ANNE ARUNDEL COUNTY
BOARD OF APPEALS
PETITIONER'S
EXHIBIT# 17B
NAME NWM
CASE BA12-13V, BA13-13V
DATE 8/14/13

Golder Associates

March 22, 2012

Project No.: 063-1431-002

Ms. Martha Hynson, Chief
Solid Waste Operations Division
Land Management Administration
Solid Waste Program
Maryland Department of the Environment
1800 Washington Boulevard
Baltimore, MD 21230

RE: RESPONSE TO MARCH 2011 MDE COMMENTS, PHASE III REPORT CHESAPEAKE TERRACE RUBBLE, ANNE ARUNDEL COUNTY, MARYLAND LANDFILL PERMIT APPLICATION (1993-WRF-0225)

Dear Ms. Hynson:

On behalf of National Waste Managers Inc. (NWM), Golder Associates Inc. (Golder) is pleased to submit this letter and the attached revisions to the Phase III Report for the proposed Chesapeake Terrace Rubble Landfill (Application 1993-WRF-0225) located in Anne Arundel County, Maryland. This letter and the attached revisions are submitted in response to the Maryland Department of the Environment (MDE) comment letter, dated March 4, 2011, to the Phase III Report, and subsequent discussions and meeting between NWM, the project team, and MDE. Upon concurrence that these revisions adequately address your comments, a complete re-submission of the Phase III Report will be provided to MDE.

As indicated in Golder's letter of January 4, 2012, NWM requested Golder to assume the role of the lead designer and primary point of contact for the project team. This change was precipitated by the retirement of Mr. Michael Armstrong from Century Engineers, who had been the lead landfill designer since the inception of the project, and Golder's experience with landfill design and permitting in Maryland.

The complete list of the project team and their corresponding roles is as follows:

Consultant	Point of Contact	Role
Golder Associates	Ms. Veronica Foster, P.E.	Lead Landfill Design/Coordination
Century Engineers	Mr. George Lambros	Landfill Design Support
Hardin Kight Associates	Ms. Steve Kight, P.E.	Geotechnical Design
CC Johnson & Malhotra	Mr. Donald Koch, P.E.	Hydrogeology
Mark Schultz Associates	Mr. Mark Schultz	Geology and Hydrogeology

The response to each MDE comment from the March 2, 2011 was developed by the team representative who was responsible for the particular aspect of the design addressed by the comment.

GENERAL COMMENTS

Please note that the permit drawings have been modified as discussed with MDE during the project meeting on October 5, 2011, and subsequent conversations between Golder and MDE. The changes to the permit drawing package include the following:

- Sheets 51-57 and 67-68 have been removed from the Phase III Report drawing package since they have already been included in the Soil Erosion and Sediment Control Plan drawing package approved by the Anne Arundel Soil Conservation District (AASCD).

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Removing these drawings from the Phase III Report will eliminate potential conflicts that may be caused by changes to Erosion Control Standards required by the AASCD, that may not be reflected in this Phase III Report drawings.

- Sheets 25 - 41 and 43 – 46 have been removed from the Phase III Report drawing package, because they show construction filling/sequencing drawings which are not required by COMAR. However, these drawings provide staging details that will be beneficial for future operations, and therefore, have been added to Section 7 of the Phase III Report.

During the course of Golder's review of these drawings, further revisions were made to provide further clarification of the Drawings, as follows:

- Details were assigned unique reference numbers (e.g., Detail 1/16 is the first detail on Drawing 16) to enable cross references to details on plan view drawings;
- Grading for the perimeter channel, perimeter road, and transitions to existing grade were made consistent on plan view drawings, eliminating conflicts in grading contours;
- Sedimentation basin grading has been provided on all plan view drawings in which the basins are shown for consistency;
- Grading shown on previous Sheets 7/8 and 14/15 were identical, with little difference between the sheets. The grading within the cells on Drawings 14 and 15 was modified to show top of protective cover grading contours;
- The riprap downchutes designed for installation atop the 2-foot thick closure cap have been replaced with reno-mattress lined downchutes, underlain by a nonwoven geotextile separation layer, a 12-inch thick layer of cover soil and the closure cap geosynthetic components;
- The low permeability, soil secondary containment liner specified in the Leachate Storage Tank areas was replaced by a 12-inch thick layer of stone, underlain by a cushion geotextile and a 60-mil high density polyethylene (HDPE) geomembrane as the barrier layer; and,
- A legend has been provided on each plan view drawing where none was previously provided.

As a result of the foregoing modifications, the Phase III Report Permit Drawings are no longer identical to Soil Erosion and Sediment Control drawing package approved by AASCD, as submitted to the MDE under May 10, 2010 cover letter. Further design changes included in this submission may require submission to AASCD for approval.

As discussed with MDE, the updated drawings are being provided with this letter for your review. For your convenience, the drawings are being provided in half-scale prints for ease of review. Full-scale drawings will be provided with the final submission of the Phase III Report, once all the proposed responses have been accepted by the MDE.

While compiling this response to comment letter, the project team took the opportunity to further review the other components of the Phase III Report and offer the following supplemental information:

- Technical Specification 02612 for reinforced concrete pipe for the stormwater conveyance piping has been added to Section 14, and is provided in Attachment 9.
- Technical Specification 02615 for high density polyethylene pipe for the clay dam underdrain piping has been added to Section 14, and is provided in Attachment 9.

The following section presents the responses to the March 4, 2011 MDE comment letter.

RESPONSES TO MDE COMMENTS

MDE's comments dated March 4, 2011 are provided below, followed by responses, including proposed modifications to the Phase III Report, based on MDE's revision requests. Please note that some of MDE's comments refer to previous response to comments letters prepared by Century Engineers dated April 28, 2009 and July 28, 2010. For your ease of review, MDE's comments are repeated in **bold font**, while the responses are in *italics* font.

Comment No 1: Response to Comment No. 16 failed to explain in detail the working face area. Please clarify the number of working faces to be active at any given time and the size of each working face. It is unclear in Paragraph 2 of your response whether there will be more than one working face at a time. Also refer to Section 12.7.7 Filling Operations Paragraph 5, to make sure that your information coincides with our comment #16.

Response to Comment No. 1 (prepared by Golder): There appears to be a disparity in the use of the term "working face". MDE appears to be using the term to indicate the area being worked on any given day; while the design team has used the term to reference "disturbed, active areas." While only one working face is expected to be in use on any given day, there may be multiple locations where filling could occur on a rotating basis, and the "working face" may shift between these locations depending upon weather and filling conditions. For example, Working Face A may be the location for landfilling on Day 1, while the next day the operation may move to a position closer to the edge of the cell due to inclement weather, making access to Working Face A difficult. As the access to Working Face A improves, the landfilling operation would return to Working Face A. This scenario represents normal landfill operation activities at many landfills throughout Maryland and the United States.

Section 12.7.7 of the Operations Plan, has been revised to reflect MDE's use of the term "working face." The revised pages of Section 12 with these revisions are provided in Attachment 1 to this letter.

Comment No. 2a: Starting with the 2nd sentence; "However, you did not address the side slope liner stability pore pressure that may be created due to perched water removal from sandy silt soils behind and under the proposed clay dam and side slopes of the landfill."

Response to Comment No. 2a (prepared by Hardin-Kight): The side slope dam-liner will be constructed using compacted clays that are indigenous to the site. While the liner/dam materials will be constructed at a moisture content that will be somewhat above the optimum for compaction in order to achieve the desired permeability characteristics, the soils will not be saturated. Fill that is compacted to the specified requirements established, based on conventional moisture density zone designations, will be roughly 80% to 90% saturated. The pore pressure does not exist in the unsaturated fill soils. There is no impact on the side slope liner stability from the perched water withdrawal during the liner construction and landfill operations.

Comment 2b: Starting with the 4th sentence: "The Department has commented numerous times that the Phase III Report must address in detail the clay dam design and the integrity of the landfill for short and long term conditions, taking into account continued landfill construction activities by heavy equipment and landfill operations that can equally produce liquefaction in the sandy silt soils. These activities were not included in the design justification."

Response to Comment 2b (prepared by Hardin-Kight and Golder): Liquefaction is not likely due to the hard nature of the underlying clays and the very dense nature of the sands. The slope stability analysis takes into consideration the strength of the soils – the native undisturbed clays, silty sands, and the compacted clay dam-liner, and a surcharge to account for the construction activity. The analysis indicates that the stability is satisfactory. The soils in, and immediately behind, the dam-liner cannot be saturated during the landfill operation because of the presence of the underdrain. It would be very difficult to construct the dam-liner without controlling the perched water. By necessity, the perched water will be controlled prior to, and during, the construction of the dam-liner. The earthwork construction equipment will compact the lining to a specified minimum density resulting in a stable condition. The dam-liner will

be constructed in 15-foot wide benches using conventional earthwork moving and compaction equipment. Based upon historical laboratory testing date for similar clays, the shear strength of the compacted clay dam-liner system is expected to exceed 2,500 ps, which is the value assumed in the stability evaluations.

A liquefaction evaluation has been performed by Golder Associates and a copy of that evaluation is attached. Based upon soils engineering principles, the composition of the native, subsurface material (cohesionless sandy silt and silty sands), the density at which it is present, and the removal of perched water in this area by the permanent underdrain, this material is not characterized as being subject to liquefaction. A description of this evaluation as well as the results are being added to Section 9 of the Phase III Report. The revised pages of Section 9 and the liquefaction evaluation are provided in Attachment 2 to this letter.

Comment No. 3i: "Evaluate hydraulic gradient factors on void ratio, total stress caused by low water pressure due to perched water withdrawal in the soil mass below the clay dam, and evaluate primary, secondary and end settlement conditions within the drained soils by showing incremental stage void settlement analysis that could result for the landfill"

Response to Comment 3i (prepared by Hardin-Kight): The perched water withdrawal will not result in low water (negative) pore pressure or subsequent settlement of the very dense silty sands. The withdrawal of the perched water imposes no different effect than the cessation of the perched water during natural cyclic dry periods when the seasonal perched water level decreases several feet naturally. Settlement analyses were conducted based on field and laboratory testing. Undisturbed samples of the sands were obtained and tested for density and moisture content. Flat plate dilatometer soundings were made and a settlement analysis was conducted based on the field data. In addition, the settlement was analyzed using elastic theory (Hooke's Law). Both analyses were conducted using saturated and drained conditions, simulating the occurrence of a rapid drawdown of the perched water level. The details of the analyses are included in the Hardin Kight Associates, Inc., report dated January 27, 2012 (Attachment 4). Based on the analyses, there will be negligible impact on the condition of the dense natural sands and no impact on the compacted dam-liner.

Comment 3ii: Evaluate shear strength of the different materials of the soils under the side slope of the clay dam from top to bottom at different points incrementally;

Response to Comment 3ii (prepared by Hardin-Kight): The strength parameters for each layer are shown on the slope stability analysis. Hardin-Kight has obtained two undisturbed soil samples of the native sand stratum material located beneath the proposed clay-dam elevation. Testing of these samples demonstrates that the assumed in-place density of this material in previous slope stability analyses was consistent with the actual material properties. These testing results are provided in Attachment 4 to this letter.

Comment 3iii: Evaluate slope stability including the unit weights and shear strength of the materials within and under the clay dam where pore pressure voids may be caused by liquid removal;

Response to Comment 3iii (prepared by Hardin-Kight): The unit weights and shear strengths of the materials are given in the slope stability analyses. We understand that the MDE concern here is the potential for settlement that could be due to the decrease in the water level by the perched water underdrain drain. The decrease in the water table can result in an increase in effective pressure in the sandy soils and presumably induce settlement. However, it has been well documented that lowering the water table in dense sand will not produce significant settlement. Quoting from Engineering Foundation, Peck Hanson and Thornburn, 2nd Edition, 1973, "A single increase in effective pressure in a mass of sand does not ordinarily produce significant settlement because even a loose sand is relatively incompressible. Only if the sand is extremely loose, so that its structure will actually collapse, is there a likelihood of important subsidence." The proposed underdrain system will lower the perched water level permanently, including during cell construction landfill operation.

The relationship between the volume of air and the volume of water in soil varies with groundwater conditions and imposed loads. It is customary in soil mechanics to designate all the volume occupied by air and water as void space. The void space cannot be increased when water is removed. When the water is removed there is an increase in effective pressure due to the removal of the water would resulting in a decrease in voids. In the dense sands found on this site, we anticipate that the decrease will be insignificant.

Hardin-Kight performed a settlement analysis of the underlying sandy stratum beneath the clay dam under "drained" and "undrained" conditions, with the maximum filling grades. The analysis indicates that the settlement of this area under either condition is negligible. A description of this evaluation has been added to Section 9.2 of the Phase III Report. The revised pages of Section 9 and the analyses, dated November 16, 2011, are provided in Attachments 3 and 4, respectively, to this letter.

Comment 3iv: Evaluate external loading factors such as vehicles and heavy landfill construction equipment operation;

Response to Comment 3iv (prepared by Hardin-Kight): The construction equipment will impose substantial compactive effort during the construction of the clay dam–liner. Compression of the underlying very dense sands will be minimal and will be complete following the dam-liner construction. The underlying soils will have the entire dam-liner as a buffer during the landfill operations. The vibration associated with landfill operations will be less than the vibrations associated with the clay dam-liner construction. The compaction during the liner construction will assure the satisfactory condition of the liner during the landfill operations.

Hardin Kight has performed further slope stability analyses for the proposed landfill, considering the stability of the excavated slope during construction and after completion of filling. A description of this evaluation has been added to Section 9. The revised pages of Section 9 and the analyses, dated January 27, 2012, are provided in Attachments 3 and 5, respectively, 5 to this letter.

Comment 3v: Evaluate the bottom containment system such as liner and geotextile shear strength on the top of the side slope of the clay dam.

Response to Comment 3v (prepared by Golder): The liner system consists of the following layers, from top to bottom:

- *2-foot thick layer of drainage/protective layer;*
- *14 ounce per square yard (oz./s.y.) (minimum) nonwoven geotextile as a cushion layer;*
- *60-mil textured high density polyethylene (HDPE) geomembrane; and,*
- *2-foot thick prepared subbase with a maximum permeability of 1.0×10^{-5} centimeter per second (cm/sec), or clay dam, depending upon the location.*

The geomembrane with be located directly atop the clay dam, which will be overlain by the geotextile and the overlying drainage/protective layer. Example interface shear strength test results from Golder's geotechnical soils testing laboratory is included with this letter as Attachment 6. This testing demonstrates that the values considered in the liner system stability evaluation are consistent with actual values observed in similar liner systems at other landfill sites. From this testing, the shear strength of the requested interfaces is as follows:

- *The textured geomembrane to geocomposite with geotextile on both sides, such that the tested interface is the geomembrane to the geotextile, yielded a peak shear strength friction angle in excess of 29 degrees.*
- *The geotextile to gravel interface had a peak shear strength friction angle in excess of 51 degrees; and,*

- *The geotextile to sand interface had a peak shear strength friction angle in excess of 37 degrees.*

This data was taken from another recent landfill project for which Golder is the designer and the construction quality assurance engineer for cell and cap construction activities. These values are in excess of the values required in the project specifications and the values assumed in the slope stability computations.

Comment 3vi: Determine the properties of all materials and layers that will affect the analysis and assess the overall stability of the landfill.

Response to Comment 3vi (prepared by Hardin-Kight): Please refer to the response to comment 3v, above.

Comment No. 4: *Drawing No. 16 of 68, Clay Dam Detail failed to show whether the drained perched water would be daylighted or drained into deeper groundwater and address the impact of plugging the perched water pipe on the downgradient monitoring wells.*

Response to Comment 4 (prepared by Century Engineers): The perched water drain is daylighted to the impoundments on the floor of the excavation. As the cell construction progresses, the perched water drain will be extended around the excavation behind the clay dam as noted on Drawing 8. After all the cells have been constructed, the perched water drain will be daylighted using a 12-inch diameter SDR-11 HDPE pipe to an existing area outside the limits of the landfill. The layout and profile of the perched water underdrain are provided on new Drawing 36.

Comment No. 5: Drawing 2 of 68 shows the overall site map with two optional access roads and one assumed access road. As you are aware, Anne Arundel County is only allowing one access road for this facility. If you choose the "assumed access road", the road will cross a hiker/biker trail called Bragers Road. Please explain in detail how you propose to manage this crossing.

Response to Comment 5 (prepared by Century Engineers): The assumed access road is an at-grade crossing with the hiker/biker trail (Bragers Road). The sanitary landfill vehicles will be managed by traffic signs (i.e., stop signs, speed signs) at the crossing in both directions.

Comment No. 6: Drawing 3 of 68 – detail shows a "WQv Facility Plan", but it does not define WQv.

Response to Comment 6 (prepared by Golder): WQv is an acronym which stands for water quality volume. Water quality volume is a basic requirement of Maryland Stormwater Management Law as documented in the Maryland Stormwater Management Design Manual, Section 2.1. The definition for WQv has been added to Drawing 3.

Comment No. 7: Drawing 4 of 68 presents a drawing labeled "Future 5,000 s.f. maintenance building and office". For clarification, please add a note stating "See construction note #3 under this label".

Response to Comment 7 (prepared by Golder): "See construction note #3" has been added to Drawing 4, as requested.

Comment No. 8: Drawing 4 of 68 – General note #9 explains the operation of the wheel wash. You have stated "landfill operator shall pump water from cleanout to tanker truck or directly to Basin No. 3". Please explain how the water will be pumped to Basin No. 3. Will the wheel wash have an automatic sprayer." Any liquid coming in contact with waste is considered leachate. Since Basin No. 3 is a stormwater pond, leachate cannot be disposed of in this pond without a national pollutant discharge elimination system permit.

Response to Comment 8 (prepared by Century Engineers): *No wheel wash water is to be pumped to Basin No. 3. An automatic sprayer will be used at the wheel wash. Drawing 9 has been revised to delete reference to Basin No. 3 as a collector for wheel wash water.*

Comment No. 9: Drawing 13 of 68 presents a detail for Storage Facility No. 1. This is mislabeled as "Section 2-2" instead of "Section 1-1".

Response to Comment 9 (prepared by Golder): *Storage Facility No. 1 detail has been revised to show "Section A-A'"; while Storage Facility No. 2 detail has been revised to show "Section B-B'". References to these sections have been also revised on Drawing 11.*

Comment No. 10: Drawing 17 of 68 and Drawing 18 of 68: detail "Sump to Pump House Section A-A" shows a 14 oz/s.y. non-woven geotextile partially on top of the No. 5 stone in the sump. The geotextile only extends 2 feet from the toe of the slope. Please give your reasoning for not extending the geotextile over the entire sump area. Also, below the 24-inch solid wall HDPE pump carrier pipe, there are two 14 oz/s.y. non-woven geotextile; please explain the purpose of the non-woven geotextile on top of each other. The same comment will apply for Drawing 19 of 68 – detail "Initial Rubble Waste Lift Section A-A."

Response to Comment 10 (prepared by Golder): *In response to MDE's May 11, 2010 letter, the sump detail was revised. As a result of this review, the geocomposite drainage layer material which was depicted as wrapping around the 24-inch diameter HDPE perforated pump riser pipe (see plan view of drawings) on the 2009 version of the drawings was removed.*

To reduce the potential for the perforations in the riser pipe to clog, the cell sump will be backfilled with No. 5 stone. A second layer of 14 oz./s.y. nonwoven geotextile is provided as additional cushion between the No. 5 stone and the geomembrane to protect the geomembrane from puncture. Since a significant amount of the 14 oz/s.y. material will be utilized for liner construction, it is more cost effective to use a double layer of this material rather than buying a very small amount of heavier material for the sump area only. There is no need for extending this second layer of geotextile up the slope.

The line types for the nonwoven geotextile and the 12-mil temporary polyethylene liner on Drawing 17 are not sufficiently clear to distinguish these materials. Golder believes that this line type similarity was contributing to confusion regarding this detail. Two distinctly different line types have been assigned to these materials to clarify where the geotextile and the temporary liner are proposed.

Comment No. 11: Please add a note on drawings 49 of 68 and 50 of 68 that says "the final cap of the landfill will be graded to a minimum 4% slope to ensure proper drainage".

Response to Comment 11 (prepared by Golder): *A note stating that the "The minimum and maximum slopes of the final cap are 4 percent and 33 percent, respectively, to promote positive drainage" has been added to Drawings 26 and 27, as requested.*

Comment No. 12: Section 6.4, Residential Well Monitoring states "the landfill will provide mitigation measures at its expense if unreasonable impacts are determined." The word unreasonable is vague; please revise wording and clearly state in detail under what circumstances the residents will get a replacement drinking water supply.

Response to Comment 12 (prepared by Mark Schultz Associates): *Potential impacts on residential wells are addressed in detail in Section 16 Appendix C "Residential Well Water Level Monitoring Program and Mitigation of Impacts."*

Appendix C has been revised in several ways to address the MDE's concern, as described below.

Appendix C, II.B., now states: "NWM has agreed to the MDE's request that the existing perched zone monitoring well network be maintained and used to evaluate the impact of the landfill on perched water levels. In addition, three new perched-zone monitoring wells (PMWs-8, 9, and 20) are proposed between the landfill and the potentially impacted shallow residential wells along Conway Road (screened in perched zone). "

Appendix C, IV.E, (Demonstration of Hydraulic Connection) now states: "Water levels in the perched water table monitoring wells (existing and proposed) will be measured monthly for at least a year before any landfilling takes place. Quarterly water level measurements will continue through the life of the landfill. These data will be used to prepare perched water table contour maps. NWM and the MDE will use these contour maps to evaluate whether landfill activities have impacted the perched water table along Conway Road."

Water levels in the residential wells will be monitored in accordance with the protocols described in Section 16, Appendix C. Eight potentially impacted wells are identified and the circumstances under which mitigation measures will be provided are described.

Appendix C, VI.A. (Response Criteria) now states: "The landfill will provide relief for neighbors that meet the following criteria:

- *A hydraulic connection between the residential well and the landfill has been demonstrated as described above in section IV(E).*
- *The well is not capable of meeting either daily or cycle demand previously determined for each well.*
- *The water level in the well is below the drought water level as determined during the baseline period. For inaccessible wells (e.g. buried wells), relief will be provided if there is evidence of drawdown in onsite monitoring wells or nearby residential wells and the well is unable to meet daily needs."*

We have deleted from Section 16 the provision that mitigation will not be provided until the landfill reaches the south corner of the landfill. These revisions are reflected in Section 16 included in Attachment 7 to this letter.

A copy of Section 16, Appendix C has also been provided to the MDE's Water Management Administration (WMA). The WMA requires a Groundwater Appropriation Permit for the perimeter drain. The WMA also requires a Surface Water Appropriation Permit for surface water that enters the cells and is then pumped out.

The WMA has completed their review of the NWM water appropriation permit applications and found them to be complete. In November 2011, the WMA instructed NWM to notify adjacent property owners of the water appropriation requests. The WMA subsequently advertised a notice of opportunity for a public hearing for the permit applications.

Comment No. 13: Section 12.6.3, page 12-8 describes inclement weather conditions, but fails to specify emergency closures and employee safety during an emergency event. Also, the safety plan in Section 12-Appendix C doesn't address this situation.

Response to Comment 13 (prepared by Golder): Section 12.6 of this document is specific to landfill operation during various events, including inclement weather. Narrative regarding health and safety of site personnel during inclement weather events has been added as new Paragraph 7.0 in Appendix 12C of the Phase III Report. However, the measures outlined in Appendix 12C, represent the minimum requirements. The Landfill Manager may, at any time, impose more stringent requirements based upon site experiences and OSHA requirements, as they may evolve over time. These revisions are included in Attachment 1 to this letter.

Comment No. 14: Section 12.7.3, first paragraph on page 12-9 states that "Noise levels are regulated by the State of Maryland." Please include language on personnel responsibility regarding the control of noise during the hours of operations and during construction, and provide additional detail how landfill operations will be managed to prevent excessive noise.

Response to Comment 14 (prepared by Golder): Section 12.7.3 has been revised to provide additional detail about personnel identifying noise issues with muffler-fitted equipment. The location and layout of the landfill, including the proposed cell development sequence and maintenance of vegetated buffers, were developed giving consideration to managing/abating equipment noise. Possible changes in equipment and the addition of sound damping mufflers to equipment are included in the Operations Plan as possible actions the Landfill Manager may take to address noise exceeding state restrictions at the property boundary. These revisions are included in Attachment 1 to this letter.

Comment No. 15: Section 12.7.7, last paragraph on page 12-12 describes fabric-type alternative daily cover information. It is not clear if you are proposing to use this alternate daily cover instead of soil; please clarify. There is also manufacturer's information provided on alternative daily covers in Appendix E. If you propose to use a specific alternative daily cover material, please indicate which one and address how the material satisfies the requirements that it will perform as well as soil cover.

Response to Comment 15 (prepared by Golder): It had been previously indicated that these materials would be proposed for MDE review and approval prior to their use, but were intentionally not included in the 2009 submission. However, Comment 18 of your letter dated January 14, 2010 required the inclusion of a discussion about alternative daily cover materials and demonstration of their compliance with the requirements. The requested information was included in Appendix E, with narrative specifically explaining the common acceptance of these materials. Additional language has been added to this section under new Section 12.7.8, "Alternate Daily Cover Materials." These revisions are included in Attachment 1 to this letter.

Comment No. 16: Paragraph 3 on page 12-26 of Section 12.13 mentions that the delivery of waste will be categorized and measured by the owner. Please explain what you mean by the term "measured," and where and how the waste will be "measured." Will this be performed by the actual owner or will it be performed by an operator?

Response to Comment 16 (prepared by Golder): Additional language has been added to Section 12.13 to clarify how the waste coming into the landfill will be measured. These revisions are included in Attachment 1 to this letter.

Comment No. 17: Please address the following comments for Section 15 regarding the Closure Plan:

i. **Include a section on vegetation of the cover system including mulching and seeding. Temporary and permanent seeding must comply with Anne Arundel Soil Conservation District details and specifications for vegetative establishment;**
ii. **Explain how you will protect the integrity of the geomembrane cap from vegetative root penetration;**
iii. **Include a section on Construction Quality Assurance/Quality Control, which should include detailed information regarding cover system material, field testing, inspection, and certification;**
iv. **Add a sentence stating certification of as-built plans for the completion of the closure cap will be submitted to the Department within 90 days of completion of the cap; and**
v. **Include a statement that an updated closure plan will be provided to the Department at least 180 days prior to the cessation of the waste disposal and the landfill will be closed in accordance with the approved closure plan.**

Response to Comment 17 (prepared by Golder): The following responses are offered:

i. *The construction of the cap will be performed in accordance with these Technical Specifications. In accordance with the Requirements of COMAR 26.04.07.21-22, the Closure and Post-Closure Plan describes the closure sequencing, final cover system, erosion and sedimentation controls, and maintenance of the final cover system. The requirements for vegetation to be established on the final cover are included in the Technical Specification 02936, included in Section 14 of the Phase III Report. The specified seed mixture was included in the Soil Erosion and Sediment Control Plan which has already been approved by Anne Arundel Soil Conservation District (AASCD). While this seed mixture was approved, it is not a standard seed mixture listed in AASCD's specifications, because the County's standards do not address this type of application. As such, it is not appropriate to stipulate that the seed must comply with AASCD's standards. This permit will require renewal with AASCD every five years, including review of the proposed seed mixture.*

ii. *The seed mixture specified in Technical Specification 02936 for the final cover at this site is comprised of species which typically do not have a root depth more than 18 inches, which is less than the 24-inch depth of the soil cover over the geomembrane. As such, the shallow root depth alone should address concerns about intrusion in the geosynthetic components of the final cover. Additionally, the geomembrane is protected from damage due to any overlying materials by the installation of a double-side geocomposite drainage layer and 24-inches of cover soil and topsoil.*

iii. *Detailed information regarding the construction quality assurance and quality control requirements for the cover system materials, field testing, inspection and certification are outlined in the Construction Quality Assurance (CQA) Plan, included in Section 13, and the Technical Specifications, included in Section 14, of the Phase III Report already provided to MDE. A reference to the Technical Specifications and the CQA plan has been added to Sections 15.1.1 and 15.1.8 of the Closure/Post-Closure Plan.*

iv. *The requested statement has been added to Section 15.1.8 of the report. This revision is included in Attachment 8 to this letter.*

v. *The requested statement has been added to Section 15.1.8 of the report. This revision is included in Attachment 8 to this letter.*

Comment No. 18: Please address the following comments for Section 15 regarding the Post-Closure plan:

i. **Section 15.2.4, doesn't include detailed information on the Inspection Plan regarding leachate tanks and tank levels. Please provide this information;**

ii. **Explain in more detail the leachate system repairs, as well as monitoring and inspections of the leachate collection system during post-closure care; and,**

iii. **Clearly define the post-closure time period and potential extension of this time frame.**

Response to Comment 18 (prepared by Golder): The following responses are offered:

i. *A new Section 15.2.3.2 addressing this issue has been added, and subsequent report sections have been renumbered to accommodate this addition. This revision is included in Attachment 8 to this letter.*

ii. *A new Section 15.2.3.1 addressing this issue has been added, and subsequent report sections have been renumbered to accommodate this addition. This revision is included in Attachment 8 to this letter.*

iii. *A new Section 15.3, "Post-Closure Period," has been added to the plan, stipulating that the post-closure period shall be 5 years as defined in COMAR 26.04.07.22. The circumstances which may cause this time to be extended are also outlined in this new section. This revision is included in Attachment 8 to this letter.*

Comment No. 19: Section 16, page 16-4, Table 2 includes a list of chemicals and PQLs. Cadmium is listed twice and calcium is missing. Please correct this discrepancy.

Response to Comment 19 (prepared by Mark Schultz Associates): Table 2 has been revised to include calcium in the place of the first cadmium listing. This revision is included in Attachment 7 to this letter.

Comment No. 20: Appendix D of Section 16 – the Department requests that there be an additional cluster well located between PMW 9 and PMW 10.

Response to Comment 20 (prepared by Mark Schultz Associates): A cluster well has been added between PMW-9 and PMW-10. This revision is included in Attachment 7 to this letter.

Comment No. 21: Section 16 – the groundwater contours in Appendix D for Areas A, TA, and TB are very similar to Figures 7, 14, and 17 of the Phase II Addendum Report dated December 22, 2004, which depict highest predicted groundwater elevation. Recently taken water levels should have been used in the Appendix D figure. If the contours depicted are the 2004 highest predicted water levels, please revise the map with current contours. In addition, please include the locations of wells and corresponding water levels on the groundwater contour map as previously done in the Phase II report.

Response to Comment 21: See response after Comment 24.

Comment No. 22: Appendix D of Section 16 should be divided into separate groundwater contour maps for each aquifer beneath the site if the confined aquifer underlying Area B is hydraulically unrelated to the other aquifers present. One of the contour maps should also depict the perched aquifer water levels.

Response to Comment 22: See response after Comment 24.

Comment No. 23: Do groundwater contours shown in Section 16, Appendix D across Area TA correspond to the perched or confined aquifer? Plate 6 of the Phase II Addendum dated December 5, 2003, shows perched groundwater elevations ranging from 95 to 115 feet across Areas B and TA. The report states a portion of Area TA is underlain by clay and perched conditions exist. If the contours are from the confined aquifer, please explain why water levels decline approximately 40 feet in Area B, but only 5 to 10 feet in Area TA adjacent to Area B.

Response to Comment 23: See response after Comment 24.

Comment No. 24: Does the hydrologic divide depicted in Appendix D of Section 16 pertain to the shallow perched aquifer? Plate 5 of the Phase II Report dated December 5, 2003 shows the clay extending beneath Area TA. If clay is present under Areas B and TA, would the shallow hydrologic divide relate to the extent of the clay and not the divide that is depicted?

Responses to Comments 21, 22, 23, and 24 (Updated Groundwater Contours) (prepared by Mark Schultz Associates)

The MDE requested that an updated series of potentiometric surface contour maps be generated from current water level data. The MDE also requested that the existing observation wells be maintained as long as possible, that is, until they interfere with landfill construction.

Groundwater levels were measured on August 5, 2010 (see the attached Table for individual water level elevations). The updated groundwater elevations were used to generate the following updated potentiometric surface contour maps, which are attached:

- *Water Table (Area A) and Perched Water Table (Areas B, TA, and TB) Contours on August 5, 2011;*
- *Hydrogeologic Area B – Potentiometric Surface in Water Bearing Zone Under Massive Clay (Lower Patapsco Aquifer) on August 5, 2011;*
- *Hydrogeologic Area TA – Semiconfined Groundwater Elevations in Silt/Clay Unit Under Perched Zone on August 5, 2011; and,*
- *Hydrogeologic Area TB – Potentiometric Surface in Water-Bearing Zone Under Clay on August 5, 2011.*

The following wording has been added to the groundwater monitoring plan (Section 16.2):

"The current observation well network will be maintained until such time that they need to be removed for landfill construction. Quarterly water level measurements made in these wells and the permanent monitoring wells will be used to generate potentiometric surface contours before, during, and after landfill construction."

This revision is included in Attachment 7 to this letter.

Comment No. 25: Groundwater highs typically mirror topographic highs. The Appendix D of Section 16 figure shows topographic contours of 190 feet southeast of Area B. The topographic contours near the hydrogeologic high range from 100 to 130 feet. Please explain why the hydrogeologic divide is distinct from the topographic high.

Response to Comment 25 (prepared by Mark Schultz Associates): Groundwater highs will generally mirror topographic highs in a homogeneous isotropic unconfined aquifer; however, this is not the case in Area B. Drillers logs for domestic wells located on the topographic highs southeast of Area B show the presence of clay units near land surface that restrict the infiltration of precipitation to the groundwater flow system. The first aquifer encountered is the permeable, but thin, perched water table aquifer that overlies the massive clay unit that underlies all of Area B. The result is a potentiometric surface in the perched zone that mirrors the clay surface rather than the topography. The potentiometric surface in the aquifer below the clay is about 50-feet lower than the potentiometric surface in the perched zone overlying the clay. Tehre is no change to Section 16 included in Attachment 7 as a result of this comment.

Comment No. 26: Groundwater wells were sampled in November 2004 and results were submitted in the Phase II Addendum dated December 22, 2004. However, a minimum of four rounds of sampling are required to fully characterize background conditions. These additional rounds of sampling must be submitted to the Department.

Response to Comment 26 (prepared by Mark Schultz Associates): An extensive network of monitoring wells is proposed for the landfill. Considerable road construction will be required to access the well sites. As discussed at the meeting with MDE on July 14, 2011, the following wording has been incorporated in Section 16.1 of the groundwater monitoring plan:

"The proposed permanent monitoring wells for the landfill will be used to establish baseline groundwater quality. The permanent wells will be installed after issuance of the permit for landfill construction. The wells will be sampled a minimum of four quarters to establish a statistically valid analytical database. Since the wells are new, it may take more than four quarters for parameter concentrations to stabilize. No rubble will be emplaced in the landfill until a stable statistically-valid analytical database has been established."

Section 16 has been reworked as a result of the above comments and is being provided in its entirety in Attachment 7 to this letter.

Comment No. 27: Section IV of Section 17 references Appendix D of the stormwater management/sediment control report; it should be referencing Appendix B. Likewise, Sections VI and VII reference incorrect appendices. Please review all appendix references in Section 17 for accuracy.

Response to Comment 27 (prepared by Century Engineers): All appendix references in Section 17 have been reviewed and revised as follows:

Section IV "Appendix D" changed to "Appendix B"
Section VI "Appendix E" changed to "Appendix C"
Section VII "Appendix F" changed to "Appendix D"

Due to the size of Section 17, re-submission of these very minor revisions will be provided when the entire document is re-submitted, after MDE approves the responses included in this letter.

Comment No. 28: Section 17, Section 111(G) of the stormwater management/sediment control report contains small pond approval letters from Anne Arundel Soil Conservation District (AASCD). These letters state that the approval will become "null and void if the construction under the approval has not begun one year from date of approval...." The approval was dated 4-12-2010. Please note if the landfill is not constructed according to the AASCD approval, you must resubmit the plans to AASCD and get approval again prior to start of construction. A copy of the approved letter must then be submitted to the department.

Response to Comment 28 (prepared by Century Engineers): This letter is signed by the owner, but it is not approved. It should be approved at the time of permit issuance. Also, AASCD, Jim Stein, has advised that the drawings as approved have a five-year approval period from April 2010 to April 2015. However, any changes made to the drawings prior to a permit would require a revised approval. The permit for construction will be obtained through MDE.

CONCLUSION

As discussed with MDE, the updated drawings are being provided with this letter, for your review. However, only excerpts of the Phase III Report which were revised as a result of these responses are being submitted to MDE for review with this letter. Once MDE is satisfied that these outstanding issues have been resolved and no new issues are raised by MDE, the Final Phase III Report will be re-submitted, in its entirety, in anticipation of the public comment period. The drawing references in the entire document will be revised in that submission, in light of the changes to the drawing package described above.

We trust that these responses to address your comments. If you wish to discuss any of these items further, please do not hesitate to contact Mr. Fleischman at 301-495-1520 or Ms. Foster at 856-793-2005.

Very truly yours,

GOLDER ASSOCIATES INC.

Veronica E. Foster, PE
Senior Engineer

Francis T. Adams, PE
Practice Leader/Associate

Attachments
VEF/FTA:lrl
cc: Mr. S. Fleischman, NWM
Mr. G. Lambros, Century Engineers
Mr. S. Kight, Hardin-Kight
Mr. M. Schultz, Mark Schultz Associates
Mr. D. Koch, CC Johnson & Malhotra

Golder Associates

Phase III Report Permit Specifications

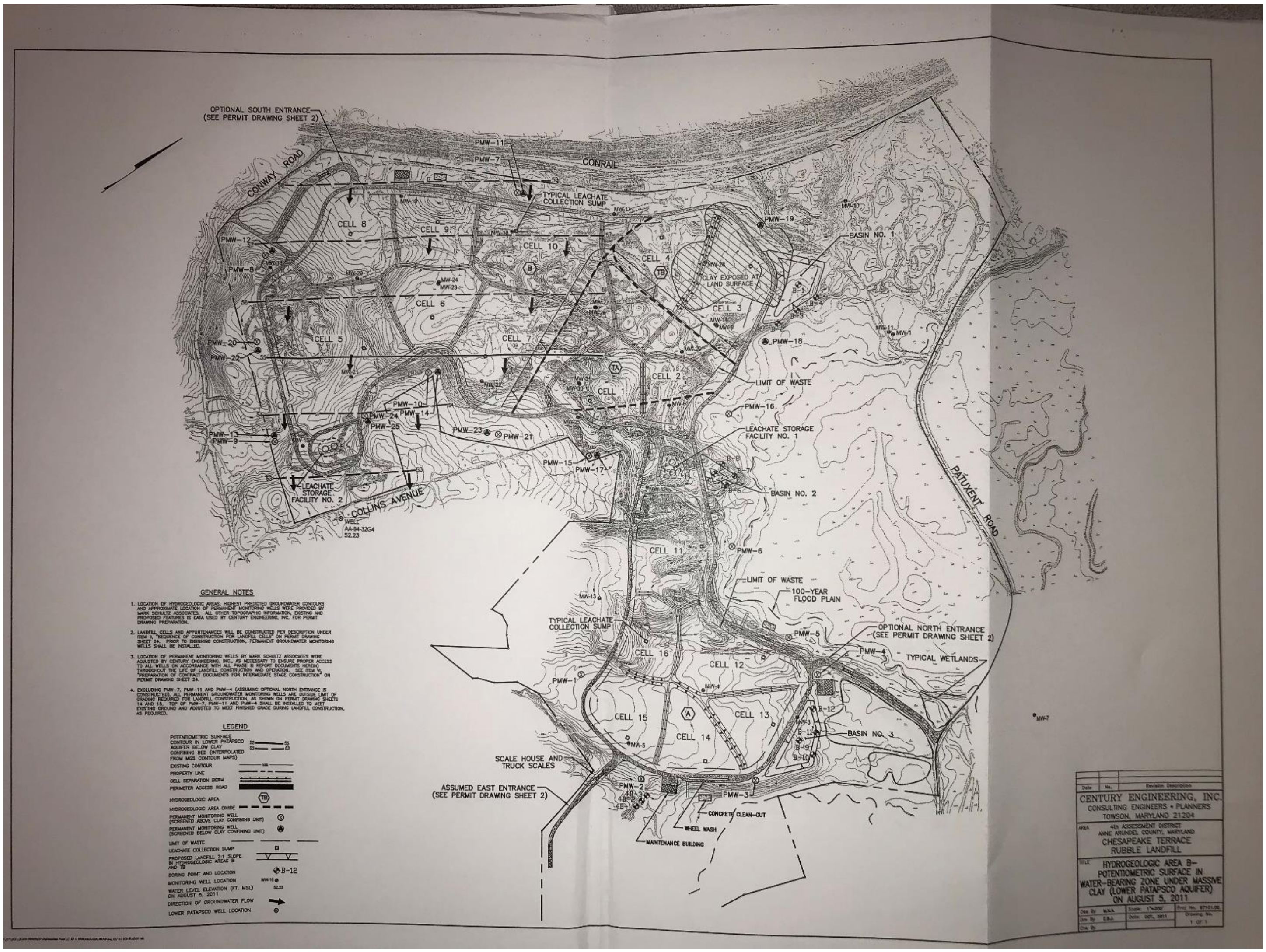
SITEWORK SPECIFICATIONS

SECTION

02100 - Site Preparation
02110 - Site Clearing and Grubbing
02125 - Erosion and Sedimentation Control
02127 - Articulating Concrete Mats
02130 - Monitoring Well Abandonment
02140 - Construction Dewatering
02150 - Shoring and Bracing
02220 - Excavation
02221 - Waste Excavation and Disposal
02223 - Structural/General Fill and Intermediate Cover
02224 –Subbase and Clay Dam
02231 - Drainage System
02232 - Leachate Drainage Layer
02233 - Coarse Aggregate
02234 - Protective Cover
02271 - Stone Riprap
02402 - Liquids Handling and Disposal
02418 - Geocomposite Drainage Net
02595 - Geotextile
02597 – High Density Polyethylene (HDPE) Geomembrane
02598 - Linear Low Density Polyethylene (LLDPE) Geomembrane
02607 – Air Release and Check Valve Vaults
02612 - Reinforced Concrete Pipe
02615 - HDPE Pipe
02650 - Leachate Collection System (LCS)
02652 - Leachate ~~Storgae~~Storage Facilities
02936 - Seeding
03100 - Concrete Formwork
03200 - Concrete Reinforcement
03300 - Cast-In-Place Concrete
15250 - Leachate Pump House
16050 - Basic Electrical Requirements

12.5.2 Quality Assurance and Control

~~All of the p~~Parameters used for quality control for the landfill disposal cells are included in the Phase III Report, the Construction Quality Assurance Plan, and the Technical Specifications. Refer to these documents for the quality control requirements. Reference is made to the facility's Closure and Post-Closure Plan for the quality assurance program and Technical Specifications specific to closure activities.


OPTIONAL SOUTH ENTRANCE (SEE PERMIT DRAWING SHEET 2)
CONWAY ROAD
CONRAIL
PMW-11
PMW-7
TYPICAL LEACHATE COLLECTION SUMP
PMW-12
PMW-8
CELL 8
CELL 9
CELL 10
CELL 4
CLAY EXPOSED AT LAND SURFACE
CELL 3
PMW-19
BASIN NO. 1
CELL 6
CELL 5
CELL 7
CELL 2
CELL 1
PMW-20
PMW-22
PMW-18
LIMIT OF WASTE
PMW-16
PMW-10
PMW-24
PMW-14
PMW-25
PMW-13
PMW-9
PMW-23
PMW-21
LEACHATE STORAGE FACILITY NO. 1
PMW-15
PMW-17
LEACHATE STORAGE FACILITY NO. 2
COLLINS AVENUE
WELL AA-94-32G4 52.23
BASIN NO. 2
PATUXENT ROAD
CELL 11
PMW-6
LIMIT OF WASTE
100-YEAR FLOOD PLAIN
TYPICAL LEACHATE COLLECTION SUMP
OPTIONAL NORTH ENTRANCE (SEE PERMIT DRAWING SHEET 2)
PMW-5
PMW-4
TYPICAL WETLANDS
CELL 16
CELL 12
PMW-1
CELL 15
CELL 14
CELL 13
B-12
BASIN NO. 3
SCALE HOUSE AND TRUCK SCALES
ASSUMED EAST ENTRANCE (SEE PERMIT DRAWING SHEET 2)
PMW-2
PMW-3
CONCRETE CLEAN-OUT
WHEEL WASH
MAINTENANCE BUILDING
MW-7
GENERAL NOTES
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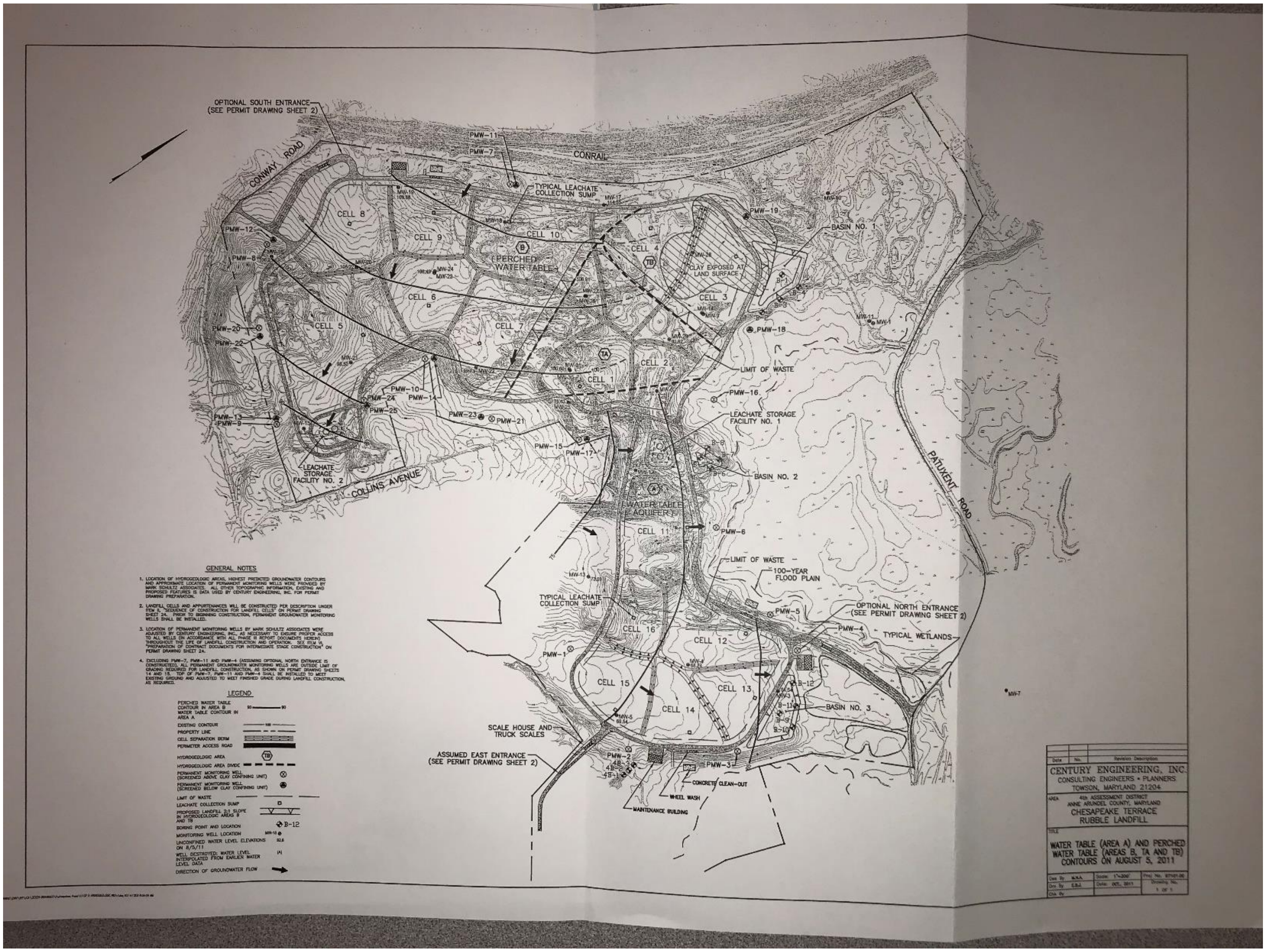
LEGEND
POTENTIOMETRIC SURFACE CONTOUR IN LOWER PATAPSCO AQUIFER BELOW CLAY CONFINING BED (INTERPOLATED FROM MGS CONTOUR MAPS)
EXISTING CONTOUR
PROPERTY LINE
CELL SEPARATION BERM
PERIMETER ACCESS ROAD
HYDROGEOLOGIC AREA
HYDROGEOLOGIC AREA DIVIDE
PERMANENT MONITORING WELL (SCREENED ABOVE CLAY CONFINING UNIT)
PERMANENT MONITORING WELL (SCREENED BELOW CLAY CONFINING UNIT)
LIMIT OF WASTE
LEACHATE COLLECTION SUMP
PROPOSED LANDFILL 2:1 SLOPE IN HYDROGEOLOGIC AREAS B AND TB
BORING POINT AND LOCATION
MONITORING WELL LOCATION
WATER LEVEL ELEVATION (FT. MSL) ON AUGUST 5, 2011
DIRECTION OF GROUNDWATER FLOW
LOWER PATAPSCO WELL LOCATION
Date
No.
Revision Description
CENTURY ENGINEERING, INC.
CONSULTING ENGINEERS • PLANNERS
TOWSON, MARYLAND 21204
AREA
4th ASSESSMENT DISTRICT
ANNE ARUNDEL COUNTY, MARYLAND
CHESAPEAKE TERRACE
RUBBLE LANDFILL
TITLE
HYDROGEOLOGIC AREA B– POTENTIOMETRIC SURFACE IN WATER–BEARING ZONE UNDER MASSIVE CLAY (LOWER PATAPSCO AQUIFER) ON AUGUST 5, 2011
Drawing No.
1 OF 1


OPTIONAL SOUTH ENTRANCE (SEE PERMIT DRAWING SHEET 2)
CONWAY ROAD
CONRAIL
PMW-11
PMW-7
TYPICAL LEACHATE COLLECTION SUMP
CELL 8
CELL 9
CELL 10
CELL 4
PMW-19
BASIN NO. 1
PMW-12
PMW-8
PERCHED WATER TABLE
CLAY EXPOSED AT LAND SURFACE
CELL 6
CELL 3
PMW-20
PMW-22
CELL 5
CELL 7
PMW-18
CELL 2
LIMIT OF WASTE
CELL 1
PMW-10
PMW-24
PMW-14
PMW-25
PMW-16
PMW-13
PMW-9
PMW-23
PMW-21
LEACHATE STORAGE FACILITY NO. 1
PMW-15
PMW-17
LEACHATE STORAGE FACILITY NO. 2
COLLINS AVENUE
BASIN NO. 2
PATUXENT ROAD
WATER TABLE AQUIFER
CELL 11
PMW-6
LIMIT OF WASTE
100-YEAR FLOOD PLAIN
TYPICAL LEACHATE COLLECTION SUMP
OPTIONAL NORTH ENTRANCE (SEE PERMIT DRAWING SHEET 2)
PMW-5
CELL 16
PMW-4
TYPICAL WETLANDS
CELL 12
PMW-1
CELL 15
CELL 13
B-12
CELL 14
BASIN NO. 3
SCALE HOUSE AND TRUCK SCALES
ASSUMED EAST ENTRANCE (SEE PERMIT DRAWING SHEET 2)
PMW-2
PMW-3
CONCRETE CLEAN-OUT
WHEEL WASH
MAINTENANCE BUILDING
MW-7
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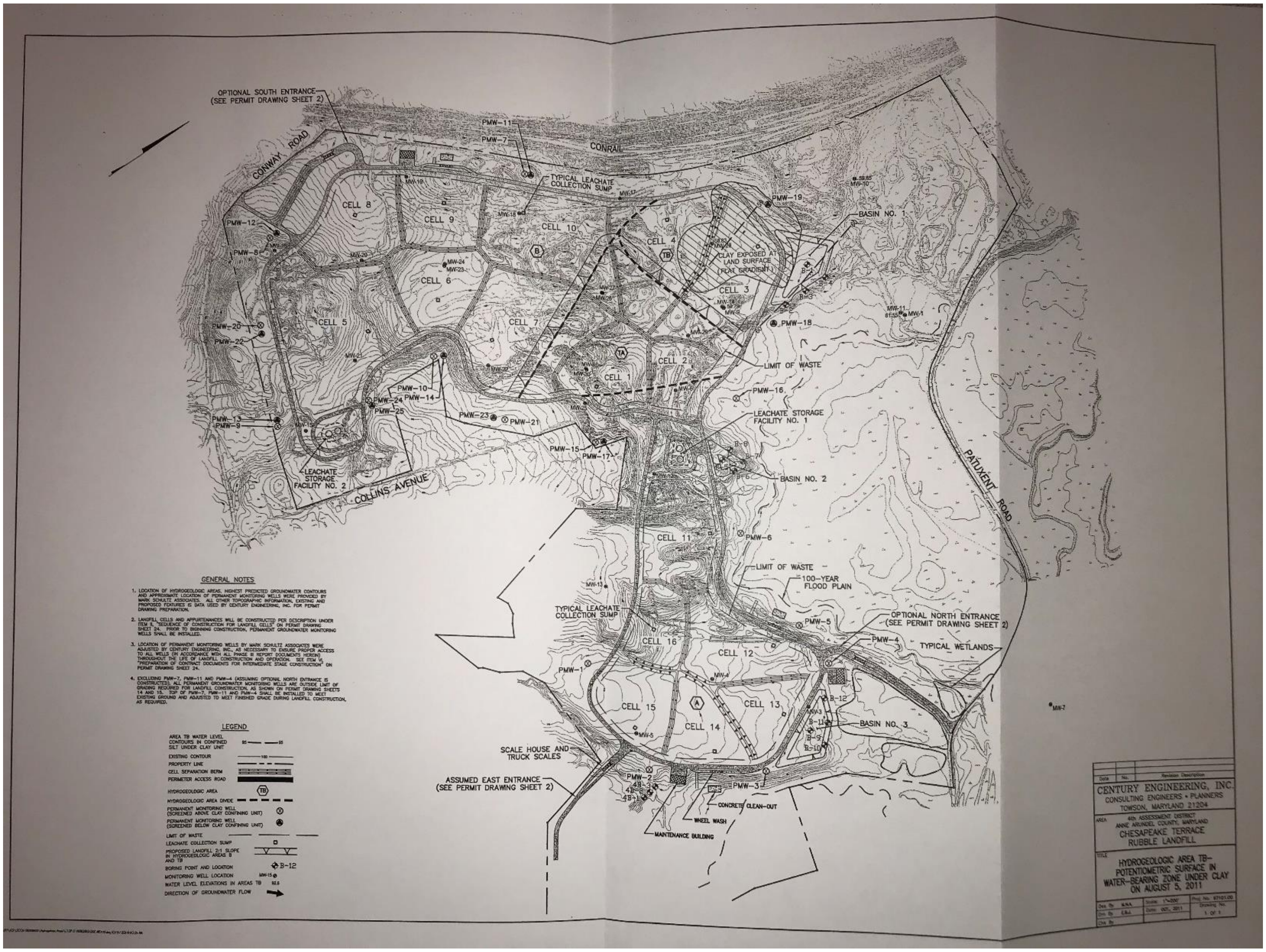
EXISTING CONTOUR
PROPERTY LINE
CELL SEPARATION BERM
PERIMETER ACCESS ROAD
HYDROGEOLOGIC AREA
HYDROGEOLOGIC AREA DIVIDE
PERMANENT MONITORING WELL (SCREENED ABOVE CLAY CONFINING UNIT)
PERMANENT MONITORING WELL (SCREENED BELOW CLAY CONFINING UNIT)
LIMIT OF WASTE
LEACHATE COLLECTION SUMP
PROPOSED LANDFILL 2:1 SLOPE IN HYDROGEOLOGIC AREAS B AND TB
BORING POINT AND LOCATION
MONITORING WELL LOCATION
UNCONFINED WATER LEVEL ELEVATIONS ON 8/5/11
WELL DESTROYED; WATER LEVEL INTERPOLATED FROM EARLIER WATER LEVEL DATA
DIRECTION OF GROUNDWATER FLOW
Date
No.
Revision Description
CENTURY ENGINEERING, INC.
CONSULTING ENGINEERS • PLANNERS
TOWSON, MARYLAND 21204
AREA
4th ASSESSMENT DISTRICT
ANNE ARUNDEL COUNTY, MARYLAND
CHESAPEAKE TERRACE RUBBLE LANDFILL
TITLE
WATER TABLE (AREA A) AND PERCHED WATER TABLE (AREAS B, TA AND TB) CONTOURS ON AUGUST 5, 2011
Scale: 1"=200'
Date: OCT., 2011
Drawing No.
1 OF 1


OPTIONAL SOUTH ENTRANCE (SEE PERMIT DRAWING SHEET 2)
CONWAY ROAD
CONRAIL
PMW-11
PMW-7
TYPICAL LEACHATE COLLECTION SUMP
PMW-19
BASIN NO. 1
CELL 8
CELL 9
CELL 10
CELL 4
CLAY EXPOSED AT LAND SURFACE (FLAT GRADIENT)
CELL 3
PMW-12
PMW-8
CELL 6
CELL 5
CELL 7
PMW-20
PMW-22
PMW-18
CELL 2
CELL 1
LIMIT OF WASTE
PMW-10
PMW-14
PMW-24
PMW-25
PMW-16
PMW-23
PMW-21
LEACHATE STORAGE FACILITY NO. 1
PMW-13
PMW-9
PMW-15
PMW-17
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COLLINS AVENUE
BASIN NO. 2
PATUXENT ROAD
CELL 11
PMW-6
LIMIT OF WASTE
100-YEAR FLOOD PLAIN
TYPICAL LEACHATE COLLECTION SUMP
PMW-5
OPTIONAL NORTH ENTRANCE (SEE PERMIT DRAWING SHEET 2)
PMW-4
TYPICAL WETLANDS
CELL 16
CELL 12
PMW-1
CELL 15
CELL 14
CELL 13
B-12
BASIN NO. 3
MW-7
SCALE HOUSE AND TRUCK SCALES
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PMW-2
PMW-3
CONCRETE CLEAN-OUT
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CELL SEPARATION BERM
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HYDROGEOLOGIC AREA
HYDROGEOLOGIC AREA DIVIDE
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PERMANENT MONITORING WELL (SCREENED BELOW CLAY CONFINING UNIT)
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BORING POINT AND LOCATION
MONITORING WELL LOCATION
WATER LEVEL ELEVATIONS IN AREAS TB
DIRECTION OF GROUNDWATER FLOW
Date
No.
Revision Description
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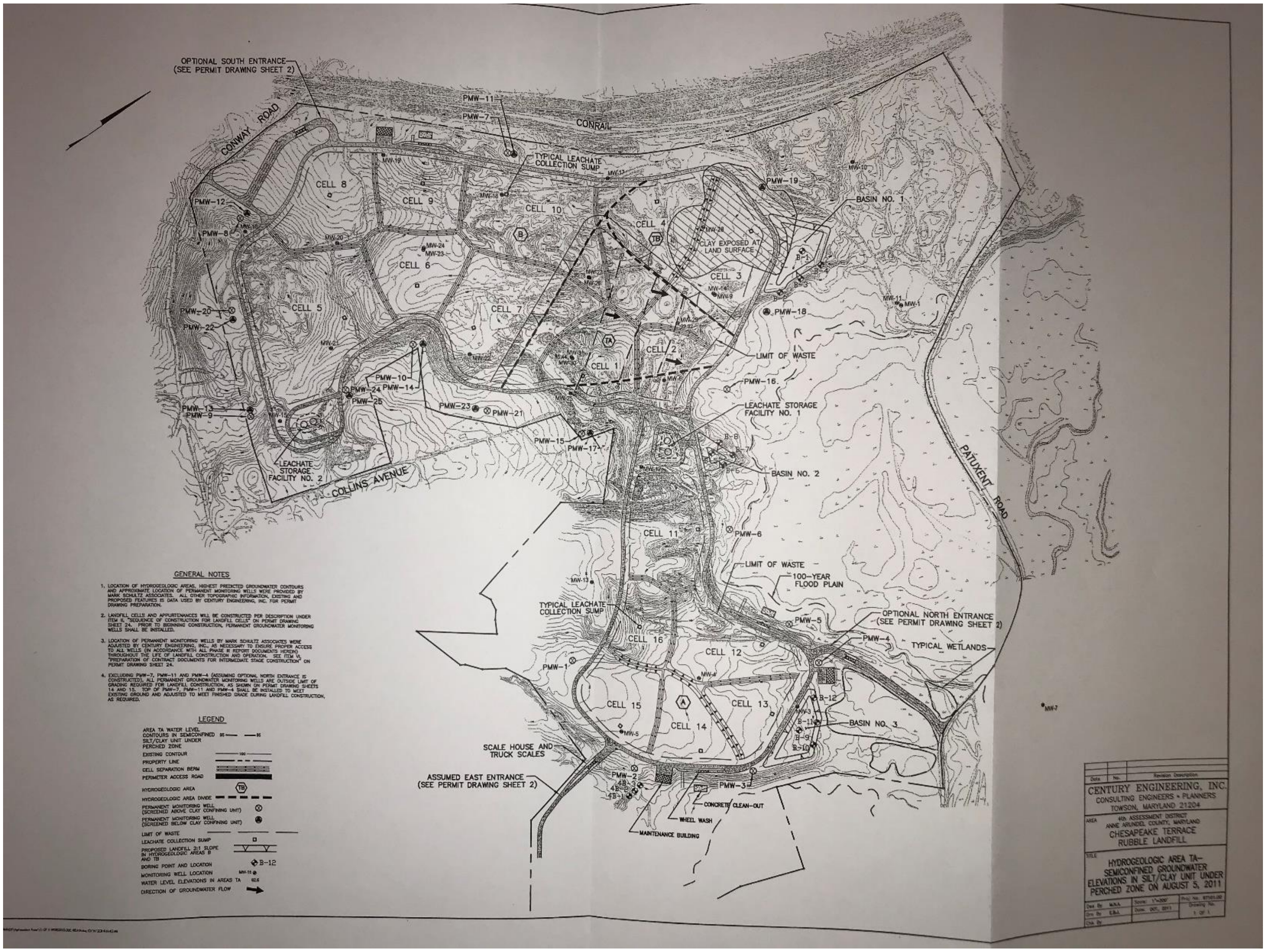
HYDROGEOLOGIC AREA TB— POTENTIOMETRIC SURFACE IN WATER—BEARING ZONE UNDER CLAY ON AUGUST 5, 2011
Proj. No.
Drawing No.
1 OF 1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PMW-11
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CELL 10
CELL 4
CELL 3
CELL 6
CELL 5
CELL 7
CELL 1
CELL 2
CLAY EXPOSED AT LAND SURFACE
PMW-19
BASIN NO. 1
PMW-12
PMW-8
PMW-20
PMW-22
PMW-18
LIMIT OF WASTE
PMW-10
PMW-14
PMW-24
PMW-25
PMW-16
PMW-13
PMW-9
PMW-23
PMW-21
LEACHATE STORAGE FACILITY NO. 1
PMW-15
PMW-17
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COLLINS AVENUE
BASIN NO. 2
PATUXENT ROAD
CELL 11
PMW-6
LIMIT OF WASTE
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TYPICAL LEACHATE COLLECTION SUMP
PMW-5
OPTIONAL NORTH ENTRANCE (SEE PERMIT DRAWING SHEET 2)
PMW-4
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CELL 16
CELL 12
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2. LANDFILL CELLS AND APPURTENANCES WILL BE CONSTRUCTED PER DESCRIPTION UNDER ITEM II, "SEQUENCE OF CONSTRUCTION FOR LANDFILL CELLS" ON PERMIT DRAWING SHEET 24. PRIOR TO BEGINNING CONSTRUCTION, PERMANENT GROUNDWATER MONITORING WELLS SHALL BE INSTALLED.
3. LOCATION OF PERMANENT MONITORING WELLS BY MARK SCHULTZ ASSOCIATES WERE ADJUSTED BY CENTURY ENGINEERING, INC., AS NECESSARY TO ENSURE PROPER ACCESS TO ALL WELLS (IN ACCORDANCE WITH ALL PHASE III REPORT DOCUMENTS HEREIN) THROUGHOUT THE LIFE OF LANDFILL CONSTRUCTION AND OPERATION. SEE ITEM VI, "PREPARATION OF CONTRACT DOCUMENTS FOR INTERMEDIATE STAGE CONSTRUCTION" ON PERMIT DRAWING SHEET 24.
4. EXCLUDING PMW-7, PMW-11 AND PMW-4 (ASSUMING OPTIONAL NORTH ENTRANCE IS CONSTRUCTED), ALL PERMANENT GROUNDWATER MONITORING WELLS ARE OUTSIDE LIMIT OF GRADING REQUIRED FOR LANDFILL CONSTRUCTION, AS SHOWN ON PERMIT DRAWING SHEETS 14 AND 15. TOP OF PMW-7, PMW-11 AND PMW-4 SHALL BE INSTALLED TO MEET EXISTING GROUND AND ADJUSTED TO MEET FINISHED GRADE DURING LANDFILL CONSTRUCTION, AS REQUIRED.
LEGEND
AREA TA WATER LEVEL CONTOURS IN SEMICONFINED SILT/CLAY UNIT UNDER PERCHED ZONE
EXISTING CONTOUR
PROPERTY LINE
CELL SEPARATION BERM
PERIMETER ACCESS ROAD
HYDROGEOLOGIC AREA
HYDROGEOLOGIC AREA DIVIDE
PERMANENT MONITORING WELL (SCREENED ABOVE CLAY CONFINING UNIT)
PERMANENT MONITORING WELL (SCREENED BELOW CLAY CONFINING UNIT)
LIMIT OF WASTE
LEACHATE COLLECTION SUMP
PROPOSED LANDFILL 2:1 SLOPE IN HYDROGEOLOGIC AREAS B AND TB
BORING POINT AND LOCATION
MONITORING WELL LOCATION
WATER LEVEL ELEVATIONS IN AREAS TA
DIRECTION OF GROUNDWATER FLOW
Date
No.
Revision Description
CENTURY ENGINEERING, INC.
CONSULTING ENGINEERS • PLANNERS
TOWSON, MARYLAND 21204
AREA
4th ASSESSMENT DISTRICT
ANNE ARUNDEL COUNTY, MARYLAND
CHESAPEAKE TERRACE
RUBBLE LANDFILL
TITLE
HYDROGEOLOGIC AREA TA—SEMICONFINED GROUNDWATER ELEVATIONS IN SILT/CLAY UNIT UNDER PERCHED ZONE ON AUGUST 5, 2011
Drawing No.
1 OF 1