Tolson & Associates, LLC

Monitoring Plan
Tolson Rubble Landfill
Crofton, Maryland

April 8, 2011

Project Number: 0100203

Environmental Resources Management
200 Harry S Truman Parkway
Suite 400
Annapolis, Maryland 21401

Tolson & Associates, LLC

Monitoring Plan
Tolson Rubble Landfill
Crofton, Maryland

April 8, 2011

Project Number: 0100203

Matthew Erbe, P.G.
Senior Scientist

Stephen Lindsay, P.E.
Project Engineer

J. Lawrence Hosmer, P.E.
Partner

Environmental Resources Management
200 Harry S Truman Parkway
Suite 400
Annapolis, Maryland 21401

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

ATTACHMENTS

1.0 GROUNDWATER MONITORING

1.1 GENERAL

Groundwater monitoring at the now-closed Cunningham Landfill, which is located on the southeastern, downgradient boundary of the proposed Tolson Rubble Landfill, has been on-going for approximately 15 years (Figure 1 in Appendix A). More recently, the monitoring network has been expanded to provide data to support the Phase II Site Geology Report for the proposed Tolson Landfill and to provide background (pre-construction) data for the proposed landfill. Quarterly monitoring of this expanded monitoring program has been completed and semi-annual monitoring is currently being conducted. Therefore, groundwater monitoring at the proposed Tolson Rubble Landfill will be continuously conducted on a semi-annual basis through the cessation of the post-closure period.

The following Sections provide a description of the current groundwater monitoring system, the sampling and analysis program, and associated Quality Assurance/Quality Control (QA/QC) procedures. Any modifications to the procedures presented below during implementation will be submitted to the MDE for review prior to adoption.

1.2 BASELINE REQUIREMENTS

In accordance with the Code of Maryland Regulations (COMAR) 26.04.07.16A (14) and (15) and the Resource Conservation and Recovery Act (RCRA), Subtitle D, a Groundwater and Surface-Water Monitoring (G&SWM) Plan must be prepared within 90 days of the effective date of a solid waste permit and submitted to the Maryland Department of the Environment (MDE) for review and approval. In addition to the submittal of the G&SWM Plan, the following criteria must also be met:

1. The landfill facility must submit a semi-annual report on water quality to the MDE which contains summary and interpretive discussion of all analyses of the chemical quality of the groundwater from each of the monitoring wells and surface-water monitoring points specified in the approved G&SWM Plan;

2. The semi-annual report on water quality must be submitted to the MDE within 90 days of the close of every first and third calendar quarters unless an alternative schedule is specified in the approved G&SWM Plan;

3. Sampling must occur during the period between January through March and July through September of each year unless an alternative schedule is included in the G&SWM Plan and approved by the MDE;

4. The facility must retain a qualified groundwater scientist to sample, or to oversee qualified environmental technicians who sample the wells twice annually at the intervals specified in the approved G&SWM Plan;

5. The parameters to be measured during the implementation of the program, and their Practical Quantification Limits (PQL), are provided in Tables 1-4 and 1-5 of this plan. The MDE may approve an alternative list of parameters or an alternative PQL for any parameter;

6. The sampling, sample handling, analyses and reporting of analytical parameters must be performed in accordance with the approved G&SWM Plan;

7. A qualified independent laboratory certified for water-quality analysis by the Maryland Department of Health and Mental Hygiene (MDHMH) or which is otherwise acceptable to the MDE must perform the analyses;

8. A qualified groundwater scientist or professional must evaluate the results and advise the facility of any changes in water quality or any exceedence of the State and Federal Maximum Contaminant Level (MCL), Action Level or other health standard;

9. A complete copy of analytical laboratory data, and the qualified groundwater scientist or professional's interpretive findings must be included in each semi-annual report on water quality submitted;

10. If analytical results from samples collected from any sources associated with the landfill or surrounding properties exceed the MCL, Action Level, or other health standards for the first time, the facility must notify the MDE in writing within 24 hours of receipt of the analytical data detecting this occurrence. Thereafter, if there is any significant increases above the MCL, Action Level or other health standard, the facility must notify the MDE in writing within 24 hours of receipt of the analytical data detecting this occurrence;

11. Upon detection of the exceedence of an MCL, Action Level or other health standard for the first time, the monitoring point(s) in which the standard was exceeded must be immediately resampled to verify the initial detection. This resampling must occur as soon as possible, and no later than 30 days following notification of the facility of the exceedence of the standard by the analytical laboratory performing the analysis of the sample which indicated the exceedence;

12. All data for each well must be summarized and presented in time-series format. The data for each well must be presented on a chart so that the water quality data for each parameter and each well can be observed simultaneously; and,

13. All "J" values must be reported. "J" values are analytical results that are below the PQL but can be estimated.

1.3 GROUNDWATER MONITORING NETWORK

Currently, there are 31 groundwater monitoring wells in the area of the landfill installed for monitoring the Cunningham Landfill located to the southwest of the proposed landfill (Figures 1-1 and 1-2). Monitoring wells MW-10A, MW-11A and B, MW-14A, and MW-13A, all of which were located within the future active portion of the landfill, were properly decommissioned in September 2007 in accordance with State of Maryland well abandonment regulations. Three new shallow aquifer monitoring wells (MW-23A, MW-24A and MW-25A) will be installed prior to the construction of Phase 1 to facilitate collection of groundwater quality samples immediately upgradient and downgradient of Phase 1 during its construction and operation (Figure 1-3). All new site monitoring wells will be installed in accordance with the regulations of the State of Maryland, and prior to the disposal of any waste in the new facility. These wells will remain in place until the construction of Phases 2 and 3 begin, as appropriate, and at which time these interim wells will be properly abandoned in accordance with State of Maryland regulations.

Of the 34 wells (31 existing and 3 planned wells), 5 are ultimately proposed for abandonment and 5 are proposed for removal from the groundwater sampling network.

- Existing monitoring wells MW-3B, MW-21A, and MW-21B, and the new wells MW-24A and MW-25A will eventually be decommissioned in accordance with State of Maryland well abandonment regulations pursuant to the schedule set forth by the MDE. All of these wells are located within the future active portions of the landfill. Based on the anticipated capacity of the landfill and the expectant fill rate, it is

anticipated that construction of Phase 2 will be begin in approximately the year 2017 with Phase 3 beginning in approximately the year 2022.

- Wells MW-1A, MW-1B, MW-6A, MW-7A, and MW-7B are proposed for removal from semi-annual monitoring in September 2011 since they are redundant with the more recently-installed wells MW-19A, MW-19B, MW-20A and MW-20B (Table 1-1 and Table 1-2), and are distant from the waste disposal unit.

- The casing for monitoring well MW-17B is compromised and attributing to the recent observation of high pH levels in the well; therefore, this monitoring well will be decommissioned in accordance with State of Maryland well abandonment regulations and a replacement well will be installed pursuant to the schedule set forth by the MDE.

The revised long-term groundwater monitoring network will consist of 1 newly installed well, and 23 existing/remaining monitoring wells (Table 1-1) (see Figure 1-3). An initial sampling event was conducted during September 2007 to monitor all serviceable wells on the property. Semiannual sampling events were conducted in February/March and August/September of each year thereafter.

Groundwater contour maps for the shallow and deep aquifers are presented on Figures 1-1 and 1-2 for reference. Based upon the hydrogeologic data obtained during the Phase II Site Geology Report preparation under the permit application process, groundwater in the shallow aquifer was determined to generally flow southwesterly to a discharge in the Little Patuxent River. Groundwater in the deeper aquifer also appears to flow to the southwest. Under these flow conditions, wells MW-17A and B and MW-18A and B are located hydraulically upgradient of the landfill and the current mining limits; wells MW-8A and B, MW-16A and B, MW-19A and B, MW-20A and B, and MW-5A and B are situated hydraulically downgradient. Note, wells MW-20A and B are located on adjacent property. However, an easement has been obtained to ensure that access to these wells is available (Attachment 1).

Each of the monitoring wells on the site is equipped with a well assembly consisting of 2-inch inside diameter, schedule 40 polyvinyl chloride (PVC) riser and slotted well screen placed in a 6-inch diameter open borehole. The annular space surrounding the well screen and casing was backfilled with a clean silica filter pack. The filter pack extends at least 2 feet above the well screen. Following placement of the filter pack, a 2-foot thick bentonite pellet seal was installed and allowed to hydrate/expand, and the remaining borehole annulus was filled with a Portland cement grout to the ground surface. The monitoring wells were all finished with a protective steel well casing and cover and set in a 2-foot by 2-foot concrete pad. Detailed drilling logs and well construction logs

were maintained by the field geologists. The boring logs for all boreholes are included in Appendix A.

Wells MW-1A, MW-2B, MW-4A, MW-5A, MW-6A, MW-7A, MW-8A, MW-9A, MW-12A, MW-15A, MW-16A, MW-17A, MW-18A, MW-19A, MW-20A, MW-21A, MW-22A, and future MW-23A, MW-24A and MW-25A are located immediately above the confining clay layer and monitor the shallow aquifer, with total well depths ranging from 25 to 95 feet below ground surface. Wells MW-1B, MW-2A, MW-3B, MW-4B, MW-5B, MW-7B, MW-15B, MW-16B, MW-17B, MW-18B, MW-19B, MW-20B, MW-21B, and MW-8B monitor the deep aquifer, with total well depths ranging from 60 to 201 feet below the ground surface. Monitoring wells MW-1A, MW-1B, MW-6A, MW-7A, and MW-7B will each be removed from the monitoring program, but will remain serviceable wells that can be sampled if anomalous results are reported during any future sampling events (Table 1-2). Each monitoring well was constructed as described above; the screened interval of each well did not exceed an overall length of 20 feet (see Boring Logs provided in Appendix A).

All monitoring wells were developed by bailing, pumping, and/or air-lifting techniques to remove fine sediments introduced into the well and filter pack during installation activities. Groundwater was evacuated from the wells until the discharge was free of sediment, or until no further improvement was visually observed.

1.4 GROUNDWATER SAMPLING AND ANALYSIS

The groundwater monitoring program will therefore ultimately include the sampling and analysis of water from the 26 existing monitoring wells and 3 new monitoring wells (Table 1-1). Existing downgradient wells MW-2A, MW2B, MW-4A, MW-4B, MW-5A, MW-5B, MW-15A, MW-15B, MW-16A, MW-16B, MW-19A, MW-19B, MW-20A, and MW-20B will be sampled during the groundwater monitoring events to provide data on downgradient water-quality changes resulting from surface mining. The new monitoring wells MW-23A, 24A and MW-25A will be used to discern impacts to groundwater quality directly attributable to Phase 1. Well MW-23A will provide background water quality data for Phase 1 to differentiate potential impacts to water quality resulting from the upgradient mining activities. Monitoring wells MW-17A, MW-17B, MW-18A, MW-18B will serve as upgradient monitoring points for the overall site to characterize water quality flowing onto the landfill property and possible upgradient sources of contamination. Monitoring wells MW-8A and MW-8B, MW-9A, MW-12A, and MW-22A are cross-gradient wells. The protocols to be employed during the collection of groundwater samples are discussed in the following sections.

1.5 WATER-LEVEL MEASUREMENT

Water levels in the monitoring wells will be measured at the beginning of each sampling event to support the determination of groundwater flow patterns. Water levels will be measured to the nearest 0.01 foot. The procedure for collecting water-level measurements will be as follows:

- The well will be identified, unlocked, the well cap removed and the top of the well casing wiped with a clean rag.
- An electronic water-level meter will be used to collect groundwater-level data. The instrument probe will be lowered down into the well until contact with the water surface is indicated. The depth to water in the well will be read directly at a surveyed reference point on the top of the PVC well casing. The depth to water will be recorded on a standard sampling log form, along with a description of the established measuring point, the date, the time, the weather conditions, project number, and sampling personnel. Depths to water also will be measured at sampling locations with reference to surveyed measuring points as described above.
- The water-level meter will be rinsed with distilled water between each measurement to prevent cross-contamination between water-level measuring points.

Following completion of the sampling event, the depth-to-water measurements will be converted to elevations relative to mean sea level and plotted on a site map. A groundwater contour map will then be constructed for each measurement period and included in the semi-annual sampling report to the MDE.

1.6 SAMPLING PROCEDURES

Groundwater samples will be collected using low-flow purging and sampling procedures. This section details the specific procedures and protocols that will be followed during the collection of representative groundwater samples from monitoring wells and/or piezometers.

1.6.1 Equipment and Materials

The following equipment will be used for the collection of samples:

- Portable photoionization detector (PID) or flame ionization detector (FID);
- Multi-gas meter (i.e., O_2, CH_4, percent LEL, percent gas) or equivalent(s);
- Interface probe or water level indicator with a tape graduated to 0.01 ft;

- Submersible pump;
- Power source (e.g., generator or battery);
- Tubing constructed of polyvinyl chloride, polypropylene, polyethylene, stainless steel or other suitable materials sized appropriate for the pump discharge;
- Polypropylene rope or other suitable bailer cord;
- Flow-through cell containing: pH, temperature, conductivity, dissolved oxygen, oxidation reduction potential, and turbidity meters;
- Graduated cylinder;
- Storage container for purge water;
- Field Notebook;
- Sample gloves (latex, vinyl, or other suitable material); and,
- Site-specific Health & Safety Plan (HASP).

1.6.2 Well Screening and Purging Procedures

As the monitoring well is initially approached, a visual inspection of the conditions will be completed and documented. If warranted in the site-specific Health & Safety Plan (HASP), the ambient air conditions in the vicinity of the wellhead will be documented prior to its opening. The PID or FID will be used to determine if any significant concentrations of volatile organic compounds (VOCs) are present in the ambient air near the well. After screening for VOCs, the appropriate meter(s) will be employed to measure percent LEL and percent O_2 and determine if explosive or oxygen deficient conditions exist in the vicinity of the wellhead. These screening measurements will be conducted at heights and distances from or in the wellhead as described in the site-specific HASP.

If either screening method indicates that conditions above action levels are present, the area will be immediately evacuated until the situation can be re-evaluated. In any case, the sampling team will perform all groundwater sampling procedures upwind from the wellhead to the extent possible.

After the environment in the vicinity of the wellhead is deemed satisfactory, the well will be opened and the air conditions in the well column determined, as specified in the site- specific HASP. The protective casing of the well/piezometer will be unlocked and the cap will be accessed. After removal of the cap, the air quality in the riser will be screened (as applicable) and the findings will be documented. If warranted, the PID or FID probe will be inserted approximately six inches into the well column for the accurate determination of VOC concentrations. After completing an assessment for VOCs, the appropriate meter(s) will be employed to determine percent LEL, percent O_2 or other gases,

to determine conditions within the well column. If either screening method indicates conditions above action levels, the area will be immediately evacuated and appropriate actions implemented.

After opening and screening, the monitoring well will be allowed to stabilize and the depth to water determined, as described in Section 1.5 The monitoring well/piezometer will then be purged to evacuate stagnant water that may be present in the well column and filter pack and thereby draw representative formation water into the well casing. Purging will be conducted using low-flow methods.

To perform low-flow purging, the submersible pump will be carefully lowered into the well to avoid disturbing sediment that may have settled to the bottom of the well. The pump intake will be situated within the screened interval by convention, halfway between the top and bottom of the screen; however, site-specific conditions may warrant setting the intake above or below the halfway point. Pumping will then be initiated, with the flow adjusted to minimize water level drawdown. The U. S. Environmental Protection Agency (USEPA) generally recommends maintaining a flow rate below 200 ml/min to avoid aeration of the water column.

Purge water will be directed through the flow through cell for measurement of Indicator field parameters. Purging will continue for at least twenty minutes with field parameter readings recorded every three to five minutes until stabilization of the field parameters occurs. USEPA recommends that stabilization be defined as three consecutive readings which fall within the following limits:

- Turbidity (±10% for values greater than 1 NTU);
- Dissolved oxygen (DO) (±10%);
- Specific conductance (±3%);
- Temperature (±3%)
- pH (± 0.1 unit); and
- ORP (± 10 millivolts).

1.6.3 Sample Collection

Once stabilization of field parameters has been achieved, the flow-through cell will be disconnected from the pump discharge tube, and samples will be collected directly from the pump discharge into laboratory-supplied bottle ware. Samples to be analyzed for dissolved (rather than total) constituents will be field-filtered through a 0.45 micron filter. Care will be taken so that minimal turbulence/aeration occurs during transfer of water from the tubing into sample

containers. All sample containers will be placed on ice as soon as possible after collection, and should remain at 4°C until analysis.

A summary of the analyses to be conducted on the groundwater samples and related parameters can be found in Table 1-3. Each groundwater sample will be analyzed for the VOCs presented in Table 1-4. Additionally, the samples will be analyzed for the parameters presented in Table 1-5.

1.6.4 Sample Custody and Documentation

The sampling team will be responsible for the custody and care of the collected samples until the containers are transferred to the custody of the laboratory. Standard chain-of-custody procedures will be followed to maintain and document sample possession. The documentation of sample collection, as well as other pertinent information, will be recorded in a field book. A chain-of-custody form will be completed for each shipping container submitted to the laboratory to document possession from the time of collection to analysis. The chain-of-custody forms will include the following information:

- Project identification and location;
- Sampling personnel;
- Identity of sample(s);
- Number and description of sample containers;
- Date of sampling;
- Signatures of persons involved in the chain-of-custody and the dates and times of possession; and,
- Special instructions to the laboratory.

1. 7 DECONTAMINATION

To minimize the potential for cross-contamination during the collection of groundwater samples, reusable pumps employed in well evacuation will be thoroughly cleaned with a laboratory-grade detergent wash and rinsed three times with deionized water immediately before placement into each well. New bailer rope will be used and new surgical gloves will be worn by sampling personnel for each well.

1.8 QUALITY CONTROL

Analytical data cannot be properly assessed for accuracy and precision unless it is accompanied by quality assurance data. For quality control purposes, a field equipment blank and blind duplicate sample will be collected during each sampling event at a frequency of one field equipment blank and blind duplicate sample for each 20 water samples. Field internal quality control checks will also be utilized during this investigation through the application of the following:

- Trip Blanks: Consist of analytically-pure water or solid in containers identical to those to be used for samples. The empty sample containers are filled prior to sampling, carried with the collected samples, and returned to the laboratory for analysis. These samples will be submitted to the laboratory using a fictitious sample location so they are 'blind" to the laboratory. Trip blanks will be analyzed exactly as are the environmental samples submitted on a day when VOC samples are collected. Trip blanks be submitted at a rate of one per sample day to serve as an indicator of container cleanliness, external contamination, and contamination from analytical procedures.
- Field Equipment Blank: Equipment blanks will be collected to ensure that the sampling equipment is clean and that the potential for cross contamination has been minimized by the equipment decontamination procedures. These blanks will be collected by decontaminating the sampling device and then pouring ultra-pure deionized water over the device. This rinsate water will be collected into a clean stainless steel bowl and then transferred to the appropriate sample containers. One equipment rinsate blank will be collected for all of the sampling devices associated with groundwater sampling. The equipment rinsate blanks will be analyzed for identical parameters as the associated samples. Equipment blanks will be collected at a frequency of one for each 20 samples.
- Field Duplicate Samples: Field duplicate samples will be collected to allow the determination of analytical and sampling precision. One field duplicate sample will be collected for every 20 groundwater and surface-water samples and submitted for the identical parameters as the associated sample.

Sampling will be performed in the following order:

- Upgradient monitoring wells;
- Cross-gradient monitoring wells; and,
- Downgradient monitoring wells.

At each well cluster location, the deep well will be sampled first, followed by the shallow aquifer well.

1.9 DATA REVIEW AND REPORTING

The results of the semi-annual groundwater monitoring events will be validated for accuracy and completeness, and then tabulated. All laboratory analyses will be performed using USEPA Data Quality Level 2. A report summarizing the results of the monitoring program will be prepared and submitted semi-annually to the MDE.

All analytical data will be plotted in time series charts, as required by MDE, and subject to statistical analyses, as specified by 40 CFR264.97. The baseline concentrations for the analytes will consist of at least four sampling events for each monitoring well. Although the baseline monitoring period will not officially begin until after the permit for the proposed landfill has been issued, historical data will be included as part of the baseline data, as appropriate. The baseline data will be submitted to MDE at least six months prior to placement of any waste in the landfill. After baseline monitoring is complete and placement of waste in the landfill has begun, the control chart method will be used to determine whether statistically-significant changes in the groundwater concentrations occur.

It is understood that on-going mining activities may have contributed elevated levels of major ions and trace metals to the shallow aquifer relative to the concentrations observed at background monitoring wells MW-17A and MW-18A[1]. Therefore, monitoring well MW-23A, located immediately upgradient of Phase 1 but cross-gradient form the current mining operations, will be used to characterize groundwater quality upgradient of the Phase 1 cell during the baseline monitoring period. Further, groundwater quality samples collected from MW-23A following the baseline monitoring period will be used to assess significant changes in the shallow aquifer during future mining and waste disposal activities. The data will also be compared to the leachate chemistry fingerprint (see Section 3.0 – Leachate) to confirm if elevated trace metals, major ions or organics detected in the shallow aquifer may be related to the waste placed in Phase 1.

[1] Focused Groundwater Evaluation, Cunningham Rubble Landfill, Capital Raceway Road, Crofton, Maryland. Prepared by Environmental Resources Management, Inc. for Cunningham Excavating, Inc., January 24, 2011.

2.0 SURFACE WATER

Discharge from the sediment basin/stormwater management pond will flow to the Little Patuxent River, located approximately 200 feet from the pond. Discharge from the stormwater management pond will occur on an intermittent basis in response to precipitation events. Contributions to the Little Patuxent River from the stormwater control pond will consist of uncontaminated runoff collected from those portions of the landfill unaffected by waste disposal.

Discharges from stormwater management structures are typically regulated through the issuance of a General Surface-Water Discharge Permit by the MDE. Surface-water monitoring is typically not required under the General Permit. An application for a General Surface-Water Discharge Permit has prepared and submitted concurrent with this Phase III Engineering Report. The frequency of surface-water sampling and analytical parameters to be monitored, if any, will be specified in the resulting permit.

3.0 LEACHATE

The proposed leachate collection system consists of geocomposite, a perforated piping network, double containment leachate transmission lines, cleanouts, a leachate wet well, a leachate vault, and leachate storage tanks. Leachate will be monitored on a periodic basis after collection in the leachate collection system to establish both quality and quantity of generation. Thereafter, accumulated leachate will be transported by truck to the Washington County Sewage Treatment Facility (WCSTF) until a wastewater treatment plant (WWTP) is built on-site. Once the on-site WWTP is operational, leachate will be treated and directly discharged into the nearby Little Patuxent River. Prior to the issuance of a National Pollutant Discharge Elimination System (NPDES) permit for the WWTP outfall, leachate will also be sampled and analyzed in accordance with the industrial pretreatment discharge requirements of the WCSTF to ensure that the concentration and constituents are compatible with wastewater plant capabilities.

A leachate sample will be collected from the leachate wet well for Phase 1 for analysis of the suite of compounds identified in Section 1.6.3 – Groundwater Monitoring, Sample Collection, concurrent with the collection of groundwater quality samples. The analysis of leachate will be used to identify chemical markers that may fingerprint leachate contamination emanating from Phase 1. A fingerprint for the leachate chemistry will be determined through evaluation of general chemical parameters (e.g., alkalinity, pH), major ion chemistry (e.g., sodium, chloride), organic contaminant markers (e.g., benzene), or ratios of trace metals and major ions. For example, leachate-impacted groundwater may be characterized as having a minimum concentration of alkalinity.

A summary of the analyses to be conducted on the leachate samples and related parameters can be found in Table 1-3. Each leachate sample will be analyzed for the VOCs presented in Table 1-4. Additionally, the samples will be analyzed for the parameters presented in Table 1-5.

4.0 LANDFILL GAS

4.1 LANDFILL GAS MONITORING PROBE NETWORK

The landfill gas vent network is designed to detect the possible presence of landfill gas at the facility, and off-site migration. Relief from landfill gas build-up will be accomplished by passive extraction through 6-inch diameter HDPE vents; each placed within a 3-foot diameter borehole backfilled with crushed stone/sand. Gas vents will be located on an approximate grid spacing of 300 feet, and will be installed after waste placement activities cease, but before the final cover system is constructed. Landfill gases, which are often lighter than air and flow via diffusion and pressure gradients, will preferentially rise and dissipate in the atmosphere. The locations and details of the gas collection system are conceptually presented on Drawing No. P7.

Additionally, 29 soil-gas monitoring points will be installed beyond the limits of waste prior to the placement of waste in the landfill to facilitate the monitoring of landfill gas closer to the perimeter of the property. These monitoring points will be installed at 300-foot intervals beyond the lateral extent of the landfill in all directions except to the west where the Little Patuxent River, a perennial stream located on-site, acts as a natural barrier to the migration of landfill gas in this direction. Monitoring points will be installed directly adjacent to the landfill waste boundary except where existing operations (i.e., the existing Cunningham Landfill and sand and gravel mining operations) require the installation to be offset. The monitoring points will be constructed with 2-inch diameter PVC and installed to an approximate depth of 20 feet below ground surface. A minimum of five feet of solid PVC piping will be placed below ground surface to ensure adequate isolation of the soil-gas monitoring points from surface influences. The annulus of the borehole will be backfilled to within three feet of the ground surface with sand or equivalent. Bentonite or equivalent will be used to backfill the borehole from a depth of three feet to the surface. The bentonite will be hydrated to seal the borehole from ambient air and/or precipitation. The proposed location of the soil-gas monitoring points is conceptually presented on Drawing No. G2.

4.2 SAMPLE COLLECTION AND RECORD KEEPING

Each gas vent and soil-gas monitoring point will be sampled quarterly using a multi-gas meter (e.g. Landtec-GEM2000, or equivalent) to ascertain the percentage of methane present with respect to the lower explosive limit (LEL) for methane, and for the concentration of hydrogen sulfide gas. A sample will be

obtained at each soil-gas monitoring point both prior to purging the probe and after approximately three probe volumes are purged. Additionally, headspace measurements will be obtained at the existing monitoring wells during quarterly groundwater sampling events. In addition to recording methane and hydrogen sulfide concentrations, water levels, if present, gas probe pressure, ambient temperature, barometric pressure and the occurrence of precipitation during sampling will be recorded. All data recorded during the quarterly sampling will be maintained on-site in the landfill office for inspection. Quarterly monitoring will commence with the initial placement of waste and continue through the post-closure period, with reporting on a semi-annual basis.

4.3 LANDFILL GAS MONITORING IN ON-SITE STRUCTURES

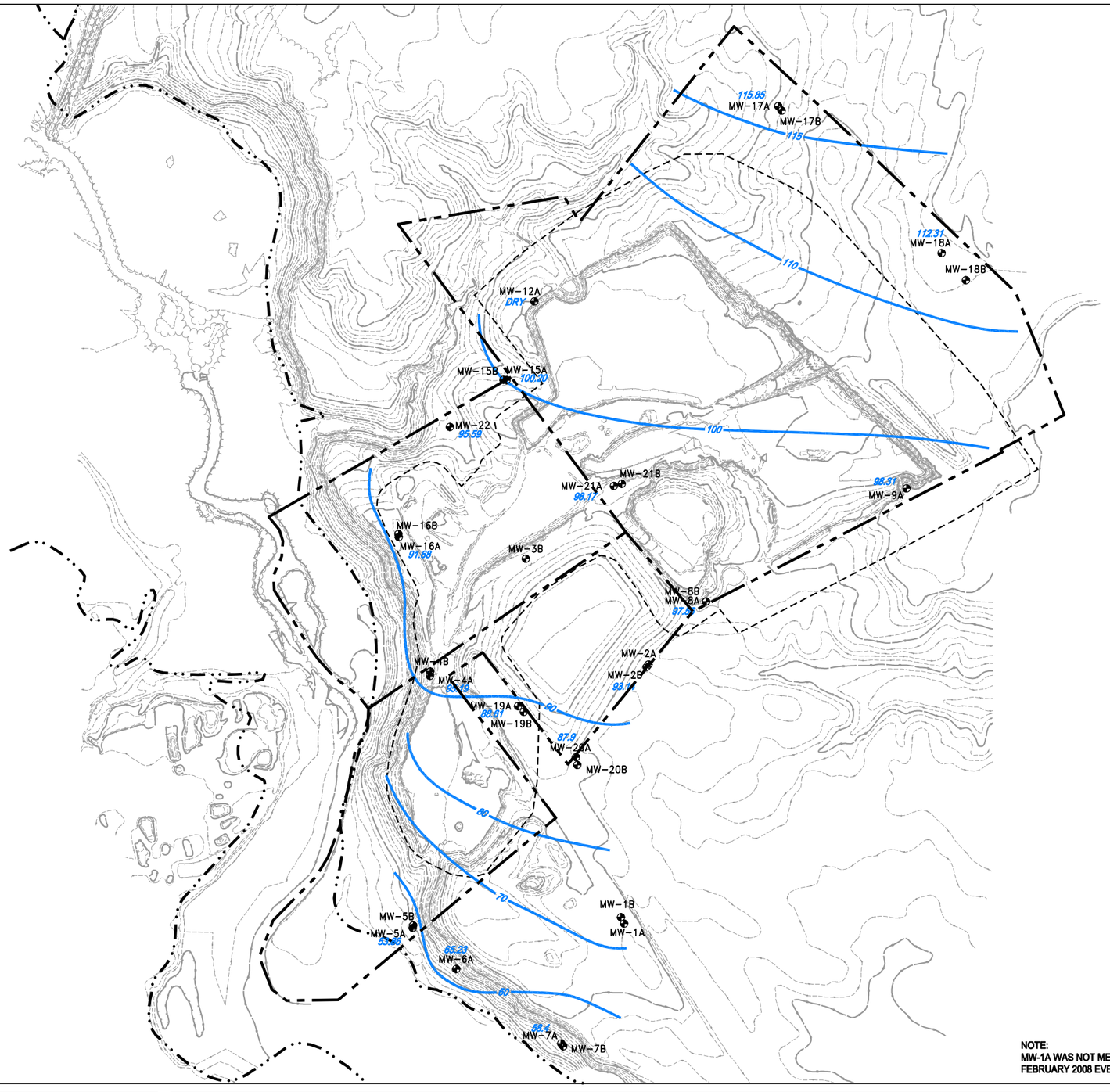
In addition to monitoring for the migration of gas beyond the property boundary, methane concentrations within the landfill office/maintenance building will also be monitored to ensure maintenance below 25 percent of the LEL. At a minimum, this monitoring will be performed on a quarterly basis; the results will be recorded along with the results of the monitoring probe sampling data in the landfill office. Also, leachate collection system structures, such as the wet well and vault will be screened for the presence of methane and oxygen before entry will be allowed. Entry will not be permitted without respiratory protection until methane is non-detectable and the oxygen concentration exceeds 20 percent.

4.4 ELEVATED GAS LEVEL RESPONSE

If methane concentrations exceed the lower explosive limit (LEL) in a monitoring probe, or if methane concentrations exceed 25 percent of the LEL in the Landfill Office/Maintenance Building, the following steps will be initiated:

1. Ensure the protection of human health by ordering evacuation of the building and the removal of all possible ignition sources.
2. Notify the MDE.
3. Review the accuracy of the results.
4. Within seven days of detection, report the methane gas levels and the action initiated to protect human health in the operating record.
5. Within 60 days of detection, implement a remediation plan for the gas release, placing a copy of the remediation plan in the operating record, and notifying the MDE.

Figures



NOTE:
MW-1A WAS NOT MEASURED DURING THE FEBRUARY 2008 EVENT

ENVIRONMENTAL RESOURCES MANAGEMENT, INC.

ERM

N

650 325 0 650

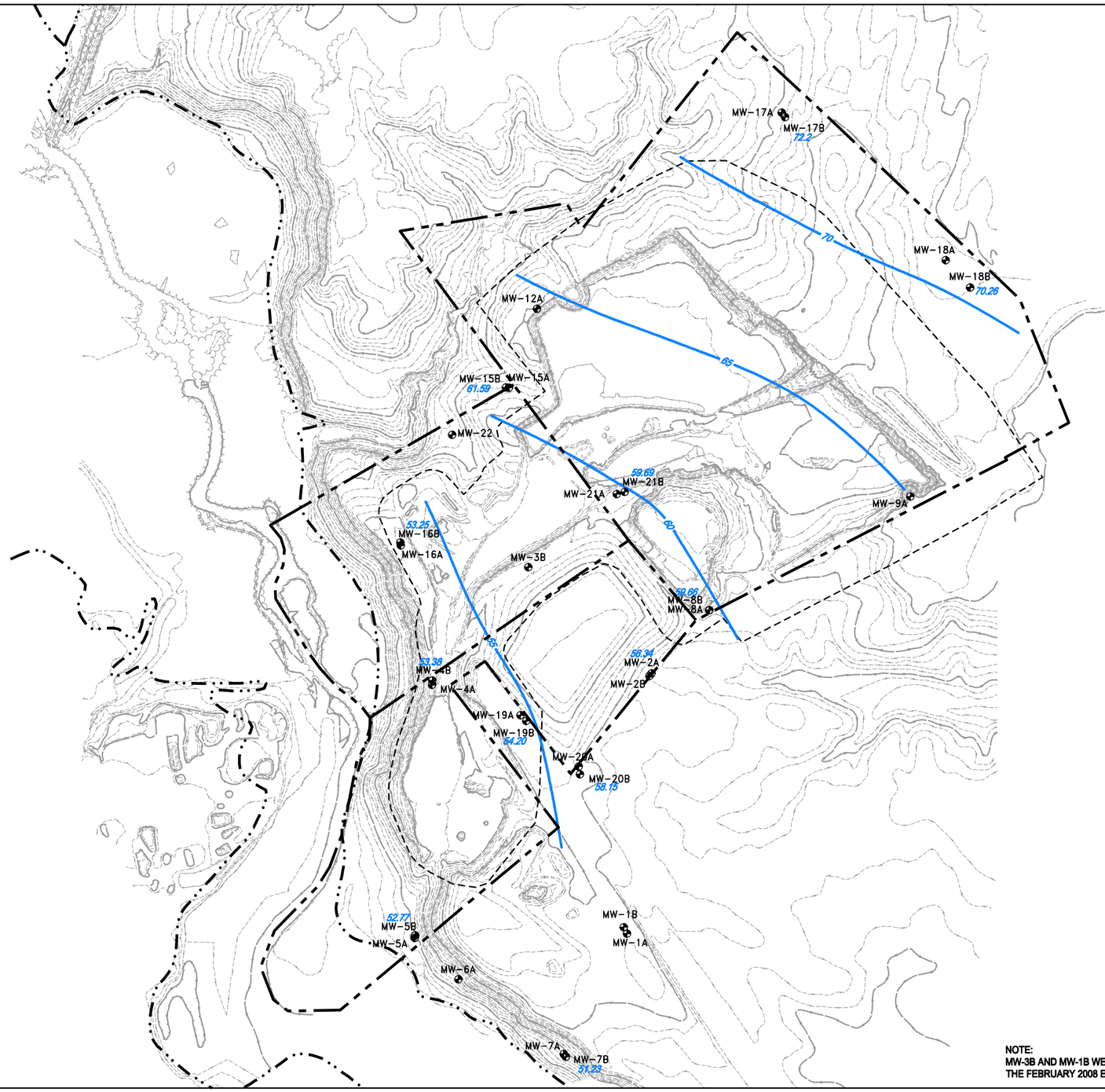
SCALE IN FEET

LEGEND:

- PROPERTY LINE
- LIMIT LINE (OF AUG. 2006 SURVEY)
- FEMA 100 YEAR FLOOD LINE
- MONITORING WELL
- 58.4 GROUND WATER ELEVATION (FEET)
- 60 GROUND WATER CONTOUR ELEVATION (FEET)

FIGURE 1-1
SHALLOW AQUIFER GROUNDWATER CONTOUR MAP
FEBRUARY 2008
TOLSON RUBBLE LANDFILL
CROFTON, MARYLAND

C:\CAD\Drawings\Tolson Landfill\0100203\A201.dwg



NOTE:
MW-3B AND MW-1B WERE NOT MEASURED DURING THE FEBRUARY 2008 EVENT

ENVIRONMENTAL RESOURCES MANAGEMENT, INC.

ERM

N

650 325 0 650

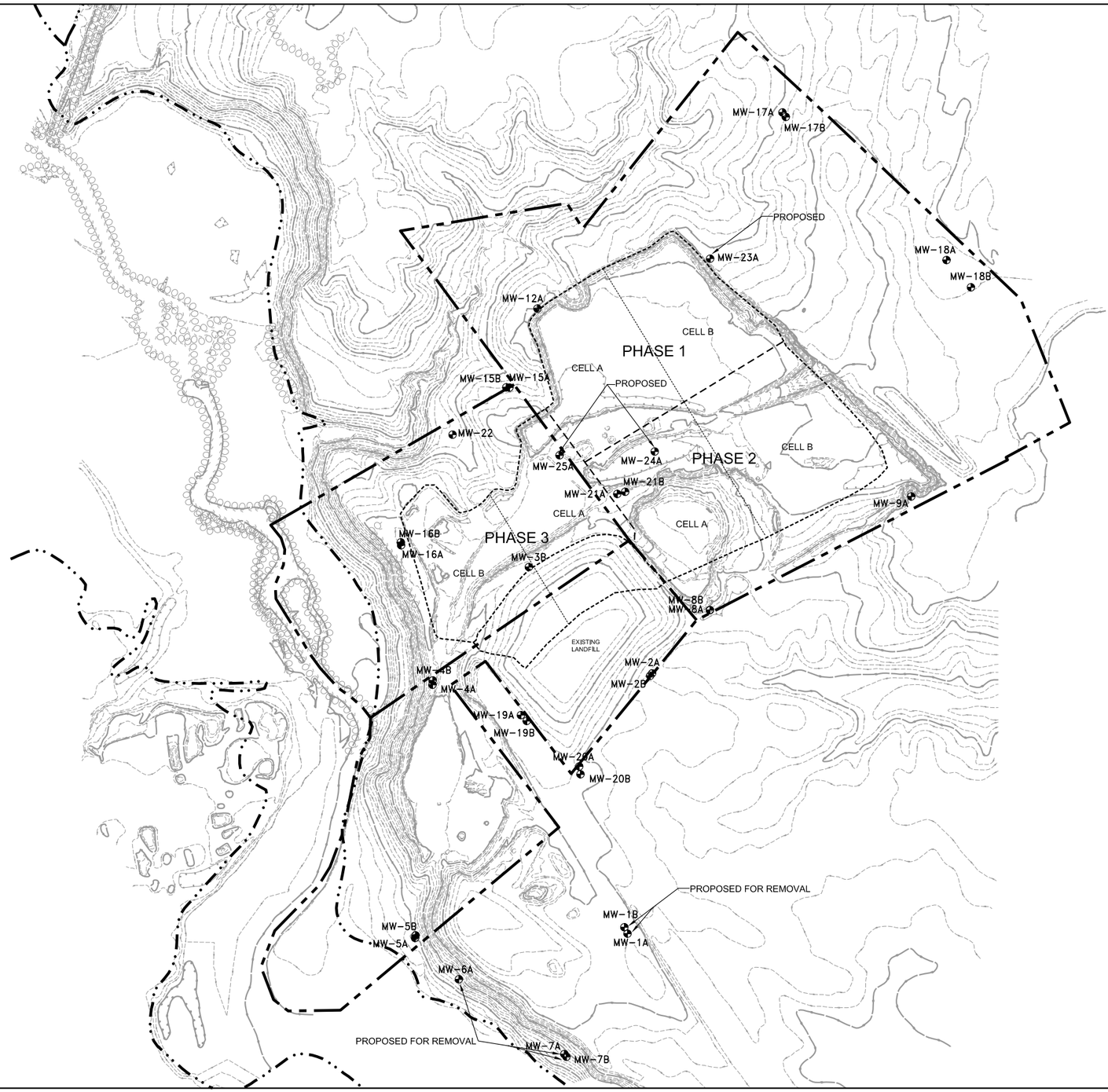
SCALE IN FEET

LEGEND:

- PROPERTY LINE
- LIMIT LINE (OF AUG. 2006 SURVEY)
- FEMA 100 YEAR FLOOD LINE
- MONITORING WELL
- 52.77 GROUND WATER ELEVATION (FEET)
- 55 GROUND WATER CONTOUR ELEVATION (FEET)

FIGURE 1-2
DEEP AQUIFER GROUNDWATER CONTOUR MAP
FEBRUARY 2008
TOLSON RUBBLE LANDFILL
CROFTON, MARYLAND

G:\CAD\Drawings\Tolson Landfill\0100203\A201.dwg



ENVIRONMENTAL RESOURCES MANAGEMENT, INC.

ERM

N

650 325 0 650

SCALE IN FEET

LEGEND:

PROPERTY LINE

FEMA 100 YEAR FLOOD LINE

MONITORING WELL

PHASE BOUNDARY

CELL BOUNDARY

FIGURE 1-3
GROUNDWATER MONITORING WELL NETWORK
APRIL 2011
TOLSON RUBBLE LANDFILL
CROFTON, MARYLAND

I:\Public\Engineering\Kevin Harnish\Tolson\A201.dwg

Tables

Table 1-1. Monitoring Well Network Summary

Initial Sampling Event September 2007	Interim Semiannual Sampling Events	Long-Term Semiannual Sampling Events
MW-1A	(a)	(a)
MW-1B	(a)	(a)
MW-2A	MW-2A	MW-2A
MW-2B	MW-2B	MW-2B
MW-3B	MW-3B***	
MW-4A	MW-4A	MW-4A
MW-4B	MW-4B	MW-4B
MW-5A	MW-5A	MW-5A
MW-5B	MW-5B	MW-5B
MW-6A	(a)	(a)
MW-7A	(a)	(a)
MW-7B	(a)	(a)
MW-8A	MW-8A	MW-8A
MW-8B	MW-8B	MW-8B
MW-9A	MW-9A	MW-9A
MW-10A*		
MW-11A*		
MW-11B*		
MW-12A	MW-12A	MW-12A
MW-13A*		
MW-14A*		
MW-15A	MW-15A	MW-15A
MW-15B	MW-15B	MW-15B
MW-16A	MW-16A	MW-16A
MW-16B	MW-16B	MW-16B
MW-17A	MW-17A	MW-17A
MW-17B	MW-17B	MW-17B
MW-18A	MW-18A	MW-18A
MW-18B	MW-18B	MW-18B
MW-19A	MW-19A	MW-19A
MW-19B	MW-19B	MW-19B
MW-20A	MW-20A	MW-20A
MW-20B	MW-20B	MW-20B
MW-21A	MW-21A**	
MW-21B	MW-21B**	
MW-22A	MW-22A	MW-22A
	MW-23A	MW-23A
	MW-24A**	
	MW-25A***	

Notes:

* - Monitoring well has been abandoned.

** - Monitoring well will be abandoned during construction of Phase 2.

*** - Monitoring well will be abandoned during construction of Phase 3.

(a) Well will be removed from the monitoring program.

Table 1-2. Comprehensive Monitoring Well List

Reference Well Number	Anne Arundel County Assigned Well Number	Alternative Well Number	Total Depth (feet bgs)	Date Installed	Gradient	Aquifer	Elevation (feet amsl)
MW-1A	AA-81-5756		83	1/6/1986	upward	Shallow	155.82
MW-1B	AA-81-5779		148	1/20/1986	upward	Deep	154.59
MW-2A	AA-88-8130		148	12/30/1985	cross	Deep	145.41
MW-2B	AA-88-9051		58	1/14/1986	cross	Shallow	147.33
MW-3A	AA-81-5757		142	1/15/1986	cross	Deep	
MW-3B [1.]	AA-81-5452			Abandoned			
MW-3B [2.]	AA-94-2905		150	8/6/1998	cross	Deep	159.75
MW-4A	AA-81-5755		61	12/30/1985	downward	Shallow	149.38
MW-4B	AA-81-5780		146	1/13/1986	downward	Deep	151.17
MW-5A	AA-81-5831		25	1/15/1986	downward	Shallow	80.01
MW-5B	AA-81-5454		60	1/15/1986	downward	Deep	78.27
MW-6A	AA-81-5832		35	12/24/1995	cross	Shallow	91.70
MW-6B [3.]				Abandoned			
MW-7A	AA-81-5830		48	1/22/1986	cross	Shallow	96.12
MW-7B	AA-81-5453		112	1/22/1986	cross	Deep	95.43
MW-8A	AA-93-0268	57	50	1/4/1995	upward	Shallow	144.22
MW-8B	**AA-95-3053**	**80**	**150**		**cross**	**Deep**	**145 [6.]**
MW-9A	AA-93-0265	55	85	1/4/1995	upward	Shallow	180.86
MW-10A	*AA-93-0266*	*54*	*100*	*1/4/1995*	*upward*	*Shallow*	*198.22*
MW-11A	*AA-93-0264*	*53*	*80*	*1/3/1995*	*upward*	*Shallow*	*185.22*
MW-11B [4.]	*AA-92-1985*		*157*	*2/3/1995*	*upward*		*185.50*
MW-12A	AA-93-0262	52	53.5	12/26/1994	upward	Shallow	151.73
MW-13A	*AA-93-0263*	*51*	*67.5*	*12/23/1994*	*downward*	*Shallow*	*158.06*
MW-14A	*AA-93-0267*	*56*	*58*		*upward*	*Shallow*	*154.96*
MW-15A [5.]			**45**	**9/5/2006**	**downward**	**Shallow**	**140 [6.]**
MW-15B			**160**	**9/8/2006**	**downward**	**Deep**	**140 [6.]**
MW-16A			**68**	**8/29/2006**	**downward**	**Shallow**	**150 [6.]**
MW-16B			**150**	**8/31/2006**	**downward**	**Deep**	**152 [6.]**
MW-17A	**AA-95-2966**	**80**	**73**	**6/8/2007**	**upward**	**Shallow**	**180 [6.]**
MW-17B	**AA-95-2965**	**160**	**201**	**6/13/2007**	**upward**	**Deep**	**180 [6.]**
MW-18A	**AA-95-2967**	**100**	**68**	**6/15/2007**	**upward**	**Shallow**	**180 [6.]**
MW-18B	**AA-95-2968**				**upward**	**Deep**	**180 [6.]**
MW-19A	**AA-95-3048**	**70**	**88**	**6/26/2007**	**downward**	**Shallow**	**160 [6.]**
MW-19B	**AA-95-3051**	**160**	**148**	**6/28/2007**	**downward**	**Deep**	**160 [6.]**
MW-20A	**AA-95-3049**	**70**	**95**	**7/2/2007**	**downward**	**Shallow**	**160 [6.]**
MW-20B	**AA-95-3050**	**160**	**138**	**7/6/2007**	**downward**	**Deep**	**160 [6.]**
MW-21A	**AA-95-3054**	**70**	**43**	**7/9/2007**	**between**	**Shallow**	**130 [6.]**
MW-21B	**AA-95-3055**	**140**	**130**	**7/13/2007**	**between**	**Deep**	**130 [6.]**
MW-22A	**AA-95-3052**	**160**	**45**	**7/16/2007**	**cross**	**Shallow**	**100 [6.]**
MW-23A			**TBD**			**Shallow**	
MW-24A			**TBD**			**Shallow**	
MW-25A			**TBD**			**Shallow**	

Notes:

1. Former well abandoned on 8/4/1998; water well abandonment sealing report provided in Appendix C (Phase II).
2. Replacement well for AA-81-5442, installed on 8/6/1998; well completion report provided in Appendix C (Phase II).
3. Well not installed.
4. Well re-drilled deeper, formerly MW-11B installed on 10/05/1994; both well completion reports (Phase II).
5. Items in **BOLD** are newly-installed wells.
6. Estimated elevations; awaiting final survey data.
7. Estimated elevations based on depth to water measurements from 9/21/2006.
8. Items in *Italics* were abandoned in September 2007.
9. Items that are underlined are proposed for removal from the standard groundwater monitoring program but will remain serviceable for future monitoring in case annomolous results are reported.
10. Proposed new monitoring well to characterize water quality impacts from Phase 1. Depth to be determined (TBD).

Table 1-3. Sample Analysis and Preservation Summary

Analyses	Method	Bottle Ware	Preservation	Holding Times
VOCs	8260B	GL - 40 (3) mL vial	HCL, Cool 4˚C	14 days
Chloride	EPA 325.3	PL or GL - 1 L	HCL, Cool 4˚C	28 days
Sulfate	375.4/300.0	PL or GL - 1 L	HCL, Cool 4˚C	28 days
Specific Conductance	EPA 120.1	PL or GL - 1L	HCL, Cool 4˚C	28 days
pH	EPA 150.1	PL or GL - 100 mL	HCL, Cool 4˚C	Immediately
Metals + mercury	6010B / 7470A	PL - 250mL	HNO3, Cool 4˚C	6 months
Nitrate/Nitrite	353.2	PL or GL / 100ml	Cool 4˚C	28 days
Ammonia Nitrogen	350.1	PL or GL / 250ml	H2SO4, Cool 4˚C	28 days
Total Alkalinity	310.1	PL or GL / 100ml	Cool 4˚C	14 days
TDS	2540 C	PL or GL - 1 L	Cool 4˚C	7 days
COD	EPA 410.4	PL or GL / 250ml	H2SO4, Cool 4˚C	28 days
TOC	EPA 9060	PL or GL - 100 mL	HCL, Cool 4˚C	28 days
Turbidity	EPA 180.1	PL or GL / 100ml	Cool 4˚C	48 hours

Table 1-4
Groundwater Monitoring Parameters (VOCs)

Volatile Organic Compounds	PQL (µg / L)
Acetone	5.0
Acrylonitrile	5.0
Benzene	1.0
Bromochloromethane	1.0
Bromodichloromethane	1.0
Bromoform	1.0
Bromomethane	1.0
2-Butanone	5.0
Carbon disulfide	1.0
Carbon tetrachloride	1.0
Chlorobenzene	1.0
Chloroethane	1.0
Chloroform	1.0
Chloromethane	1.0
Dibromochloromethane	1.0
1,2-Dibromo-3-chloropropane	1.0
1,2-Dibromoethane (EDB)	1.0
Dibromomethane	1.0
1,2-Dichlorobenzene	1.0
1,4-Dichlorobenzene	1.0
Trans-1,4-dichloro-2-butene	5.0
1,1-Dichloroethane	1.0
1,2-Dichloroethane	1.0
Cis-1,2-Dichloroethene	1.0
Trans-1,2-Dichloroethene	1.0
Methylene chloride	1.0
1,2-Dichloropropane	1.0
Cis-1,3-Dichloropropene	1.0
Trans-1,3-Dichloropropene	1.0
Ethylbenzene	1.0
2-Hexanone	5.0
Idomethane	1.0
4-Methyl-2-pentanone	5.0
Methyl tertiary-butyl ether	2.0
Styrene	1.0
1,1,1,2-Tetrachloroethane	1.0
1,1,2,2-Tetrachloroethane	1.0
Tetrachloroethene	1.0
Toluene	1.0
1,1,1-Trichloroethane	1.0

Table 1-4 (Continued)
Groundwater Monitoring Parameters (VOCs)

Volatile Organic Compounds	PQL (µg / L)
1,1,2-Trichloroethane	1.0
Trichloroethene	1.0
Trichlorofluoromethane	1.0
1,2,3-Trichloropropane	1.0
Vinyl acetate	1.0
Vinyl chloride	1.0
Xylene	1.0

Table 1-5
Additional Groundwater Monitoring Parameters

Elements and Indicator Parameters	**PQL (ppm)**
Total Antimony	0.0020
Total Arsenic	0.0020
Total Barium	0.0100
Total Beryllium	0.0020
Total Cadmium	0.0040
Total Calcium	0.08
Total Chromium	0.0100
Total Cobalt	0.0100
Total Copper	0.0100
Total Iron	0.0050
Total Lead	0.0020
Total Magnesium	0.004
Total Manganese	0.0100
Total Mercury	0.0002
Total Nickel	0.0110
Total Potassium	0.39
Total Selenium	0.035
Total Silver	0.0100
Total Sodium	0.2
Total Thallium	0.0020
Total Vanadium	0.0100
Total Zinc	0.0100
pH	0.1 (SU)
Alkalinity	1
Hardness	0.5
Chloride	0.39
Specific conductance	1
Nitrate	0.06
Chemical Oxygen Demand	10
Turbidity	0.11 (NTU)
Ammonia	1
Sulfate	0.38
Total dissolved solids	10

Attachment 1
Groundwater Monitoring Well Easement Agreement

NO TITLE EXAMINATION
NO CONSIDERATION

DEED AND DECLARATION OF EASEMENT

THIS DEED OF EASEMENT AND AGREEMENT made this 4th day of August, 2008, between **SOUTH SHORE DEVELOPMENT COMPANY, INC.**, party of the first part, GRANTOR, and **CAPITOL ASSOCIATES, LLC**, party of the second part, GRANTEE.

Now, therefore, in consideration of the premises and the sum of One Dollar ($1.00), the receipt whereof is hereby acknowledged, the said Grantor hereby grants and conveys unto the Grantee, its successors and assigns, the perpetual and exclusive easement and right to install, maintain and sample two groundwater monitoring wells in the easement area within the land of the Grantor, situate in the Sixth Tax District of Anne Arundel County, State of Maryland, described on EXHIBIT A, and depicted on EXHIBIT B, attached hereto and made a part hereof (the "Easement"). These wells are installed to monitor the groundwater impacts of the construction and demolition debris landfills (one closed and one to be constructed upon approval of an application pending before the Maryland Department of the Environment) on property owned by Grantee located adjacent to the premises subject to this Easement.

The Grantor does hereby covenant and agree that the said Grantee, its successor and assigns, shall have the right and privilege of entering upon the easement, whenever it may be necessary to sample, maintain or repair the two monitoring wells.

Capitol Associates, LLC seeks to have and to hold the said Easement for the purposes of ingress and egress to the Easement to sample or maintain the two monitoring wells in the Easement for the duration of the permit.

Grantee covenants and agrees to indemnify and save harmless the Grantor, its successors, and assigns, from any and all suits, losses, costs, actions, or liabilities which may occur by reason of injury to person and/or property related to or arising from the wells, including their presence, installation, sampling, maintenance or any other activities conducted by said Grantee, or its agents or employees pursuant to this Easement.

The Grantor warrants that it owns the property over which the Easement is established and covenants to execute such further assurances of the same as may be requisite.

This Easement shall remain in effect only so long as the two monitoring wells remain a requirement of the governmental approvals for the construction and demolition debris landfills. When, and if, the requirement terminates, Grantee shall close the wells in accordance with all applicable local, state and federal environmental laws, after which any rights conveyed herein to Grantee associated with the Easement, and said Easement itself shall cease.

NO TAXES NECESSARY
8/14/08
CONTROLLER
TAX DIVISION

NO RECORDATION
TAX DUE
AUG 14 2008

As Witness the due execution hereof by the parties hereto as of the day and year first above written.

WITNESS:

Barbara A. Ratliff

ATTEST:

SOUTH SHORE DEVELOPMENT COMPANY, INC.

By: _____

Nancy C. Williams

CAPITOL ASSOCIATES, LLC

By: _____

STATE OF MARYLAND, COUNTY OF ANNE ARUNDEL, TO WIT:

I HEREBY CERTIFY that on this 4th day of August, 2008, before me, the undersigned, a Notary Public of the State and County aforesaid, personally appeared Thomas D. Baldwin (known to me or satisfactorily proven) to be the Vice President of South Shore Development Company, Inc., a Maryland Corporation, and the said Corporate officer being authorized to do so, executed the foregoing instrument for the purpose thereof contained on behalf of the Company.

IN WITNESS WHEREOF, I hereunto set my hand and official seal.

Barbara A. Ratliff
Notary Public

(SEAL)

My Commission Expires: 5/14/2012

STATE OF MARYLAND, COUNTY OF ANNE ARUNDEL, TO WIT:

I HEREBY CERTIFY that on this 14th day of July, 2008, before me, the undersigned, a Notary Public of the State and County aforesaid, personally appeared James Cunningham (known to me or satisfactorily proven) to be the managing member of Capital Associates, a Maryland Limited Liability Company, and the said managing member being authorized to do so, executed the foregoing instrument for the purpose thereof contained on behalf of the Limited Liability Company.

IN WITNESS WHEREOF, I hereunto set my hand and official seal.

Joy Faithful
Notary Public
My Commission Expires: 9/1/2008

(SEAL)

ATTORNEY CERTIFICATION

I, the undersigned, an attorney admitted to practice before the Court of Appeals of Maryland, hereby certify that this instrument was prepared by me or under my supervision.

Michael R. Roblyer, Esquire

C:\Documents and Settings\User\Local Settings\Temporary Internet Files\Content.IE5\SRKAD3DN\Deed and Declaration of Easement.wpd

Bay Engineering Inc.
Engineers, Planners and Surveyors

Exhibit A

Legal Description

Variable Width Private
Access Easement
Part of the South Shore Development Company Inc. Property
Tax Map 36, Grid 4, Parcel 237
Sixth Tax District
Anne Arundel County, Maryland

Beginning for the same at an iron bar found at the beginning of the first or North 46°18'31" East 1092.24 foot line of the property conveyed from The Little Patuxent Sand Company to Capital Raceway promotions, Inc. by a deed dated November 1, 1977 and recorded among the Land Records of Anne Arundel County, Maryland in Liber 3026, Folio 275; said place of beginning also being located as now surveyed with bearings referred to Maryland Grid North; North 37°20'10" West 182.07 feet from the beginning of the first or North 30°15'39" West 953.73 foot line of the conveyance from Winifred W. Bullard to Jerry Maiatico, et al by a deed dated October 27, 1966 and recorded among the Land Records of Anne Arundel County, Maryland in Liber 2019 Folio 513; thence leaving said place of beginning and running with part of the aforesaid North 46°18'31" East 1092.24 foot line, as now surveyed,

1. North 39°14'01" East, 77.19 feet to a point; thence leaving said boundary line and running through the property conveyed from Hattie Washington and Benjamin Washington to South Shore Development Company, Inc. by a deed dated October 16, 1962 and recorded among the Land Records of Anne Arundel County, Maryland in Liber 1608, Folio 151; the following courses and distances viz:
2. South 37°44'05" East, 66.75 feet to a point
3. South 52°39'50" West, 75.55 feet to a point located on the aforesaid North 30°5`39" East 953.73 foot line; thence running with part of said boundary line, as now surveyed,
4. North 37°20'10" West, 48.82 feet to the place of beginning.

Containing 4,354 square feet or 0.100 acres of land, more or less.

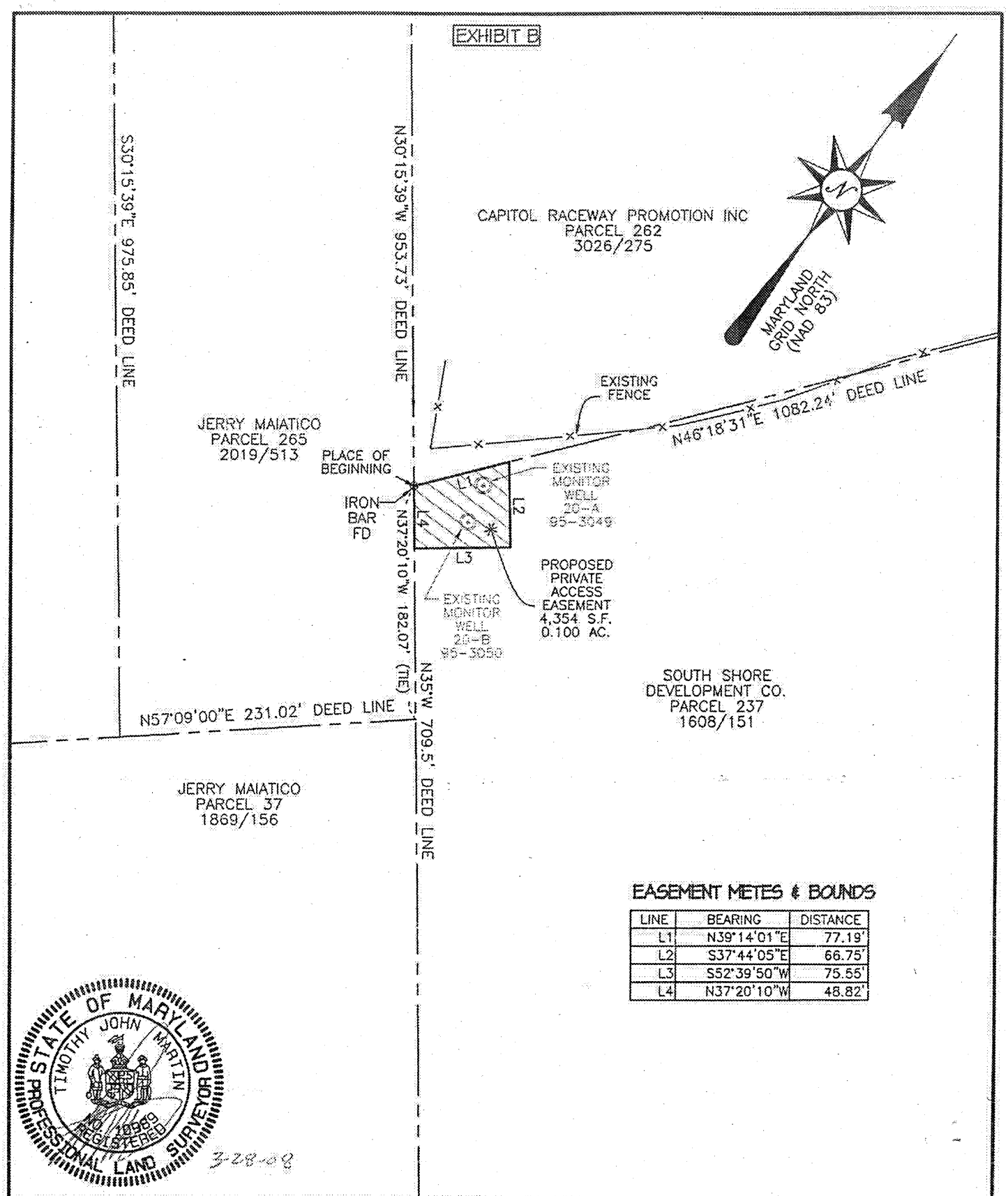
Being part of the property conveyed from Hattie Washington and Benjamin Washington to South Shore Development Company, Inc. by a deed dated October 16, 1962 and recorded among the Land Records of Anne Arundel County, Maryland in Liber 1608, Folio 151.

3-28-08

F:\Cunningham Cell Expan. Re-Zone 02-623\Survey\Cunningham Well Access Easement Description.doc

190 Admiral Cochrane Drive, Suite 175 -- Annapolis, MD 21401
Ph. 410-897-9290 Fax 410-897-9295 email: dmiller@bayengineering.com
www.BayEngineering.com

EXHIBIT B



EASEMENT METES & BOUNDS

LINE	BEARING	DISTANCE
L1	N39°14'01"E	77.19'
L2	S37°44'05"E	66.75'
L3	S52°39'50"W	75.55'
L4	N37°20'10"W	48.82'

STATE OF MARYLAND
TIMOTHY JOHN MARTIN
NO. 10969
REGISTERED
PROFESSIONAL LAND SURVEYOR

3-28-08

Bay Engineering Inc.
Engineers, Planners and Surveyors
190 Admiral Cochrane Drive, Suite 175
Annapolis, Maryland 21401
410.897.9290
410.897.9295 fax
email: info@bayengineering.com

VARIABLE WIDTH PRIVATE ACCESS EASEMENT
PART OF THE SOUTH SHORE DEVELOPMENT COMPANY INC. PROPERTY
GAMBRILLS
TAX MAP 36 ~ BLOCK 4 ~ PARCEL 237
4TH DISTRICT ANNE ARUNDEL COUNTY, MD.

DRAWN BY: D. MILLER
SCALE: 1"=100'
DATE: Mar 28, 2008
JOB NO.:
FOLDER REF: CUNNINGHAM
CADD FILE: See Below

F:\Cunningham Cell Encr. ReaTrac 02-623\Survey\cunningham well access easement.dgn Mar 28 2008 7:16:04 Fri