste mass and/or drainage areas as applicable (including the property with waste encroachment that is owned by M-NCPPC) are provided in the ACM Report.

2.2.2 Geology

The Landfill is located in central Montgomery County, Maryland, within the upland section of the Piedmont Plateau physiographic province (Maryland Geological Survey 1968, Trapp and Horn 1997). The geology in the upland section of the Piedmont Plateau physiographic province primarily consists of metamorphic and igneous rock formations of Paleozoic and Precambrian age. The Piedmont Plateau is underlain by an assortment of phyllite, slate, marble, schist, gneiss, and gabbro formations. Unconsolidated material overlying bedrock is present at the surface in the vicinity of the Landfill site and extends twenty (20) to sixty (60) ft below ground surface (bgs). Based on available groundwater monitoring well construction logs from ATEC Associates Inc. (1988) and more recent boring logs (EA 2010 and 2011), the unconsolidated material consists primarily of silt and clay.

2.2.3 Hydrogeologic Setting

The uplands section of the Piedmont is underlain by three (3) principle types of bedrock aquifers: crystalline-rock and undifferentiated sedimentary-rock aquifers, aquifers in early Mesozoic basins, and carbonate-rock aquifers (Trapp and Horn 1997). The Landfill is underlain by the crystalline rock aquifer that extends over approximately eighty-six (86) percent of the Piedmont Plateau Physiographic Province. At the Landfill, the crystalline rock that comprises the regional aquifer is overlain by unconsolidated material consisting of interbedded silts and clays and

saprolite. Recorded logs from on-site and off-site borings for the groundwater monitoring wells correlated well with these general geological descriptions.

Based on information from site boring logs and well gauging, groundwater is present in the unconsolidated material, as well as the bedrock at the Landfill site. The groundwater table is typically present in the unconsolidated material along the perimeter of the Landfill and under the Derwood Station development, at depths ranging from approximately three (3) to sixty (60) ft bgs. Groundwater recharge at the Landfill is variable and is primarily determined by precipitation and runoff. Topographic relief, unconsolidated material, and surface recharge variations created by the Landfill may significantly affect the groundwater flow.

Groundwater flow is highly dependent on the composition and grain size of the sediments, and therefore water likely moves more readily in the unconsolidated material than in the underlying bedrock. Groundwater in the bedrock (typically twenty [20] to sixty [60] ft below grade) is stored in, and moves through, fractures. No documentation of the degree of fracturing or orientation of bedrock fractures at the Landfill is available.

The site topography and the natural cover system (grassy surface and soil layer) of the Landfill may allow surface water infiltration. Some of the infiltrating water likely moves vertically into the bedrock, while a portion also moves laterally along the boundary between the unconsolidated material and the surface of the bedrock and discharges to nearby streams and surface depressions.

Geologic cross-sections of the Landfill area, showing the subsurface geology and the relative depths of unconsolidated material, bedrock, and groundwater, are presented in the ACM Report.

2.2.4 Groundwater Flow

Based on the data collected from new and existing groundwater monitoring wells, including temporary groundwater monitoring wells, the groundwater flow direction was inferred. The data indicated that groundwater flows in an easterly flow direction across the Landfill site, with minor northerly, northeasterly, and southeasterly flow components. The above referenced data collection locations and the inferred groundwater flow contours have been overlain on the site topographic map, and are presented in Figure 1-5 of the ACM Report. The stream gauge data of surface water elevations were consistent with groundwater table elevations from adjacent

groundwater monitoring wells and locations, indicating a hydraulic connection between groundwater and surface water.

2.3 ASSESSMENT OF CORRECTIVE MEASURES

The ACM Report was prepared for the Landfill in accordance with the specific requirements set forth under Title 40 Code of Federal Regulations (CFR) § 258.56 and the general requirements of the Maryland Department of the Environment (MDE) for regulating solid waste disposal facilities under COMAR to recommend a CMA that addresses the following:

- Reported concentrations exceeding MCLs, established by EPA as limits for drinking water, for volatile organic compounds (VOCs) and metals at and beyond the Landfill property boundary per the COMAR 26.08.02. The constituents identified in the NES Amendment No. 1 for the Landfill (EA 2011) as groundwater impacts, based on MCL exceedances in 2011, include cadmium (dissolved), 1,1-dichloroethene (DCE), cis-1,2-DCE, 1,2-dibromoethane, 1,2-dichloropropane, benzene, methylene chloride, tetrachloroethene, trichloroethene, vinyl chloride, and nitrate.

- Intermittent exceedances of the lower explosive limit (LEL) for methane gas at the Landfill property boundary (per COMAR 26.04.07.03B(9)).

- Occurrences of non-stormwater discharges (e.g., leachate seeps) at the Landfill property boundary (per COMAR 26.08.04.08).

2.3.1 Recommended Corrective Measure Alternative

Based on the results of the evaluation presented in the ACM Report, the recommended CMA is Alternative 6, Toupee Capping and Additional Landfill Gas Collection. This CMA includes the following components:

- Toupee Capping of the top of the Landfill (inclusive of the Northwest, West, Southwest, South, and Southeast Areas), as well as the Landfill side-slopes in the Northwest and West Areas.

- Additional Landfill Gas Collection in the Northwest, West, and Southwest Areas.

Landfill capping was selected as a corrective measure for the Landfill top as well as portions of the side-slopes of the Landfill, to address MCL exceedances in groundwater, as well as leachate seeps and landfill gas LEL exceedances in the Northwest and West Areas. It is anticipated that

the horizontal conveyance and header piping associated with the landfill gas collection system would be removed prior to regrading the top of the Landfill and side-slopes. The landfill gas collection system would be reconstructed, including the installation of new extraction wells to provide additional control over gas migration along the property boundary that leads to LEL exceedances. The Toupee Cap would then be installed. In addition to these remedial technologies, the ACM Report recommended that approximately nine (9) new groundwater monitoring well pairs be installed along the property boundary to enable additional monitoring of groundwater impacts following cap construction.

3. PRE-DESIGN ACTIVITIES

Prior to beginning the design, pre-design activities will be conducted to support the design, as described below. A health and safety plan will be prepared prior to initiation of work.

3.1 TOPOGRAPHIC SURVEY OF LANDFILL

The most recent topographic survey made available by the County will be used as the base survey for the design and construction drawings. Additional survey will be performed by a registered land surveyor in key areas and components for the landfill cap and landfill gas collection design.

3.2 MONITORING WELL INSTALLATION AND SAMPLING PROGRAM

Prior to initiating installation of new monitoring wells, well permits, construction permits, and utility clearance will be obtained. A Maryland licensed well driller will obtain well permits for proposed monitoring wells. The well permits will be submitted to EA prior to mobilization to the site for installation of the wells.

EA will contact Miss Utility and will coordinate utility clearance to be conducted by a private utility locator in areas of proposed excavation. The utility contractor will utilize electro-magnetic or other detection methods to sense the presence of subsurface utilities and mark the horizontal location of utilities on the ground surface.

Current groundwater monitoring well spacing is approximately one thousand (1,000) ft between groundwater monitoring wells. Additional monitoring wells are to be installed to improve groundwater monitoring during implementation of the CMA. A total of nine (9) groundwater monitoring well shallow and deep pairs (eighteen [18] total groundwater monitoring wells) are proposed (**Figure 3-1**), which will result in approximately five hundred (500) ft spacing between wells. Access along the property boundary of the Landfill (where additional groundwater monitoring wells are required) is limited, due to steep slopes and thick vegetation; therefore, site clearing and road construction may be required in association with the well installation activities. The wells will have screened intervals that are twenty (20) to thirty (30) ft long (**Figure 3-2**). The annular space of each well will be packed with #2 morie gravel pack and sealed with bentonite and cement at the surface. The wells will be completed with a steel protective stickup

and concrete pads. The new groundwater monitoring wells will be developed by standard surging or pumping techniques until the water is free of sediment.

The installation of the groundwater monitoring wells will be completed in accordance with the MDE "Specifications for the Design and Construction of Groundwater Monitoring Wells at Solids Waste Disposal Facilities" included in **Appendix A**. During completion of the monitoring well boreholes, soil sampling will be conducted via continuous split-spoon samples collected until sample refusal is encountered or to a depth of thirty (30) ft bgs (average depth to consolidated rock). The EA Soil Sampling Standard Operating Procedure is provided in **Appendix B**. Soil samples will be inspected for geologic classification, and photo-ionization detector (PID) readings will be recorded to assess organic vapor concentrations. The PID will be calibrated daily according to manufacturer specifications. A detailed log of PID calibration results will be maintained by field personnel. A combustible gas indicator (CGI) will be used to monitor the work area for health and safety purposes. The CGI will be calibrated daily according to manufacturer specifications. A detailed log of CGI calibration results will be maintained by field personnel. After well installation is complete, the location and top of casing elevation of each of the groundwater monitoring wells will be surveyed by a licensed surveyor in the State of Maryland. This will likely be performed in conjunction with the topographic survey (see Section 3.1). The horizontal survey datum will be North American Datum (NAD) 83, the vertical datum will be North American Vertical Datum (NAVD) 88, and the coordinate system will be Maryland State Plan (feet).

3.2.1 Well Development

Well development of the newly constructed groundwater monitoring wells will occur subsequent to the installation of the new groundwater monitoring wells. The groundwater in the monitoring wells will be developed by overpumping. A two (2)-inch stainless steel submersible pump, or similar (without a foot or check valve), will be lowered into the well screen and pumped at a rate that exceeds the recharge capacity of the well. The pump will be alternated on and off to allow for backwashing of the borehole with water from the plumbing. A surge block will also be used to agitate and mobilize sediment around the well screen. Pumping and surging will be continued until at least three (3) to five (5) well volumes have been purged and there is low turbidity in the discharge water (less than ten [10] nephelometric turbidity units and clear to the unaided eye). Turbidity, pH, and temperature will be measured and recorded on the Well Development Log for each well. If low turbidity water is not present after two (2) hours, pumping will end. Water

produced during well development will be containerized and disposed as referenced in Section 3.2.3.

3.2.2 Well Volume Calculations

Static water level will be measured immediately prior to purging each groundwater monitoring well. After unlocking the well and removing the cap, a decontaminated water level indicator will be placed into the well to measure the depth to the static water level and total depth of the well. The measurement will be recorded to the nearest one-hundredth (0.01) ft and will be measured from a clearly marked reference point at the top of the well casing. The water column height is calculated from the difference between the total well depth measurement and the static water level measurement. The well volume per foot (in gallons) can be equated based on the diameter of the well casing (in inches). The total well volume is determined from the product of the water column height for the well and the well volume per foot (based on the diameter of the well casing).

3.2.3 Groundwater Monitoring and Sampling Program

After the installation and development of the groundwater monitoring wells, groundwater sampling will be conducted at the eighteen (18) new groundwater monitoring wells. Prior to sampling, the wells will be undisturbed for a minimum period of two (2) weeks to allow for equilibration with subsurface conditions. The groundwater monitoring event will consist of groundwater gauging of both the existing and newly installed groundwater monitoring wells and sampling of the new groundwater monitoring wells.

In addition, groundwater and/or perched liquid within the landfill gas extraction wells within the area of the pilot study will be gauged to aid in defining groundwater flow direction in areas where waste is present.

Field activities to be completed during the groundwater sampling events include measurement of water levels and water quality parameters, well purging, and collection of groundwater samples from each well. Well sampling information (including well depth, purge volume, and water quality parameters) will be recorded on Groundwater Sampling Logs.

The monitoring wells will be sampled in accordance with the County's approved Groundwater and Surface Water Monitoring Plan (G&SWMP). Sampling will be conducted using the methods described below.

- A physical inspection will be performed and observations will be noted on the Groundwater Sampling Log before sampling begins.

- The static water level in the monitoring well will be determined to the nearest one-hundredth (0.01) ft using a decontaminated water level indicator probe.

- Purging will be accomplished by pumping with a stainless steel submersible pump at a rate of less than one-half (0.5) liter per minute. The pumping rate will be adjusted in order to stabilize the water level within the well, if necessary. During purging, water quality parameters will be recorded every three (3) to five (5) minutes. Purge water will be containerized in fifty-five (55)-gallon drums and disposed as waste.

- Sampling will begin once three consecutive readings of water quality parameters agree within approximately ten (10) percent.

- Samples will be collected using dedicated tubing and filling sample containers from the pump discharge, allowing the water to fill the containers by allowing the pump discharge to flow gently down the inside of the container with as little agitation or aeration as possible.

- Temperature, pH, conductivity, turbidity, dissolved oxygen, and oxygen-reduction potential will be measured in the field.

Upon completion of sampling, the submersible pump will be removed from the well and the tubing disposed as municipal waste. The necessary entries on the chain-of-custody form will be completed. The labeled and filled sample containers will be immediately placed into an iced cooler with bubble wrap or vermiculite to prevent breakage. At the end of the sampling day, the chain-of-custody form will be placed in a waterproof plastic bag and taped to the inside lid of the cooler. The purge water, containerized in fifty-five (55)-gallon drums will be transported to the leachate treatment plant at the County's Oaks Landfill. Decontamination, sample labeling, chain-of-custody documentation and sampling packing/shipping will be conducted in accordance with the County's current approved G&SWMP. Samples will be submitted for the laboratory analyses per the approved G&SWMP.

4. LANDFILL CAPPING

As described in Section 2.3.1 and shown in **Figure 4-1** of this Work Plan, an engineered geosynthetic cap will be constructed on the top and Northwest and West side-slopes of the Landfill to decrease infiltration of stormwater and to better control landfill gas and leachate.

4.1 CAP DESIGN

A design, with technical specifications and drawings, will be prepared prior to construction of the landfill cap. The design will include site grading, the selected cap materials with rationale for their selection; erosion and stormwater control features; design requirements and provisions including applicable local, state, or federal regulations; and discussion of maintenance requirements. Specifications will be prepared to identify construction methods as related to level of quality, materials of construction, installation techniques, and testing and verification procedures.

4.2 CAP PERMITTING

The Toupee Capping design is subject to review and approval by MDE. As Toupee Capping will consist of land disturbance greater than five thousand (5,000) square feet, the County is required to obtain a Montgomery County Engineered Sediment and Control Permit. The application for the permit must include an Erosion and Sediment Control Plan, a Stormwater Management Plan, and design plans and computations. The Engineered Sediment Control Permit is subject to approval by the Department of Permitting Services.

4.3 CAP CONSTRUCTION

In preparation for cap construction, existing trees will be removed from the Northwest and West side-slopes. The horizontal conveyance and header piping that are part of the landfill gas collection system will be removed and risers will be installed on existing landfill gas extraction wells. The areas to be capped will then be regraded to promote drainage off of the landfill and ensure the stability of the cap is maintained long term. Following regrading, the new landfill gas extraction wells will be installed.

The engineered geosynthetic cap will be constructed with a geocomposite drainage layer. A minimum of two (2) ft of vegetative support soil will be placed on top of the cap (**Figure 4-2**).

The cap will be vegetatively stabilized using a perennial cover species recommended by the Montgomery Soil Conservation District.

During regrading and cap installation, landfill gas emissions and increased levels of dust, odor, and noise will be managed through compliance measures to be developed in an operations plan. Worker safety will also be addressed in the Health and Safety Plan, and personal protective equipment will be utilized as necessary.

Also during construction, temporary stormwater management and erosion and sediment control measures will be required. Permanent stormwater management infrastructure, including slope drains and stormwater management ponds, if required, will also be constructed.

4.4 CAP MAINTENANCE

Inspection of the landfill will be performed regularly to identify required maintenance. The landfill cap will be visually inspected regularly for settlement and other damage that may compromise the integrity of the cap, such as erosion, unvegetated areas, and unauthorized land use activities. Low spots will be repaired to ensure positive drainage throughout the top of the Landfill,

5. LANDFILL GAS COLLECTION SYSTEM ENHANCEMENTS

The existing landfill gas monitoring network for the Landfill consists of seventeen (17) locations along the perimeter boundaries of the site. Although not part of the landfill gas monitoring network, the County maintains an active gas collection and management system at the Landfill, consisting of over one hundred (100) vertical extraction wells, five (5) dewatering sumps, two (2) enclosed ground flares, and a gas-to-energy facility. Twelve (12) additional landfill gas monitoring wells are currently planned for installation along the eastern border of the Landfill. The gas collection and management system is operated and maintained on a continuous basis by the County's Operations Contractor.

Based on historical landfill gas data collected following the most recent installation of vertical landfill gas extraction wells, additional extraction wells are required to provide direct control over landfill gas migration. The County is actively addressing exceedances and may choose to install additional vertical landfill gas extraction wells prior to implementation of the recommended CMA.

5.1 LANDFILL GAS EXTRACTION WELLS

Exceedances of the LEL have been identified at landfill gas monitoring wells W-04, W-05, W-06, W-07, W-08, and W-28 in the Northwest and West Area defined in the ACM. Additionally, exceedances have been identified in monitoring well W-26 in the corner of the Southwest Area. As a result, additional landfill gas extraction wells will be installed in waste to eliminate landfill gas migration in these areas.

Prior to the design of the landfill gas collection system enhancements, historical data will be reviewed to determine where exceedances are the greatest and the locations of the existing vertical landfill gas extraction wells will be reviewed to determine the horizontal location for placement of additional vertical landfill gas extraction wells. Based on an initial review, possible locations for the addition of vertical landfill gas extraction wells are depicted on **Figure 5-1** of this Work Plan.

The depths of the existing landfill gas extraction wells will be compared to the monitoring wells where exceedances have been observed to determine the necessary vertical extent of the proposed landfill gas extraction wells. Extraction wells and remote extraction wells will be constructed to be consistent with the existing landfill gas extraction well construction

(**Appendix C**). Landfill gas extraction wells and condensate traps (if necessary) may be installed by the County's existing Operations Contractor or the landfill capping contractor and connected to the existing collection system. The landfill gas extraction wells would be installed following any Cover System Improvements (Section 4).

6. MONITORING AND SCHEDULE

6.1 GROUNDWATER MONITORING

Groundwater monitoring will be performed on a semi-annual basis, in conjunction with the current monitoring program for the Landfill and consistent with the methodology presented in Section 3.2.3. The groundwater monitoring data will be used to evaluate performance of the remedy, in accordance with the contingency plan, which is also included as an appendix to the ACM.

6.2 LANDFILL GAS MONITORING

Landfill gas monitoring will be performed in accordance with the approved Landfill Gas Monitoring Plan for the Gude Landfill. Monitoring of the landfill gas monitoring wells will be utilized to evaluate the performance of the Landfill Gas Collection System Enhancements. In the event the installation of the landfill gas extraction wells does not result in eliminating landfill gas migration at the property boundary, the placement of additional extraction wells or other enhancements will be evaluated.

6.3 SCHEDULE

The anticipated schedule for implementation of the recommended CMA is illustrated in **Figure 6-1** of this Work Plan. It is estimated that remedial activities will begin within three (3) years after approval of the ACM, based on design, permitting, and contracting requirements. Construction of the landfill cap and installation of the landfill gas extraction wells will be completed within three (3) years following completion of the design and permitting phase. Note that the schedule is preliminary, based on best estimates at the time of Work Plan development.

7. REFERENCES

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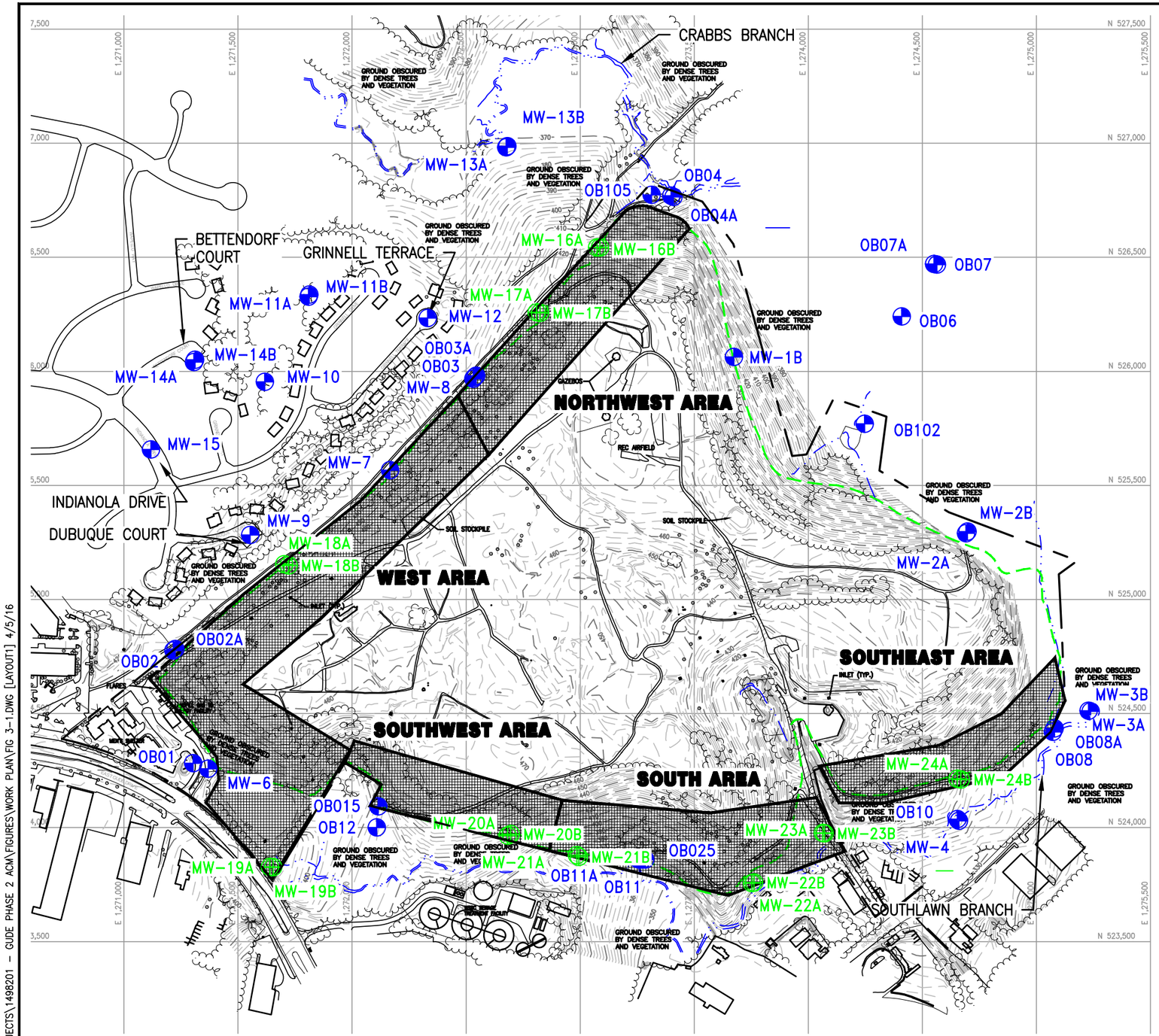
Figures



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NOTES:

1. TOPOGRAPHY COMPILED BY APPLIED MAPPING SOLUTIONS, INC. USING PHOTOGRAMMETRIC METHODS WITH PHOTOGRAPHY DATED 06/24/09 AND SUPPLEMENTED WITH FIELD SURVEY PERFORMED BY C.C. JOHNSON & MALHOTRA, P.C., OCTOBER 2009.
2. HORIZONTAL DATUM IS NORTH AMERICAN DATUM OF 1983/91 (NAD–83/91). COORDINATE SYSTEM IS MARYLAND STATE PLANE, U.S. SURVEY FEET. VERTICAL DATUM IS NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD–88) WITH ELEVATIONS SHOWN IN FEET.
3. TOPOGRAPHY IS APPROXIMATE IN AREAS NOTED "GROUND OBSCURED BY DENSE TREES AND VEGETATION".
4. THE PROPERTY BOUNDARY SHOWN REFLECTS A LAND EXCHANGE BETWEEN MONTGOMERY COUNTY AND M–NCPPC WHICH OCCURRED ON 21 OCTOBER 2014.

LEGEND

- 400 — 10–FT CONTOUR
- 2–FT CONTOUR
- PROPERTY BOUNDARY
- LIMIT OF WASTE
- STREAM
- TREELINE
- MW–X/OBX — GROUNDWATER MONITORING WELL
- MW–X — PROPOSED GROUNDWATER MONITORING WELL
- APPROXIMATE REMEDIATION AREAS FOR CORRECTIVE MEASURE ALTERNATIVES ANALYSIS

500 250 0 500 1000
GRAPHIC SCALE IN FEET

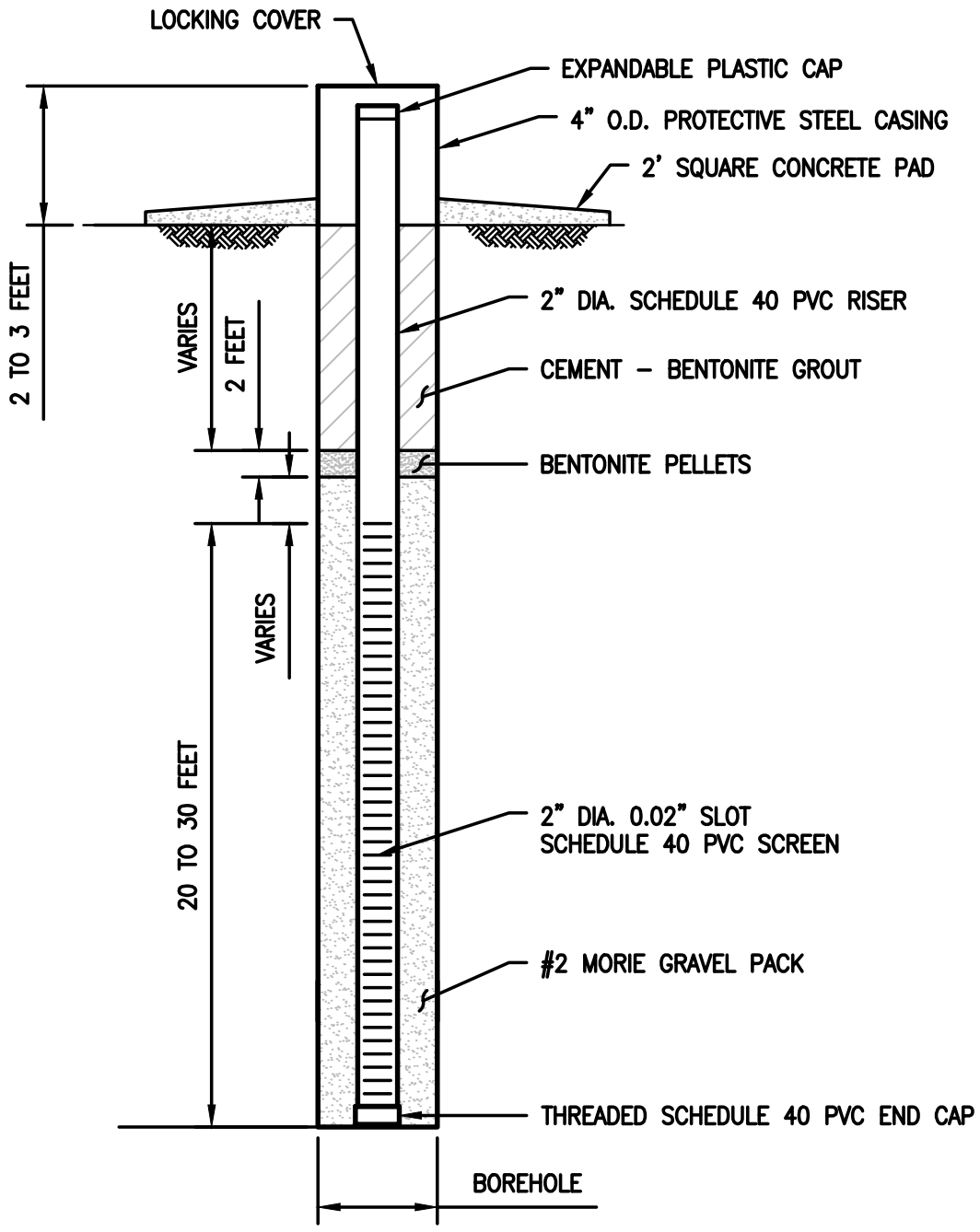
FILE PATH: Q:\PROJECTS\14982O1 – GUDE PHASE 2 ACM\FIGURES\WORK PLAN\FIG 3–1.DWG [LAYOUT1] 4/5/16

EA ENGINEERING, SCIENCE, AND TECHNOLOGY®

GUDE LANDFILL
RECOMMENDED CMA WORK PLAN
MONTGOMERY COUNTY, MARYLAND

FIGURE 3–1
PROPOSED MONITORING WELL LOCATION MAP

DESIGNED BY	DRAWN BY	DATE	PROJECT NO.
PL	JSP	APR. 2016	14982.01
CHECKED BY	PROJECT MGR.	DRAWING NO.	FIGURE
BR	MJG	–	3–1



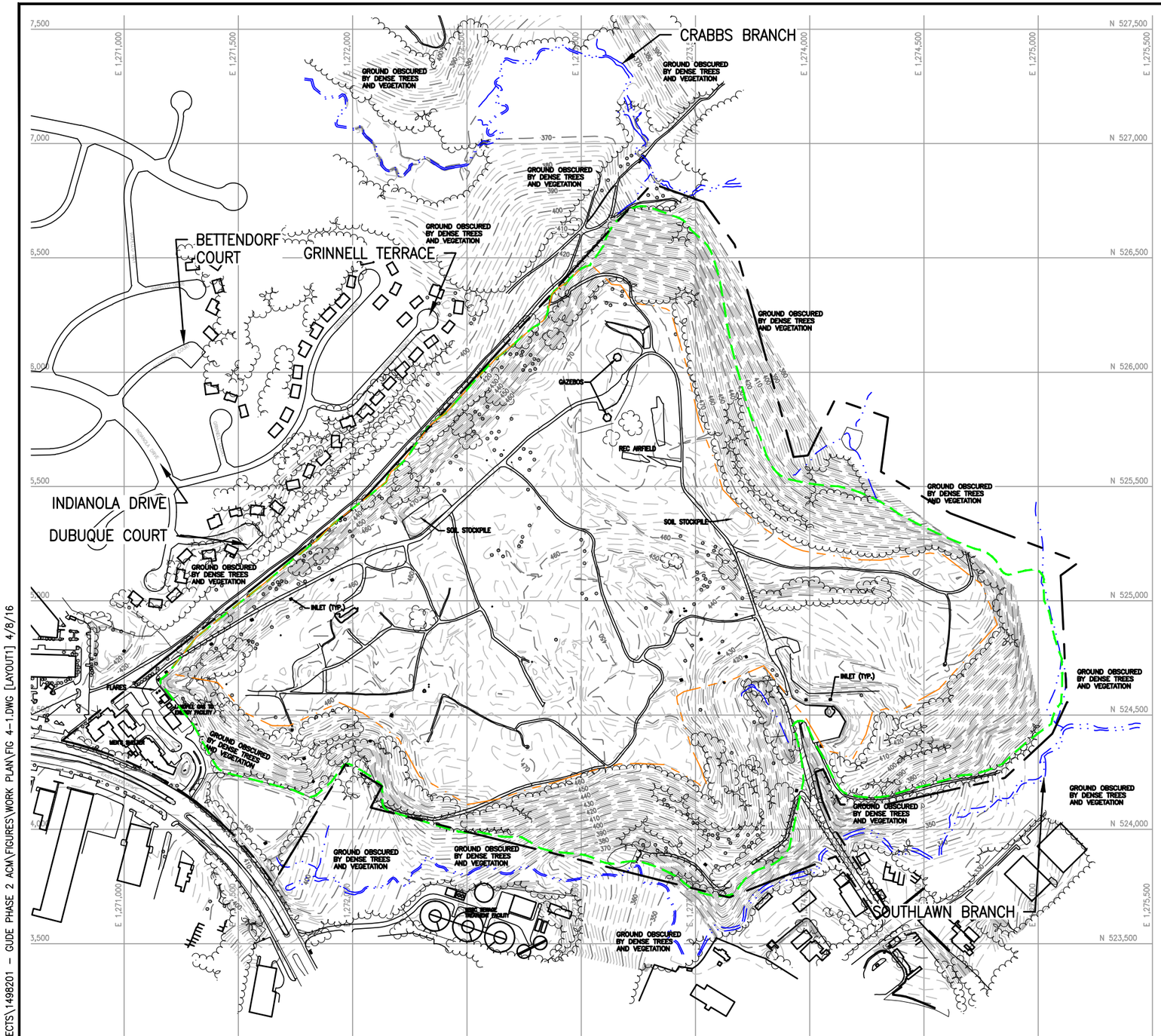
EA ENGINEERING, SCIENCE, AND TECHNOLOGY

GUDE LANDFILL
RECOMMENDED CMA WORK PLAN
MONTGOMERY COUNTY, MARYLAND

FIGURE 3–2
PROPOSED MONITORING WELL DETAIL

PROJECT MGR	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	DATE	PROJECT NO	FIGURE
MJG	LJO	JAP	BR	–	OCT. 2013	14982.01	3–2

FILE PATH: Q:\PROJECTS\1498201 GUDE PHASE 2 ACM\FIGURES\WORK PLAN\FIG 3-2.DWG [LAYOUT1] 10/10/13



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NOTES:

1. TOPOGRAPHY COMPILED BY APPLIED MAPPING SOLUTIONS, INC. USING PHOTOGRAMMETRIC METHODS WITH PHOTOGRAPHY DATED 06/24/09 AND SUPPLEMENTED WITH FIELD SURVEY PERFORMED BY C.C. JOHNSON & MALHOTRA, P.C., OCTOBER 2009.
2. HORIZONTAL DATUM IS NORTH AMERICAN DATUM OF 1983/91 (NAD–83/91). COORDINATE SYSTEM IS MARYLAND STATE PLANE, U.S. SURVEY FEET. VERTICAL DATUM IS NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD–88) WITH ELEVATIONS SHOWN IN FEET.
3. TOPOGRAPHY IS APPROXIMATE IN AREAS NOTED "GROUND OBSCURED BY DENSE TREES AND VEGETATION".
4. THE PROPERTY BOUNDARY SHOWN REFLECTS A LAND EXCHANGE BETWEEN MONTGOMERY COUNTY AND M–NCPPC WHICH OCCURRED ON 21 OCTOBER 2014.

LEGEND

- 400 — 10–FT CONTOUR
- 2–FT CONTOUR
- PROPERTY BOUNDARY
- LIMIT OF WASTE
- STREAM
- TREELINE
- LIMIT OF PROPOSED CAP

500 250 0 500 1000

GRAPHIC SCALE IN FEET

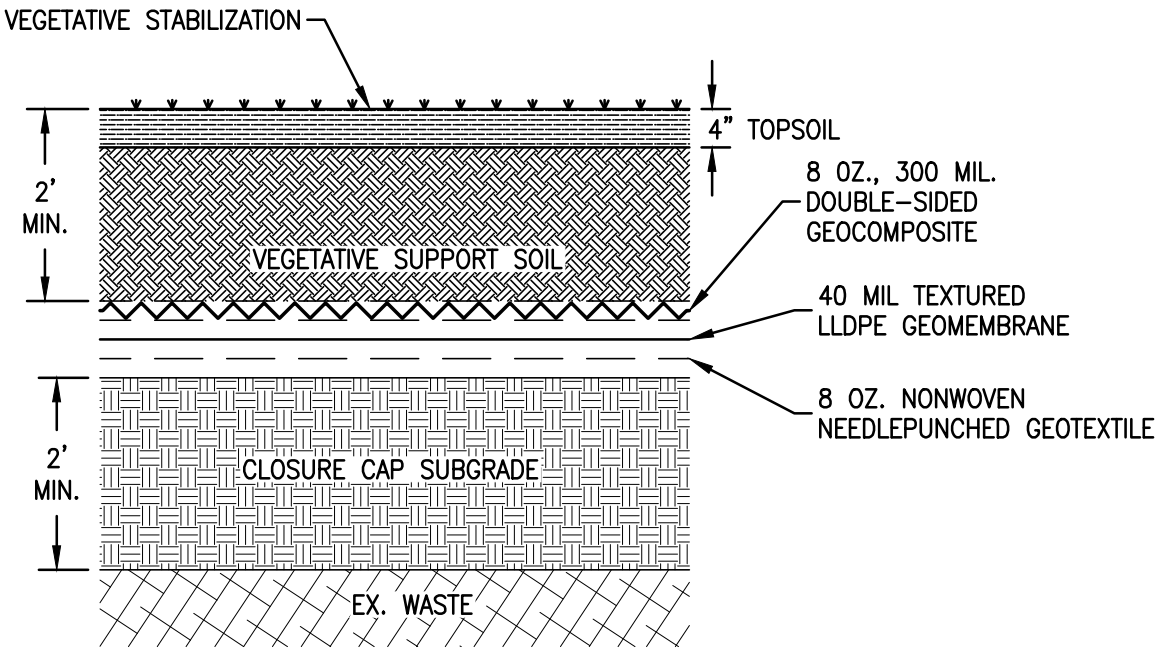
FILE PATH: Q:\PROJECTS\14982O1 – GUDE PHASE 2 ACM\FIGURES\WORK PLAN\FIG 4–1.DWG [LAYOUT1] 4/8/16

EA ENGINEERING, SCIENCE, AND TECHNOLOGY

GUDE LANDFILL
RECOMMENDED CMA WORK PLAN
MONTGOMERY COUNTY, MARYLAND

FIGURE 4–1
PROPOSED LANDFILL CAPPING LOCATION MAP

DESIGNED BY	DRAWN BY	DATE	PROJECT NO.
PL	JSP	APR. 2016	14982.01
CHECKED BY	PROJECT MGR.	DRAWING NO.	FIGURE
BR	MJG	–	4–1



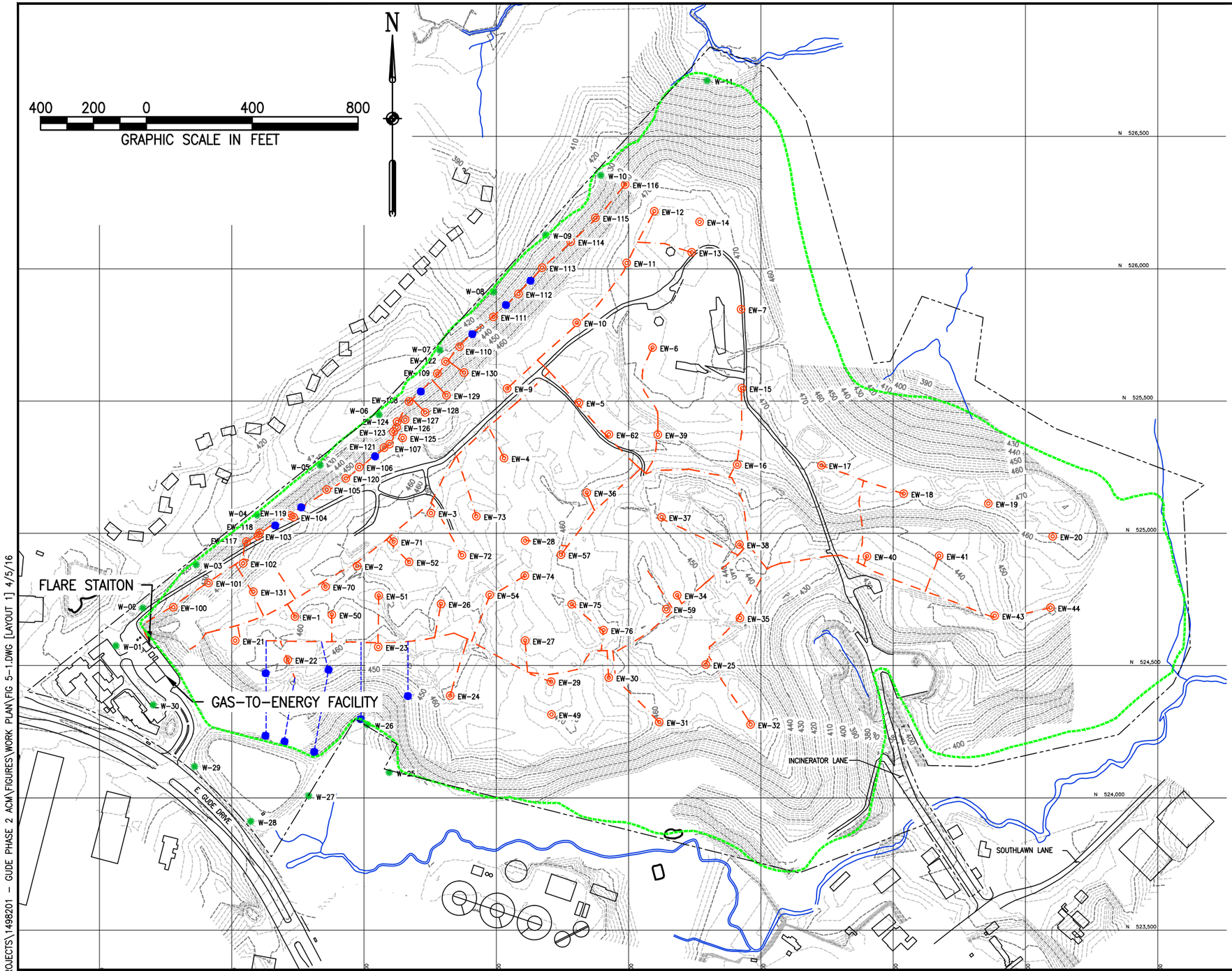
EA ENGINEERING, SCIENCE, AND TECHNOLOGY

GUDE LANDFILL
RECOMMENDED CMA WORK PLAN
MONTGOMERY COUNTY, MARYLAND

FIGURE 4-2
TYPICAL LANDFILL CAP
CROSS-SECTION

PROJECT MGR	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	DATE	PROJECT NO	FIGURE
MJG	LJO	JAP	BR	–	APR 2016	14982.01	4-2

FILE PATH: Q:\PROJECTS\1498201 - GUDE PHASE 2 ACM\FIGURES\WORK PLAN\FIG 4-2.DWG [LAYOUT1] 10/10/13



NOTES:

1. TOPOGRAPHY COMPILED BY APPLIED MAPPING SOLUTIONS, INC. USING PHOTOGRAMMETRIC METHODS WITH PHOTOGRAPHY DATED 06/24/09 AND SUPPLEMENTED WITH FIELD SURVEY PERFORMED BY C.C. JOHNSON & MALHOTRA, P.C., OCTOBER 2009.
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3. TOPOGRAPHY IS APPROXIMATE IN AREAS NOTED "GROUND OBSCURED BY DENSE TREES AND VEGETATION".
4. THE PROPERTY BOUNDARY SHOWN REFLECTS A LAND EXCHANGE BETWEEN MONTGOMERY COUNTY AND M–NCPPC WHICH OCCURRED ON 21 OCTOBER 2014.

LEGEND

- 10–FT CONTOUR
- 2–FT CONTOUR
- PROPERTY BOUNDARY
- ROADS
- STREAM/BODY OF WATER
- LANDFILL GAS EXTRACTION PIPING
- LIMIT OF WASTE
- LANDFILL GAS EXTRACTION WELL
- LANDFILL GAS MONITORING WELL
- PROPOSED LANDFILL GAS EXTRACTION WELL
- PROPOSED LANDFILL GAS EXTRACTION PIPING

FILE PATH: Q:\PROJECTS\1498201 – GUDE PHASE 2 ACM\FIGURES\WORK PLAN\FIG 5-1.DWG [LAYOUT 1] 4/5/16

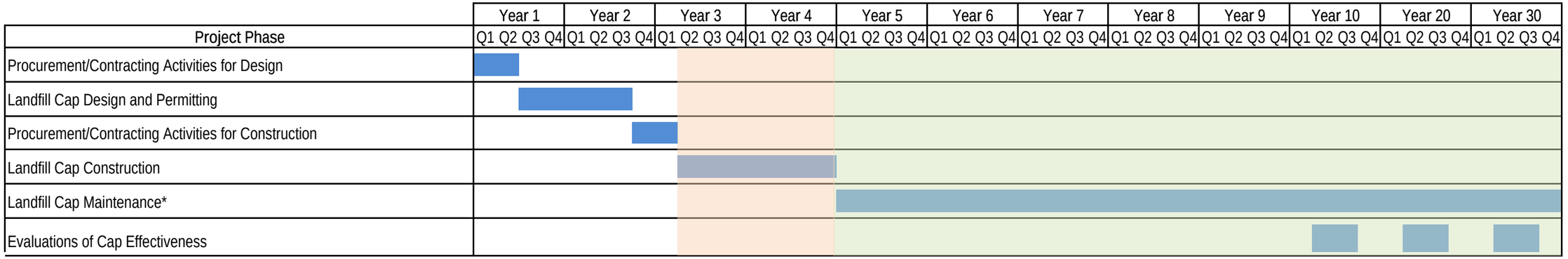
EA ENGINEERING, SCIENCE, AND TECHNOLOGY

GUDE LANDFILL
RECOMMENDED CMA WORK PLAN
MONTGOMERY COUNTY, MARYLAND

FIGURE 5–1
PROPOSED LANDFILL GAS EXTRACTION WELL LOCATION MAP

DESIGNED BY	DRAWN BY	DATE	PROJECT NO.
PL/LJO	JAP	APR. 2016	14982.01
CHECKED BY	PROJECT MGR.	DRAWING NO.	FIGURE
BR	MJG	–	5–1

Figure 6-1 Anticipated Implementation Schedule



*Maintenance of the cap will continue in perpetuity

NO SHADING: NO SITE ACTIVITY

ORANGE SHADING: CONSTRUCTION

GREEN SHADING: CONSTRUCTION COMPLETE/FULL OPERATION

Appendix A

MDE Specification for the Design and Construction of Groundwater Monitoring Wells at Solid Waste Disposal Facilities

MARYLAND DEPARTMENT OF THE ENVIRONMENT
Waste Management Administration
Solid Waste Program, Suite 605
1800 Washington Boulevard
Baltimore, Maryland 21230-1719

Specifications for the Design and Construction Of Groundwater Monitoring Wells At Solid Waste Disposal Facilities

updated 1/30/09

Wells are defined in COMAR 26.04.04.02.J as "...any hole made in the ground to explore for groundwater, to obtain or monitor groundwater, or to inject water into any underground formation from which groundwater may be produced." This definition includes monitoring wells, piezometers, and any exploratory boring which penetrates the groundwater table. The following general specifications pertain to monitoring wells being installed in the vicinity of sanitary landfills and other solid waste disposal facilities for the purpose of obtaining high-quality samples for chemical analysis. Please note that wells installed for other purposes, such as piezometers installed solely for water level monitoring, wells intended to detect floating gasoline, and wells at petroleum, industrial and Superfund sites are likely to have somewhat different specifications. In all cases, the design of a monitoring system must be approved in advance by the appropriate Waste Management Administration (WAS) project manager.

1. All wells must be installed by a Maryland-licensed well-driller in accordance with all pertinent State and local laws and regulations, and not until this Administration has approved the proposed location and design of each well. A permit to drill each well must be applied for and obtained from the local County Health Department for the county in which the well is to be located prior to well installation.

2. All monitoring well casings and screens must be constructed of 2" to 4" inner-diameter pipe composed of Schedule 40 Polyvinylchloride (PVC), Teflon (PFE), or stainless steel, joined using threaded couplings or an approved alternative. No solvent-welded construction will be approved. No solvents, glues, or lubricants shall be used in the construction of the well, except as specifically approved by the Administration. No reduction fittings may be used in the construction of the well; "telescoped" screen construction is not acceptable. Connections between casing lengths and screen sections may not have protrusions or restricted diameters on the inside of the well casing which could cause a pump or bailer to become lodged in the well.

3. The screened interval of the monitoring well must consist of at least 10 feet but not more than 20 feet of pre-constructed, commercially manufactured well screen of the same material and inner diameter as the main well casing. Slot size of the screen (generally 0.020") shall be selected so that, with the gravel pack, it will preclude clogging and excessive turbidity in the well. The bottom of the screen must be capped.

4. The diameter of the boring into which the casing is set must exceed the diameter of the casing by at least four inches (4") (e.g., a four inch well must be installed in a hole at least eight inches in diameter), so that the gravel pack and grout may be properly placed in the annular space between the casing and the sides of the hole.

5. For wells set into bedrock, and for any well greater than 50 feet deep, at least three (3) centralizers must be installed to center the well casing in the annular space, with one at the screen and the others spaced evenly along the well casing. The centralizers shall be composed of the same material as the casing and screen, or other inert material approved by the Administration.

6. The annular space of all wells shall be packed with sterilized pea gravel or coarse sand of a size compatible with the selected screen slot size from the base of the well to a level three feet (3') above the top of the screen. The gravel or sand pack used must be selected so that it prevents fine-grained sediment in the screened formation from clogging the slots in the screen or causing excessive turbidity in the well, and it must have a permeability at least approximately equal to or higher than the permeability of the monitored formation. Two feet (2') of finer sand must be placed on top of the gravel or sand pack to prevent the migration of bentonite and/or other grout components vertically down into the gravel pack and screen. Two feet (2') of bentonite pellets must be placed above the fine sand, to prevent the entry of grout into the gravel pack, and to act as a long-term barrier to liquid which might seep down the formation/grout interface. Two (2) hours should be allowed for hydration of the bentonite prior to grout emplacement.

All materials used to construct the well, including the gravel pack, seal, and grout, must be clean, sterilized, new materials - cuttings may not be placed back in the hole, as this can cause cross-contamination of the well from shallower contaminated zones or surface contaminants. Also, the gravel and sand must be composed of quartz or a similar inert mineral; limestone, marble, shale or other rock chips containing soluble minerals may not be used. If in doubt as to the consistency of the proposed materials, submit a sample to the Administration's project manager. If any wastes, contaminated soils or contaminated liquids are produced during the drilling process, they must be disposed of properly. If the gravel pack is emplaced with auger flights or temporary casing still in the hole, the augers or casing must be backed out by increments as the gravel pack is emplaced to insure that the gravel pack sets properly without bridging and without displacing the well casing when the casing or augers are extracted.

7. The annular space of all wells must be pressure-grouted with Portland cement or a Portland cement/10% bentonite slurry from the top of the pelletized bentonite seal to the surface. The grout must be installed by means of a tremie pipe inserted into the annular space of the well to a point just above the bentonite seal, and should not be installed until the two-foot (2') bentonite seal has had two (2) hours to hydrate. Under certain circumstances, a 100%-bentonite slurry or a > 10% bentonite-enriched cement may be specified as the grouting material. If bentonite clay is the approved grouting material, the well must be developed **before** grouting, and the groundwater tested prior to bentonite use. A 100% bentonite slurry may not be used for grout where it will come into contact with groundwater having a pH below 5.0 or a Total Dissolved Solids concentration of greater than 1000 mg/l.

8. After the grout has set up, some additional grout may have to be added to replace grout volume lost due to shrinkage. Regardless of the type of grout used, the top three feet must be composed of Portland cement or an acceptable concrete. All wells must be provided with a means of protection from tampering, vandalism, and accidental damage. At a minimum, all wells must be provided with a steel outer casing with a diameter at least 2" greater than the main casing anchored three feet (3') into the cement grout, with a hinged, locking steel cap which allows access to the main casing inside only when open. Alternative protective devices may be proposed. It is recommended that any proposed method should not entail sliding parts which would require periodic lubrication, such as threaded steel pipe, as this can foul sampling equipment and coat the inside of the well rendering it useless for water quality sampling.

At the ground surface, a concrete form must be provided during grout installation for the construction of a square concrete pad at least 18"x18" centered around the well, which shall extend from three inches above to three inches below the undisturbed ground surface. The height of the protective casing shall be two feet (2') above the top of the cement pad plus or minus no more than two inches (2"), unless otherwise approved. The top of the PVC casing inside must be provided with a removable cap that fits just under the locking protective steel cap, and be accessible for cap removal with normal tools. The Waste Management Administration must be provided with such keys or other special devices required for access to the wells for sampling. The Administration may approve other access control arrangements provided that access to the wells for sampling by Administration personnel on demand is assured.

High-traffic areas such as maintenance areas and parking lots may require special installations such as concrete posts set around the well to prevent damage by vehicles. Such barriers should be painted a highly visible color, and should be spaced so as to protect the well but still allow a vehicle to back up to it for sampling and repairs. Also, some installations such as gas stations may require ground-level or low-profile anti-vandalism caps; leak-proof metal caps are commercially available for these locations. These should be carefully marked so that inexperienced personnel do not mistake them for the fuel-fill ports of underground storage tanks. Also, low-profile caps are not recommended for most landfill applications, as they make relocating the well for sampling more difficult; however, they may be appropriate in paved areas.

9. After the grout has thoroughly cured or set up, all wells must be developed to insure that a satisfactory hydraulic connection exists between the well and the monitored formation. Development must consist of alternating mechanical- and/or air-surging techniques with pumping, to remove fine materials that may remain in the well, gravel pack, and the formation nearest the well which would otherwise threaten sample quality. Jetting or other techniques may be employed where necessary to speed this process, particularly when the drilling method used to install the wells was the mud-rotary method, or a variant. Wells shall be developed so that the water produced has a measured turbidity of 10 NTUs (Nephelometric Turbidity Units) or less.

10. Following development, all wells must undergo a pump test of not less than one (1) hour in order to determine the yield of the well. Yield must be reported on the completion reports. If wells are developed using high-pressure air development techniques, the air compressors must be of the oilless variety and/or have sufficient carbon filtration to remove any chance that oil vapor will be introduced into the well.

11. All wells must be properly tagged, with the well construction permit number and monitoring well designation (e.g., MW-2D, etc.) clearly visible from the outside of the well, and flagged or otherwise made visible so that they can be located for sampling and avoided by on-site heavy equipment. The inner plastic casing should be carefully sealed prior to any spray-painting or any other work on the protective casing which could introduce contaminants into the well.

12. Well completion reports must be fully completed for each well installed, and a copy of the well completion reports forms submitted to the County Health Department must be forwarded to this Administration within thirty (30) days of well completion. A project summary describing the installation procedure must accompany the copies of the

completion reports, and must contain an accurate map depicting the precise location of all wells installed at the site in relation to known landmarks; a detailed description of the construction of the wells installed including casing, screen, gravel pack and grout intervals; the elevation of the top of the concrete pad installed at the base of the protective outer well casing; the top-of-casing elevation; and both the static and pumping water levels to the nearest one-hundredth of a foot.

13. The well driller or the supervising engineer or geologist must notify this Administration via telephone at least three (3) work days prior to initiation of drilling at any waste disposal site, so that representatives may be present to observe the well installation. Failure to notify WAS may result in rejection of the well or system as an acceptable monitoring point.

14. All regulatory requirements must be met concerning the application for, permitting of, construction of and completion of all monitoring wells. Wells not constructed in accordance with the regulations (COMAR 26.04.04 of the Annotated Code of Maryland) and these specifications will not be accepted by this Administration unless a variance was obtained prior to or during well construction. Also, drilling at waste disposal sites may generate contaminated soils or liquids which must be collected and disposed of in a safe and legal manner. This may entail sampling for TCLP or other characterization tests, particularly when wastes may have been encountered during drilling.

15. It is recognized that geologic conditions at a site may require that changes to these general specifications be made in order that the monitoring system installed is adequate for monitoring the intended geologic formations, while not creating an additional hazard to groundwater quality. The specific reason for installing the well - e.g., looking for "floaters" like gasoline, dissolved compounds like landfill leachate, or "sinkers" like some chlorinated solvents ("DNAPLs")- will also control the specific design requirements of the well. Variances from the specifications described may be sought from the WAS project manager coordinating the well installation. Also, the Administration may require additional or more stringent construction specifications for any well where site conditions warrant it.

16. Any wells which are to be abandoned, and which are located at or near a solid waste disposal facility, must be abandoned so that the appropriate section of the Well Drilling regulations addressing abandonment is carefully followed. Casing must be removed, drilled out, or thoroughly split or pierced, and the entire well and gravel pack completely filled with Portland cement grout from the base of the former boring to the ground surface.

17. Placement of wells through refuse should be avoided. If it is impossible to site an accessible well at a place which is not on fill and still adequately monitor the facility, then the boring must be drilled or reamed out to at least a twelve inch (12") diameter into the next confining layer below the waste or where no clay layers occur to a depth at least five feet below the lowest occurrence of waste, and a steel casing of at least an eight inch internal diameter (8" I.D.) grouted in place with Portland cement or a mixture of Portland cement and bentonite as discussed above. After the grout has cured, drilling may commence in the boring at the previous diameter inside the steel pipe. The annular space between the steel outer casing and the 4" main well casing is to be grouted normally upon completion of the drilling. Alternative designs of an equally protective nature may be proposed. **Construction details of wells to be placed through waste MUST be approved by this Administration in advance, and a variance obtained for this construction in the well construction permit.**

18. For sites not located in the Coastal Plain physiographic province, or which are located along the Fall Line where bedrock is encountered at shallow depths, if groundwater is found in a boring above the bedrock/saprolite interface, two wells must be installed at that location in near proximity to each other, although not in the same boring. One well is to be screened in the weathered zone above the bedrock as defined by auger refusal, and the other is to be screened in a productive bedrock zone. If water is not found above bedrock, then the first productive zone or zones encountered that cumulatively produce at least 1 gallon per minute should be screened.

For sites on the Coastal Plain, the occurrence of noncontinuous confining layers or clay lenses on the site may require the installation of similar well clusters. This is typically required where clays greater than one foot thick are observed within 50 feet of the ground surface, where a lower zone is thought to be uncontaminated but needs to be evaluated, or where a plume of mixed contaminants (e.g., "floaters" and "sinkers") might be separating into different levels of the aquifer. In some cases such clusters may have to consist of 3 or 4 wells, each screened at different levels. Each well in a cluster must be installed in an individual boring; multiple casing installation in one boring is not acceptable.

19. Except for wells installed at petroleum product distribution facilities (e.g., gas stations), no well should be set less than fifteen feet (15') into the saturated zone without consultation and approval by the WAS project manager. Significant confining layers (e.g., sedimentary clays > 1 foot thick, fire-clay below coal seams, etc.) should not be penetrated without similar approval.

Also, wells generally should not be overdrilled to a depth greater than 5' below the elevation at which the screen is to be set, to avoid cross-contamination of deeper zones and averaging of hydraulic pressure across the open interval. When overdrilling is required, as in cases where a site is being investigated for the first time, the hole should be grouted with Portland cement up to the bottom of the selected screened interval and the grout allowed to fully cure before the screen is set. The well should also be developed with particular care to avoid residual cement contamination in subsequent water samples.

20. Unless the geological setting is well defined, continuous core-sampling (in rock) or split-spoon or Shelby-tube sampling (in sediments and soils) should be performed so that the correct location of the screen can be verified during drilling. The anticipated zone in which the screen should be set should be established and approved by the Administration prior to drilling. If conditions are not sufficiently well defined to permit absolute identification of the conditions to be encountered beforehand, then a protocol for choosing the proper zone should be established in advance. In the case of shallow monitoring wells, generally the first zone or zones which cumulatively yield 1 gallon per minute or more should be screened.

21. All monitoring wells must be accessible to 4-wheel drive vehicles. Any mounds of dirt, vegetation, etc., must be removed or bridged, and any stormwater control devices, fences or other necessary restrictions to access be constructed so that access to the wells is possible upon reasonable request without prior notice. All-weather access roads to the wells must be maintained in a serviceable condition.

22. These standards generally apply to the installation of piezometers installed strictly for water level exploration and monitoring; however, the following variances are typically allowed for piezometers:

a) Casing diameters less than 4";

b) Boring diameters less than 8";

c) Screened intervals less than 10'; and

d) Solvent-welded plastic casing above the water table.

These details should be discussed with and approved in advance by with the WAS project manager.

23. Alternative designs may be requested, but a demonstration that the requested changes will provide equal or superior performance must be submitted to MDE, and approved prior to implementation, or the monitoring system will not be deemed to be acceptable to MDE. Examples include the use of narrow diameter wells for use with low-flow sampling systems.

24. Where a conflict exists between these specifications and the more general well construction requirements of COMAR 26.04.04, a variance for the required construction may be obtained from the local County Health Department. Questions concerning this matter may be referred to the WAS project manager or facility inspector, or to the Solid Waste Program at (410)-537-3424.

Project Manager...._____....(410)-___-____

EMD:emd

Tuesday, February 09, 2010

Appendix B

Standard Operating Procedure No. 025 for Soil Sampling

Standard Operating Procedure No. 025
for
Soil Sampling

Prepared by

EA Engineering, Science, and Technology, Inc.
11019 McCormick Road
Hunt Valley, Maryland 21031

Revision 0
August 2007

CONTENTS

1. SCOPE AND APPLICATION

The purpose of this Standard Operating Procedure is to delineate protocols for sampling surface and subsurface soils. Soil samples give an indication of the area and depth of site contamination, so a representative sample is very important.

2. MATERIALS

The following materials may be required:

Bucket auger or push tube sampler	Split-spoon, Shelby tube, or core barrel sampler
Drill rig and associated equipment	Stainless steel bowl
Personal protective equipment as required by the Health and Safety Plan	Stainless steel spoon, trowel, knife, spatula (as needed)

3. PROCEDURE

3.1 SUBSURFACE SAMPLES

Don personal protective equipment. Collect split-spoon, core barrel, or Shelby Tube samples during drilling. Upon opening sampler, or extruding sample, immediately screen soil for volatile organic compounds using either a photoionization detector or flame ionization detector. If sampling for volatile organic compounds, determining the area of highest concentration, use a stainless steel knife, trowel, or laboratory spatula to peel and sample this area. Log the sample in the Field Logbook while it is still in the sampler. Peel and transfer the remaining sample in a decontaminated stainless steel bowl. Mix thoroughly with a decontaminated stainless steel spoon or trowel. Place the sample into the required number of sample jars. Preserve samples as required. Discard any remaining sample into the drums being used for collection of cuttings. Decon sampling implements. All borings will be abandoned.

NOTE: If sample recoveries are poor, it may be necessary to composite samples before placing them in jars. In this case, the procedure will be the same, except that two split-spoon samples will be mixed together. The Field Logbook should clearly state that the samples have been composited, which samples were composited, and why the compositing was done.

Samples taken for geotechnical analysis will be undisturbed samples, collected using a thin-walled (Shelby tube) sampler.

3.2 SURFICIAL SOIL SAMPLES

Don personal protective equipment. Remove vegetative mat. Collect a sample from under the vegetative mat with a stainless steel trowel, push tube sampler, or bucket auger. If a representative sample is desired over the depth of a shallow hole or if several shallow samples are to be taken to represent an area, composite as follows:

- As each sample is collected, place a standard volume in a stainless steel bowl.
- After all samples from each hole or area are in the bucket, homogenize the sample thoroughly with a decontaminated stainless steel spoon or spatula.

If no compositing is to occur, place sample directly into the sample jars. Place the leftover soil in the auger borings and holes left by sampling. If necessary, add clean sand to bring the subsampling areas back to original grade. Replace the vegetative mat over the disturbed areas. Samples for volatile organic compounds will not be composited. A separate sample will be taken from a central location of the area being composited and transferred directly from the sampler to the sample container. Preserve samples as required. Decon sampling implements.

4. MAINTENANCE

Not applicable.

5. PRECAUTIONS

Refer to the Health and Safety Plan.

Soil samples will not include vegetative matter, rocks, or pebbles, unless the latter are part of the overall soil matrix.

6. REFERENCES

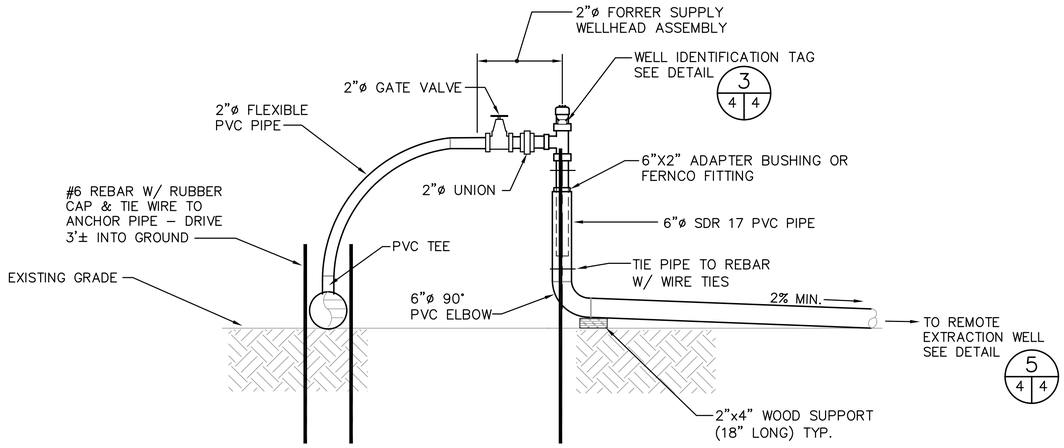
American Society for Testing and Materials (ASTM). Method D1586-84, Penetration Test and Split-Barrel Sampling of Soils.

ASTM. Method D1587-83, Thin Walled Sampling of Soils.

Department of the Army, Office of the Chief of Engineers. 1972. Engineer Manual 1110-2-1907 Soil Sampling. 31 March.

Appendix C

As-Built Details



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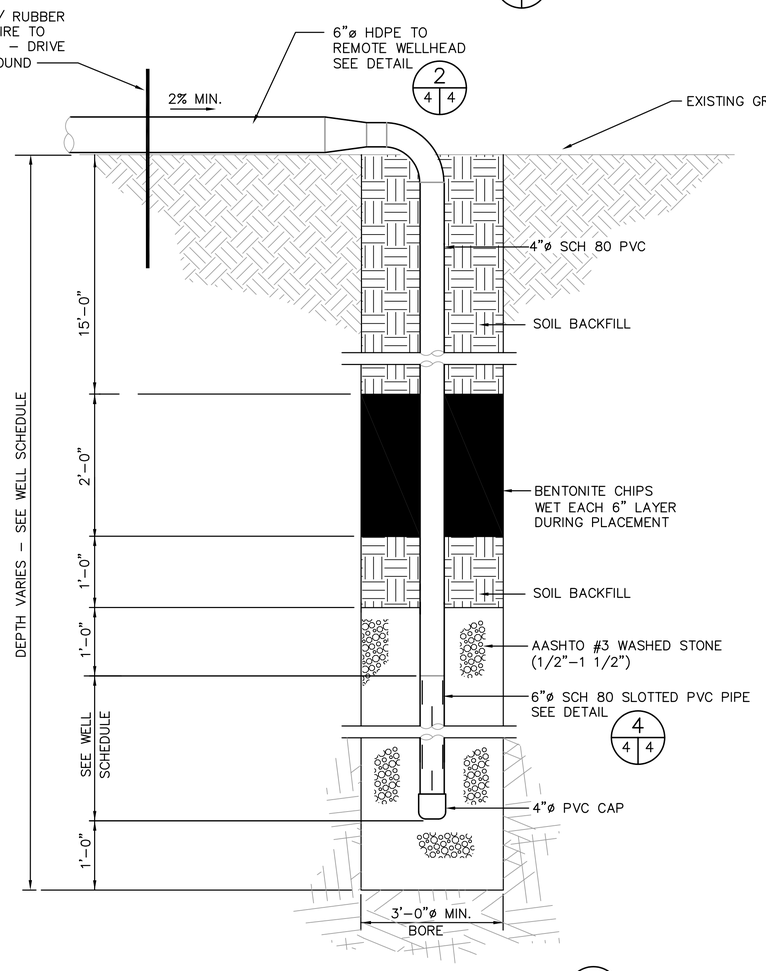

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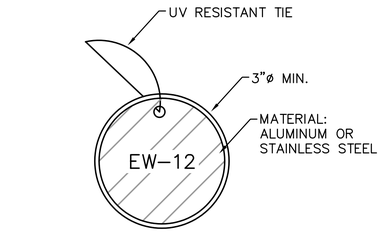

EMBOSS LETTERS ACCORDINGLY:
EW–15 = LFG WELL

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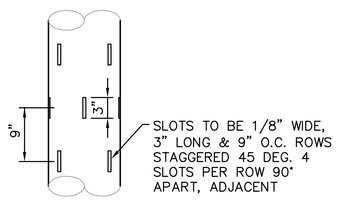

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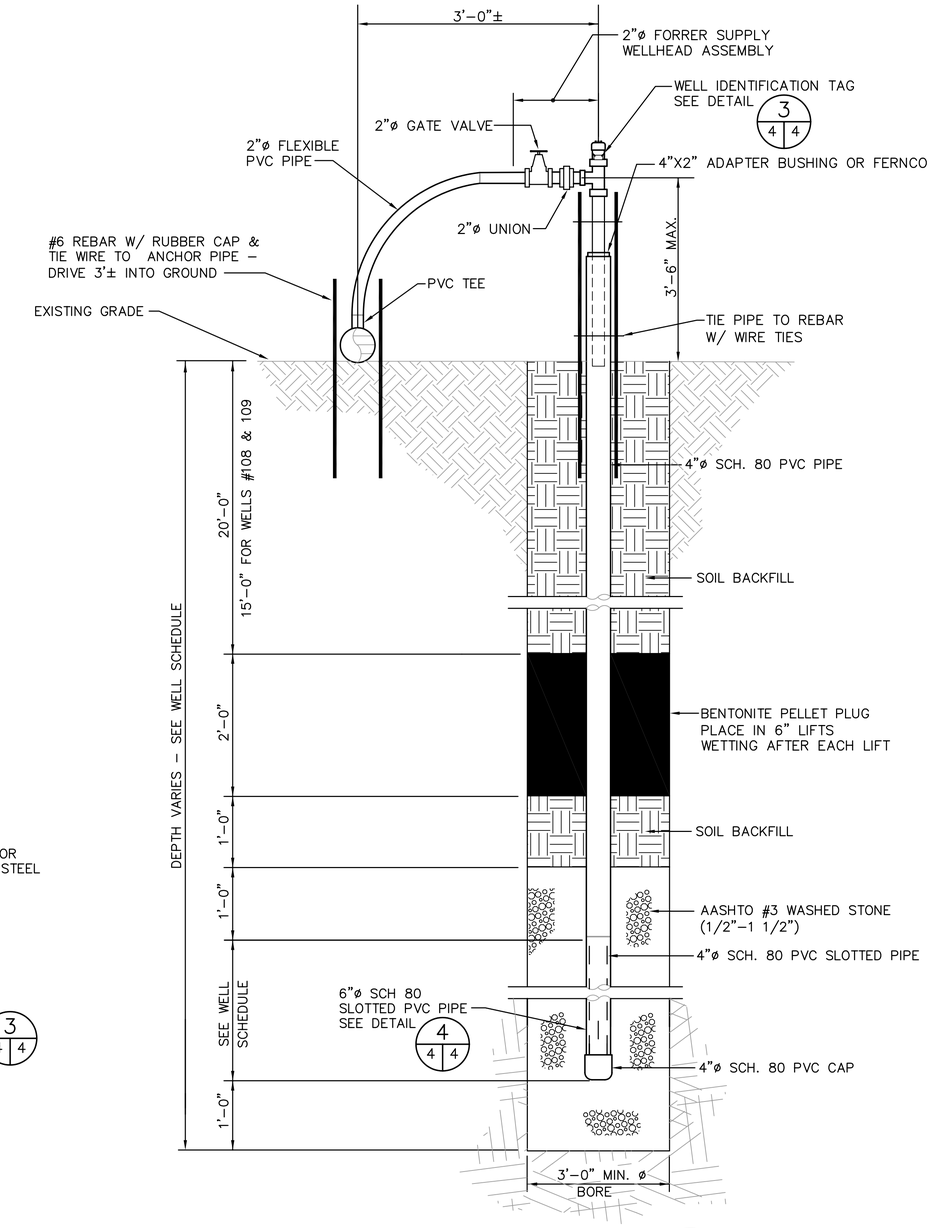


EXTRACTION WELL DETAIL 1 2,3 4
SCALE: 1"=1'–0"

DETAILS AS–BUILT

NO.	REVISION	DATE

SHEET TITLE: LFG SYSTEM DETAILS (1)

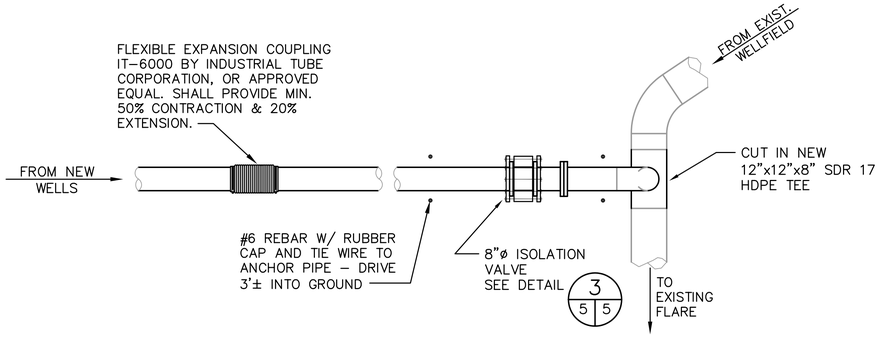
PROJECT TITLE: GUDE LANDFILL LANDFILL GAS SYSTEM

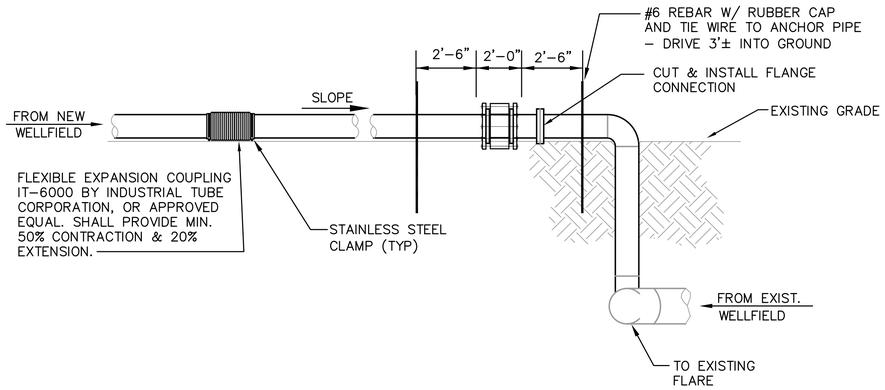
CLIENT
MONTGOMERY COUNTY
DPWT/DSWS
16101 FREDERICK ROAD
DERWOOD, MARYLAND 20855

SCS ENGINEERS
STEARNS, CONRAD AND SCHMIDT
CONSULTING ENGINEERS, INC.
11260 ROGER BACON DRIVE - RESTON, VA 20190
PH. (703) 471-6150 FAX. (703) 471-6676

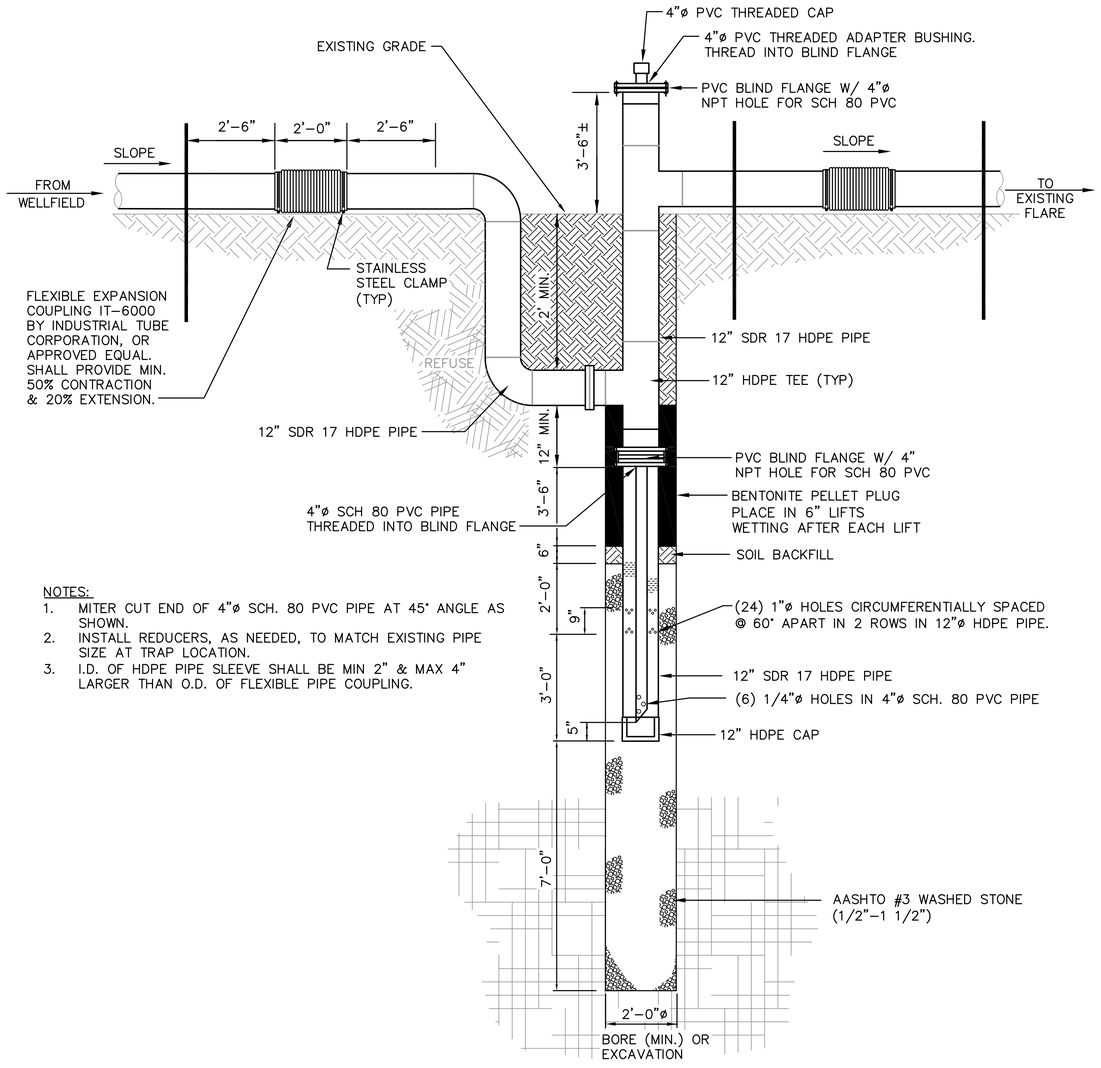
PROJ. NO.	DWN. BY:	CHK. BY:	D/A R/W BY:	APP. BY:
02203039.07	MAK/DJD	MAK	MAK	MAK

CADD FILE: 4–5 DETAILS
DATE: 9.18.08
SCALE: AS SHOWN
DRAWING NO. 4 of 5





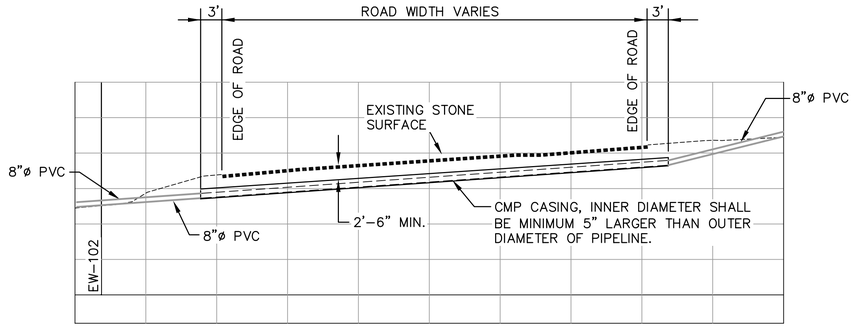
TIE IN NEW HEADER TO EXISTING DETAIL 2/3/5
N.T.S.



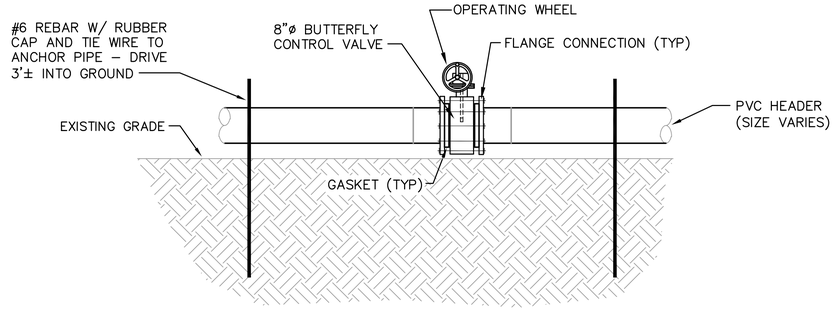
NOTES:
1. MITER CUT END OF 4"ø SCH. 80 PVC PIPE AT 45° ANGLE AS SHOWN.
2. INSTALL REDUCERS, AS NEEDED, TO MATCH EXISTING PIPE SIZE AT TRAP LOCATION.
3. I.D. OF HDPE PIPE SLEEVE SHALL BE MIN 2" & MAX 4" LARGER THAN O.D. OF FLEXIBLE PIPE COUPLING.

SELF DRAINING CONDENSATE TRAP 1/2,3/5
N.T.S.

NOTE:
CONTRACTOR SHALL RESTORE ACCESS ROAD TO MATCH ORIGINAL CONDITIONS.



ROAD CROSSING DETAIL 4/3/5
N.T.S.



ABOVEGROUND ISOLATION VALVE DETAIL 3/2,3/4/5
N.T.S.

DETAILS AS–BUILT

NO.	REVISION	DATE

SHEET TITLE: LFG SYSTEM DETAILS (2)

PROJECT TITLE: GUDE LANDFILL LANDFILL GAS SYSTEM

CLIENT: MONTGOMERY COUNTY DPWT/DSWS 16101 FREDERICK ROAD DERWOOD, MARYLAND 20855

SCS ENGINEERS
STEARNS, CONRAD AND SCHMIDT CONSULTING ENGINEERS, INC.
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PROJ. NO. 02203039.07 | DSN. BY: MAK | DWN. BY: MAK/DJD | CHK. BY: MAK | Q/A REVIEW BY: MAK | APP. BY: MAK

CADD FILE: 4–5 DETAILS

DATE: 9.18.08

SCALE: N.T.S.

DRAWING NO. 5 of 5