

ATTACHMENT D

Hydrogeologic Investigation Report

**MILL SEAT LANDFILL
FACILITY ID NO. 8-2648-00014
RIGA, NEW YORK**

**6 NYCRR PART 360 SOLID WASTE MANAGEMENT PERMIT
MODIFICATION APPLICATION**

**APPENDIX D
HYDROGEOLOGIC INVESTIGATION REPORT**

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HYDROGEOLOGIC INVESTIGATION REPORT
Mill Seat Landfill – Potential Soil Borrow Area
Town of Riga, New York

1.0 INTRODUCTION

Monroe County (“the County”) is the owner and permittee of the Mill Seat Landfill. The currently permitted landfill and associated operations will be referred to hereafter as the “Mill Seat Facility” or the “facility” and the land on which the currently permitted Mill Seat Landfill is located will be referred to as the “landfill site” or the “site”. The Mill Seat Landfill is operated by Waste Management of New York, LLC (WMNY) under a lease agreement with Monroe County.

AMEC Geomatrix (AMEC) was retained by WMNY to conduct a hydrogeologic investigation of undeveloped property contiguous to the Mill Seat Landfill southern landfill footprint and WMNY acquired land contiguous to the County owned property located in the Town of Riga, New York. Investigation of the property was conducted in separate phases between 2006 and 2008. The NYSDEC reviewed the investigation data and requested the investigation to include property east of Brew Road (correspondence dated March 30, 2010). In August 2010, AMEC Geomatrix conducted the additional investigation activities and those data are compiled into this hydrogeologic report.

The landfill location is presented on Figure 1 and the investigation area is shown on Figure 2. The goal of the investigation was to assess hydrogeologic conditions of the property and suitability of the investigation area for potential soil borrow material for landfill operations. The proposed extent of the soil borrow area is shown on Figure 3. Primary objectives of the site investigation of the property included the assessment of the following:

- Overburden thickness
- Soil type
- Soil permeability
- Bedrock topography
- Depth to groundwater
- Shallow groundwater flow direction
- Groundwater/surface water interaction

This report presents property-specific geologic and hydrogeologic conditions encountered in the investigation area of the County and WMNY-owned property. For the purpose of this report, the two undeveloped properties are collectively referred to as the “Bovee Road Property” or “investigation area”.

The presentation of investigation findings have been organized into four sections in this report. The remainder of Section 1.0 describes the property south of the operating landfill, identifies previous hydrogeologic investigations at the Mill Seat Landfill completed in support of the original 6NYCRR Part 360 permit application, and summarizes regional geology and hydrogeology. The hydrogeologic investigation scope of work completed at the Bovee Road Property is described in Section 2.0. Section 3.0 summarizes the geology and hydrogeology of the investigation area. Section 4.0 provides a summary of findings. Section 5.0 presents conclusions.

1.1 SITE DESCRIPTION

The area of investigation is focused on approximately 300 acres of contiguous land, south of the existing landfill footprint (investigation area). The investigation area consists primarily of a stockpile area, low relief cultivated farm lands, heavily treed wetland areas, low lying brush, and treed fence-rows.

The majority of the ground surface of the investigation area slopes gently in a southward direction toward Hotel Creek. An abrupt slope change occurs in the eastern central portion of the investigation area as the ground surface drops rapidly toward Hotel Creek. Excluding the soil stockpile, the highest ground surface elevations in the investigation area occur near the landfill and at the intersection of Bovee and Brew Roads on the western flank of the Science Hill drumlin. Elevations are approximately 680 feet above mean sea level (msl) and 700 feet above msl, respectively. The lowest ground surface elevations occur in the area of Hotel Creek as the creek flows east past Brew Road. Elevations near the creek at Brew Road are approximately 650 feet above msl.

A New York State Department of Environmental Conservation (NYSDEC) regulated wetland (RG-6) is situated in the north-central portion of the investigation area. The RG-6 wetland is currently drained by a south-flowing shallow swale. Surface water in the swale flows south approximately 500 feet beyond the landfill property perimeter fence to its confluence with eastward flowing Hotel Creek. Wetland areas bordering Hotel Creek are currently unmapped. Other wetlands on the landfill property include regulated wetland areas RG-5 and RG-7 located respectively west and east of the investigation area. Figure 2 identifies significant property features within the investigation area.

1.2 PREVIOUS HYDROGEOLOGIC INVESTIGATIONS

Seven subsurface exploration programs were conducted at the Mill Seat Facility in support of landfill siting and permitting during the time-period from 1980 to 1989. The investigations are documented in the following reports:

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1. Todd Giddings Associates, Inc. (TGA) – June 1980
2. TGA – September through October 1982
3. TGA and Erdman, Anthony Associates (EAA) – April through November 1984
4. Dunn Geoscience Corporation (Dunn)– October through December 1986
5. H&A of New York – September 1988
6. H&A of New York – February through March 1989
7. H&A of New York – May 1989 through July 1989

Geomatrix incorporated investigation findings from reports 1 through 7 above into a single comprehensive hydrogeologic investigation summary report (Geomatrix 2006). The report was submitted to NYSDEC Region 8 on September 29, 2006.

1.3 REGIONAL GEOLOGY AND HYDROGEOLOGY

A synopsis of the regional geologic and hydrogeologic conditions is presented below. More detailed information can be found in the previously submitted hydrogeologic investigation reports.

1.3.1 Regional Geologic Setting

Monroe County is located within the Erie-Ontario Lowlands physiographic province. The region is typified by broad plains of relatively low relief, underlain by gently south-southwestward dipping (50 to 80 ft/mile) sedimentary bedrock of the early Paleozoic age. Land surface elevations in the lowlands province vary between 245 feet above sea level (asl) at the Lake Ontario Shore, to nearly 1600 fasl in the Southern Tier of New York State, at the boundary of the Allegheny Plateau (Appalachian Uplands province). The regional bedrock is covered by a veneer of glacially derived sediments that exhibit four distinct glacial successions.

Bedrock Geology

The surficial bedrock strata in the western New York region range in age from the uppermost Ordovician age Queenston Formation (Richmond Group) along the southern shore of Lake Ontario to the Upper Devonian age shales of the Allegheny Plateau in the Southern Tier. These bedrock strata consist dominantly of interbedded shales, sandstones, siltstones and limestones, with more resistant dolostone units forming east-west trending escarpments to the north (Niagara Escarpment) and south (Onondaga Escarpment). The Paleozoic bedrock section thickness varies between 2,000 feet along the southern shore of Lake Ontario to over 9,000 feet in the southern tier unconformably overlying the crystalline Precambrian basement complex.

The primary structural feature associated with the regional bedrock is the Clarendon-Linden fault complex. The fault complex is located approximately 5 miles west of the landfill property and trends approximately northeast-southwest. Several uniquely oriented fracture sets are superimposed upon the bedrock surface, reflecting several distinct stress conditions. The most dominant northwest-trending fracture set is attributed to stresses arising from deformation associated with the late Paleozoic Appalachian Orogeny. A more detailed description of these structural bedrock features can be found in the Mill Seat Landfill Hydrogeologic Report Permit Application (H&A, 1989).

Overburden Geology

The glacial sediments in the Erie-Ontario Lowlands were deposited between 25,000 and 10,000 years ago during the Wisconsinan Stage of the Pleistocene Era. These deposits generally include a mantle of glacial lodgement till which locally was transformed into elongated ridges (drumlins) indicating the general direction of ice-sheet advancement. A variety of sand, gravel, silt and clay deposits reflect variable depositional environments associated with the glaciation, including glacial melt water, ice marginal or glacial lacustrine (lake) regimes. Topographic highs in the region are generally composed of till deposited under the basal ice flow near the margins of the continental ice sheet, with lower areas generally exhibiting sequences of silt and clay deposited in pro-glacial lakes. Glacial outwash deposits throughout the area consist of poorly sorted sand and gravel, often reflecting the trend of melt water streams flowing southward from the ice margin. Well defined beach ridges reflect several lake elevation stages across the region, the most prominent being the ridge along Route 104 in the northern portion of Monroe County.

1.3.2 Regional Hydrogeologic Setting

The Town of Riga is situated within the Genesee River Basin. The Genesee River watershed encompasses approximately 2,500 square miles composed predominantly of agricultural areas. The Genesee River originates in the uplands of Pennsylvania and flows northward to Lake Ontario. The 125 square mile Black Creek watershed is a sub-watershed of the Genesee River and its drainage area includes the Mill Seat site and nearby towns of Riga, Chili, Wheatland, Sweden, and Ogden in Monroe County, as well as a large portion of eastern Genesee County. The Bergen Swamp in Genesee County is located in the extreme upper reach of the watershed, and acts as one of the major sources of Black Creek. Hotel Creek is a sub-watershed of Black Creek, and is the watershed that includes the investigation area. The Hotel Creek watershed encompasses approximately 7.5 square miles from its origin in the village of Bergen to the confluence with Black Creek northeast of the site.

Groundwater flow across the region occurs both within the fractured bedrock units and, to a lesser extent, the overlying unconsolidated glacial deposits. The fine grained nature of the overburden sediments generally confines groundwater within the lower overburden units, and groundwater occurrence within a few feet of the ground surface may often exist as water table or perched conditions. Discharge points for overburden groundwater include streams and seeps, springs, or wetlands where the overburden-bedrock interface intersects the land surface. Precipitation which infiltrates through the glacial overburden, combined with numerous streams and wetlands, act to recharge bedrock groundwater throughout the region. Groundwater flow within the bedrock units occurs principally within the interconnected network of horizontal and vertical fractures. Typically, this fracture frequency increases toward the bedrock surface, resulting from both weathering and erosional stress relief. As fracture frequency and interconnections decrease with depth, the rate of groundwater flow correspondingly decreases. Although several small-scale bedrock groundwater divides occur throughout the region, the dominant bedrock groundwater flow direction is northward to Lake Ontario.

2.0 INVESTIGATION METHODS

The geologic and hydrogeologic investigations conducted on property south of the landfill were completed during three separate investigation phases: Phase I was conducted between December 5, 2006 and March 29, 2007; Phase II was conducted between March 17, 2008 and April 10, 2008; and Phase III was conducted between August 5 and August 19, 2010. The investigations included the following:

- electromagnetic geophysical survey
- test pit excavations
- completion of soil borings to the top of bedrock
- installation of temporary piezometers to monitor groundwater elevations in the glacial overburden
- installation of monitoring wells screened in the till and weathered bedrock
- hydraulic conductivity testing
- physical testing of site soil
- groundwater and surface water elevation monitoring

Investigation methods are described below.

2.1 ELECTROMAGNETIC GEOPHYSICAL SURVEY

Soil borings and test pit excavations completed during the 2006 Phase I investigation identified surficial, loose sand and gravel deposits having a thickness of more than 10 feet in the southeastern portion of the property. The deposits bordered the WMNY-acquired property and, based on site topography, were suspected to extend in a southward direction. An electromagnetic (EM) geophysical survey using an EM-31 terrain conductivity meter was conducted on open areas of the County and WMNY-owned property during the Phase II and Phase III investigation to map the extent of the sand and gravel deposits identified in the area of Brew Road, south of O'Brien Road and north of Hotel Creek. The EM geophysical survey mapped electrical conductivity contrasts between soil types such as conductive silt and clays and resistive sands and gravels to assess the extent of sand and gravel deposits. The EM surveys were conducted in March 2008 (Phase II investigation) and in August 2010 (Phase III investigation).

Conductivity readings were recorded at 3 to 4 foot intervals along parallel transects nominally spaced 50-feet apart using a data logger. A Trimble Global Positioning System (GPS) field located data acquisition stations during the survey. The mapped area and color contoured conductivity readings are included in Appendix A. Shades of purple and blue in Appendix A identify resistive soil types representing sand and gravel. Test pit excavations and soil borings were used to confirm the extent of the deposits during the Phase II investigation on the WMNY property. Findings are discussed in Section 3.0.

2.2 TEST PIT EXCAVATIONS

Fourteen deep exploratory test pits were excavated within the investigation area. Four test pits were excavated in 2006 (Phase I) and 10 test pits were excavated in 2008 (Phase II). Test pit locations are shown on Figure 3. The goal of the test pit excavations was to obtain a comprehensive view of the bulk soil profile, which may not be achievable in discrete soil samples collected from split-spoon sampling during soil boring advancement. The test pits were excavated using a track-mounted excavator operated by WMNY personnel. Each test pit was excavated to the maximum depth-reach of the excavator (approximately 20 feet) or competent bedrock surface, whichever was encountered first. Exceptions included test pits where loose sand and gravel was present and did not allow the test pit to remain open for observation. The soil profile was examined in two foot lifts directly from the excavator bucket, and was logged by a Geomatrix hydrogeologist. The presence of a weathered bedrock zone and saturated conditions were carefully noted when encountered. Test pits were backfilled and compacted in two foot lifts to ground surface at the completion of each excavation. Test pit excavation logs are provided in Appendix B.

2.3 SOIL BORINGS

A total of 31 soil borings were completed during the investigations. During Phase I, 10 borings (SB-1 through SB-10 {2006}) were advanced. Seventeen soil borings (SB01 through SB17 {2008}) were advanced on WMNY property north of Bovee Road during Phase II. Four soil borings (SB-01-2010 through SB-03-2010 and PZ-01 {2010}) were completed on August 10 and 11, 2010 on County-owned property east of Brew Road during Phase III. Boring locations shown on Figure 3. Soil borings were advanced using 2 1/4 inch or 4 1/4 inch inside diameter hollow stem augers driven by a CME 850 all terrain track mounted drill rig. The overburden soils were continuously sampled in two foot increments using a split spoon sampler, and logged according to the Unified Soil Classification System (USCS) by a Geomatrix hydrogeologist. Soil boring logs are included in Appendix B. Where sufficient recovery was present, a representative sample of each split spoon sample was placed in an 8 oz. glass jar and labeled with the boring location, sample depth and date for archive at the landfill facility.

Soil borings were advanced to the competent bedrock surface or auger refusal, whichever was encountered first. The weathered bedrock zone, where present, was closely examined for degree of weathering and was noted on the drilling logs. At the completion of each soil boring, the borehole was grouted to within one foot of ground surface by tremie method with a grout composed of Portland-type cement and bentonite powder. The remaining one foot was backfilled with native soil cuttings to ground surface. Soil boring logs are provided in Appendix B.

2.4 TEMPORARY PIEZOMETER INSTALLATION

Piezometers were installed in the investigation area. Four borings were completed and converted into temporary piezometers (PZ-1 through PZ-4) and six piezometers (PZ-01 through PZ-06(2008)) were completed on the County-owned property. Additionally, a temporary piezometer PZ-01-2010 was installed on County-owned property East of Brew Road during the Phase III investigation on August 11, 2010. Piezometer locations are shown on Figure 3. Piezometer construction consisted of a 1 or 2-inch diameter, 10-foot length PVC well screen (0.010" slot) and associated PVC riser. Each temporary piezometer was installed to screen the bottom 10 feet of overburden. Filter sand (#00N) was placed in the borehole to a depth of approximately 2 feet above the top of the well screen. Each borehole was backfilled to within one foot of ground surface with soil cuttings. Bentonite pellets were placed in the remaining annulus to preclude surface-water from entering the borehole. Passero Associates provided survey location coordinates and elevations for borings and piezometers. Soil boring logs and piezometer completion details are provided in Appendix B.

2.5 MONITORING WELL INSTALLATION

Three permanent monitoring wells, MW-1S (2006), MW-1D (2006) and MW-2 (2006) were installed along the southern edge of the investigation area to monitor groundwater elevations near the property boundary, and to obtain estimates of hydraulic conductivity for the glacial overburden and the overburden/bedrock interface which included the weathered portion of the bedrock. Monitoring well construction was consistent with the requirements outlined in 6NYCRR Part 360 2.11(a)(8)(ii) "Construction of Monitoring Wells and Piezometers". An overburden monitoring well was not installed at the MW-2 (2006) location due to comparatively shallow bedrock (depth to bedrock was six feet) and unsaturated overburden. Each boring was advanced using 4 ¼-inch inside diameter hollow stem augers. The soil profile was continuously sampled using 2-inch diameter split spoon sampler, and logged according to the USCS classification system by a qualified Geomatrix hydrogeologist. A ten-foot length of continuous wire-wrap PVC well screen was installed in each borehole, and #00N sand was added as a filter pack to a depth of approximately 2-feet above the top of the well screen. A

six-inch layer of fine silica choke sand was placed above the filter pack to eliminate bentonite and/or grout intrusion into the screened interval. A minimum of three feet of $\frac{3}{8}$ -inch diameter bentonite pellets was placed in the borehole annulus to form the monitoring well seal. Potable water was introduced to hydrate the bentonite pellets prior to grout addition. An additional six inch layer of fine choke sand was added to the top of the hydrated pellet seal. A slurry of portland cement and bentonite powder was added to each borehole via tremie method to within two feet of ground surface. Surface completions consisted of 36-inch diameter concrete pads with lockable protective surface casings. Each monitoring well was appropriately labeled for survey by Passero Associates, which was completed in January 2007. Soil boring logs and well completion details are provided in Appendix B.

2.6 HYDRAULIC TESTING

Estimates of horizontal hydraulic conductivity were provided through slug tests conducted in the 2006 monitoring wells. Slug test analyses are provided in Appendix C.

2.7 STAFF GAUGE INSTALLATION

Four staff gauges were installed during the investigations. Staff gauges SG-2 and SG-3 were installed to monitor elevations in wetland areas RG-6 and RG-5, respectively. Staff gauges SG-1 and SG-4 were installed to monitor surface water elevations in Hotel Creek. The ground surface elevation was surveyed at each staff gauge by Passero Associates.

2.8 PHYSICAL TESTING OF SOIL

Representative soil samples were collected during the Phase I and Phase II investigations for geotechnical analysis. Geotechnical analysis was performed by Third Rock LLC in East Aurora, New York. Soil samples were collected from 12 soil boring locations, 3 piezometer locations, and 8 test pit locations. Samples considered representative of laterally extensive soil types were collected and analyzed for the following parameters:

- Atterberg limits – ASTM D4767
- Grain Size Gradation (grain size distribution sieve and hydrometer analysis – ASTM D422)

During the Phase I investigation, a Shelby tube sample was collected from the 4 to 6 foot interval below ground surface interval at location SB-7 for in-situ permeability testing by method ASTM D1587. Collection of Shelby tube samples was attempted at other boring locations during the Phase I and Phase II investigations but soil densities caused the Shelby



tube to bend, precluding sample collection and analysis. The soils laboratory analytical data are provided in Appendix D and summarized in Table 1.

2.9 GROUNDWATER AND SURFACE WATER ELEVATION MONITORING

Groundwater and surface water elevations were measured on January 4, 2007 and March 29, 2007 in monitoring wells and temporary piezometers installed during the Phase I investigation. Elevations were measured at the same locations and newly installed piezometers during Phase II investigation on April 10, 2008. Detection monitoring well groundwater elevations were provided by TestAmerica for the first quarter 2008 sampling event (April 3, 2008) at well locations: M1A, M1B, M1Z, M2A, M2B, M2Z, M7A, M7B, MW14A and MW14B. Groundwater elevations obtained from accessible monitoring wells and piezometers were also measured on August 19, 2010 following the completion of the Phase III investigation. Water level data are summarized in Table 2.

3.0 GEOLOGY AND HYDROGEOLOGY

The geology and hydrogeology of the investigation area were characterized through the implementation of investigation methods described in Section 2.0. The investigation characterized site stratigraphy, overburden thickness, physical properties of overburden material, degree of weathering of the shallow bedrock, depth to groundwater and hydraulic properties, groundwater flow direction, and established the relationship between groundwater and surface water in and near the investigation area. Geologic and hydrogeologic data provided by detection monitoring wells installed on the south side of the active landfill during previous investigations support the interpretation of geologic and hydrogeologic conditions in the investigation area. The following subsections describe the geologic and hydrogeologic conditions in the investigation area.

3.1 GEOLOGY

Glacially-derived materials cover sedimentary bedrock in the investigation area. Remnants of a drumlin are located in the northwestern portion of the investigation area. The drumlin has been partially excavated and used as a source of borrow material for the active landfill. On the southern and eastern drumlin slope, soil consisting of re-worked till has been stockpiled to a height of approximately 40 feet in the western portion of the investigation area. East of the stockpile, glacial till is present at the ground surface and covers sedimentary bedrock. The western flank of a drumlin known as Science Hill occurs on the extreme southeastern portion of the investigation area at the corner of Brew and Bovee Roads. Isolated areas of sand and gravel deposits were also encountered in the eastern portion of the investigation area. Principal geologic units encountered in the investigation area include:

- Sand and gravel deposits
- Coarse Grained Till
- Dense Lodgement Till
- Shale bedrock

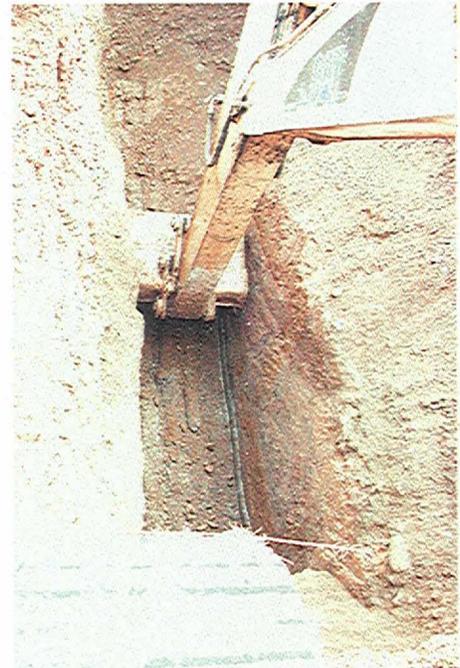
Geologic units identified along the cross-section lines shown on Figure 4 are depicted on the geologic cross-sections presented on Figures 5 through 8. Lacustrine deposits identified in previous investigations conducted by others prior to landfill construction were not present in borings or test pits completed in the investigation area.

3.1.1 Overburden

The thickness of the overburden materials encountered in borings completed across the investigation area ranges from being absent (TP-9 2008) to 37 feet (SB02 2008). Excluding Science Hill, the greatest natural thickness of unconsolidated materials occurs in the central eastern portion of the investigation area near Brew Road. Areas having no or a thin cover of unconsolidated material occur in the southwestern portion of the investigation area in the wetland area of Hotel Creek and along Bovee Road west of the Science Hill drumlin. An isopach map displaying the total thickness of unconsolidated deposits across the investigation area is presented in Figure 9.

The overburden materials identified in the investigation area include: 1. two glacial till units: - a coarse-grained till and a dense lodgement till; and 2. a surficial deposit of sand and gravel. Table 3 presents a stratigraphic thickness summary of the geologic units encountered in borings and test pits completed during Phase I and Phase II in the investigation area. Overburden materials are described below:

Dense Lodgement Till: The dense lodgment till is laterally extensive in the northern portion of the investigation area. The till was found to directly overly bedrock in each boring on the property (with the exception of monitoring well MW-2 (2006)) and was encountered beneath the sand and gravel unit (discussed below) in the eastern portion of the WMNY-owned property. Where encountered, the dense lodgment till ranged in thickness between 3.6 feet (SB-2) and 28.8feet (SB-02-2010) and was characterized as a dense to very dense red-brown to purple-red till composed of generally more than 50% fines (silt and clay fraction), with fine sand and trace to little gravel. The till exposed in test pits had a massive, blocky form, low moisture content, and was very hard. The till in several test pit exposures exhibited moderate plasticity. It was often difficult to excavate with the large track-mounted excavator. Typical N-values obtained from Standard Penetration Testing (SPT) were in a range of 20 to 30 blows per foot. The high density of the till precluded Shelby tube sample collection for permeability measurement. However, based on the fine-grained nature of the till (15 to 20% clay), the permeability is expected to be very low.



Coarse-Grained Till: The coarse-grained till is also laterally extensive and was found to cover the dense lodgement till across most of the property except in the south-central portion of the investigation area at soil borings SB-4 (2006) and SB-5 (2006) and in the eastern portion of the investigation area at TP-2 (2006), SB-02-2010, SB-03-2010 and MW-1D (2006). In the southern portion of the investigation area (WMNY-owned property), the coarse-grained till unit was present at each boring location where overburden was present except boring location SB-09(2008) and test pit TP-01(2008). The coarse-grained till unit was present at its greatest thickness at boring SB-11(2008) located on the northwestern flank of the Science Hill Drumlin. Where present and excluding boring SB-11(2008), the coarse-grained till varied in thickness between one foot at SB13 (2008), SB15 (2008), and TP-04(2008)) and 21.7 feet at SB08 (2008). The till is a dark brown to reddish brown sandy, clayey silt with little fine sand. Frequent large cobbles and small boulders were encountered within the coarse-grained till

during the test pit investigation program and grain size analysis indicate the coarse-grained till frequently has higher percentages of gravel than the lodgement till. The coarse-grained till is less dense than the lodgement till as indicated by Standard Penetration Testing (SPT) N-values which are typically less than 20 blows per foot. The density and composition difference between the two tills was readily apparent during the test pit program and most split spoon samples. The coarse-grained till was generally easier to



excavate than the lodgement till and included cobble and boulder size material. The photo above shows the approximate contact (yellow line) between the coarse-grained till unit and the dense lodgement till unit. The permeability of the unit is expected to be low based on the high percentage of fines. Where the till density was sufficient to obtain a Shelby tube (SB-7 – 2006 investigation), the permeability of the unsaturated till was 1.6×10^{-7} cm/s (see Table 1).

Sand and Gravel Deposits: Sand and gravel deposits were encountered beneath the ground surface in the central-eastern portion of the investigation area near Brew Road and a few isolated areas in the western and southern portion of the investigation area. The sand and gravel unit is described as loose to firm, well graded sand with medium to coarse subangular gravel. Substantial quantities of cobble size materials were observed in each of the test pit excavations. The lithology of the gravel and cobbles is generally shale and limestone. The subangular shape of the gravel and cobbles and compact nature of the sand and silt matrix suggests glacial deposition (non-fluvial or non-lacustrine).



The geophysical survey proved successful in mapping the extent of sand and gravel of surveyed areas during the Phase II and Phase III investigations. The geophysical survey results were field verified through test pit excavation and/or soil boring completions in areas where sand and gravel presence/absence was inferred from the survey. The sand and gravel deposits encountered at the investigation area are isolated and discontinuous. Figure 10 depicts the extent and thickness of sand and gravel deposits identified on the investigation area. The most expansive area of surficial sand and gravel deposits occurs in the central-eastern portion of the investigation area. The sand and gravel deposits in that portion of the investigation area cover approximately 18 acres of the property. Smaller areas covered by sand and gravel deposits (less than 3 acres) were encountered at test pit TP-03 (2008) and soil borings SB-06 (2008), SB8 (2006) and SB-01-2010. The maximum thickness of sand and gravel encountered was 17 feet at soil boring SB-01-2010 (Figure 10) in the southeastern portion of the proposed Eastern Soil Borrow area. Saturated conditions were noted in the bottom 1 to 2 feet of the sand and gravel deposits during the Phase II investigation.

3.1.2 Bedrock

The bedrock in the area of the Mill Seat Facility is the Vernon Formation which has been extensively evaluated during previous investigations. The bedrock is composed of an interbedded shale and limestone that frequently exhibits a high degree of weathering near its top and where shale is more prevalent than limestone. In most areas, the weathered bedrock

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is sufficiently soft to be recovered by a split-spoon sampler and was excavated during test pit excavation. The weathered bedrock is described as a gray to olive brown shale with interbedded clay and resistant layers of limestone. The weathered bedrock zone was typically 1 to 3 feet thick and as much as 10 feet thick at well MW-02D (2006) and 14 feet thick at TP09 (2008).

Figure 11 depicts the bedrock topography across the investigation area. The bedrock surface generally slopes from west to east with its highest elevation occurring at detection monitoring well M-1B/1A (663.6 feet msl) and its lowest elevation occurring east of Brew Road at SB-02-2010 (632.1 feet msl). The bedrock occurs closest to the ground surface below the south-central portion of the investigation area (6 feet to bedrock at MW-2D {2006} and 5 feet to bedrock at PZ-02 {2008}), beneath the RG-5 wetland area located west, and the wetland area paralleling Hotel Creek where it is exposed at the ground surface.

3.2 HYDROGEOLOGY

Previous hydrogeologic investigations defined the Critical Stratigraphic Section (CSS) for the landfill site as “groundwater flow in the unconsolidated glacial deposits and upper 30 to 40 feet of bedrock.” The detection monitoring well network at the landfill site monitors two distinct sections of the CSS:

- A Zone wells – screened to monitor the lower portion of the CSS, generally between 15 to 30 feet below the top of bedrock; and
- B Zone wells – screened to monitor the upper portion of the CSS that includes the overburden/bedrock interface and the upper 5 to 15 feet of bedrock.

Groundwater which occurs under unconfined conditions in the investigation area (predominantly in the coarse-grained till and dense lodgement till) is referred to in this report as the “upper water-bearing zone”. This zone is not considered to be equivalent to the B Zone hydrostratigraphic unit described in previous hydrogeologic investigation reports. The B Zone, defined above, has much higher hydraulic conductivity and is semi-confined. The thicker section of saturated, low permeability glacial material in the investigation area allows water table conditions to occur typically within 7 to 10 feet of the ground surface. The saturated thickness of the upper water-bearing zone is variable ranging from approximately 15 to 20 feet within the low hydraulically conductive soil located in the central portion of the investigation area and thins to only 1 to 2 feet in a southerly direction toward Hotel Creek. The upper water-bearing zone at the investigation area presents an additional flow zone at the landfill site, albeit a zone with very slow groundwater flow velocity. The remainder of this section

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describes hydrogeologic characteristics of the upper water-bearing zone in the investigation area.

The sand and gravel deposits encountered in the central-eastern portion of the investigation area are generally unsaturated. Piezometer PZ-06 (2008) and monitoring well MW-1S (2006) were installed to monitor saturation in the thickest areas of the sand and gravel unit. Groundwater elevation data show the sand and gravel unit is unsaturated at well MW-1S (2006) and 0.8 feet of saturation at PZ-06 (2008). Test pit excavation at TP-01 (2008) reported 1 to 2 feet of saturation on March 24, 2008. Groundwater is expected to drain quickly from the sand and gravel unit toward Hotel Creek. Based on grain size data from TP-01 and using Hazen's Approximation (Hazen, 1911) where:

$$K = C (d_{10})^2 \text{ and}$$

K is the hydraulic conductivity (cm/sec)
 d_{10} is the effective grain size (cm)
 C is a coefficient based on the following table

Very fine sand, poorly sorted	40-80
Fine sand with appreciable fines	40-80
Medium sand, well sorted	80-120
Coarse sand, poorly sorted	80-120
Coarse sand, well sorted, clean	120-150

$$K = 100 X (0.043)^2$$

The hydraulic conductivity of the saturated sand and gravel deposits at TP-01 (2008) is approximately 1.8×10^{-1} cm/sec. Following dissipation of seasonal recharge (late winter – early spring snow melt and rainfall), the sand and gravel unit is likely to become entirely unsaturated.

Groundwater elevation data for the water level monitoring event recorded in April 2008 and August 2010 for wells and piezometers screened in the upper water-bearing zone in the investigation area are contoured on Figures 12A and 12B, respectively. The August 2010 water levels are similar to those measured in March 2007 and April 2008. As shown on Figures 12A and B, groundwater flow in the upper water-bearing zone is radial from the north-central portion of the investigation area. Groundwater flows in an easterly direction toward wetland RG-7 (horizontal hydraulic gradient is approximately 0.012), in a southerly direction toward Hotel Creek (horizontal hydraulic gradient is approximately 0.008), and in a westerly direction toward wetland RG-5 (horizontal hydraulic gradient is approximately 0.002).

Below the till, groundwater generally occurs in shallow bedrock under confined or semi-confined conditions (B Zone). The exception occurs in the south-central portion of the investigation area where the overburden is thin and unsaturated and groundwater is present in the weathered bedrock (MW06-2D). Deeper groundwater flow conditions were investigated during studies conducted in support of original landfill siting and permitting (A Zone and Z Zone). Deeper groundwater flows in a northeast direction through bedding plane fractures and vertical joint sets.

Groundwater elevation data for the January 2007 monitoring event indicate the low permeability overburden soils produce confining conditions exhibited by a vertically upward hydraulic gradient between wells MW-1S (2006) (screened in the overburden) and MW-1D (2006) (screened in the weathered bedrock). Upward vertical gradients were also noted at existing landfill monitoring wells located east and northeast of the landfill footprint. These data indicate shallow bedrock groundwater discharges to Wetland RG-7 east of the investigation area. In the wetland, the topography is low and the thickness of the overburden is presumed to be thin (based on boring data for borings and wells completed northeast of the existing landfill). The vertical hydraulic gradient reversed to downward during seasonal high water table conditions (March 2007 and April 2008) as water levels in the upper bedrock did not substantially change and water levels in the upper water-bearing zone rose during temporal recharge from the percolation of precipitation and snow melt.

Table 4 summarizes horizontal hydraulic conductivity values estimated from rising head slug tests performed in the monitoring wells. The horizontal hydraulic conductivity of the saturated lodgement till (upper water-bearing zone) at well MW-1S (2006) in the southeastern portion of property is 7.92×10^{-6} cm/s. The horizontal hydraulic conductivity estimated for MW06-1S is similar to a geometric mean value of 3.35×10^{-6} cm/s reported for wells installed in dense lodgement till at the landfill (Geomatrix 2006). The permeability value analyzed from the Shelby tube sample collected from boring SB-7 is 1.6×10^{-7} cm/s.

Horizontal hydraulic conductivity values of 6.40×10^{-3} cm/s (MW-1D (2006)) and 9.73×10^{-3} cm/s (MW-2 (2006)) were estimated for wells having screens monitoring the overburden/weathered bedrock interface (B Zone). These horizontal hydraulic conductivity values are higher than the geometric mean hydraulic conductivity value of 3.08×10^{-4} cm/s for overburden/bedrock interface monitoring wells previously tested at the landfill but within the range of 8.3×10^{-5} cm/s to 6.6×10^{-2} cm/s previously identified by Geomatrix (2006). Hydraulic conductivity values for the weathered bedrock are substantially higher than till which suggests that nearly all shallow bedrock groundwater recharge occurs in areas beyond the limits of the investigation area.

3.3 GROUNDWATER/SURFACE WATER INTERACTION

Surface water is present in the investigation area at Wetland RG-6 and the drainage swale that flows south to Hotel Creek. Surface water is also present west of the investigation area at Wetland RG-5 and east of the investigation area at Wetland RG-7. The wetlands serve as temporal recharge/discharge areas of overburden and, in the case of wetlands RG-5 and RG-7, upper bedrock groundwater. Wetland RG-6 is uniquely different from RG-5 and RG-7 in that RG-6 is comparatively small and isolated, lies in an elevated area of thicker till deposits, and is recharged solely by on-site precipitation and groundwater discharge.

The surface water elevation in Wetland RG-6 (SG-2) varied by less than 0.4 feet during each of the three monitoring events. H&A (1989) also noted a near static head in the wetland during the hydrogeologic investigation of the landfill property. It would appear that the head is held relatively constant through surface water discharge to the drainage swale that flows south across the investigation area to Hotel Creek. Heads in wells located in close proximity to the wetland (M-7B and PZ-2) were higher than the wetland surface water elevations recorded in 2007; however, the head at well M-7B was lower in 2008. These data indicate that Wetland RG-6 is an area of both groundwater discharge and groundwater recharge within the investigation area of the property.

Precipitation that falls on Wetland RG-6 and precipitation that falls on the land surface near the wetland and on the south side of the capped landfill flow overland (runoff) and recharges surface water in Wetland RG-6. As mentioned previously, groundwater temporarily recharges the wetland. However, the volume of recharge from groundwater is substantially lower compared to the volume of recharge from precipitation and runoff. This is due to the low hydraulic conductivity of the saturated till and the small hydraulic gradients in the area of the wetland that effectively constrain the volume of groundwater that discharges to the wetland.

Appendix E provides a calculation that estimates recharge to Wetland RG-6 from precipitation/runoff and groundwater discharge. As shown in Appendix E, the volume of precipitation that annually falls in the area of Wetland RG-6 that could flow overland into the wetland is estimated to be 9,900 cubic feet per day. During hydraulic conditions that favor groundwater discharge to the wetland, the volume of groundwater discharging to the wetland is conservatively estimated to be 20 cubic feet per day. Precipitation and runoff is the dominant mechanism of recharge to Wetland RG-6, with groundwater discharge accounting for less than ½ -percent of the total flow to the wetland.

Surface water elevations measured in Wetland RG-5 (SG-3) are nearly 10 feet lower than Wetland RG-6. In fact, the surface water elevation in Wetland RG-5 is similar to the elevation

of the bedrock surface and bedrock groundwater elevations measured in well M-1A. These data support a conclusion that Wetland RG-5 is a receptor of overburden and shallow bedrock groundwater (B-zone groundwater flow) west of the investigation area in addition to precipitation and surface water runoff. Similar conditions are anticipated for Wetland RG-7 which is located more than 1,000 feet east of the investigation area. The ground surface topography drops rapidly into the wetland area east of Brew Road and the overburden thickness is presumed to thin allowing bedrock groundwater to discharge to the wetland. Precipitation and surface water runoff are the primary mechanisms of recharge to these wetland areas.

The surface water elevation of Hotel Creek near Brew Road was approximately 651 feet msl during each of the three monitoring events. The creek is located in a topographic low approximately 3,500 feet south of the landfill. Aerial photography shows wooded areas of Wetland RG-5 extending to the south toward treed areas surrounding Hotel Creek. As observed in test pit excavations completed immediately north of the Creek, bedrock outcrops in the topographically low area near the Creek. The shallow bedrock in this area would allow bedrock groundwater to discharge into Hotel Creek. The Creek is also recharged by the temporal presence of groundwater in the sand and gravel deposits in the vicinity of Brew Road.

4.0 CHARACTERIZATION SUMMARY

A hydrogeologic investigation was conducted of the investigation area shown on Figure 2 in 2006 , 2008 and 2010 to supplement existing site characterization data obtained during investigations of landfill property to support landfill siting and the original 6NYCRR Part 360 permit application to construct and operate the Mill Seat landfill. The data collected during the Phase I, Phase II, and Phase III investigations addressed specific geologic and hydrogeologic data for the suitability of the property for soil borrow material and calculation of soil volumes for landfill operations. Findings are presented in summary for each of the following in the investigation area:

- Overburden thickness
- Soil type
- Soil permeability
- Bedrock topography
- Depth to groundwater
- Shallow groundwater flow direction

Overburden Thickness

North of Hotel Creek, the natural overburden thickness (excluding stockpiled soil) of the investigation area ranges from 1 foot (areas north and south of Hotel Creek) to 37 feet. Overburden soils are absent in a portion of the wetland area paralleling Hotel Creek. Stratigraphic information from boring and test pits show that the overburden thickness across a majority of the investigation area north of Hotel Creek is greater than 10 feet. However, a northeast-southwest trending rise in the bedrock surface was identified near the border of the property in the central-western portion of the investigation area. The rise of the bedrock surface causes the overburden thickness to become less than 10 feet in a localized area.

Soil Type and Permeability

The soils in the investigation area consist predominantly of coarse-grained till and dense lodgement till. Sand and gravel deposits occur as discontinuous, surficial deposits and were encountered primarily in the eastern portion of the investigation area near Brew Road. A few isolated areas of sand and gravel were identified in central and western portion of the WMNY-owned property and County-owned property in the area of the proposed soil borrow area. The till units have silt and clay as the dominant particle size with the coarse-grained till having a larger percentage of gravel and larger size particles. The horizontal hydraulic conductivity of the saturated lodgement till in the southeastern portion of property is approximately 7.9×10^{-6} cm/s (as demonstrated at well MW-1S (2006)). This value is similar to a low permeability

value measured in an unsaturated coarse-grained till sample analyzed from a Shelby tube collected from boring SB-7 (1.6×10^{-7} cm/s). A geometric mean value of 3.3×10^{-6} cm/s was reported for wells installed in dense lodgement till at the existing landfill area (Geomatrix, 2006). The low permeability values for till in the investigation area suggest excavation and re-compaction for use as landfill cover soil (i.e., daily, intermediate, and final cover) is a viable alternative for till in the investigation area. The more permeable sand and gravel deposits could be excavated for use as daily cover or provide alternative uses at the landfill (i.e., haul road base material).

Shallow Bedrock Composition and Bedrock Topography

Materials comprising the bedrock surface were examined during test pit excavation and the collection of split-spoon soil samples. Mapping of the bedrock surface shows bedrock sloping in an eastward direction. The bedrock is composed of an interbedded shale and limestone. Weathered bedrock in the investigation area was defined as material that could be excavated or sampled with a split spoon sampler. The thickness of the weathered bedrock ranged from 0.1 to 14 feet. The limestone appeared to be much more resistant to weathering than the shale and frequently could not be penetrated with hollow stem augers. The limestone was typically hard and when retrieved in a split spoon sampler, it was present as angular, laminated limestone gravel with no soil. The weathered shale was typically encountered as a laminated silt and clay with platy, fissile fabric. Occasional soft shale gravel was present which was interbedded with less resistant fissile shale partings among stratified silt and clay. At each boring and test pit completed in the investigation area, the top of weathered bedrock was identified with a high degree of confidence.

Depth to Groundwater

Groundwater occurs under unconfined conditions at depths five feet below the ground surface or deeper in the eastern portion of the investigation area. In the vicinity of Wetland Area RG-6 (north-central) and in the southern portion of the investigation area, the groundwater occurs within five feet of the ground surface.

Upper Water-Bearing Zone Flow Direction

The groundwater flow direction of the upper water-bearing zone in the investigation area is radial from the current soil borrow and soil stockpile area near the existing landfill. Groundwater flow occurs in a westward direction toward wetland RG-5, in a southward direction toward Hotel Creek, and in an eastward direction toward wetland RG-7.



Wetland RG-6 Surface Water/Groundwater Interaction

Precipitation on and surface water runoff to Wetland RG-6 recharges the wetland. Groundwater temporarily recharges the wetland during seasonally wet periods. Water balance calculations show that groundwater recharge accounts for less than one percent of the total flow to the wetland. Soil excavations in the area of Wetland RG-6 would have little impact on recharge to the wetland. Soil excavations would minimally affect recharge to RG-5, RG-7, and Hotel Creek.

5.0 CONCLUSION

The hydrogeologic investigations conducted at the investigation area have shown that soil on the property is suitable for use as borrow material for current Mill Seat Landfill operations. The volume of soil that could be available for borrow material decreases in a southward direction toward Hotel Creek. Soil borrow area excavation design should consider surface water recharge to Wetland RG-6. Since the design should not significantly divert surface water flow that currently recharges the wetland, surrounding wetland areas (RG-5 and RG-7) would be minimally affected by soil excavations in the investigation area.



6.0 REFERENCES

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H&A of New York, June 1989. Hydrogeologic Report for the Proposed Mill Seat Solid Waste Landfill.

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TABLES



TABLE 1
Summary of Soil Physical Testing
Mill Seat Landfill
Riga, New York

Soil Boring or Piezometer ID	Sample Depth (fbgs)	USCS Classification/Description	% Gravel	% Sand	% Silt	% Clay	Plastic Limit	Liquid Limit	Plasticity Index	Density (N) Value & Sample Depth (fbgs)
Soil Borings										
2006										
SB-1	8-12	SC-SM/ Silty, clayey SAND (Till) with Gravel	19.0	38.3	28.4	14.3	13.3	18.9	5.6	30 (10-12)
SB-2	2-6	SC/ Clayey SAND (Till)	10.7	42.6	25.1	21.6	14.0	22.4	8.4	7 (4-6)
SB-3	4-6	ML/ Sandy SILT (Till)	11.1	31.9	42.0	15.0	13.9	--	--	14 (4-6)
SB-4	2-6	CL-ML/ Sandy clayey SILT (Till)	9.3	33.6	31.9	25.2	13.7	21.5	7.8	18 (4-6)
SB-5	2-6	CL-ML/ Sandy clayey SILT (Till)	9.5	40.5	31.8	18.2	12.5	18.3	5.8	23 (4-6)
SB-6	4-8	CL-ML/ Sandy clayey SILT (Till)	7.5	36.9	31.5	24.1	12.2	18.5	6.3	32 (4-6)
SB-7	2-6	SC-SM/ Silty, Clayey SAND (Till)	13.6	37.2	32.7	16.5	12.9	17.9	5.0	13 (4-6)
SB-8	8-12	SC-SM/ Silty, Clayey SAND (Till)	16.5	38.9	28.4	16.2	11.9	17.5	5.6	13 (8-10)
SB-9	4-8	CL-SM/ Sandy Clayey SILT (Till)	8.8	38.4	35.1	17.7	11.8	18.0	6.2	35 (4-6)
Soil Borings										
2008										
SB03 (2008)	14-16	SC-SM/ Gray silty, clayey sand with gravel	15.9	35.8	32.3	16.0	10.9	16.6	5.7	82 (14-16)
SB07 (2008)	4-8	CL/ Brown, sandy lean clay	12.7	33.6	29.5	24.2	12.3	21.3	9.0	51 (6-8)
SB09 (2008)	14-16	CL/ Brown, sandy lean clay	6.1	33.6	29.7	30.6	10.9	19.4	8.5	>100 (14-16)
Piezometers										
PZ-1	4-6	CL-ML/ Sandy clayey SILT (Till)	2.6	43.8	53.6 ⁽¹⁾	--	--	--	--	31 (4-6)
PZ-2	10-14	CL-ML/ Sandy clayey SILT (Till)	9.0	37.2	35.2	18.6	11.2	16.7	5.5	25 (12-14)
PZ-4	2-6	SC-SM/ Sandy Clayey SILT (Till)	14.6	35.7	31.8	17.9	13.4	19.9	6.5	26 (2-4)
Test Pits 2008										
TP-1 (2008)	8-10	GP-GC/ Poorly graded gravel with silty clay and sand	47.5	46.3	6.2 ⁽¹⁾	0.0	20.9	27.9	7.0	NA
TP-2 (2008)	11-12	SM/ Brown silty sand	13.1	38.8	34.9	13.2	NP	NV	NP	NA
TP-3 (2008)	8-10	GW-GC/ Well graded gravel with clay and sand	52.5	39.7	7.8 ⁽¹⁾	0.0	16.4	23.7	7.3	NA
TP-5 (2008)	5-6	SC-SM/ Brownish gray, silty, clayey sand	14.6	38.5	32.6	14.3	11.2	14.9	3.7	NA
TP-6 (2008)	6-8	CL-ML/ Brown, sandy, silty clay	10.4	35.2	30.4	24.0	12.6	19.3	6.7	NA
TP-7 (2008)	4-5	CL/ Brown lean clay with sand	8.1	20.9	37.7	33.3	22.4	34.4	12.0	NA
TP-8 (2008)	8-10	CL/ Brown lean clay with sand	2.8	23.5	34.5	39.2	14.2	26.9	12.7	NA
TP-10 (2008)	12-14	SM/ Brown, silty sand	11.9	48.2	31.9	8.0	15.5	19.0	3.5	NA

In Situ Permeability by ASTM D5084		
Location	Depth (fbgs)	Average Permeability
ST-1/SB-7	4-6	1.6x10 ⁻⁷ cm/s
% Moisture		135.8/124.1
9.4		

Notes:
 (1)- Presented as a total fines value.
 - Gramsize distribution by ASTM D422
 - Atterberg Limits Analysis by ASTM D4318
 fbgs- feet below ground surface



TABLE 2
SUMMARY OF GROUNDWATER and SURFACE WATER ELEVATIONS
 Mill Seat Landfill
 Riga, New York

Well/ Piezometer ID	TOR Elevation ⁽¹⁾	January 4, 2007		March 29, 2007		April 10, 2008		08/19/10	
		Depth ⁽²⁾	Elevation ⁽¹⁾	Depth	Elevation	Depth	Elevation	Depth	Elevation
Monitoring Wells									
M1A	706.17	47.10	659.07	46.93	659.24	46.74	659.43	48.20	657.97
M1B	706.36	DRY	<660.20	DRY	<660.20	NA	NA	DRY	DRY
M1Z	704.53	44.79	659.74	44.91	659.62	44.09	660.44	46.85	657.68
M2A	675.56	25.86	649.70	25.85	649.71	25.61	649.95	27.67	647.89
M2B	675.86	24.58	651.28	24.55	651.31	24.53	651.33	25.70	650.16
M2Z	675.00	25.28	649.72	25.30	649.70	NA	NA	26.75	648.25
M7A	672.01	12.72	659.29	12.46	659.55	12.78	659.23	14.00	658.01
M7B	671.87	4.65	667.22	4.40	667.47	5.32	666.55	5.84	666.03
M14A	668.59	NA	NA	22.38	646.21	22.32	646.27	23.07	645.52
M14B	668.24	NA	NA	22.13	646.11	22.01	646.23	23.00	645.24
MW-1S (2006)	678.03	23.50	654.53	17.32	660.71	17.62	660.41	18.58	659.45
MW-1D (2006)	677.82	22.99	654.83	22.75	655.07	23.10	654.72	24.75	653.07
MW-2 (2006)	670.50	6.05	664.45	5.00	665.50	5.83	664.67	6.07	664.43
Piezometers									
PZ-1	683.25	13.20	670.05	11.58	671.67	13.21	670.04	NA	NA
PZ-2	675.44	7.19	668.25	6.29	669.15	6.51	668.93	NA	NA
PZ-3	679.30	10.69	668.61	9.89	669.41	10.14	669.16	NA	NA
PZ-4	677.17	12.71	664.46	12.39	664.78	11.92	665.25	NA	NA
PZ-01 (2008)	671.14					6.08	665.06		Destroyed
PZ-02 (2008)	669.23					4.21	665.02	6.92	662.31
PZ-03 (2008)	663.91					5.41	658.50	6.11	657.80
PZ-04 (2008)	657.10					4.00	653.10	5.32	651.78
PZ-05 (2008)	659.17					4.60	654.57	5.66	653.51
PZ-06 (2008)	676.28					19.22	657.06	19.65	656.63
PZ-01-2010	668.44							17.25	651.19
Staff Gauges									
SG-1	649.45	1.97	651.42	2.30	651.75	2.45	651.90	NA	NA
SG-2	666.57	0.56	667.13	0.56	667.13	0.94	667.51	NA	NA
SG-3	658.51	0.58	659.09	0.65	659.16	1.36	659.16	NA	NA
SG-4	655.56					0.40	655.96	NA	NA

Notes:

(1) TOR (top of riser, for piezometers and monitoring wells) or ground surface elevation (for staff gauges) measured in feet; distance above sea level.

(2) Monitoring wells: Depth to water measured in feet; distance below top of riser (TOR).
 Staff Gauges: Depth of surface water added to ground surface elevation.

NA- Measurement not taken.

"M - Series" Monitoring well measurements recorded on April 3, 2008 by TestAmerica during routine monitoring



TABLE 3
Stratigraphic Summary
Mill Seat Landfill
Riga, New York

Test Pit, Soil Boring or Piezometer ID	Surface Elevation (fasl)	Stratigraphic Unit Thickness			Depth to Bedrock (ft.)	Bedrock Elevation (fasl)	Thickness of Weathered Bedrock Zone (ft.)
		Sand and Gravel	Coarse Grained Till	Dense Lodgment Till			
Soil Borings							
SB-1	678.26	0	8	7.2	15.2	663.1	2.8
SB-2	677.49	0	14.4	3.6	18.0	659.5	0.1
SB-3	667.93	0	4.6	9.4	14.0	653.9	2.1
SB-4	668.22	0	0	15.2	15.2	653.0	1.3
SB-5	671.03	0	0	16.7	16.7	654.3	0.2
SB-6	669.02	0	4	30	34.0	635.0	1.2
SB-7	669.28	0	6	18.7	24.7	644.6	0.1
SB-8	672.61	8.4	5.6	18.2	32.2	640.4	1.0
SB-9	670.65	0	4	14.2	18.2	652.5	2.3
SB-10	677.01	0	0	16	16.0	661.0	0.0
SB01 (2008)	671.04	12	0	12	24.0	647.0	0.0
SB02 (2008)	674.09	13	0	24	37.0	637.1	1.2
SB03 (2008)	669.70	0	21.7	0	21.7	648.0	2.5
SB04 (2008)	676.01	10	6	13	29.0	647.0	0.2
SB05 (2008)	669.47	0	14	0	14.0	655.5	0.0
SB06 (2008)	672.16	8	4	0	12.0	660.2	2.7
SB07 (2008)	664.82	0	11	0	11.0	653.8	2.7
SB08 (2008)	665.83	0	17.7	0	17.7	648.1	0.3
SB09 (2008)	674.33	12	0	15.7	27.7	646.6	2.3
SB10 (2008)	673.88	16	6.5	0	22.5	651.4	0.0
SB11 (2008)	695.63	0	45.2	0	45.2	650.4	2.8
SB12 (2008)	657.75	0	2	0	2.0	655.8	8.1
SB13 (2008)	655.62	0	1	0	1.0	654.6	5.0
SB14 (2008)	664.42	0	2	0	2.0	662.4	7.2
SB15 (2008)	661.71	0	1	0	1.0	660.7	5.9
SB16 (2008)	662.16	0	1.5	0	1.5	660.7	4.6
SB17 (2008)	652.44	0	2	0	2.0	650.4	1.1
SB-01-2010	672.48	17	0	11	30.0	642.5	3.0
SB-02-2010	666.11	0	5.2	28.8	34.0	632.1	3.0
SB-03-2010	671.70	0	0	26	28.0	643.7	0.8
Monitoring Wells							
MW-1S/1D (2006)	676.08	16	0	17	33	643.1	2.5
MW-2 (2006)	668.10	0	6	0	6.0	662.1	10
Piezometers							
PZ-1	680.13	0	14	4.2	18.2	661.9	3.3
PZ-2	673.68	0	11.5	6.5	18.0	655.7	5.1
PZ-3	676.59	0	8	22	30.0	646.6	0.5
PZ-4	673.63	0	6	23.5	29.5	644.1	0.5
PZ-01 (2008)	668.04	0	14	0	14.0	654.0	0.4
PZ-02 (2008)	667.18	0	5	0	5.0	662.2	8.0
PZ-03 (2008)	660.26	0	8.5	0	8.5	651.8	0.1
PZ-04 (2008)	654.20	0	4	0	4.0	650.2	4.2
PZ-05 (2008)	656.92	0	6	0	6.0	650.9	4.0
PZ-06 (2008)	673.88	16	6.5	0	22.5	651.4	0.0
PZ-01-2010	665.96	0	0	25	27.0	639.0	1.0
Test Pits							
TP-1	673.80	0	10	>9	>19.0	<654.7	NA
TP-2	676.20	11	0	>11	>21.0	<655.2	NA
TP-3	671.20	0	9	7	16.0	655.2	0.0
TP-4	675.40	0	11	7	18.0	657.4	4.0
TP-01 (2008)	674.71	14	0	>2	>16	<658.7	NA
TP-02 (2008)	663.91	0	11	>3	>14	<649.9	NA
TP-03 (2008)	660.90	14	0	0	>14	<646.9	NA
TP-04 (2008)	663.27	0	1	0	1.0	662.3	9.0
TP-05 (2008)	660.53	0	4	3	7.0	653.5	NA
TP-06 (2008)	662.18	0	8	1	9.0	653.2	1.0
TP-07 (2008)	661.96	0	5	2	7.0	655.0	1.0
TP-08 (2008)	669.54	0	17	0	17.0	652.5	0.0
TP-09 (2008)	663.66	0	0	0	0.0	663.6	14.0
TP-10 (2008)	671.61	0	8	>6	>14	<657.6	NA

Notes:

fasl- feet above sea level

NA- unit not encountered at specified location



TABLE 4
Horizontal Hydraulic Conductivity Summary
Mill Seat Landfill
Riga, New York

<i>Well I.D.</i>	<i>Material Screened</i>	<i>Screen Interval</i>		<i>Estimated Hydraulic Conductivity¹</i>	
		<i>Elevation (famsl)</i>	<i>Depth (fbgs)</i>	<i>(cm/sec)</i>	<i>(ft/day)</i>
MW-1S(2006)	overburden (till)	661.08-651.08	15-25	7.92×10^{-6}	0.022
MW-1D (2006)	shallow bedrock/overburden contact	647.97-637.97	28-38	6.40×10^{-3}	18.18
MW-2 (2006)	shallow bedrock	662.10-652.10	6-16	9.73×10^{-3}	27.58

Notes:

1. Hydraulic conductivity estimated by Geomatrix Consultants, Inc. using Bouwer and Rice Methods.

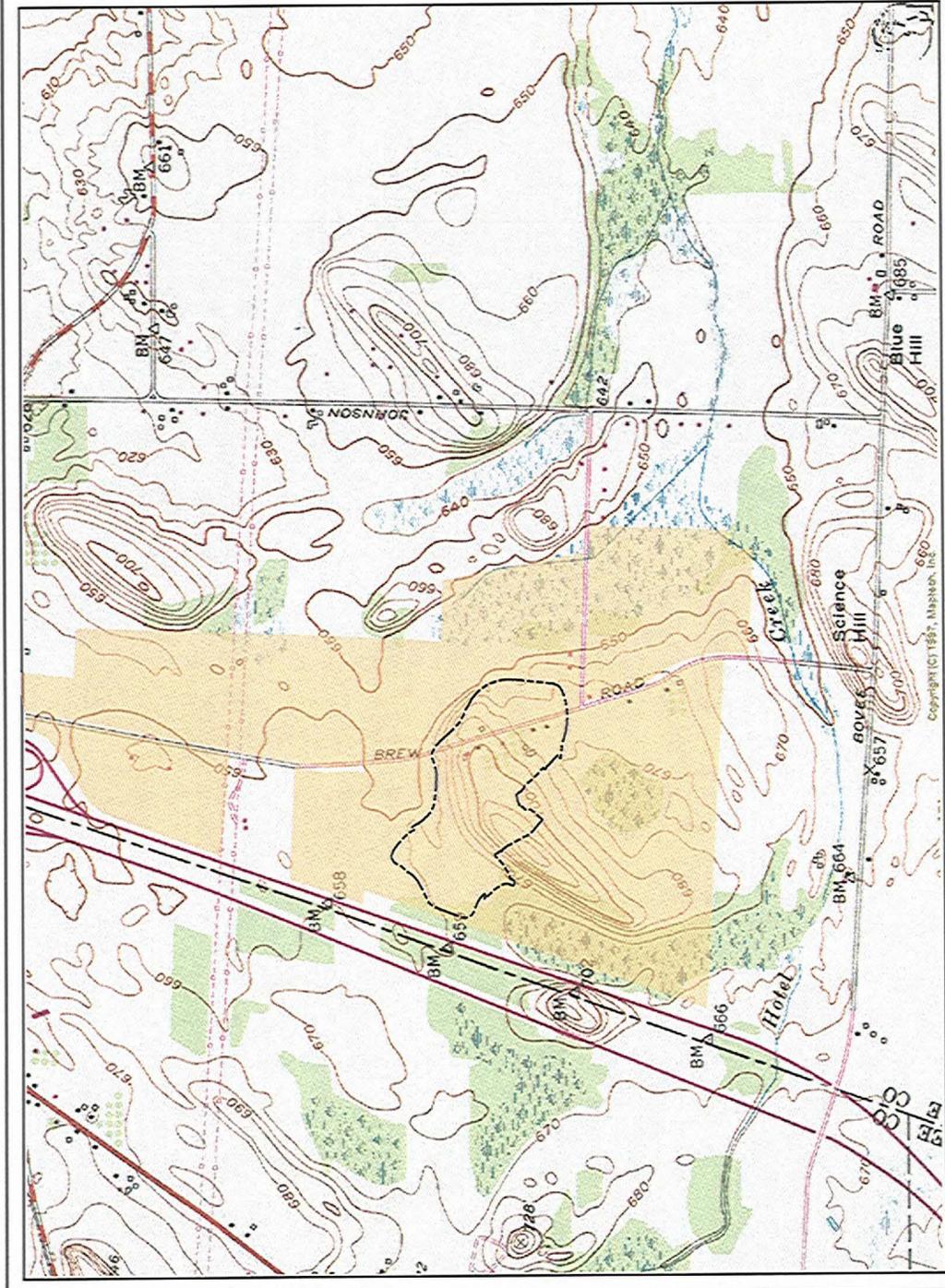
famsl = feet above mean sea level

fbgs = feet below ground surface

cm/sec = centimeters per second

ft/day = feet per day

FIGURES



- Monroe County Property
(source: <http://www.monroecounty.gov>)
- Landfill Footprint (approximate)

SITE LOCATION MAP
 Mill Seat Landfill
 Supplemental Hydrogeologic Investigation
 Town of Riga, New York

By: MAC

Date: 9/2006

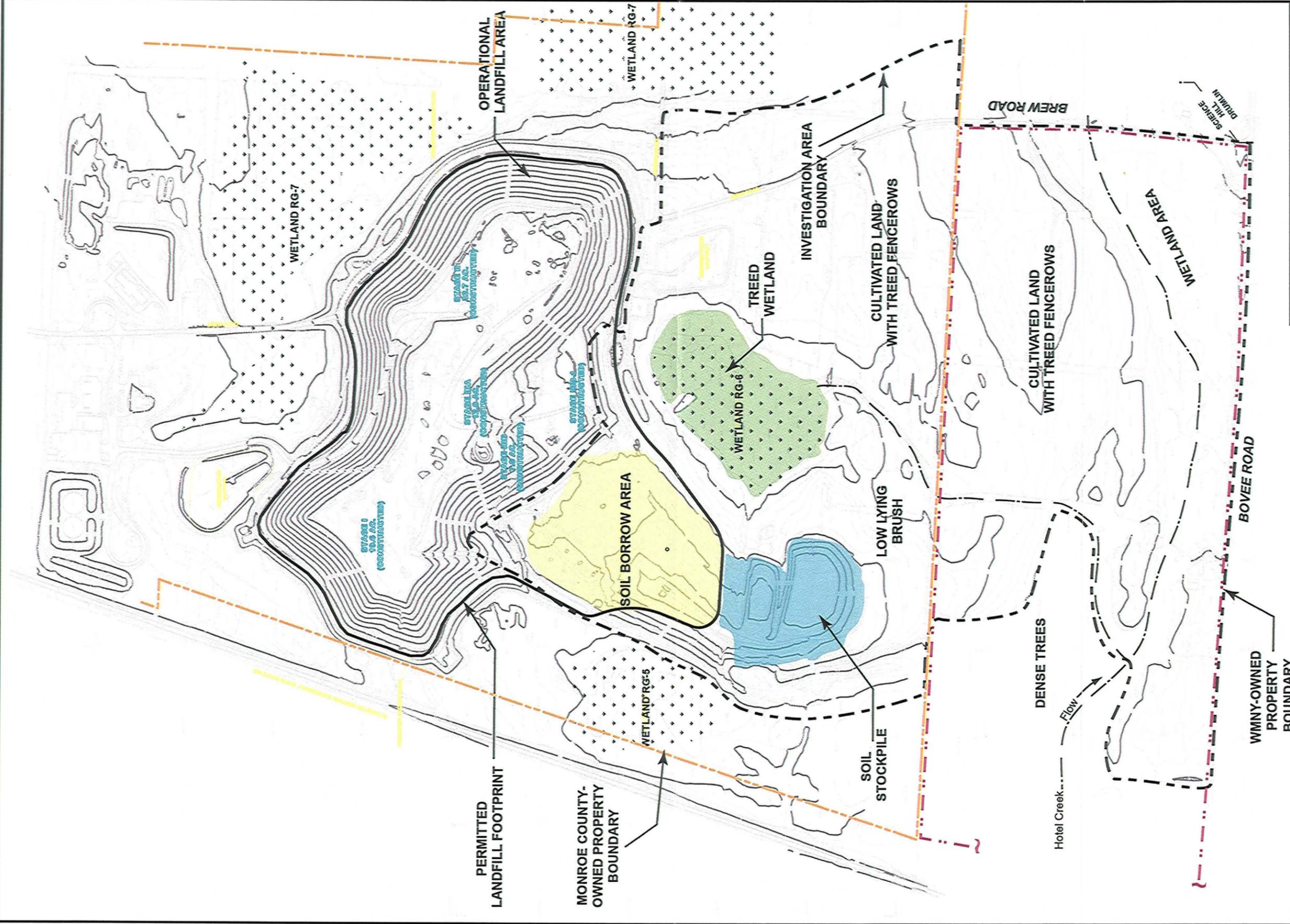
Project No. 12625

AMEC Geomatrix

Figure 1



SCALE
(miles, approximate)

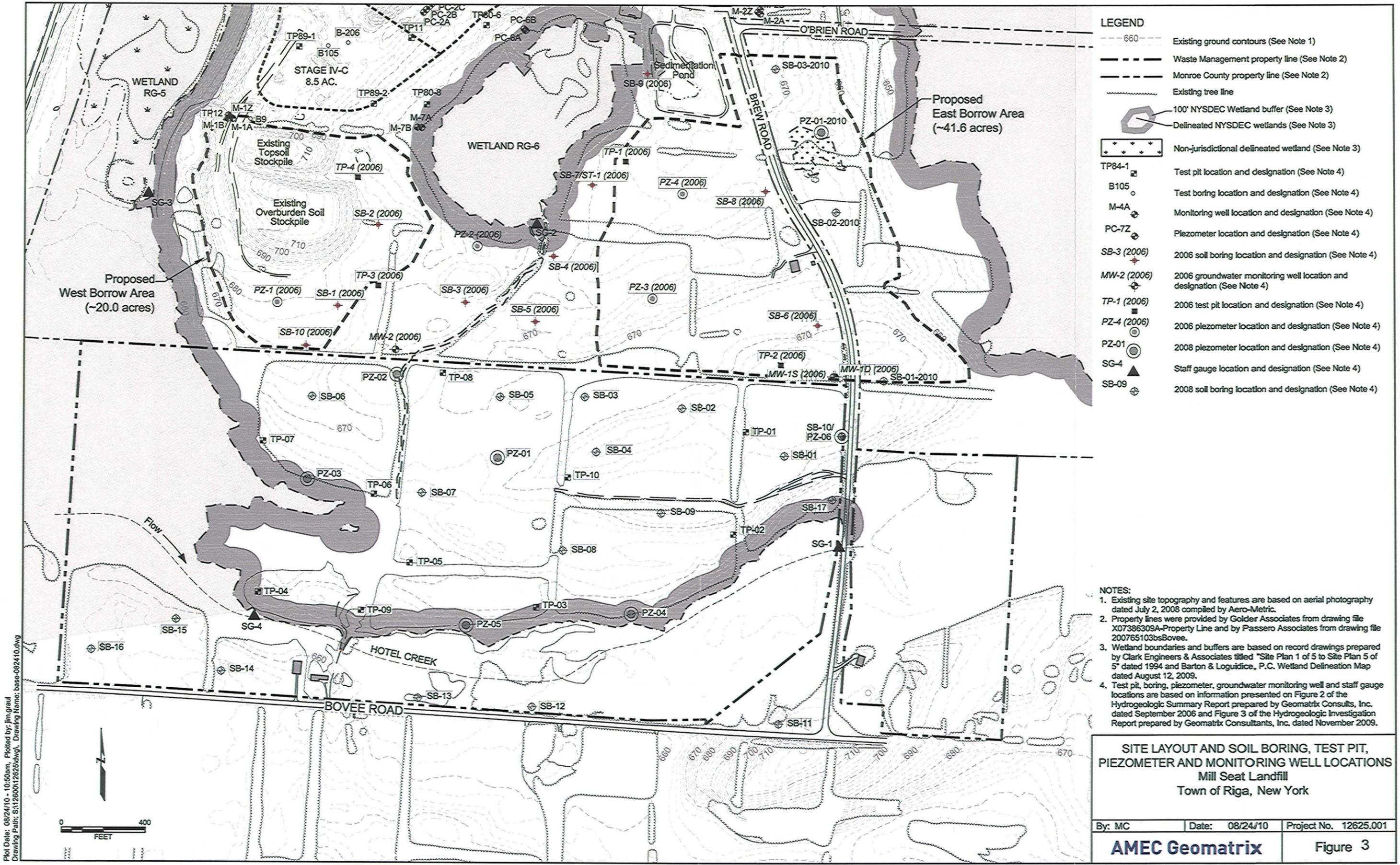


INVESTIGATION AREA and SITE FEATURES
Mill Seat Landfill
Riga, New York

By: MAC | Date: August 2010 | Project No. 12625

AMEC Geomatrix

Figure 2



- LEGEND**
- 660 --- Existing ground contours (See Note 1)
 - Waste Management property line (See Note 2)
 - Monroe County property line (See Note 2)
 - Existing tree line
 - 100' NYSDEC Wetland buffer (See Note 3)
 - Delineated NYSDEC wetlands (See Note 3)
 - Non-jurisdictional delineated wetland (See Note 3)
 - TP84-1 ■ Test pit location and designation (See Note 4)
 - B105 ○ Test boring location and designation (See Note 4)
 - M-4A ⊕ Monitoring well location and designation (See Note 4)
 - PC-7Z ⊕ Piezometer location and designation (See Note 4)
 - SB-3 (2006) ⊕ 2006 soil boring location and designation (See Note 4)
 - MW-2 (2006) ⊕ 2006 groundwater monitoring well location and designation (See Note 4)
 - TP-1 (2006) ■ 2006 test pit location and designation (See Note 4)
 - PZ-4 (2006) ⊕ 2006 piezometer location and designation (See Note 4)
 - PZ-01 ⊕ 2008 piezometer location and designation (See Note 4)
 - SG-4 ▲ Staff gauge location and designation (See Note 4)
 - SB-09 ⊕ 2008 soil boring location and designation (See Note 4)

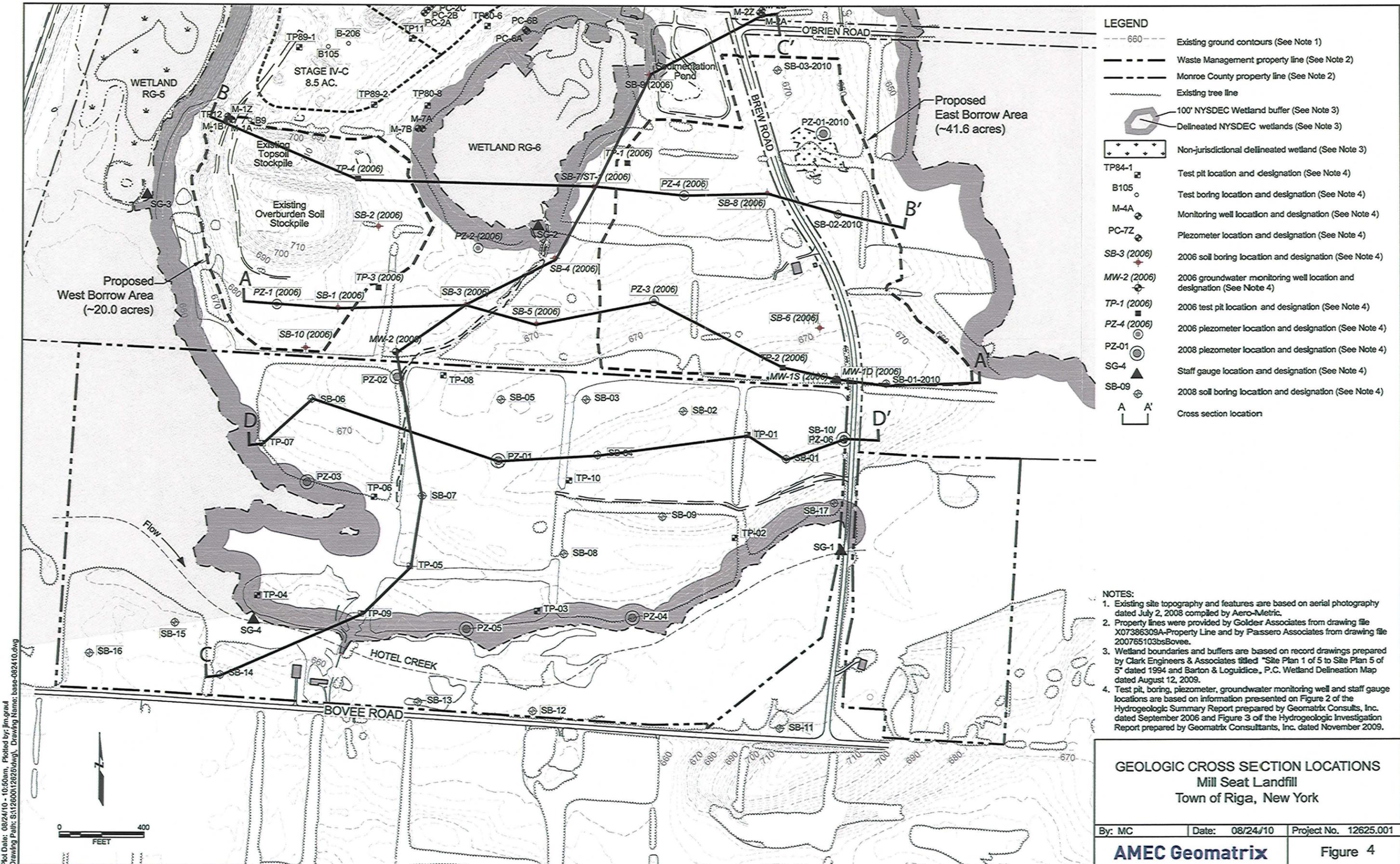
- NOTES:**
1. Existing site topography and features are based on aerial photography dated July 2, 2008 compiled by Aero-Metric.
 2. Property lines were provided by Golder Associates from drawing file X07386309A-Property Line and by Passero Associates from drawing file 200765103bsBovee.
 3. Wetland boundaries and buffers are based on record drawings prepared by Clark Engineers & Associates titled "Site Plan 1 of 5 to Site Plan 5 of 5" dated 1994 and Barton & Loguidice, P.C. Wetland Delineation Map dated August 12, 2009.
 4. Test pit, boring, piezometer, groundwater monitoring well and staff gauge locations are based on information presented on Figure 2 of the Hydrogeologic Summary Report prepared by Geomatrix Consults, Inc. dated September 2006 and Figure 3 of the Hydrogeologic Investigation Report prepared by Geomatrix Consultants, Inc. dated November 2009.

SITE LAYOUT AND SOIL BORING, TEST PIT, PIEZOMETER AND MONITORING WELL LOCATIONS
Mill Seat Landfill
Town of Riga, New York

By: MC	Date: 08/24/10	Project No. 12625.001
AMEC Geomatrix		Figure 3

Plot Date: 08/24/10 - 10:50am, Plotted by: jim.graud
Drawing Path: S:\126001\2625\dwg\ Drawing Name: base-082410.dwg





LEGEND

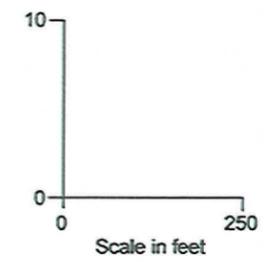
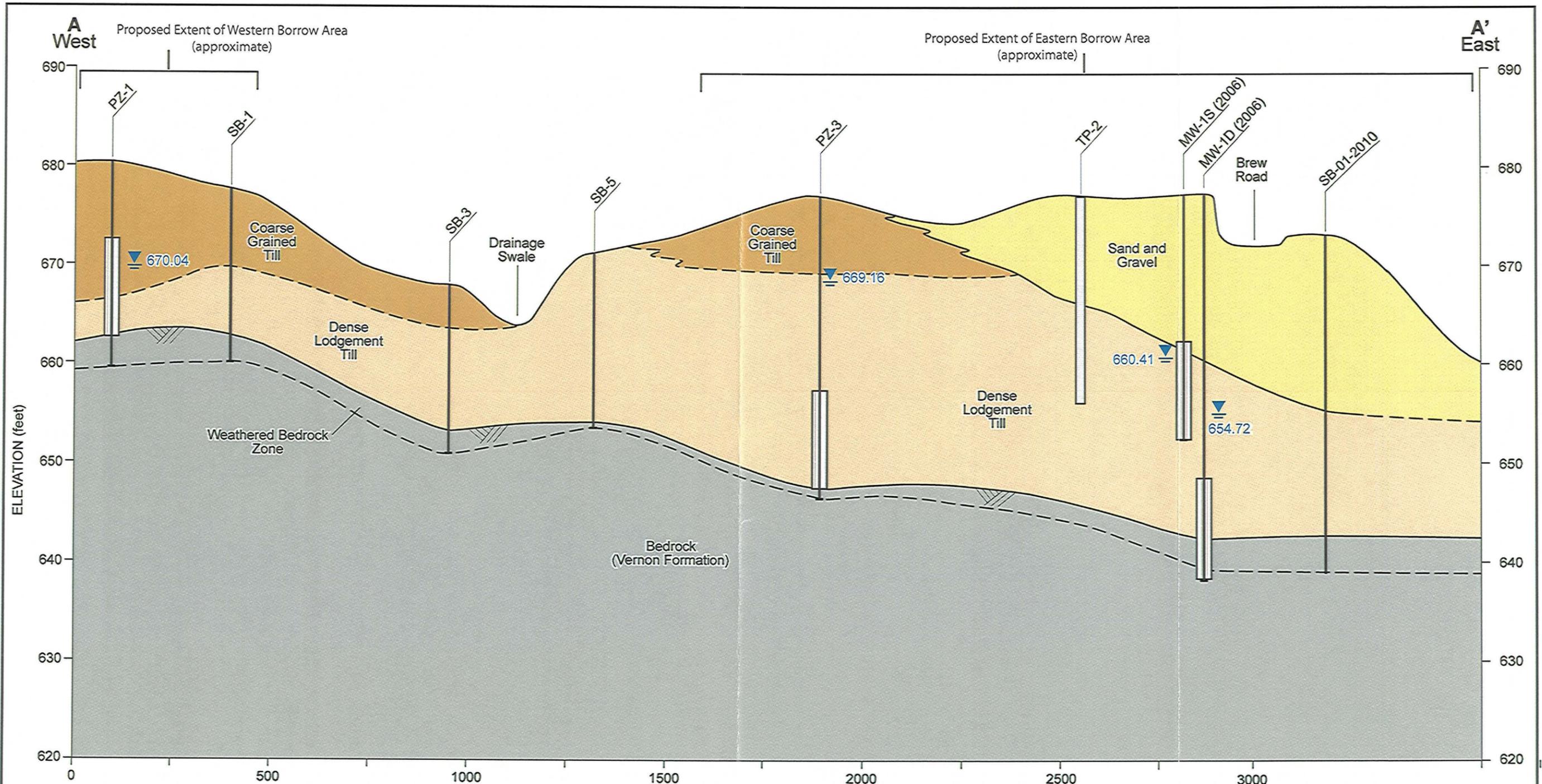
- 660 --- Existing ground contours (See Note 1)
- Waste Management property line (See Note 2)
- Monroe County property line (See Note 2)
- Existing tree line
- 100' NYSDEC Wetland buffer (See Note 3)
- Delineated NYSDEC wetlands (See Note 3)
- Non-jurisdictional delineated wetland (See Note 3)
- TP84-1 Test pit location and designation (See Note 4)
- B105 Test boring location and designation (See Note 4)
- M-4A Monitoring well location and designation (See Note 4)
- PC-7Z Piezometer location and designation (See Note 4)
- SB-3 (2006) 2006 soil boring location and designation (See Note 4)
- MW-2 (2006) 2006 groundwater monitoring well location and designation (See Note 4)
- TP-1 (2006) 2006 test pit location and designation (See Note 4)
- PZ-4 (2006) 2006 piezometer location and designation (See Note 4)
- PZ-01 2008 piezometer location and designation (See Note 4)
- SG-4 Staff gauge location and designation (See Note 4)
- SB-09 2008 soil boring location and designation (See Note 4)
- A A' Cross section location

- NOTES:**
1. Existing site topography and features are based on aerial photography dated July 2, 2008 compiled by Aero-Metric.
 2. Property lines were provided by Golder Associates from drawing file X07386309A-Property Line and by Passero Associates from drawing file 200765103bsBovee.
 3. Wetland boundaries and buffers are based on record drawings prepared by Clark Engineers & Associates titled "Site Plan 1 of 5 to Site Plan 5 of 5" dated 1994 and Barton & Loguidice, P.C. Wetland Delineation Map dated August 12, 2009.
 4. Test pit, boring, piezometer, groundwater monitoring well and staff gauge locations are based on information presented on Figure 2 of the Hydrogeologic Summary Report prepared by Geomatrix Consults, Inc. dated September 2006 and Figure 3 of the Hydrogeologic Investigation Report prepared by Geomatrix Consultants, Inc. dated November 2009.

GEOLOGIC CROSS SECTION LOCATIONS
Mill Seat Landfill
Town of Riga, New York

By: MC	Date: 08/24/10	Project No. 12625.001
AMEC Geomatrix		Figure 4

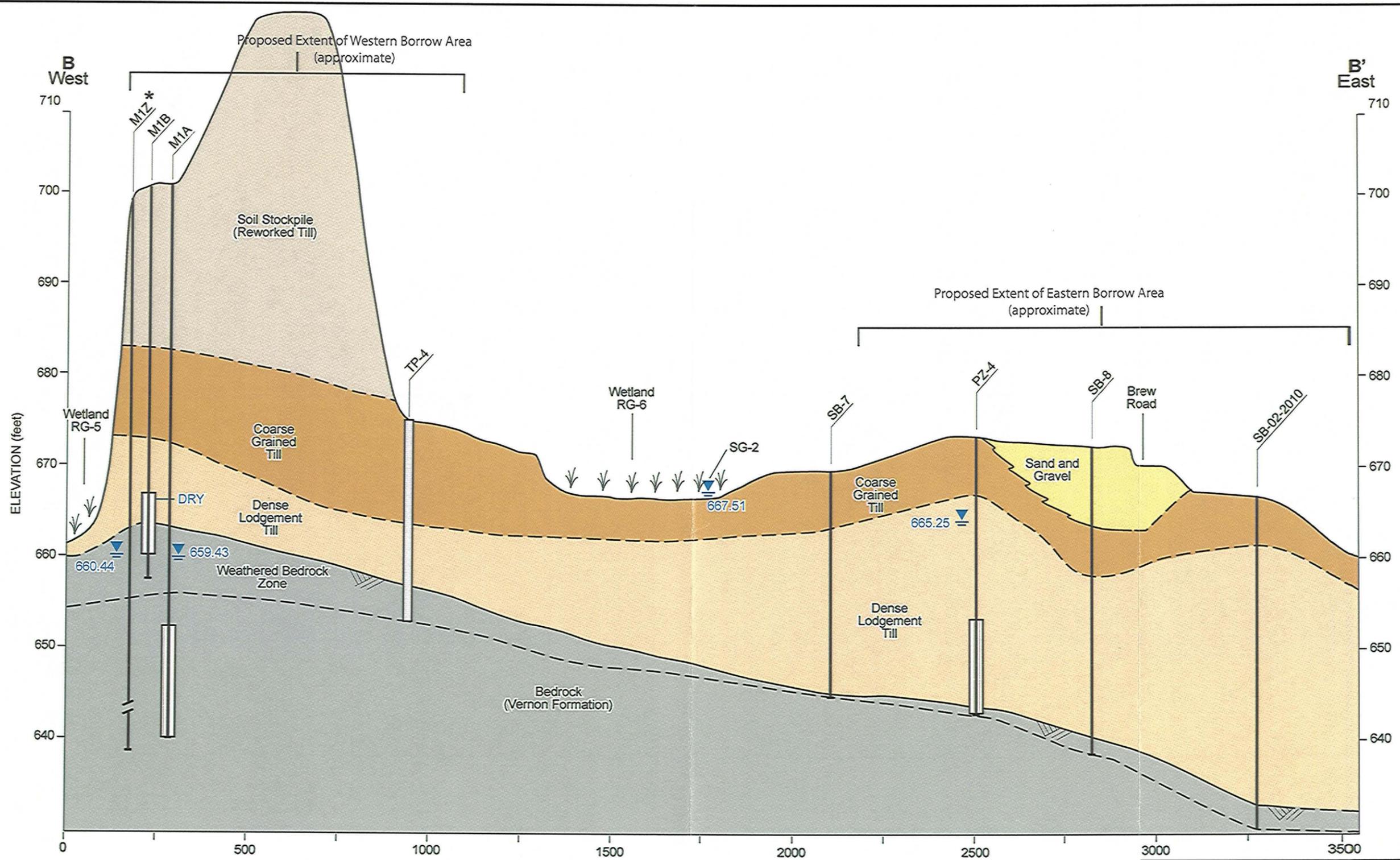
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 Drawing Path: S:\126001\2625\dwg\ Drawing Name: base-082410.dwg



GEOLOGIC CROSS SECTION A-A'
Mill Seat Landfill
Riga, New York

By: MAC	Date: August 2010	Project No. 12625.001
AMEC Geomatrix		Figure 5

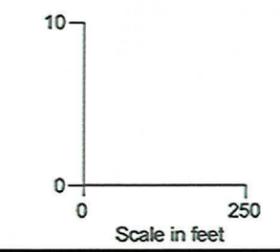
S:\12625\12625\12625.001\task_2\fig_a.ai



* M1Z screened interval 604.03 to 583.03 fasl

- EXPLANATION**
- Monitoring well
 - Screened interval
 - Groundwater elevation (April 2008 data)

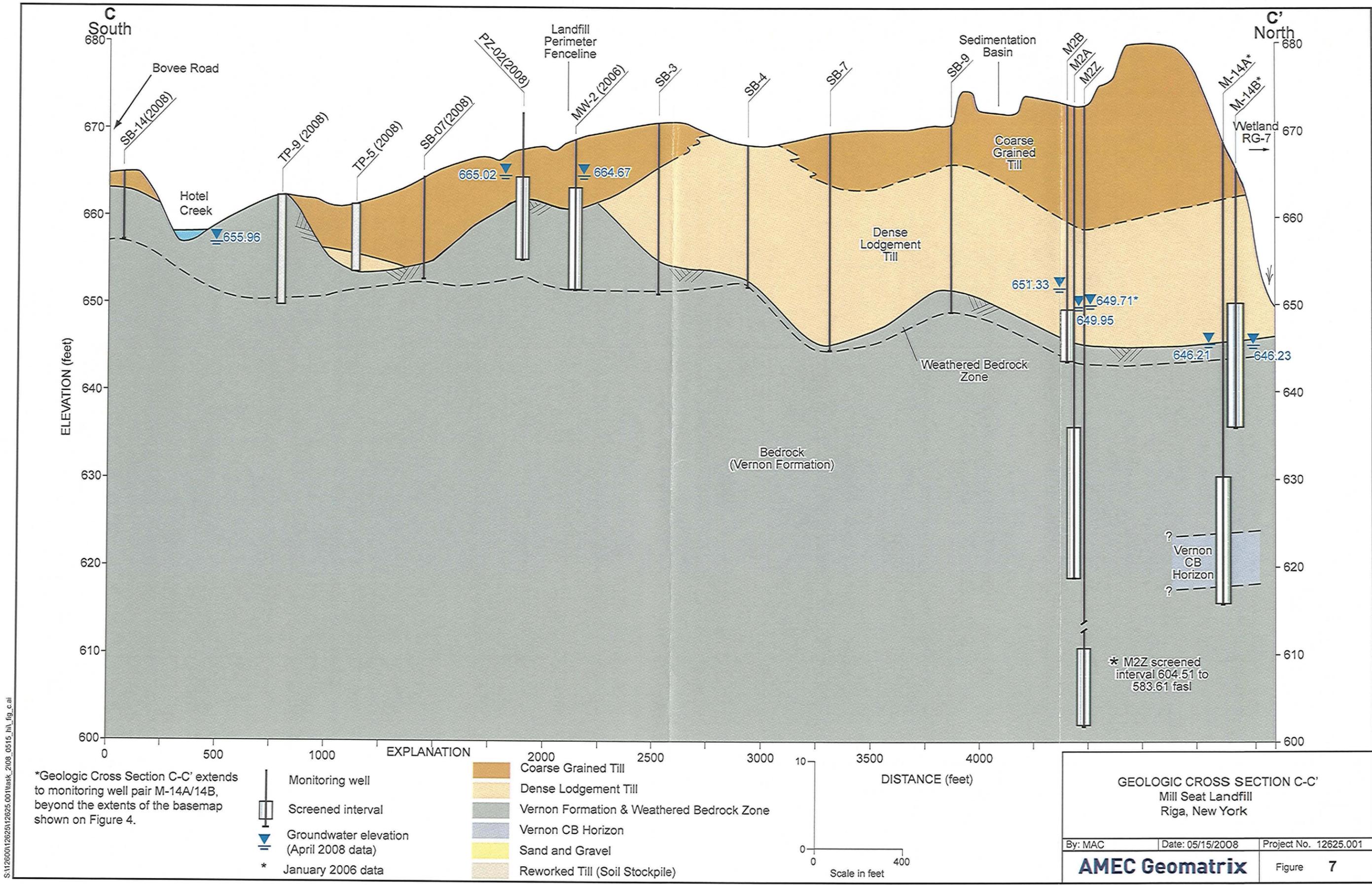
- Coarse Grained Till
- Dense Lodgement Till
- Vernon Formation & Weathered Bedrock Zone
- Sand and Gravel
- Reworked Till (Soil Stockpile)



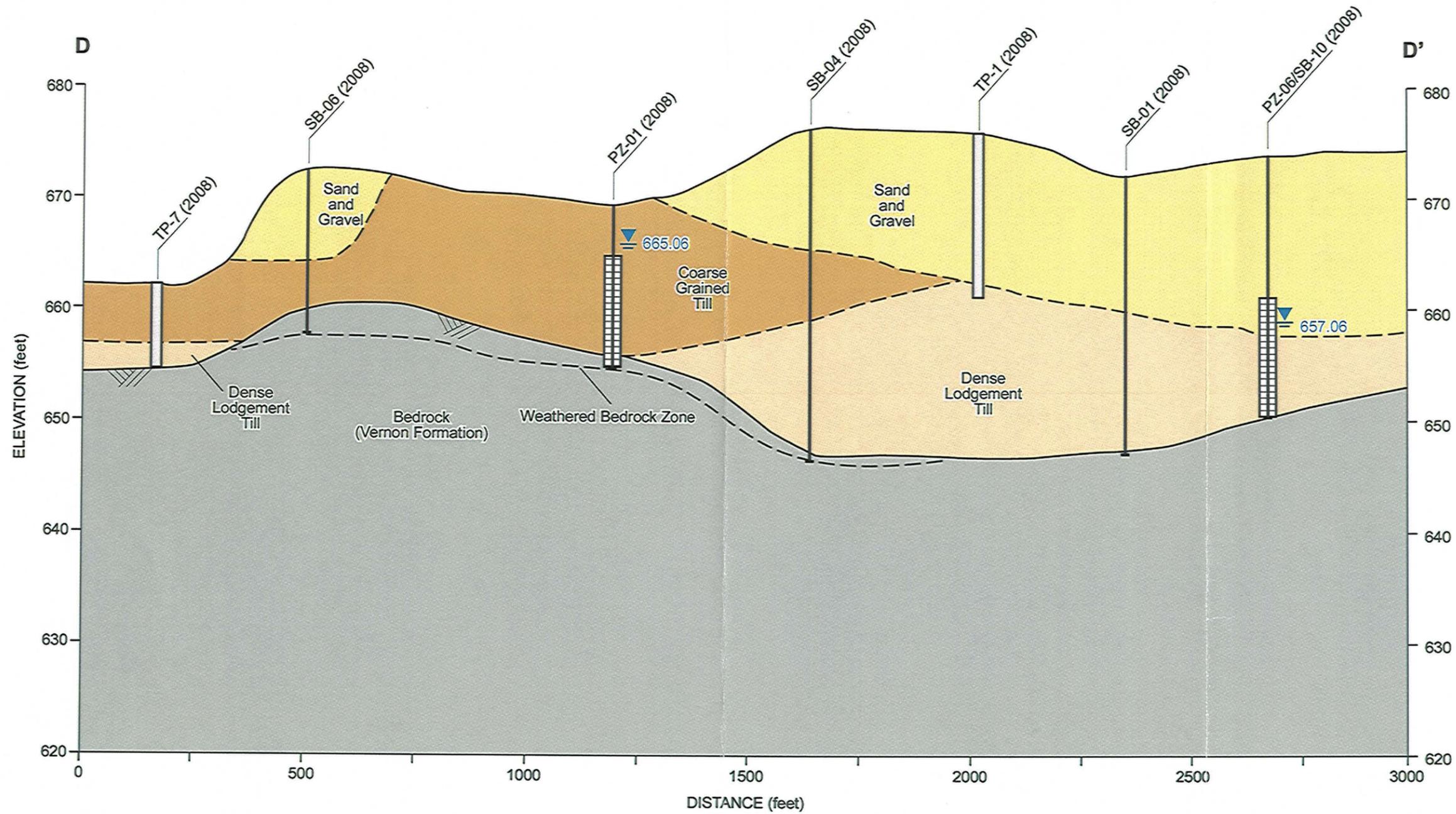
GEOLOGIC CROSS SECTION B-B'
Mill Seat Landfill
Riga, New York

By: MAC	Date: August 2010	Project No. 12625.001
AMEC Geomatrix		Figure 6

S:\126001\12625\001\Task_2\fig_b.ai

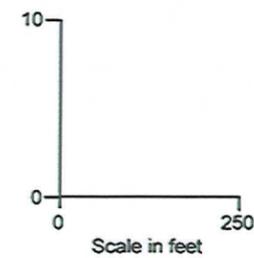


S:\126001\12625\12625.001\Task_2008_0515_h1_fig_c.ai



EXPLANATION

- Monitoring well
- Screened interval
- Groundwater elevation (April 2008 data)
- Coarse Grained Till
- Dense Lodgement Till
- Vernon Formation & Weathered Bedrock Zone
- Sand and Gravel

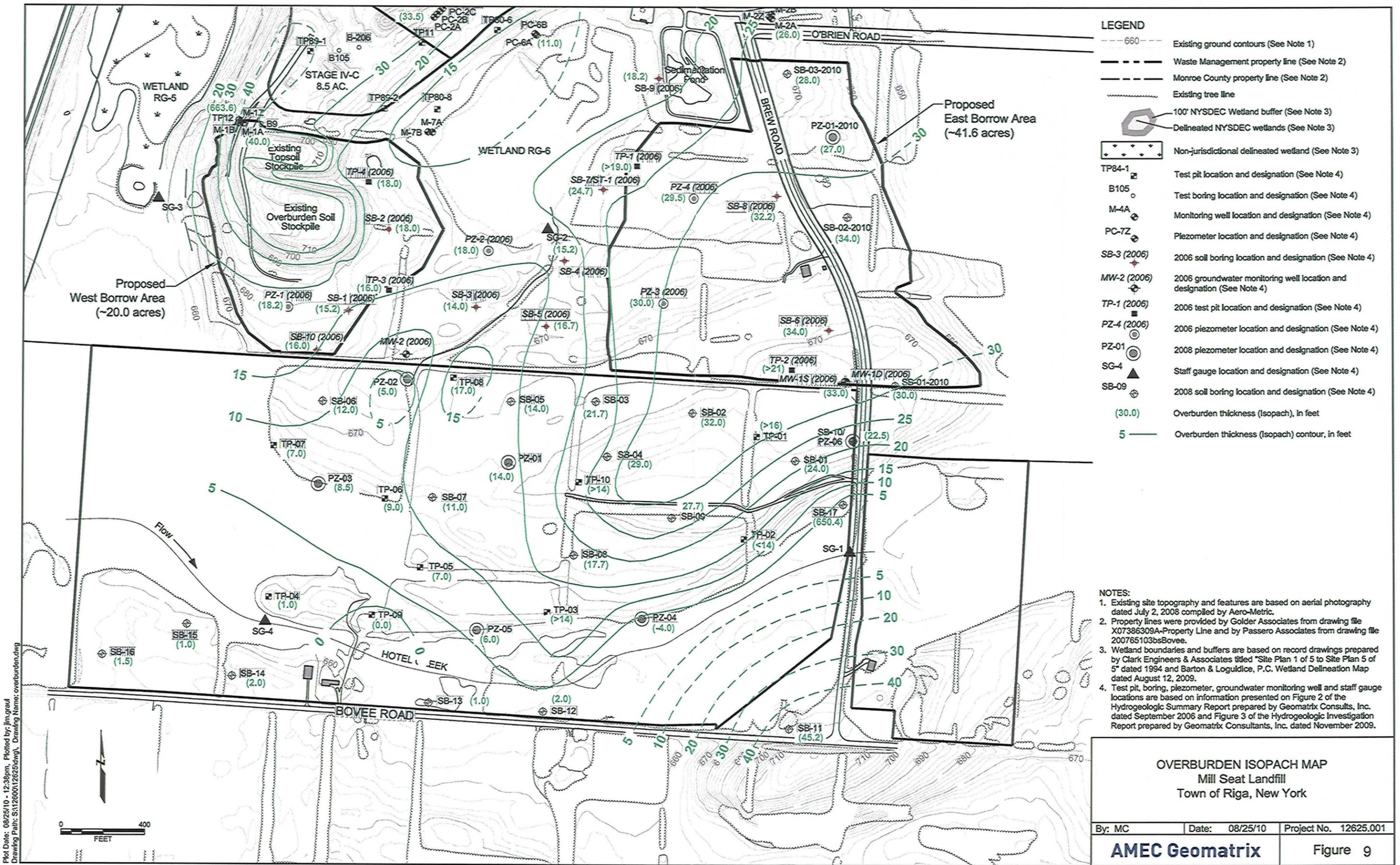


GEOLOGIC CROSS SECTION D-D'
 Mill Seat Landfill
 Riga, New York

By: MAC | Date: 05/15/2008 | Project No. 12625.001

AMEC Geomatrix

Figure **8**



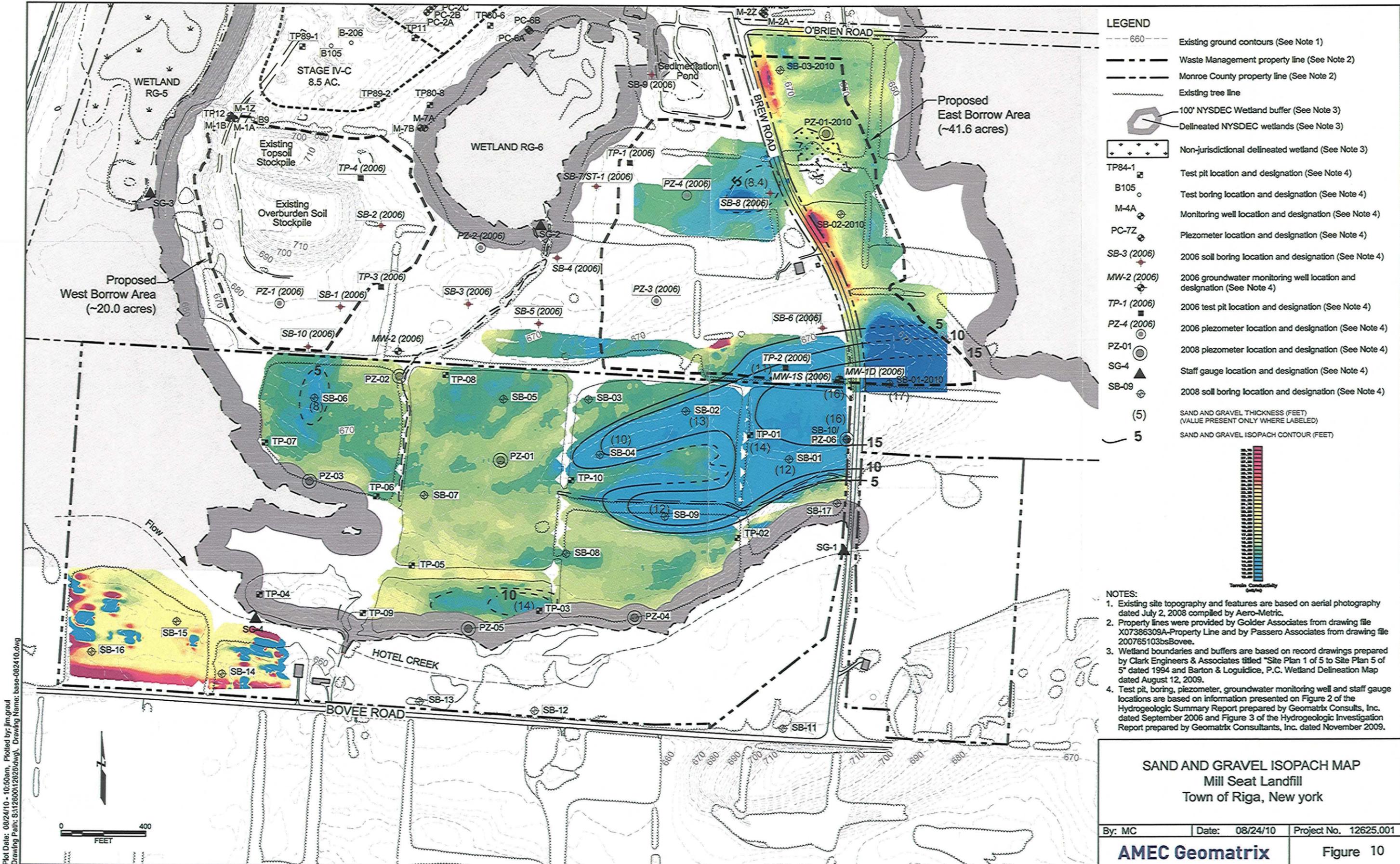
- LEGEND**
- 660 --- Existing ground contours (See Note 1)
 - Waste Management property line (See Note 2)
 - Monroe County property line (See Note 2)
 - Existing tree line
 - 100' NYSDEC Wetland buffer (See Note 3)
 - Delineated NYSDEC wetlands (See Note 3)
 - Non-jurisdictional delineated wetland (See Note 3)
 - TP84-1 Test pit location and designation (See Note 4)
 - B105 Test boring location and designation (See Note 4)
 - M-4A Monitoring well location and designation (See Note 4)
 - PC-TZ Piezometer location and designation (See Note 4)
 - SB-3 (2006) 2006 soil boring location and designation (See Note 4)
 - MW-2 (2006) 2006 groundwater monitoring well location and designation (See Note 4)
 - TP-1 (2006) 2006 test pit location and designation (See Note 4)
 - PZ-4 (2006) 2006 piezometer location and designation (See Note 4)
 - PZ-01 2008 piezometer location and designation (See Note 4)
 - SG-4 Staff gauge location and designation (See Note 4)
 - SB-09 2008 soil boring location and designation (See Note 4)
 - (30.0) Overburden thickness (Isopach), in feet
 - 5 Overburden thickness (Isopach) contour, in feet

- NOTES:**
1. Existing site topography and features are based on aerial photography dated July 2, 2008 compiled by Aero-Metric.
 2. Property lines were provided by Golder Associates from drawing file X07386309A-Property Line and by Passero Associates from drawing file 200765103bsBovee.
 3. Wetland boundaries and buffers are based on record drawings prepared by Clark Engineers & Associates titled "Site Plan 1 of 5 to Site Plan 5 of 5" dated 1994 and Barton & Loguidice, P.C. Wetland Delineation Map dated August 12, 2009.
 4. Test pit, boring, piezometer, groundwater monitoring well and staff gauge locations are based on information presented on Figure 2 of the Hydrogeologic Summary Report prepared by Geomatrix Consults, Inc. dated September 2006 and Figure 3 of the Hydrogeologic Investigation Report prepared by Geomatrix Consultants, Inc. dated November 2009.

OVERBURDEN ISOPACH MAP
 Mill Seat Landfill
 Town of Riga, New York

By: MC	Date: 08/25/10	Project No. 12625.001
AMEC Geomatrix		Figure 9

Plot Date: 08/25/10 - 12:36pm, Plotted by: jim.grad
 Drawing Path: S:\126001\2625\dwg_ Drawing Name: overburden.dwg



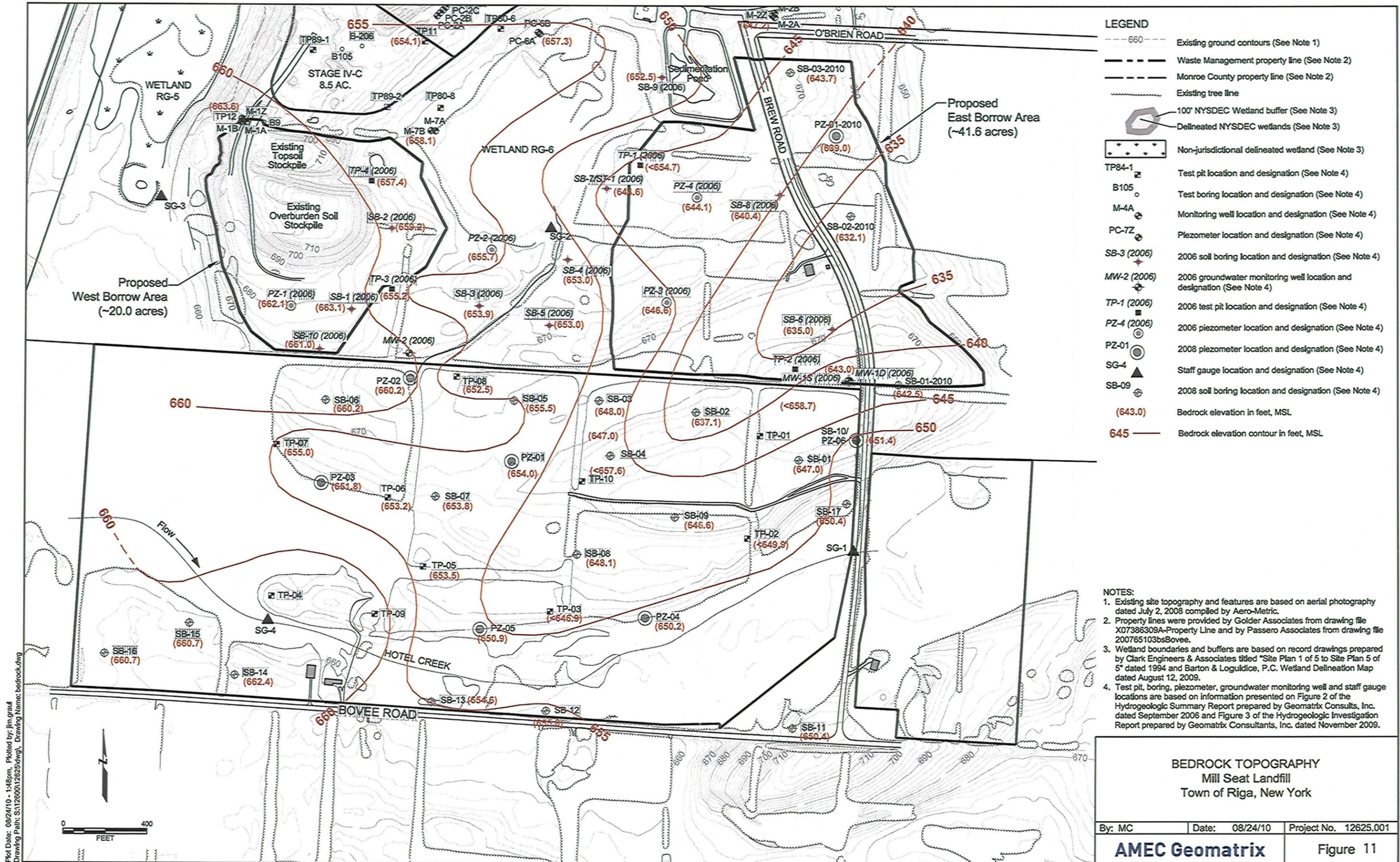
- LEGEND**
- 660 --- Existing ground contours (See Note 1)
 - Waste Management property line (See Note 2)
 - Monroe County property line (See Note 2)
 - Existing tree line
 - 100' NYSDEC Wetland buffer (See Note 3)
 - Delineated NYSDEC wetlands (See Note 3)
 - Non-jurisdictional delineated wetland (See Note 3)
 - TP84-1 Test pit location and designation (See Note 4)
 - B105 Test boring location and designation (See Note 4)
 - M-4A Monitoring well location and designation (See Note 4)
 - PC-7Z Piezometer location and designation (See Note 4)
 - SB-3 (2006) 2006 soil boring location and designation (See Note 4)
 - MW-2 (2006) 2006 groundwater monitoring well location and designation (See Note 4)
 - TP-1 (2006) 2006 test pit location and designation (See Note 4)
 - PZ-4 (2006) 2006 piezometer location and designation (See Note 4)
 - PZ-01 2008 piezometer location and designation (See Note 4)
 - SG-4 Staff gauge location and designation (See Note 4)
 - SB-09 2008 soil boring location and designation (See Note 4)
 - (5) SAND AND GRAVEL THICKNESS (FEET) (VALUE PRESENT ONLY WHERE LABELED)
 - 5 SAND AND GRAVEL ISOPACH CONTOUR (FEET)

- NOTES:**
1. Existing site topography and features are based on aerial photography dated July 2, 2008 compiled by Aero-Metric.
 2. Property lines were provided by Golder Associates from drawing file X07386309A-Property Line and by Passero Associates from drawing file 200765103bsBovee.
 3. Wetland boundaries and buffers are based on record drawings prepared by Clark Engineers & Associates titled "Site Plan 1 of 5 to Site Plan 5 of 5" dated 1994 and Barton & Loguidice, P.C. Wetland Delineation Map dated August 12, 2009.
 4. Test pit, boring, piezometer, groundwater monitoring well and staff gauge locations are based on information presented on Figure 2 of the Hydrogeologic Summary Report prepared by Geomatrix Consults, Inc. dated September 2006 and Figure 3 of the Hydrogeologic Investigation Report prepared by Geomatrix Consultants, Inc. dated November 2009.

SAND AND GRAVEL ISOPACH MAP
Mill Seat Landfill
Town of Riga, New York

By: MC	Date: 08/24/10	Project No. 12625.001
AMEC Geomatrix		Figure 10

Plot Date: 08/24/10 - 10:50am. Plotted by: jmg,grad
 Drawing Path: S:\126001\2625\dwg. Drawing Name: base-082410.dwg



- LEGEND**
- 660 --- Existing ground contours (See Note 1)
 - Waste Management property line (See Note 2)
 - Monroe County property line (See Note 2)
 - Existing tree line
 - 100' NYSDEC Wetland buffer (See Note 3)
 - Delineated NYSDEC wetlands (See Note 3)
 - Non-jurisdictional delineated wetland (See Note 3)
 - TP84-1 Test pit location and designation (See Note 4)
 - B105 Test boring location and designation (See Note 4)
 - M-4A Monitoring well location and designation (See Note 4)
 - PC-TZ Piezometer location and designation (See Note 4)
 - SB-3 (2006) 2006 soil boring location and designation (See Note 4)
 - MW-2 (2006) 2006 groundwater monitoring well location and designation (See Note 4)
 - TP-1 (2006) 2006 test pit location and designation (See Note 4)
 - PZ-4 (2006) 2006 piezometer location and designation (See Note 4)
 - PZ-01 2008 piezometer location and designation (See Note 4)
 - SG-4 Staff gauge location and designation (See Note 4)
 - SB-09 2008 soil boring location and designation (See Note 4)
 - (643.0) Bedrock elevation in feet, MSL
 - 645 Bedrock elevation contour in feet, MSL

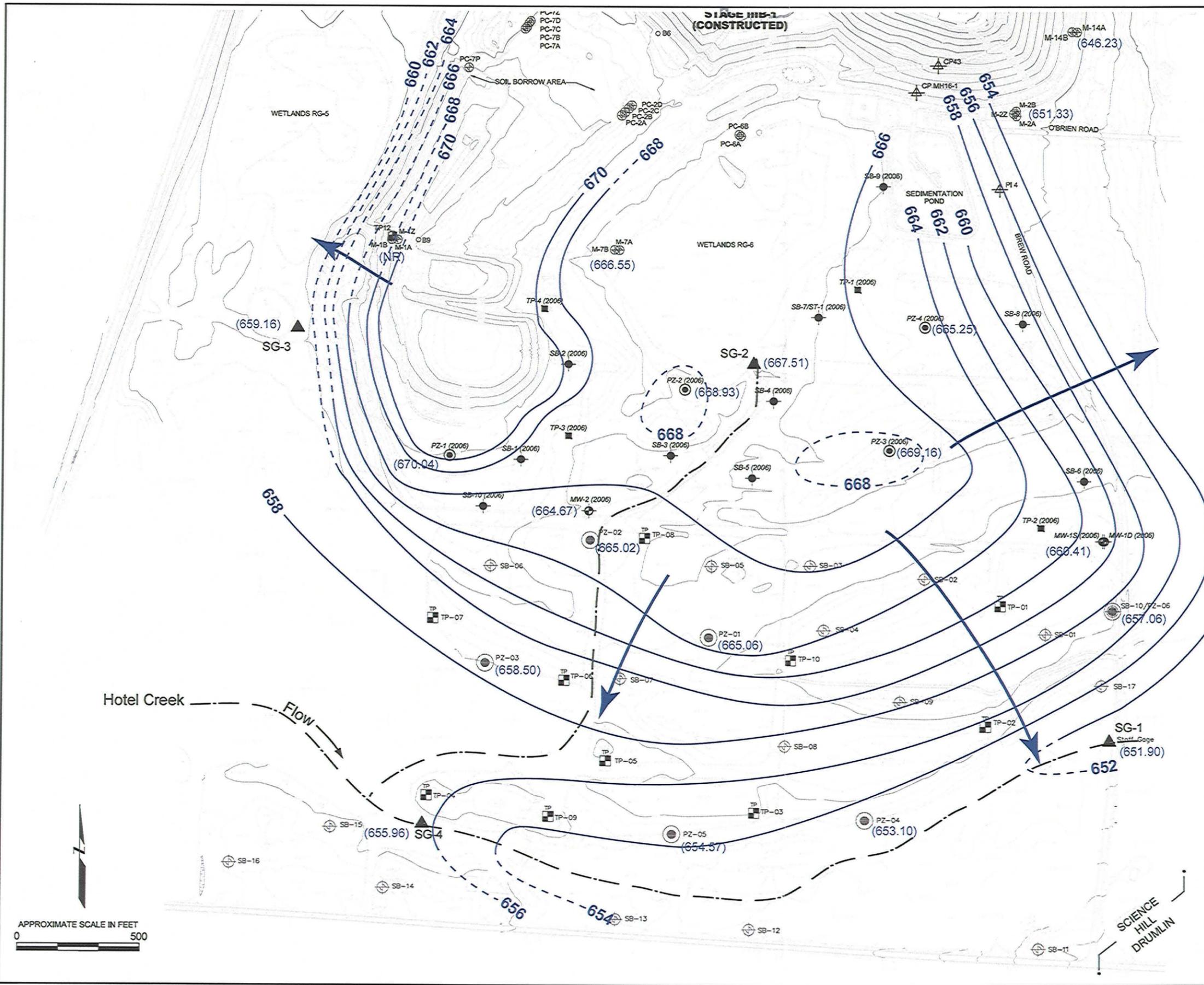
- NOTES:**
1. Existing site topography and features are based on aerial photography dated July 2, 2008 compiled by Aero-Metric.
 2. Property lines were provided by Golder Associates from drawing file X07386309A-Property Line and by Passero Associates from drawing file 200765103bsBovee.
 3. Wetland boundaries and buffers are based on record drawings prepared by Clark Engineers & Associates titled "Site Plan 1 of 5 to Site Plan 5 of 5" dated 1994 and Barton & Loguidice, P.C. Wetland Delineation Map dated August 12, 2009.
 4. Test pit, boring, piezometer, groundwater monitoring well and staff gauge locations are based on information presented on Figure 2 of the Hydrogeologic Summary Report prepared by Geomatrix Consults, Inc. dated September 2006 and Figure 3 of the Hydrogeologic Investigation Report prepared by Geomatrix Consultants, Inc. dated November 2009.

BEDROCK TOPOGRAPHY
Mill Seat Landfill
Town of Riga, New York

By: MC	Date: 08/24/10	Project No. 12625.001
AMEC Geomatrix		Figure 11

Plot Date: 08/24/10 - 1:46pm, Plotted by: jim.graud
 Drawing Path: S:\12625\12625.dwg, Drawing Name: bedrock.dwg

Plot Date: 05/02/08 - 11:04am. Plotted by: doshea
 Drawing Path: S:\126001\12625.dwg, Drawing Name: site_v2000_rev3.dwg



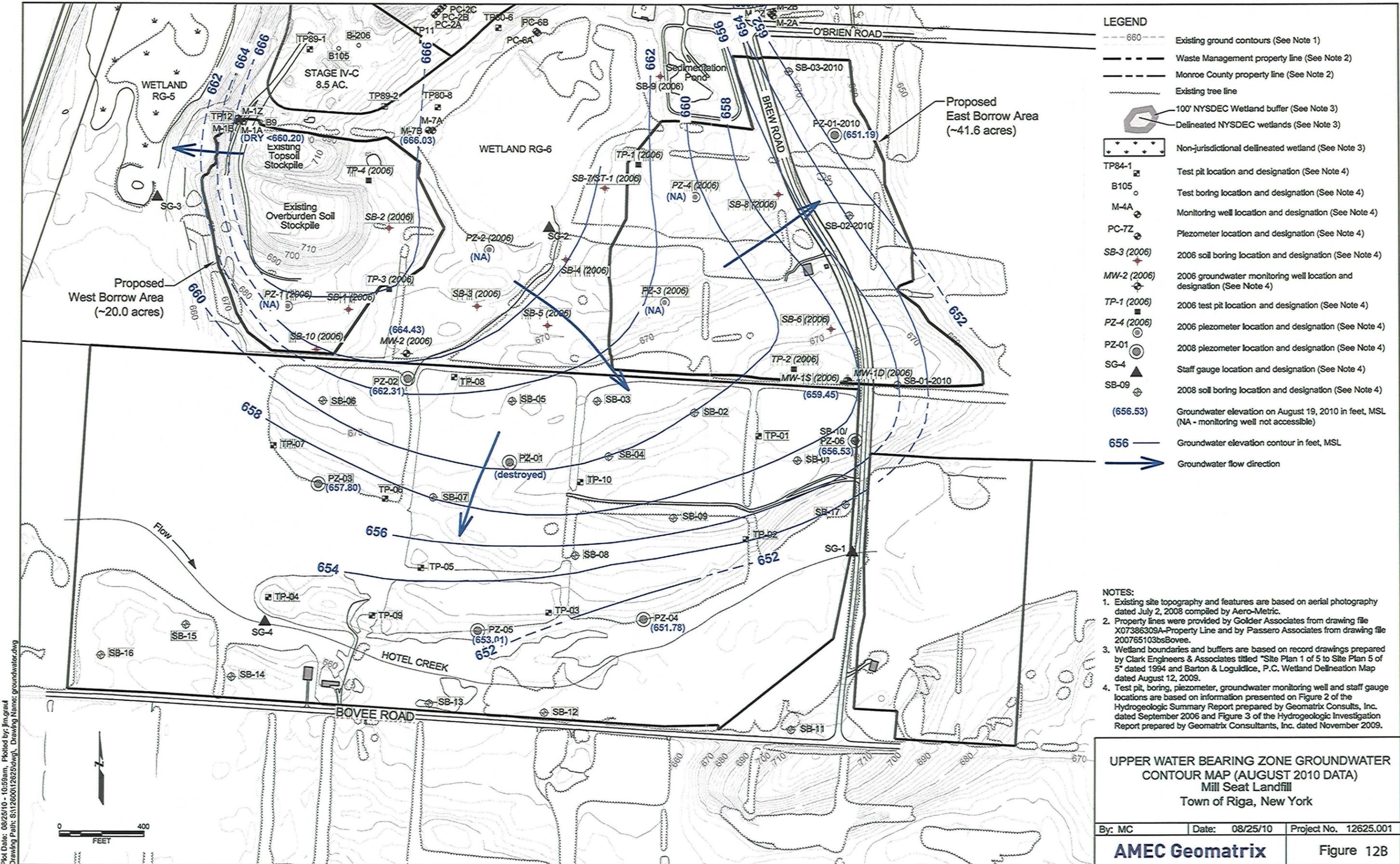
EXPLANATION

TP8	LOCATION OF TEST PIT EXCAVATION
OB4	LOCATION OF TEST BORING
M-10B	LOCATION OF MONITORING WELL
PC-7C	LOCATION OF PIEZOMETER
RC-6	LIMITS OF D.E.C. REGULATED WETLAND & IDENTIFICATION NUMBER
PI 4	SURVEY CONTROL POINT
SB-3 (2006)	SOIL BORING LOCATIONS (2006) (SEE NOTE 3)
MW-2 (2006)	GROUNDWATER MONITORING WELLS (2006) (SEE NOTE 3)
TP-3 (2006)	TEST PITS (2006) (SEE NOTE 3)
PZ-2 (2006)	PIEZOMETERS (2006) (SEE NOTE 3)
	PIEZOMETERS (2008)
SG-2	STAFF GAUGE
SB-02	SOIL BORING LOCATION (2008)
(657.06)	GROUNDWATER ELEVATION (April 2008)
654	GROUNDWATER ELEVATION CONTOUR (feet above sea level)
→	GROUNDWATER FLOW DIRECTION

- NOTES:**
1. TOPOGRAPHY SHOWN ON THIS PLAN WAS TAKEN FROM AERIAL MAPPING PERFORMED BY AIR SURVEY CORPORATION, DULLES VIRGINIA, DATED JULY 2007, AND PROVIDED BY MCMAHON AND MANN
 2. VERTICAL DATUM BASED ON NGS MEAN SEA LEVEL. CONTOUR INTERVAL IS 2 FT. GRID BASED ON N.Y. STATE PLANE COORDINATE SYSTEM NAD 1927.
 3. ALL SOIL BORING, PIEZOMETERS, TEST PITS AND GROUNDWATER MONITORING WELL LOCATIONS INSTALLED IN 2006 WERE SURVEYED BY PASSERO AND ASSOCIATES. DATE OF SURVEY WAS DECEMBER 11, 2006 THRU DECEMBER 14, 2006.
 4. LOCATIONS OF TEST PITS, TEST BORINGS, PIEZOMETERS AND MONITORING WELLS INSTALLED PRIOR TO 2006 TAKEN FROM "CONTRACT DOCUMENTS, VOLUME III- GEOTECHNICAL INFORMATION FOR MILL SEAT LANDFILL STAGES I AND II, PREPARED FOR MONROE COUNTY DEPARTMENT OF PUBLIC WORKS, DATED OCTOBER 7, 1991.

**UPPER WATER BEARING ZONE GROUNDWATER
 CONTOUR MAP (APRIL 2008 DATA)
 Mill Seat Landfill
 Town of Riga, New York**

By: MC	Date: 05/02/08	Project No. 12625.001
AMEC Geomatrix		Figure 12A



LEGEND

- 660 --- Existing ground contours (See Note 1)
- Waste Management property line (See Note 2)
- Monroe County property line (See Note 2)
- Existing tree line
- 100' NYSDEC Wetland buffer (See Note 3)
- Delineated NYSDEC wetlands (See Note 3)
- Non-jurisdictional delineated wetland (See Note 3)
- TP84-1 Test pit location and designation (See Note 4)
- B105 Test boring location and designation (See Note 4)
- M-4A Monitoring well location and designation (See Note 4)
- PC-TZ Piezometer location and designation (See Note 4)
- SB-3 (2006) 2006 soil boring location and designation (See Note 4)
- MW-2 (2006) 2006 groundwater monitoring well location and designation (See Note 4)
- TP-1 (2006) 2006 test pit location and designation (See Note 4)
- PZ-4 (2006) 2006 piezometer location and designation (See Note 4)
- PZ-01 2008 piezometer location and designation (See Note 4)
- SG-4 Staff gauge location and designation (See Note 4)
- SB-09 2008 soil boring location and designation (See Note 4)
- (656.53) Groundwater elevation on August 19, 2010 in feet, MSL (NA - monitoring well not accessible)
- 656 Groundwater elevation contour in feet, MSL
- Groundwater flow direction

- NOTES:**
1. Existing site topography and features are based on aerial photography dated July 2, 2008 compiled by Aero-Metric.
 2. Property lines were provided by Golder Associates from drawing file X07386309A-Property Line and by Passero Associates from drawing file 200765103bsBovee.
 3. Wetland boundaries and buffers are based on record drawings prepared by Clark Engineers & Associates titled "Site Plan 1 of 5 to Site Plan 5 of 5" dated 1994 and Barton & Loguidice, P.C. Wetland Delineation Map dated August 12, 2009.
 4. Test pit, boring, piezometer, groundwater monitoring well and staff gauge locations are based on information presented on Figure 2 of the Hydrogeologic Summary Report prepared by Geomatrix Consults, Inc. dated September 2006 and Figure 3 of the Hydrogeologic Investigation Report prepared by Geomatrix Consultants, Inc. dated November 2009.

**UPPER WATER BEARING ZONE GROUNDWATER
CONTOUR MAP (AUGUST 2010 DATA)
Mill Seat Landfill
Town of Riga, New York**

By: MC	Date: 08/25/10	Project No. 12625.001
AMEC Geomatrix		Figure 12B

Plot Date: 08/25/10 - 10:58am, Plotted by: Jim.Grad
Drawing Path: S:\126001\2625\dwg\ Drawing Name: groundwater.dwg



APPENDIX A

Electromagnetic Geophysical Survey Results

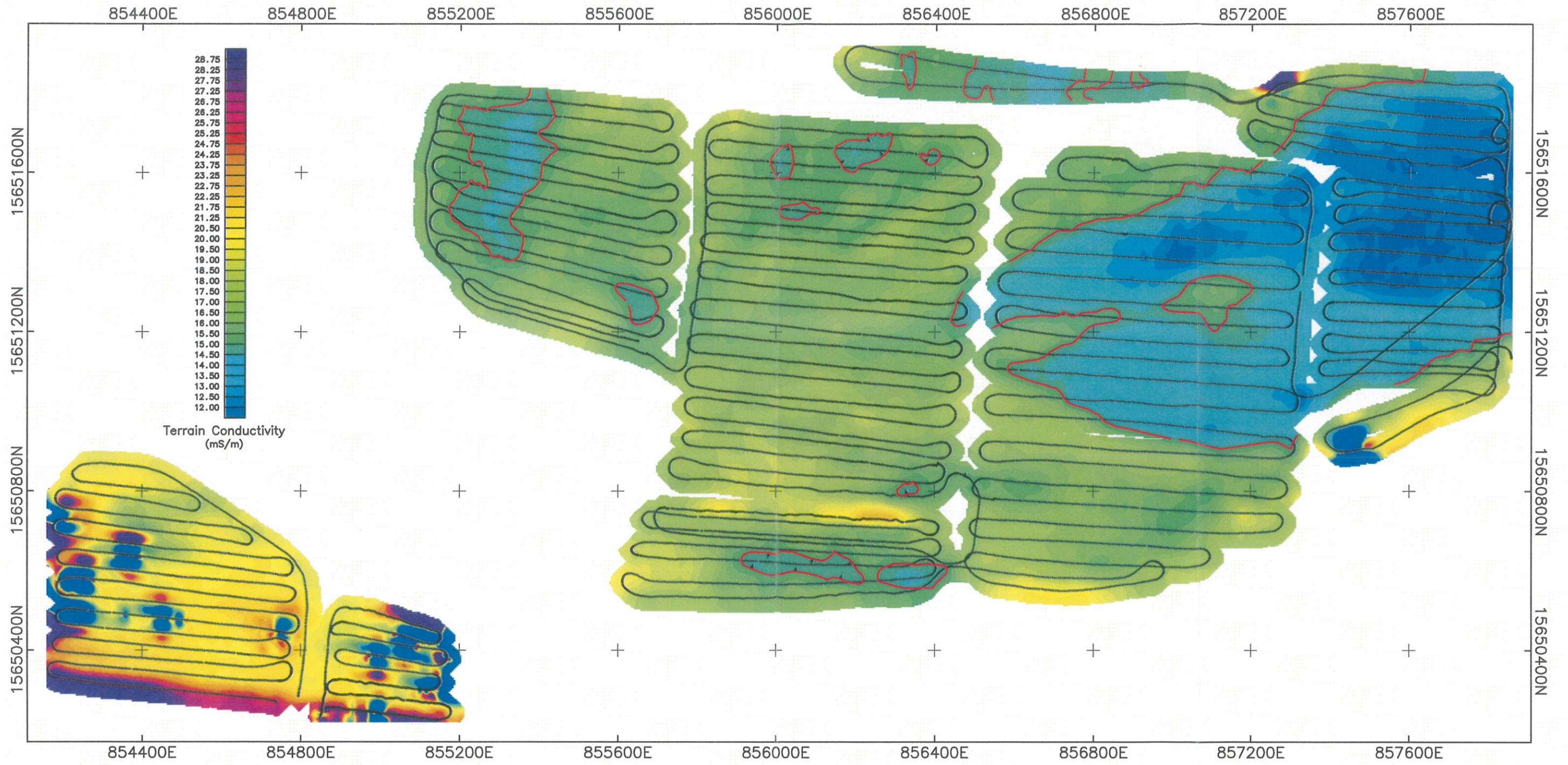


Figure 1
 Geophysical Survey Results
 Color Contours of EM31 Data
 Terrain Conductivity (mS/m)
 Mill Seat Landfill
 Bovee Road Property
 Geomatrix (716) 565-0624

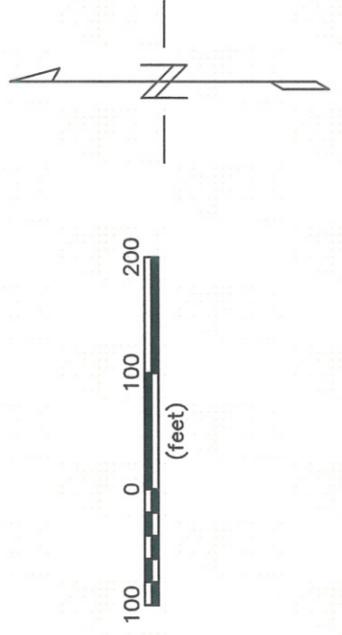
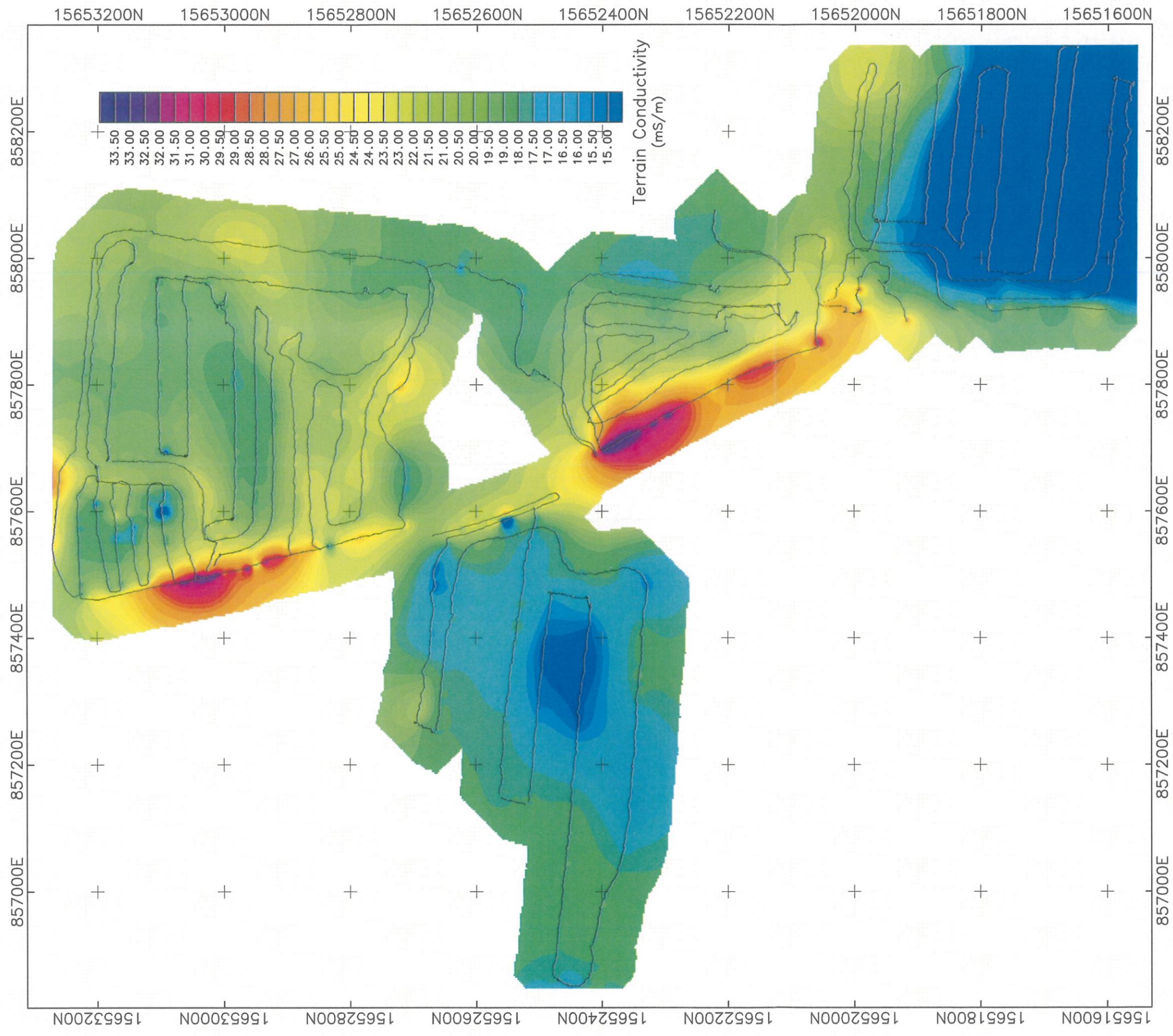


Figure 1

Geophysical Survey Results
 Color Contours of EM31 Data
 Terrain Conductivity (mS/m)

Mill Seat Landfill
 Bovee Road Property
 AMEC Geomatrix (716) 565-0624

APPENDIX B

Test Pit, Soil Borings, Monitoring Well and Piezometer Construction Logs

PROJECT: Mill Seat Landfill Riga, New York		Log of Well No. MW-1D (2006)	
BORING LOCATION: South of Active Facility		TOP OF RISER ELEVATION: 677.82 fmsl	DATUM: NAD27
DRILLING CONTRACTOR: Nothnagle Drilling, Inc.		DATE STARTED: 12/12/06	DATE FINISHED: 12/12/06
DRILLING METHOD: 4 1/4" dia. Hollow Stem Auger		TOTAL DEPTH: 38.0 fbgs	SCREEN INTERVAL: 28-38 fbgs
DRILLING EQUIPMENT: CME 850 ATV		DEPTH TO WATER:	FIRST COMPL. CASING: 2" PVC
SAMPLING METHOD: 2" dia. SS split spoons		LOGGED BY: MAC	
HAMMER WEIGHT: Autohammer	DROP: 30"	RESPONSIBLE PROFESSIONAL: Richard H. Frappa	REG. NO.

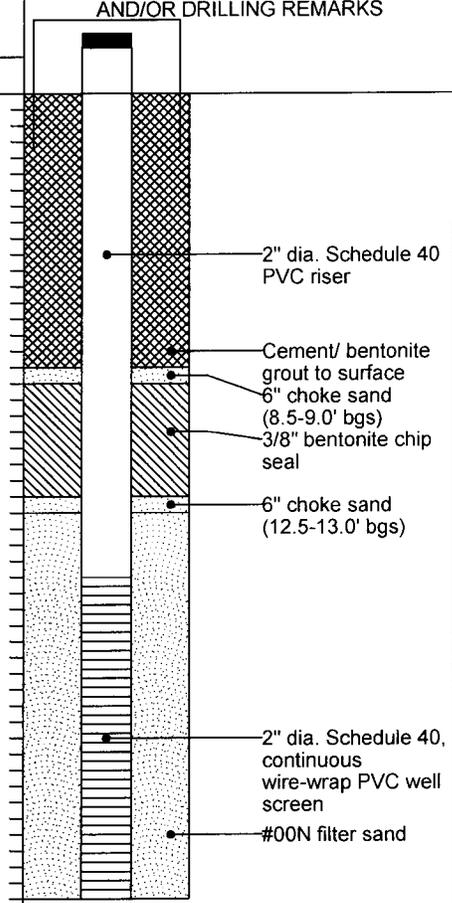
DEPTH (feet)	SAMPLES			NA	DESCRIPTION NAME (USCS Symbol): color, moist, % by weight, plast., structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
	Sample No.	Sample	Blows/foot			
Surface Elevation: 676.08 fmsl						
1	1		2.3, 3.2	NA	TOPSOIL Brown fine SAND with silt, trace med. rounded gravel, little vegetative matter, moist	<p>2" dia. Schedule 40 PVC riser</p> <p>Cement/ bentonite grout to surface</p> <p>6" choke sand (21.0-21.5' bgs)</p> <p>3/8" bentonite chip seal</p> <p>6" choke sand (25.5-26.0' bgs)</p> <p>#00N filter sand</p> <p>2" dia. Schedule 40, continuous wire-wrap PVC well screen</p>
2						
3	2		4.6, 6.5	NA	Well Graded SAND with GRAVEL (SW) red fine to med. sand with med. to coarse angular weathered bedrock gravel, moist, loose	
4						
5	3		5.9, 10.12	NA		
6						
7	4		15.13, 11.12	NA		
8						
9	5		8.10, 8.8	NA		
10						
11	6		13.15, 13.13	NA		
12						
13	7		9.5, 12.11	NA		
14						
15	8		12.9, 8.13	NA	decreasing gravel content below 8.0' bgs, dominantly fine to coarse SAND with little SILT and fine, subrounded GRAVEL. Saturated at 15.8' bgs.	
16						
17	9		4.7, 8.17	NA	Sandy SILT (ML) 5YR 5/2 reddish gray silt with fine sand, little fine rounded gravel and clay, moist, hard	
18						
19	10		24.32, 41.50	NA		
20						
21	11		13.26, 36.42	NA	increasing rounded to subangular gravel content (~30%)	
22						
23	12		41, 50/0.4	NA		
24						
25	13		18, 50/0.2	NA		
26						
27	14		32, 50/0.4	NA		
28						
29	15		8.20, 47, 50/0.3	NA	increasing weathered shale/ siltstone angular bedrock gravel content (~30%)	
30						
31	16		24.45, 50/0.4	NA		
32						
33	17		20.28, 50/0.5	NA		
34						
35	18		16.40, 50/0.2	NA	Weathered interbedded shale and limestone bedrock , locally weathered to fine sand/silt with few shaley interbeds, visible platy, friable structure, locally dry with few moist zones. Competent bedrock at 35.5' bgs (auger refusal).	
36						
37						
38						
39						
40						

WELL_OVM BORINGS, PZ AND MW LOGS.GPJ (4/07)



PROJECT: Mill Seat Landfill Riga, New York		Log of Well No. MW-1S (2006)	
BORING LOCATION: South of Active Facility		TOP OF RISER ELEVATION: 678.03 fmsl	DATUM: NAD27
DRILLING CONTRACTOR: Nothnagle Drilling, Inc.		DATE STARTED: 12/12/06	DATE FINISHED: 12/12/06
DRILLING METHOD: 4 1/4" dia. Hollow Stem Auger		TOTAL DEPTH: 25.0 fbgs	SCREEN INTERVAL: 15-25 fbgs
DRILLING EQUIPMENT: CME 850 ATV		DEPTH TO WATER:	FIRST COMPL. CASING: 2" PVC
SAMPLING METHOD: 2" dia. SS split spoons		LOGGED BY: MAC	
HAMMER WEIGHT: Autohammer	DROP: 30"	RESPONSIBLE PROFESSIONAL: Richard H. Frappa	REG. NO.

DEPTH (feet)	SAMPLES				NA	DESCRIPTION NAME (USCS Symbol): color, moist, % by weight, plast., structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
	Sample No.	Sample	Blows/foot				
						Surface Elevation: 676.08 fmsl	
1					Not logged for lithology. See boring log of MW06-1D for lithology details		
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							
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26							
27							
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34							
35							
36							
37							
38							
39							
40							



PROJECT: Mill Seat Landfill Riga, New York		Log of Well No. MW-2 (2006)	
BORING LOCATION: South of Active Facility		TOP OF RISER ELEVATION: 670.50 fmsl	DATUM: NAD27
DRILLING CONTRACTOR: Nothnagle Drilling, Inc.		DATE STARTED: 12/13/06	DATE FINISHED: 12/13/06
DRILLING METHOD: 4 1/4" dia. Hollow Stem Auger		TOTAL DEPTH: 16.0 fbgs	SCREEN INTERVAL: 6-16 fbgs
DRILLING EQUIPMENT: CME 850 ATV		DEPTH TO WATER:	FIRST COMPL. CASING: 2" PVC
SAMPLING METHOD: 2" dia. SS split spoons		LOGGED BY: MAC	
HAMMER WEIGHT: Autohammer	DROP: 30"	RESPONSIBLE PROFESSIONAL: Richard H. Frappa	REG. NO.

DEPTH (feet)	SAMPLES			NA	DESCRIPTION NAME (USCS Symbol): color, moist, % by weight, plast., structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
	Sample No.	Sample	Blows/foot			
Surface Elevation: 668.10 fmsl						
1	1		1.1, 3.6	NA	TOPSOIL brown fine sand with silt, little vegetative matter, rootlets, trace low plasticity fines, moist to wet, soft	
2				NA		
3	2		3.2, 3.3	NA	Silty SAND (SC) 10YR 4/5 (dark yellowish brown) fine to med. sand with silt, some fines, trace fine rounded gravel, moist, firm	
4				NA		
5	3		2.3, 5.5	NA	Weathered interbedded shale and limestone bedrock , 2.5Y mottled between 7/2 (light gray) to 4/4 olive brown, fine subangular shale gravel with silt and low plasticity clay, soft, becoming stiff below 8.0' bgs, saturated at 6.0' bgs, Visible dry, platy structure with less weathering below 9.0' bgs.	
6				NA		
7	4		3.3, 8.4	NA		
8				NA		
9	5		2.6, 16.34	NA		
10				NA		
11	6		13.14, 42.12	NA		
12				NA		
13	7		14, 50/0.1	NA		
14				NA		
15	8		50/0.3	NA	Competent interbedded shale and limestone bedrock (auger refusal) at 16.0' bgs	
16				NA		
17				NA		
18				NA		
19				NA		
20				NA		
21				NA		
22				NA		
23				NA		
24				NA		
25				NA		
26				NA		
27				NA		
28				NA		
29				NA		
30				NA		
31				NA		
32				NA		
33				NA		
34				NA		
35				NA		
36				NA		
37				NA		
38				NA		
39				NA		
40				NA		

WELL_OVM BORINGS, PZ AND MW LOGS.GPJ (4/07)

PROJECT: Mill Seat Landfill Riga, New York		Log of Well No. PZ-1 (2006)	
BORING LOCATION: South of Active Facility		TOP OF RISER ELEVATION: 683.25 fmsl	DATUM: NAD27
DRILLING CONTRACTOR: Nothnagle Drilling, Inc.		DATE STARTED: 12/6/06	DATE FINISHED: 12/6/06
DRILLING METHOD: 2 1/4" dia. Hollow Stem Auger		TOTAL DEPTH: 21.7 fbgs	SCREEN INTERVAL: 8-18 fbgs
DRILLING EQUIPMENT: CME 850 ATV		DEPTH TO WATER: 2.6 ft	COMPL. CASING: 1" PVC
SAMPLING METHOD: 2" dia. SS split spoons		LOGGED BY: MAC	
HAMMER WEIGHT: Autohammer	DROP: 30"	RESPONSIBLE PROFESSIONAL: Richard H. Frappa	REG. NO.

DEPTH (feet)	SAMPLES		NA	DESCRIPTION NAME (USCS Symbol): color, moist, % by weight, plast., structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS	
	Sample No.	Sample Blows/foot				
Surface Elevation: 680.13 fmsl						
1	1	1.1, 2.2	NA	Coarse Grained TILL- Sandy SILT (ML) 10YR 4/2 (dark grayish brown) silt with fine sand, trace low plasticity fines, soft, moist to saturated	<ul style="list-style-type: none"> 3/8" bentonite chip seal native soil backfill 1" dia. temporary PVC riser 3/8" bentonite chip seal 1" dia. temporary PVC well screen #00N Filter sand 	
2						
3	2	2.3, 3.6	NA			
4						
5	3	7.14, 17.24	NA			
6						
7	4	22.27, 31.37	NA			AA, grading to 5YR 4/2 (dark reddish brown), becoming dense with increasing fine sand content, little fine to med. rounded to angular gravel.
8						
9	5	11.19, 22.24	NA			
10						
11	6	21.25, 35.31	NA			
12						
13	7	11.12, 36, 100/0.5	NA	grading to Dense Lodgment TILL-Sandy SILT (ML) 10YR 5/1 (gray) silt with fine sand, little fine to med. angular to rounded gravel and low plasticity fines, hard, moist		
14						
15	8	13.31, 30.48	NA			
16	9	100/0.6	NA			
17						
18						
19	10	11.21, 42.44	NA	Weathered interbedded shale and limestone bedrock angular limestone bedrock gravel within weathered gray shale matrix. Shale weathered to silt/ clay, moist		
20						
21	11	36.29, 36, 50/0.2	NA	Competent bedrock at 21.7' bgs. Sampler refusal.		
22						
23						
24						
25						
26						
27						
28						
29						
30						
31						
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33						
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WELL_OVM BORINGS, PZ AND MW LOGS.GPJ (4/07)

PROJECT: Mill Seat Landfill Riga, New York		Log of Well No. PZ-2 (2006)	
BORING LOCATION: South of Active Facility		TOP OF RISER ELEVATION: 675.44 fmsl	DATUM: NAD27
DRILLING CONTRACTOR: Nothnagle Drilling, Inc.		DATE STARTED: 12/7/06	DATE FINISHED: 12/7/06
DRILLING METHOD: 2 1/4" dia. Hollow Stem Auger		TOTAL DEPTH: 23.1 fbgs	SCREEN INTERVAL: 13.1-23.1 fbgs
DRILLING EQUIPMENT: CME 850 ATV		DEPTH TO WATER: 4.5 ft	COMPL. CASING: 1" PVC
SAMPLING METHOD: 2" dia. SS split spoons		LOGGED BY: MAC	
HAMMER WEIGHT: Autohammer	DROP: 30"	RESPONSIBLE PROFESSIONAL: Richard H. Frappa	REG. NO.

DEPTH (feet)	SAMPLES			NA	DESCRIPTION NAME (USCS Symbol): color, moist, % by weight, plast., structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
	Sample No.	Sample	Blows/foot			
Surface Elevation: 673.68 fmsl						
1	1		2.4, 4.4	NA	Coarse Grained TILL- Sandy SILT (ML) 10YR 4/2 (dark grayish brown) silt with fine sand, trace low plasticity fines, some fine angular weathered shale bedrock gravel, soft, moist to saturated	<ul style="list-style-type: none"> 3/8" bentonite chip seal native soil backfill 1" dia. temporary PVC riser
2			5.5, 5.5	NA		
3	2		4.7, 5.5	NA		
4			5.4, 2.3	NA		
5	3		1.1, 1.1	NA		
6			1.2, 3.3	NA		
7	4		2.3, 3.3	NA		
8			3.5, 7.1	NA		
9	5		4.8, 4.10	NA		
10			1.4, 7.8	NA		
11	6		9.5, 4.9	NA		
12			14, 50/0.5	NA		
13	7			NA	Dense Lodgment TILL-Sandy SILT (ML) 5YR 5/1 (gray) silt with fine sand, little fine to med. angular to rounded gravel (glacial erratics and shale bedrock-derived) and low plasticity fines, hard, moist	<ul style="list-style-type: none"> 3/8" bentonite chip seal #00N filter sand
14				NA		
15	8			NA		
16				NA		
17	9			NA		
18				NA		
19	10			NA	Weathered interbedded shale and limestone bedrock angular limestone bedrock gravel within weathered gray shale matrix. Shale weathered to silt/ clay, dry to moist.	<ul style="list-style-type: none"> 1" dia. temporary PVC well screen
20				NA		
21	11			NA		
22				NA		
23	12			NA		
24				NA	Competent bedrock at 23.1' bgs. Sampler refusal.	
25				NA		
26				NA		
27				NA		
28				NA		
29				NA		
30				NA		
31				NA		
32				NA		
33				NA		
34				NA		
35				NA		
36				NA		
37				NA		
38				NA		
39				NA		
40				NA		

WELL_OVM BORINGS, PZ AND MW LOGS.GPJ (4/07)



PROJECT: Mill Seat Landfill Riga, New York	Log of Well No. PZ-3 (2006)
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BORING LOCATION: South of Active Facility	TOP OF RISER ELEVATION: 679.30 fmsl	DATUM: NAD27
DRILLING CONTRACTOR: Nothnagle Drilling, Inc.	DATE STARTED: 12/8/06	DATE FINISHED: 12/8/06
DRILLING METHOD: 2 1/4" dia. Hollow Stem Auger	TOTAL DEPTH: 30.0 fbgs	SCREEN INTERVAL: 20-30 fbgs
DRILLING EQUIPMENT: CME 850 ATV	DEPTH TO WATER:	FIRST: COMPL.:
SAMPLING METHOD: 2" dia. SS split spoons	LOGGED BY: MAC	
HAMMER WEIGHT: Autohammer	DROP: 30"	RESPONSIBLE PROFESSIONAL: Richard H. Frappa
		REG. NO.

DEPTH (feet)	SAMPLES			NA	DESCRIPTION	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
	Sample No.	Sample	Blows/foot		NAME (USCS Symbol): color, moist, % by weight, plast., structure, cementation, react. w/HCl, geo. inter.	
Surface Elevation: 676.59 fmsl						
1	1		1.2, 2.4	NA	TOPSOIL Brown fine SAND with silt, trace med. rounded gravel, little vegetative matter, moist	<p>3/8" bentonite chip seal</p> <p>native soil backfill</p> <p>1" dia. temporary PVC riser</p> <p>3/8" bentonite chip seal</p> <p>1" dia. temporary PVC well screen</p> <p>#00N filter sand</p>
2						
3	2		6.8, 14,11	NA	Coarse Grained TILL- Sandy SILT (ML) 10YR 4/2 (dark grayish brown) silt with fine sand, trace low plasticity fines, some fine angular weathered shale bedrock gravel, soft, moist to saturated	
4						
5	3		8,12, 15,23	NA		
6						
7	4		28,20, 13,13	NA		
8						
9	5		3.8, 11,11	NA		
10						
11	6		17,24, 26,30	NA	Dense Lodgment TILL-Sandy SILT (ML) 5YR 5/2 (reddish gray) silt with fine sand, little fine to med. angular to rounded gravel (glacial erratics and shale bedrock-derived) and low plasticity fines, hard, moist	
12						
13	7		7,12, 13,14	NA		
14						
15	8		12,14, 12,15	NA		
16						
17	9		14,24, 27, 50/0.4	NA		
18						
19	10		42, 50/0.6	NA		
20						
21	11		22,43, 50/0.3	NA	frequent small cobbles	
22						
23	12		17,31, 36,50	NA		
24						
25	13		11,35, 36,50	NA		
26						
27	14		50/0.4	NA		
28						
29	15		26,30, 40, 50/0.2	NA		
30						
31					Weathered interbedded shale and limestone bedrock angular limestone bedrock gravel within weathered gray shale matrix. Shale weathered to silt/ clay, dry to moist.	
32						
33						
34					Competent bedrock at 30.5' bgs. Sampler refusal.	
35						
36						
37						
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39						
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PROJECT: Mill Seat Landfill Riga, New York		Log of Well No. PZ-4 (2006)	
BORING LOCATION: South of Active Facility		TOP OF RISER ELEVATION: 677.17 fmsl	DATUM: NAD27
DRILLING CONTRACTOR: Nothnagle Drilling, Inc.		DATE STARTED: 12/11/06	DATE FINISHED: 12/11/06
DRILLING METHOD: 2 1/4" dia. Hollow Stem Auger		TOTAL DEPTH: 30.0 fogs	SCREEN INTERVAL: 20-30 fogs
DRILLING EQUIPMENT: CME 850 ATV		DEPTH TO FIRST WATER:	COMPL. CASING: 1" PVC
SAMPLING METHOD: 2" dia. SS split spoons		LOGGED BY: MAC	
HAMMER WEIGHT: Autohammer	DROP: 30"	RESPONSIBLE PROFESSIONAL: Richard H. Frappa	REG. NO.

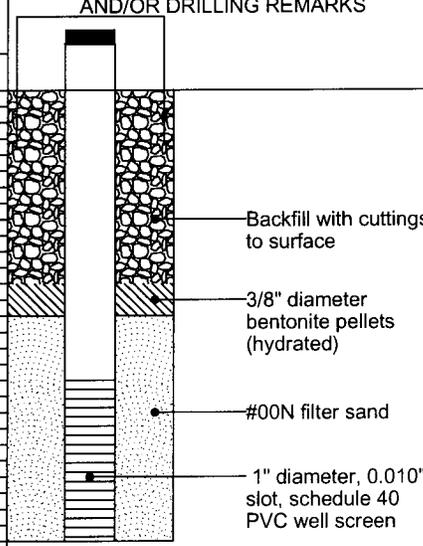
DEPTH (feet)	SAMPLES			NA	DESCRIPTION NAME (USCS Symbol); color, moist, % by weight, plast., structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
	Sample No.	Sample	Blows/foot			
Surface Elevation: 673.63 fmsl						
1	1		1.2, 3.4	NA	TOPSOIL Dark gray fine SAND with silt, trace med. rounded gravel, little vegetative matter, moist	<p>3/8" bentonite chip seal</p> <p>native soil backfill</p> <p>1" dia. temporary PVC riser</p> <p>3/8" bentonite chip seal</p> <p>1" dia. temporary PVC well screen</p> <p>#00N filter sand</p>
2						
3	2		10.16, 10.12	NA	Coarse Grained TILL- Sandy SILT (ML) 7.5YR 6/1 (gray) grading to 10YR 5/1 (yellowish brown) silt with fine sand, trace low plasticity fines, some fine angular weathered shale bedrock gravel, soft, moist to saturated	
4						
5	3		6.11, 16.20	NA		
6						
7	4		21.37, 50/0.6	NA	Dense Lodgment TILL-Sandy SILT (ML) 10YR 5/3 (brown) grading to 5YR 4/1 (dark gray) silt with fine sand, little fine to med. angular to rounded gravel (glacial erratics and shale bedrock-derived) and low plasticity fines, hard, moist	
8						
9	5		11.15, 38, 50/0.4	NA		
10						
11	6		15, 50/0.4	NA		
12						
13	7		22, 50/0.5	NA		
14						
15	8		17.29, 39, 40	NA		
16						
17	9		43, 50/0.5	NA		
18						
19	10		19.23, 25.22	NA		
20						
21	11		20.47, 50/0.4	NA		
22						
23	12		17.21, 21.25	NA		
24						
25	13		10.20, 26.40	NA		
26						
27	14		39, 50/0.4	NA		
28						
29	15		12.24, 30, 50/0.1	NA		
30						
31					Weathered interbedded shale and limestone bedrock angular limestone bedrock gravel within weathered gray shale matrix. Shale weathered to silt/ clay, dry to moist.	
32						
33					Competent bedrock at 30.0' bgs. Sampler refusal.	
34						
35						
36						
37						
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39						
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WELL_OVM BORINGS, PZ AND MW LOGS.GPJ (4/07)

PROJECT: Mill Seat Landfill- Bovee Road Hydrogeological Investigation
Riga, New York

Log of Well No. PZ-01 (2008)

BORING LOCATION: Bovee Road Property		TOP OF RISER ELEVATION: 671.14 fmsl	DATUM: NAGVD-1983
DRILLING CONTRACTOR: Nothnagle Drilling, Inc.		DATE STARTED: 3/26/08	DATE FINISHED: 3/26/08
DRILLING METHOD: 4 1/4" ID HSA		TOTAL DEPTH: 14.4 fbgs	SCREEN INTERVAL: 9-14 fbgs
DRILLING EQUIPMENT: CME 850 ATV		DEPTH TO WATER: NA	FIRST COMPL. CASING: 1" dia. PVC
SAMPLING METHOD: 2" dia. split spoons		LOGGED BY: MAC	
HAMMER WEIGHT: 140	DROP: 30" (Autohammer)	RESPONSIBLE PROFESSIONAL: Richard H. Frappa	REG. NO.

DEPTH (feet)	SAMPLES			OVM (ppm)	DESCRIPTION <small>NAME (USCS Symbol): color, moist, % by weight, plast., structure, cementation, react. w/HCl, geo. inter.</small>	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
	Sample No.	Sample	Blows/foot			
Surface Elevation: 668.04 fmsl						
1	1	1	1	NA	<p>Poorly graded SAND with GRAVEL (SP), 7.5Y 5/2, moist, fine to medium sand with fine angular to subangular gravel, trace silt and low plasticity fines, firm (ABLATION TILL)</p> <p>dry below 4.0 fbgs.</p>	 <p>Backfill with cuttings to surface</p> <p>3/8" diameter bentonite pellets (hydrated)</p> <p>#00N filter sand</p> <p>1" diameter, 0.010" slot, schedule 40 PVC well screen</p>
2		7		NA		
3	2	13	12	NA		
4		9		NA		
5	3	17	20	NA		
6		29		NA		
7	4	3	4	NA		
8		100/0.6		NA		
9	5	17	32	NA		
10		48	58	NA		
11	6	13	29	NA		
12		35	62	NA		
13	7	22	39	NA		
14		45	100/0.4	NA		
15	8	100/0.4		NA	<p>Sampler bouncing at 14.4 fbgs. Weathered moist shale bedrock returned in sampler.</p> <p>Auger refusal at 14.4</p>	
16						
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PROJECT: Mill Seat Landfill- Bovee Road Hydrogeological Investigation Riga, New York		Log of Well No. PZ-02 (2008)	
BORING LOCATION: Bovee Road Property		TOP OF RISER ELEVATION: 669.23 fmsl	DATUM: NAGVD-1983
DRILLING CONTRACTOR: Nothnagle Drilling, Inc.		DATE STARTED: 3/27/08	DATE FINISHED: 3/27/08
DRILLING METHOD: 4 1/4" ID HSA		TOTAL DEPTH: 13.0 fbg	SCREEN INTERVAL: 8-13 fbg
DRILLING EQUIPMENT: CME 850 ATV		DEPTH TO WATER: NA	COMPL. CASING: 1" dia. PVC
SAMPLING METHOD: 2" dia. split spoons		LOGGED BY: MAC	
HAMMER WEIGHT: 140	DROP: 30" (Autohammer)	RESPONSIBLE PROFESSIONAL: Richard H. Frappa	REG. NO.

DEPTH (feet)	SAMPLES			OVM (ppm)	DESCRIPTION NAME (USCS Symbol): color, moist, % by weight, plast., structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
	Sample No.	Sample	Blows/foot			
Surface Elevation: 667.18 fmsl						
1	1		1	NA	Poorly graded SAND with GRAVEL (SP) , 7.5Y 5/2, moist, fine to medium sand with fine angular to subangular gravel, trace silt and low plasticity fines, firm (ABLATION TILL)	
2			2	NA		
3	2		4	NA		
4			2	NA	Weathered grey to grey-green shale and siltstone bedrock, generally moist with few dry zones where less weathered, friable. Firm.	
5	3		2	NA		
6			6	NA		
7	4		6	NA		
8			2	NA		
9	5		4	NA		
10			11	NA		
11	6		41	NA		
12	7		10	NA		
13			36	NA		
14			50/0.2	NA		
15					Sampler bouncing at 12.7 fbg.	
16					Auger refusal at 13.0 fbg.	
17						
18						
19						
20						
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22						
23						
24						
25						
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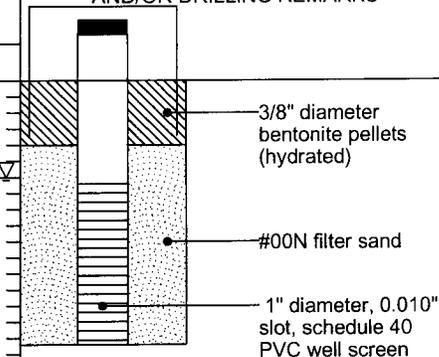
PROJECT: Mill Seat Landfill- Bovee Road Hydrogeological Investigation Riga, New York				Log of Well No. PZ-03 (2008)			
BORING LOCATION: Bovee Road Property				TOP OF RISER ELEVATION: 663.91 fmsl		DATUM: NAGVD-1983	
DRILLING CONTRACTOR: Nothnagle Drilling, Inc.				DATE STARTED: 3/27/08		DATE FINISHED: 3/27/08	
DRILLING METHOD: 4 1/4" ID HSA				TOTAL DEPTH: 8.5 fbg		SCREEN INTERVAL: 3.5-8.5 fbg	
DRILLING EQUIPMENT: CME 850 ATV				DEPTH TO WATER:	FIRST NA	COMPL.	CASING: 1" dia. PVC
SAMPLING METHOD: 2" dia. split spoons				LOGGED BY: MAC			
HAMMER WEIGHT: 140		DROP: 30" (Autohammer)		RESPONSIBLE PROFESSIONAL: Richard H. Frappa		REG. NO.	
DEPTH (feet)	SAMPLES			OVM (ppm)	DESCRIPTION NAME (USCS Symbol): color, moist, % by weight, plast., structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS	
	Sample No.	Sample	Blows/ foot				
1	1		1	NA	<p>Surface Elevation: 660.26 fmsl</p> <p>Poorly graded SAND with GRAVEL (SP), 7.5Y 5/2, moist, fine to medium sand with fine angular to subangular gravel, trace silt and low plasticity fines, firm (ABLATION TILL)</p>	<p>3/8" diameter bentonite pellets (hydrated)</p> <p>#00N filter sand</p> <p>1" diameter, 0.010" slot, schedule 40 PVC well screen</p>	
2			3	NA			
3	2		7	NA			
4			8	NA			
5	3		11	NA			
6			2	NA			
7	4		2	NA			
8			3	NA			
9	5		3	NA			
10			5		<p>Weathered grey-brown shale bedrock returned in sampler. Approximately 0.1' thick weathered bedrock zone. Auger refusal at 8.6 fbg.</p>		
11			4				
12			5				
13			4				
14			4				
15			5				
16			4				
17			4				
18			5				
19			4				
20			5				
21			4				
22			5				
23			4				
24			5				
25			4				
26			5				
27			4				
28			5				
29			4				
30			5				
31			4				
32			5				
33			4				
34			5				
35			4				
36			5				
37			4				
38			5				
39			4				
40			5				

WELL_OVM BORING LOGS.GPJ (6/08)

PROJECT: Mill Seat Landfill- Bovee Road Hydrogeological Investigation
Riga, New York

Log of Well No. PZ-04 (2008)

BORING LOCATION: Bovee Road Property		TOP OF RISER ELEVATION: 657.10 fmsl	DATUM: NAGVD-1983
DRILLING CONTRACTOR: Nothnagle Drilling, Inc.		DATE STARTED: 3/28/08	DATE FINISHED: 3/28/08
DRILLING METHOD: 4 1/4" ID HSA		TOTAL DEPTH: 8.2 fbgs	SCREEN INTERVAL: 3.2-8.2 fbgs
DRILLING EQUIPMENT: CME 850 ATV		DEPTH TO WATER: 3 ft	FIRST COMPL. CASING: 1" dia. PVC
SAMPLING METHOD: 2" dia. split spoons		LOGGED BY: MAC	
HAMMER WEIGHT: 140	DROP: 30" (Autohammer)	RESPONSIBLE PROFESSIONAL: Richard H. Frappa	REG. NO.

DEPTH (feet)	SAMPLES			OVM (ppm)	DESCRIPTION <small>NAME (USCS Symbol): color, moist, % by weight, plast., structure, cementation, react. w/HCl, geo. inter.</small>	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
	Sample No.	Sample	Blows/foot			
Surface Elevation: 654.20 fmsl						
1	1		1	NA	Poorly graded SAND with GRAVEL (SP) , 7.5Y 5/2, moist, fine to medium sand with fine angular to subangular gravel, trace silt and low plasticity fines, firm (ABLATION TILL)	 <p>3/8" diameter bentonite pellets (hydrated)</p> <p>#00N filter sand</p> <p>1" diameter, 0.010" slot, schedule 40 PVC well screen</p>
2			2			
3	2		5	NA		
4			7			
5	3		4	NA	Lightly weathered grey-green to brick red shale bedrock, generally moist to saturated, firm.	
6			2			
7	4		8	NA		
8	5		22	NA		
9			19			
10			26			
11			46			
12			74			
13			41			
14			100/0.2	NA	Auger refusal at 13.0 fbgs.	
15						
16						
17						
18						
19						
20						
21						
22						
23						
24						
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PROJECT: Mill Seat Landfill- Bovee Road Hydrogeological Investigation
Riga, New York

Log of Well No. PZ-05 (2008)

BORING LOCATION: Bovee Road Property

TOP OF RISER ELEVATION:
659.17 fmsl

DATUM:
NAGVD-1983

DRILLING CONTRACTOR: Nothnagle Drilling, Inc.

DATE STARTED:
3/28/08

DATE FINISHED:
3/28/08

DRILLING METHOD: 4 1/4" ID HSA

TOTAL DEPTH:
10.0 fbgs

SCREEN INTERVAL:
5-10 fbgs

DRILLING EQUIPMENT: CME 850 ATV

DEPTH TO FIRST COMPL. WATER: NA

CASING:
1" dia. PVC

SAMPLING METHOD: 2" dia. split spoons

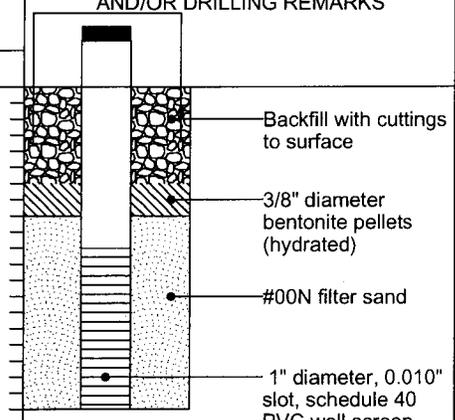
LOGGED BY:
MAC

HAMMER WEIGHT: 140

DROP: 30" (Autohammer)

RESPONSIBLE PROFESSIONAL:
Richard H. Frappa

REG. NO.

DEPTH (feet)	SAMPLES			OVM (ppm)	DESCRIPTION <small>NAME (USCS Symbol): color, moist, % by weight, plast., structure, cementation, react. w/HCl, geo. inter.</small>	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
	Sample No.	Sample	Blows/ foot		Surface Elevation: 656.92 fmsl	
1	1		WH 2	NA	<p>Poorly graded SAND with GRAVEL (SP), 7.5Y 5/2, moist, fine to medium sand with fine angular to subangular gravel, trace silt and low plasticity fines, firm (ABLATION TILL)</p>	<p>Backfill with cuttings to surface</p> <p>3/8" diameter bentonite pellets (hydrated)</p>
2			3	NA		
3	2		4	NA		
4			8	NA		
5	3		7	NA		
6			6	NA	<p>Weathered grey to grey-green shale and siltstone bedrock, generally moist with few dry zones where less weathered, friable. Firm. Sampler bouncing at 9.2 fbgs.</p> <p>Auger refusal at 10.0 fbgs.</p>	<p>#00N filter sand</p> <p>1" diameter, 0.010" slot, schedule 40 PVC well screen</p>
7	4		16	NA		
8			27	NA		
9	5		31	NA		
10			16			
11			16			
12			12			
13			41			
14			60/10.2			
15						
16						
17						
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WELL_OVM BORING LOGS.GPJ (6/08)

PROJECT: Mill Seat Landfill- Bovee Road Hydrogeological Investigation
Riga, New York

Log of Well No. PZ-06/SB-10 (2008)

BORING LOCATION: Bovee Road Property

TOP OF RISER ELEVATION:
676.28 fmsl

DATUM:
NAGVD-1983

DRILLING CONTRACTOR: Nothnagle Drilling, Inc.

DATE STARTED:
3/28/08

DATE FINISHED:
3/28/08

DRILLING METHOD: 4 1/4" ID HSA

TOTAL DEPTH:
22.5 fbgs

SCREEN INTERVAL:
17.5-22.5 fbgs

DRILLING EQUIPMENT: CME 850 ATV

DEPTH TO WATER: FIRST NA COMPL.

CASING:
1" dia. PVC

SAMPLING METHOD: 2" dia. split spoons

LOGGED BY:
MAC

HAMMER WEIGHT: 140

DROP: 30" (Autohammer)

RESPONSIBLE PROFESSIONAL:
Richard H. Frappa

REG. NO.

DEPTH (feet)	SAMPLES			OVM (ppm)	DESCRIPTION NAME (USCS Symbol): color, moist, % by weight, plast., structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
	Sample No.	Sample	Blows/foot			
Surface Elevation: 673.88 fmsl						
1	1		2	NA	<p>Well graded GRAVEL with SILT and SAND (GW-GM) mottled throughout 7.5YR scale, dry to moist, loose. (SAND and GRAVEL)</p>	
2			4			
3	2		6	NA		
4			12			
5	3		7	NA		
6			12			
7	4		12	NA		
8			13			
9	5		43	NA		
10			44			
11	6		15	NA		
12			18			
13	7		15	NA		
14			19			
15	8		8	NA		
16			14			
17	9		6	NA		
18			7			
19	10		7	NA		
20			9			
21	11		22	NA		
22	12		19	NA		
23			16	NA		
24			100/0.4	NA		
25					<p>Sampler bouncing and auger refusal at 22.5 fbgs. Dry, tan-brown shale bedrock returned in sampler.</p>	
26						
27						
28						
29						
30						
31						
32						
33						
34						
35						
36						
37						
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39						
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WELL_OVM BORING LOGS.GPJ (6/08)



PROJECT: Mill Seat Landfill Riga, New York		Log of Well No. PZ-01 (2010)	
BORING LOCATION: South of Active Facility		TOP OF RISER ELEVATION: 668.44 fmsl	DATUM: NAD27
DRILLING CONTRACTOR: Nothnagle Drilling, Inc.		DATE STARTED: 8/11/10	DATE FINISHED: 8/11/10
DRILLING METHOD: 4 1/4" dia. Hollow Stem Auger		TOTAL DEPTH: 28.0 fbgs	SCREEN INTERVAL: 17-27 fbgs
DRILLING EQUIPMENT: CME 850 ATV		DEPTH TO WATER:	FIRST COMPL. CASING: 2" PVC
SAMPLING METHOD: 2" dia. SS split spoons		LOGGED BY: MAC	
HAMMER WEIGHT: Autohammer	DROP: 30"	RESPONSIBLE PROFESSIONAL: Richard H. Frappa	REG. NO.

DEPTH (feet)	SAMPLES		NA	DESCRIPTION NAME (USCS Symbol): color, moist, % by weight, plast., structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
	Sample No.	Blows/foot			
Surface Elevation: 665.96 fmsl					
1	1	2	NA	Brown topsoil, wet, fine sand with silt and some vegetative matter, compact	3/8" bentonite chip seal
2		4			
3	2	10	NA	Dense Lodgment TILL-Sandy SILT (ML) 5YR 5/3 (brown) silt with fine sand, little fine to med. angular to rounded gravel (glacial erratics and shale bedrock-derived) and low plasticity fines, hard, dry throughout.	native soil backfill
4		12			
5	3	8	NA		2" dia. temporary PVC riser
6		18			
7	4	10	NA		
8		20			
9	5	18	NA		
10		25			
11	6	28	NA	thin (2" thick) fine sand and silt lenses at 10' and 11' bgs. Saturated.	
12		40			
13	7	29	NA		
14		35			
15	8	35	NA		
16		45			
17	9	32	NA	5 gallons of potable water added to facilitate drilling	
18		50/0.4			
19	10	12	NA		
20		45			
21	11	19	NA		
22		35			
23	12	30	NA		#00N Filter sand
24		29			
25	13	14	NA		2" dia. temporary PVC well screen
26		25			
27	14	19	NA	TILL becoming moist at 26.5' bgs.	
28		27		Weathered grey shale bedrock. Moist. Friable. Augers grinding evenly on competent shale bedrock at 28' bgs.	
29		30			
30		50.4			
31					
32					
33					
34					
35					
36					
37					
38					
39					
40					

WELL_OVM BORINGS, PZ AND MW LOGS.GPJ (9/10)



PROJECT: Mill Seat Landfill
Riga, New York

Log of Boring No. SB-1(2006)

BORING LOCATION: South of Active Facility		ELEVATION: 678.26 fmsl	DATUM: NAD27
DRILLING CONTRACTOR: Nothnagle Drilling, Inc.		DATE STARTED: 12/6/06	DATE FINISHED: 12/6/06
DRILLING METHOD: 2 1/4" dia. Hollow Stem Auger		TOTAL DEPTH: 19.0 fbg	MEASURING POINT:
DRILLING EQUIPMENT: CME 850 ATV		DEPTH TO WATER: FIRST 11.0 feet	COMPL.
SAMPLING METHOD: 2" dia. SS split spoons		LOGGED BY: MAC	
HAMMER WEIGHT: Autohammer	DROP: 30"	RESPONSIBLE PROFESSIONAL: Richard H. Frappa	REG. NO.

DEPTH (feet)	SAMPLES			NA	DESCRIPTION <small>NAME (USCS Symbol); color, moist, % by weight, plast., structure, cementation, react. w/HCl, geo. inter.</small>	DRILLING REMARKS
	Sample No.	Sample	Blows/foot			
Surface Elevation: 678.26 fmsl						
1	1		1.2, 2.4	NA	TOPSOIL Dark gray fine SAND with silt, trace med. rounded gravel, little vegetative matter, moist	
2			5.4, 4.5	NA		
3	2		12.25, 41.24	NA	Coarse Grained TILL- Sandy SILT (ML) 7.5YR 2/2 (very dark brown) silt with fine sand, trace low plasticity fines, some fine angular weathered shale bedrock gravel, soft, moist to saturated	
4			12.14, 10.16	NA		
5	3		2.5, 9.15	NA	Dense Lodgment TILL-Sandy SILT (ML) 7.5YR 5/3 (brown) silt with fine sand, little fine to med. angular to rounded gravel (glacial erratics and shale bedrock-derived) and low plasticity fines, hard, moist	
6			9.11, 15.14	NA		
7	4		7.11, 14.19	NA	increasing (40-50%) weathered bedrock gravel below 12.0' bgs.	
8			21.22, 27, 100/0.4	NA		
9	5			NA	Weathered interbedded shale and limestone bedrock , angular limestone bedrock gravel within weathered gray shale matrix. Shale weathered to silt/clay, dry to moist.	
10				NA		
11	6			NA	Competent bedrock at 18' bgs. Sampler refusal.	
12				NA		
13	7			NA		
14				NA		
15	8			NA		
16				NA		
17	9			NA		
18				NA		
19				NA		
20				NA		
21				NA		
22				NA		
23				NA		
24				NA		
25				NA		
26				NA		
27				NA		
28				NA		
29				NA		
30				NA		
31				NA		
32				NA		
33				NA		
34				NA		
35				NA		
36				NA		
37				NA		
38				NA		
39				NA		
40				NA		

PROJECT: Mill Seat Landfill Riga, New York		Log of Boring No. SB-2 (2006)	
BORING LOCATION: South of Active Facility		ELEVATION: 677.49 fmsl	DATUM: NAD27
DRILLING CONTRACTOR: Nothnagle Drilling, Inc.		DATE STARTED: 12/6/06	DATE FINISHED: 12/6/06
DRILLING METHOD: 2 1/4" dia. Hollow Stem Auger		TOTAL DEPTH: 18.9 fbgs	MEASURING POINT:
DRILLING EQUIPMENT: CME 850 ATV		DEPTH TO WATER: 3.5 feet	COMPL.
SAMPLING METHOD: 2" dia. SS split spoons		LOGGED BY: MAC	
HAMMER WEIGHT: Autohammer	DROP: 30"	RESPONSIBLE PROFESSIONAL: Richard H. Frappa	REG. NO.

DEPTH (feet)	SAMPLES			NA	DESCRIPTION NAME (USCS Symbol): color, moist, % by weight, plast., structure, cementation, react. w/HCl, geo. inter.	DRILLING REMARKS
	Sample No.	Sample	Blows/ foot			
Surface Elevation: 677.49 fmsl						
1	1		1.2, 2.2	NA	TOPSOIL Dark reddish brown fine SAND with silt, trace low plasticity fines and med. rounded gravel, little vegetative matter, moist	
2						
3	2		3.4, 4.5	NA	Coarse Grained TILL- Sandy SILT (ML) 5YR 3/2 (dark reddish brown) silt with fine sand, trace fine rounded gravel, soft, saturated at 4.0' bgs	
4						
5	3		1.2, 5.7	NA		
6						
7	4		9.13, 22.21	NA	several 6" thick lenses of clayey silt between 6 and 8' bgs.	
8						
9	5		8.12, 34.32	NA		
10						
11	6		37.31, 39.42	NA		
12						
13	7		11.14, 11.14	NA		
14						
15	8		6.11, 10.20	NA	Dense Lodgment TILL-Sandy SILT (ML) 7.5YR 5/3 (brown) silt with fine sand, little fine to med. angular to rounded gravel (glacial erratics and shale bedrock-derived) and low plasticity fines, hard, moist	
16						
17	9		21.22, 16.14	NA		
18						
19	10		36, 50/0.4	NA	Weathered interbedded shale and limestone bedrock ,gray, friable shale bedrock with visible laminations/ bedrock fabric, dry	
20						
21					Competent bedrock at 18.9' bgs. Sampler refusal.	
22						
23						
24						
25						
26						
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PROJECT: Mill Seat Landfill Riga, New York		Log of Boring No. SB-3 (2006)	
BORING LOCATION: South of Active Facility		ELEVATION: 667.93 fmsl	DATUM: NAD27
DRILLING CONTRACTOR: Nothnagle Drilling, Inc.		DATE STARTED: 12/6/06	DATE FINISHED: 12/6/06
DRILLING METHOD: 2 1/4" dia. Hollow Stem Auger		TOTAL DEPTH: 16.1 fbgs	MEASURING POINT:
DRILLING EQUIPMENT: CME 850 ATV		DEPTH TO WATER:	FIRST COMPL.
SAMPLING METHOD: 2" dia. SS split spoons		LOGGED BY: MAC	
HAMMER WEIGHT: Autohammer	DROP: 30"	RESPONSIBLE PROFESSIONAL: Richard H. Frappa	REG. NO.

DEPTH (feet)	SAMPLES			NA	DESCRIPTION	DRILLING REMARKS
	Sample No.	Sample	Blows/ foot		NAME (USCS Symbol): color, moist, % by weight, plast., structure, cementation, react. w/HCl, geo. inter.	
					Surface Elevation: 667.93 fmsl	
1	1		1.1, 2.5	NA	TOPSOIL Brown fine SAND with silt, little vegetative matter, moist, soft	
2					Coarse Grained TILL- Sandy SILT (ML) 5YR 3/2 (dark reddish brown) silt with fine sand, trace fine rounded gravel, soft, saturated at 4.0' bgs	
3	2		4.5, 5.5	NA		
4					Dense Lodgment TILL-Sandy SILT (ML) 5YR 4/2 (dark reddish gray) silt with fine sand, little fine to med. angular to rounded gravel (glacial erratics and shale bedrock-derived), trace low plasticity fines, hard, moist	
5	3		4.9, 5.7	NA		
6						
7	4		5.6, 7.8	NA		
8						
9	5		15, 100/0.3	NA		
10					Weathered interbedded shale and limestone bedrock ,gray-green shale with little limestone bedrock gravel, friable shale bedrock with visible laminations/ bedrock fabric, moist, becoming dry bottom 6" of sample.	
11	6		5.6, 6.7	NA		
12						
13	7		7.6, 6.4	NA		
14					Competent bedrock at 16.1' bgs. Sampler refusal.	
15	8		8.28, 9.46	NA		
16	9		50/0.1	NA		
17						
18						
19						
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PROJECT: Mill Seat Landfill Riga, New York		Log of Boring No. SB-4 (2006)	
BORING LOCATION: South of Active Facility		ELEVATION: 668.22 fmsl	DATUM: NAD27
DRILLING CONTRACTOR: Nothnagle Drilling, Inc.		DATE STARTED: 12/7/06	DATE FINISHED: 12/7/06
DRILLING METHOD: 2 1/4" dia. Hollow Stem Auger		TOTAL DEPTH: 16.5 fbgs	MEASURING POINT:
DRILLING EQUIPMENT: CME 850 ATV		DEPTH TO FIRST WATER:	COMPL.
SAMPLING METHOD: 2" dia. SS split spoons		LOGGED BY: MAC	
HAMMER WEIGHT: Autohammer	DROP: 30"	RESPONSIBLE PROFESSIONAL: Richard H. Frappa	REG. NO.

DEPTH (feet)	SAMPLES			NA	DESCRIPTION NAME (USCS Symbol): color, moist, % by weight, plast., structure, cementation, react. w/HCl, geo. inter.	DRILLING REMARKS
	Sample No.	Sample	Blows/ foot			
Surface Elevation: 668.22 fmsl						
1	1		4.2, 3.6	NA	<p>Dense Lodgment TILL-Sandy SILT (ML) 7.5YR 4/2 (brown), becoming mottled within 7.5YR color scale, silt with fine sand, little fine to med. angular to rounded gravel (glacial erratics and shale bedrock-derived), trace low plasticity fines, hard, moist</p> <p>color grading to 7.5YR 5/1 (gray)</p>	
2						
3	2		6.6, 5.6	NA		
4						
5	3		4.9, 9,17	NA		
6						
7	4		34,20, 16,30	NA		
8						
9	5		5.9, 10,13	NA		
10						
11	6		11,13, 22,19	NA		
12						
13	7		11,21, 20,26	NA		
14						
15	8		7.9, 12,18	NA		
16	9		50/0.5	NA		
17					<p>Weathered interbedded shale and limestone bedrock, gray-green shale with little limestone bedrock gravel, friable shale bedrock with visible laminations/ bedrock fabric, moist, becoming dry bottom 6" of sample.</p>	
18						
19						
20					Competent bedrock at 16.5' bgs. Sampler refusal.	
21						
22						
23						
24						
25						
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PROJECT: Mill Seat Landfill Riga, New York				Log of Boring No. SB-5 (2006)			
BORING LOCATION: South of Active Facility				ELEVATION: 671.03 fmsl		DATUM: NAD27	
DRILLING CONTRACTOR: Nothnagle Drilling, Inc.				DATE STARTED: 12/7/06		DATE FINISHED: 12/7/06	
DRILLING METHOD: 2 1/4" dia. Hollow Stem Auger				TOTAL DEPTH: 16.9 fbg		MEASURING POINT:	
DRILLING EQUIPMENT: CME 850 ATV				DEPTH TO FIRST WATER:		COMPL.	
SAMPLING METHOD: 2" dia. SS split spoons				LOGGED BY: MAC			
HAMMER WEIGHT: Autohammer		DROP: 30"		RESPONSIBLE PROFESSIONAL: Richard H. Frappa		REG. NO.	
DEPTH (feet)	SAMPLES			NA	DESCRIPTION		DRILLING REMARKS
	Sample No.	Sample	Blows/ foot		NAME (USCS Symbol): color, moist, % by weight, plast., structure, cementation, react. w/HCl, geo. inter.		
Surface Elevation: 671.03 fmsl							
1	1		1.1, 4.4	NA	<p>Dense Lodgment TILL-Sandy SILT (ML) 5YR 4/2 (dark reddish gray) silt with fine sand, little fine to med. angular to rounded gravel (glacial erratics and shale bedrock-derived), trace low plasticity fines, hard, moist</p>		
2							
3	2		5.4, 4.6	NA			
4							
5	3		6.9, 14.20	NA			
6							
7	4		21.22, 24.22	NA			
8							
9	5		7.12, 17.19	NA			
10							
11	6		11.17, 19.21	NA			
12							
13	7		6.12, 13.11	NA			
14							
15	8		12.22, 25.30	NA			
16							
17	9		31, 50/0.4	NA			
18					<p>Weathered interbedded shale and limestone bedrock, gray-green shale with little limestone bedrock gravel, friable shale bedrock with visible laminations/ bedrock fabric, moist, becoming dry bottom 6" of sample.</p>		
19					<p>Competent bedrock at 16.9' bgs. Sampler refusal.</p>		
20							
21							
22							
23							
24							
25							
26							
27							
28							
29							
30							
31							
32							
33							
34							
35							
36							
37							
38							
39							
40							

PROJECT: Mill Seat Landfill Riga, New York		Log of Boring No. SB-6 (2006)	
BORING LOCATION: South of Active Facility		ELEVATION: 669.02 fmsl	DATUM: NAD27
DRILLING CONTRACTOR: Nothnagle Drilling, Inc.		DATE STARTED: 12/8/06	DATE FINISHED: 12/8/06
DRILLING METHOD: 2 1/4" dia. Hollow Stem Auger		TOTAL DEPTH: 36.2 fbgs	MEASURING POINT:
DRILLING EQUIPMENT: CME 850 ATV		DEPTH TO WATER:	FIRST COMPL.
SAMPLING METHOD: 2" dia. SS split spoons		LOGGED BY: MAC	
HAMMER WEIGHT: Autohammer	DROP: 30"	RESPONSIBLE PROFESSIONAL: Richard H. Frappa	REG. NO.

DEPTH (feet)	SAMPLES			NA	DESCRIPTION NAME (USCS Symbol): color, moist, % by weight, plast., structure, cementation, react. w/HCl, geo. inter.	DRILLING REMARKS
	Sample No.	Sample	Blows/ foot			
Surface Elevation: 669.02 fmsl						
1	1		3.4, 3.10	NA	TOPSOIL 7.5YR 4/3 Brown fine SAND with silt, little vegetative matter, moist, soft	
2						
3	2		3.4, 4.9	NA	Coarse Grained TILL- Sandy SILT (ML) 5YR 5/1 (gray) silt with fine sand, little coarse sand, trace fine rounded gravel, soft, moist	
4						
5	3		14.17, 20.24	NA	Dense Lodgment TILL-Sandy SILT (ML) 5YR 4/1 (gray to dark gray) silt with fine sand, little fine to med. angular to rounded gravel (glacial erratics and shale bedrock-derived), trace low plasticity fines, hard, moist	
6	4		28, 50/0.4	NA		
7						
8						
9	5		22.46, 50/0.3	NA		
10						
11	6		18.46, 48, 50/0.5	NA		
12						
13	7		16.30, 31.35	NA		
14						
15	8		18.37, 50/0.4	NA		
16						
17	9		13.34, 40, 50/0.4	NA		
18						
19	10		14.28, 40, 50/0.4	NA		
20						
21	12		16.24, 50/0.6	NA		
22						
23	13		5.8, 18.16	NA		
24						
25	14		5.10, 18.20	NA	increasing med. plasticity fines 24-26' bgs	
26						
27	15		2.9, 27, 50/0.5	NA		
28						
29	16		36.39, 50/0.5	NA		
30						
31	17		12.17, 17.14	NA		
32						
33	18		23.43, 40, 50/0.4	NA		
34						
35	19		22.48, 50/0.5	NA	Weathered interbedded shale and limestone bedrock ,slightly weathered gray, friable shale bedrock with visible laminations/ bedrock fabric, dry throughout	
36	20		50/0.2	NA		
37						
38					Competent bedrock at 36.2' bgs. Sampler refusal.	
39						
40						

BORING BORINGS, PZ AND MW LOGS.GPJ (4/07)



PROJECT: Mill Seat Landfill Riga, New York		Log of Boring No. SB-7 (2006)	
BORING LOCATION: South of Active Facility		ELEVATION: 669.28 fmsl	DATUM: NAD27
DRILLING CONTRACTOR: Nothnagle Drilling, Inc.		DATE STARTED: 12/8/06	DATE FINISHED: 12/8/06
DRILLING METHOD: 2 1/4" dia. Hollow Stem Auger		TOTAL DEPTH: 24.7 fbgs	MEASURING POINT:
DRILLING EQUIPMENT: CME 850 ATV		DEPTH TO FIRST WATER:	COMPL.
SAMPLING METHOD: 2" dia. SS split spoons		LOGGED BY: MAC	
HAMMER WEIGHT: Autohammer	DROP: 30"	RESPONSIBLE PROFESSIONAL: Richard H. Frappa	REG. NO.

DEPTH (feet)	SAMPLES			NA	DESCRIPTION NAME (USCS Symbol): color, moist, % by weight, plast., structure, cementation, react. w/HCl, geo. inter.	DRILLING REMARKS
	Sample No.	Sample	Blows/ foot			
Surface Elevation: 669.28 fmsl						
1	1		1.1, 3.5	NA	TOPSOIL 7.5YR 4/3 Brown fine SAND with silt, little vegetative matter, moist, soft	
2						
3	2		5.5, 6.6	NA	Coarse Grained TILL- Sandy SILT (ML) 5YR 5/1 (gray) silt with fine sand, little coarse sand, little fine angular to rounded gravel (shale bedrock derived), soft, saturated at 2.0' bgs, becoming moist below 3.0' bgs	
4						
5	3		4.6, 7.7	NA		
6						
7	4		17.15, 16.15	NA	Dense Lodgment TILL-Sandy SILT (ML) 5YR 4/1 (gray to dark gray) silt with fine sand, little fine to med. angular to rounded gravel (glacial erratics and shale bedrock-derived), trace low plasticity fines, hard, moist	
8						
9	5		7.14, 37.15	NA		
10						
11	6		23.27, 43.28	NA		
12						
13	7		8.17, 17.26	NA		
14						
15	8		10.20, 22.26	NA		
16						
17	9		19.37, 47, 50/0.2	NA		
18						
19	10		14.23, 29.50	NA		
20						
21	12		23.33, 46.50	NA		
22						
23	13		44, 50/0.5	NA		
24						
25	14		21, 50/0.2	NA	Weathered interbedded shale and limestone bedrock , weathered gray, friable shale bedrock with visible laminations/ bedrock fabric, dry throughout	
26						
27						
28					Competent bedrock at 24.7' bgs. Sampler refusal.	
29						
30						
31						
32						
33						
34						
35						
36						
37						
38						
39						
40						

BORING BORINGS, PZ AND MW LOGS.GPJ (4/07)



PROJECT: Mill Seat Landfill Riga, New York		Log of Boring No. SB-8 (2006)	
BORING LOCATION: South of Active Facility		ELEVATION: 672.61 fmsl	DATUM: NAD27
DRILLING CONTRACTOR: Nothnagle Drilling, Inc.		DATE STARTED: 12/11/06	DATE FINISHED: 12/11/06
DRILLING METHOD: 2 1/4" dia. Hollow Stem Auger		TOTAL DEPTH: 32.2 fbgs	MEASURING POINT:
DRILLING EQUIPMENT: CME 850 ATV		DEPTH TO WATER: 7.0 feet	COMPL.
SAMPLING METHOD: 2" dia. SS split spoons		LOGGED BY: MAC	
HAMMER WEIGHT: Autohammer	DROP: 30"	RESPONSIBLE PROFESSIONAL: Richard H. Frappa	REG. NO.

DEPTH (feet)	SAMPLES			NA	DESCRIPTION NAME (USCS Symbol): color, moist, % by weight, plast., structure, cementation, react. w/HCl, geo. inter.	DRILLING REMARKS	
	Sample No.	Sample	Blows/foot				
Surface Elevation: 672.61 fmsl							
1	1		1.3, 3.3	NA	TOPSOIL 7.5YR 4/3 Brown fine SAND with silt, little vegetative matter, moist, soft		
2							
3	2		2.2, 2.2	NA	Well Graded SAND with GRAVEL (SW) red fine to med. sand with med. to coarse angular weathered bedrock gravel, moist, loose		
4							
5	3		5.4, 5.4	NA			
6							
7	4		5.4, 4.3	NA		▽	
8							
9	5		2.5, 9.9	NA	Coarse Grained TILL- Sandy SILT (ML) 5YR 5/1 (gray) silt with fine sand, little coarse sand, little fine angular to rounded gravel (shale bedrock derived), soft, moist		
10							
11	6		9.10, 12.13	NA			
12							
13	7		25, 50/0.5	NA			
14							
15	8		26.47, 46.46	NA	Dense Lodgment TILL-Sandy SILT (ML) 5YR 4/1 (gray to dark gray) silt with fine sand, little fine to med. angular to rounded gravel (glacial erratics and shale bedrock-derived), trace low plasticity fines, hard, moist		
16							
17	9		45, 50/0.3	NA			
18							
19	10		15.28, 34.33	NA			
20							
21	11		35.38, 50/0.5	NA			
22							
23	12		14.34, 34.30	NA			
24							
25	13		4.7, 16.28	NA			
26							
27	14		27.30, 50/0.5	NA			
28							
29	15		9.15, 9.27	NA			
30							
31	16		22.31, 40.40	NA			
32							
33	17		18.36, 50/0.4	NA	Weathered interbedded shale and limestone bedrock , slightly weathered gray, friable shale bedrock (weathered to fine angular gravel-sized fragments) with visible laminations and bedrock fabric, moist		
34							
35							
36					Competent bedrock at 33.2' bgs. Sampler refusal.		
37							
38							
39							
40							

PROJECT: Mill Seat Landfill Riga, New York		Log of Boring No. SB-9 (2006)	
BORING LOCATION: South of Active Facility		ELEVATION: 670.65 fmsl	DATUM: NAD27
DRILLING CONTRACTOR: Nothnagle Drilling, Inc.		DATE STARTED: 12/11/06	DATE FINISHED: 12/11/06
DRILLING METHOD: 2 1/4" dia. Hollow Stem Auger		TOTAL DEPTH: 21.0 fbgs	MEASURING POINT:
DRILLING EQUIPMENT: CME 850 ATV		DEPTH TO FIRST WATER:	COMPL.
SAMPLING METHOD: 2" dia. SS split spoons		LOGGED BY: MAC	
HAMMER WEIGHT: Autohammer	DROP: 30"	RESPONSIBLE PROFESSIONAL: Richard H. Frappa	REG. NO.

DEPTH (feet)	SAMPLES			NA	DESCRIPTION NAME (USCS Symbol): color, moist, % by weight, plast., structure, cementation, react. w/HCl, geo. inter.	DRILLING REMARKS
	Sample No.	Sample	Blows/ foot			
					Surface Elevation: 670.65 fmsl	
1	1		1.2, 2.2	NA	TOPSOIL 7.5YR 4/3 Brown fine SAND with silt, little vegetative matter, moist, soft	
2						
3	2		2.5, 7.7	NA	Coarse Grained TILL- Sandy SILT (ML) 7.5YR 5/4 (brown) silt with fine sand, little fine angular to rounded gravel (shale bedrock derived), soft	
4						
5	3		12,18, 17,25	NA	Dense Lodgment TILL-Sandy SILT (ML) 5YR 4/1 (gray to dark gray) silt with fine sand, little fine to med. angular to rounded gravel (glacial erratics and shale bedrock-derived), trace low plasticity fines, hard, moist	
6						
7	4		24,35, 35,27	NA		
8						
9	5		11,32, 40,40	NA		
10						
11	6		44, 50/0.5	NA		
12						
13	7		15, 50/0.4	NA		
14						
15	8		19, 50/0.2	NA		
16						
17	9		14, 50/0.5	NA		
18						
19	10		29,35, 39,41	NA	Weathered interbedded shale and limestone bedrock ,slightly weathered gray, friable shale bedrock (weathered to fine angular gravel-sized fragments) with visible laminations/ bedrock fabric, moist	
20						
21	11		49, 50/0.5	NA		
22					Competent bedrock at 21.0' bgs. Sampler refusal.	
23						
24						
25						
26						
27						
28						
29						
30						
31						
32						
33						
34						
35						
36						
37						
38						
39						
40						

PROJECT: Mill Seat Landfill Riga, New York		Log of Boring No. SB-10 (2006)	
BORING LOCATION: South of Active Facility		ELEVATION: 677.01 fmsl	DATUM: NAD27
DRILLING CONTRACTOR: Nothnagle Drilling, Inc.		DATE STARTED: 12/13/06	DATE FINISHED: 12/13/06
DRILLING METHOD: 2 1/4" dia. Hollow Stem Auger		TOTAL DEPTH: 16.2 fbs	MEASURING POINT:
DRILLING EQUIPMENT: CME 850 ATV		DEPTH TO WATER:	FIRST COMPL.
SAMPLING METHOD: 2" dia. SS split spoons		LOGGED BY: MAC	
HAMMER WEIGHT: Autohammer	DROP: 30"	RESPONSIBLE PROFESSIONAL: Richard H. Frappa	REG. NO.

DEPTH (feet)	SAMPLES			NA	DESCRIPTION NAME (USCS Symbol): color, moist, % by weight, plast., structure, cementation, react. w/HCl, geo. inter.	DRILLING REMARKS
	Sample No.	Sample	Blows/ foot			
Surface Elevation: 677.01 fmsl						
1	1		1.1, 8.5	NA	TOPSOIL 7.5YR 4/3 Brown fine SAND with silt, little vegetative matter, moist, soft	
2						
3	2		11.6, 5.4	NA	Dense Lodgment TILL-Sandy SILT (ML) 10YR 5/2 (gray to dark gray) silt with fine sand, little fine to med. angular to rounded gravel (glacial erratics and shale bedrock-derived), trace low plasticity fines, hard, moist	
4						
5	3		6.11, 15.37	NA		
6						
7	4		31, 50/0.5	NA		
8						
9	5		22.29, 31.42	NA		
10						
11	6		24.36, 38, 50/0.3	NA		
12						
13	7		16.18, 24.29	NA		
14						
15	8		30.44, 50/0.2	NA	increasing shale bedrock gravel below 15' bgs.	
16	9		50/0.2	NA	Competent interbedded shale and limestone bedrock at 16.2' bgs. Sampler refusal. No weathered bedrock zone present.	
17						
18						
19						
20						
21						
22						
23						
24						
25						
26						
27						
28						
29						
30						
31						
32						
33						
34						
35						
36						
37						
38						
39						
40						

BORING BORINGS, PZ AND MW LOGS.GPJ (4/07)



PROJECT: Mill Seat Landfill- Bovee Road Hydrogeological Investigation
Riga, New York

Log of Boring No. SB-01 (2008)

BORING LOCATION: Bovee Road Property

ELEVATION:
671.04 fmsl

DATUM:
NAGVD-1983

DRILLING CONTRACTOR: Nothnagle Drilling, Inc.

DATE STARTED:
3/25/08

DATE FINISHED:
3/25/08

DRILLING METHOD: 2 3/4" ID HSA

TOTAL DEPTH:
24.8 fbgs

MEASURING POINT:

DRILLING EQUIPMENT: CME 850 ATV

DEPTH TO FIRST
WATER: 15.5 feet

COMPL.

SAMPLING METHOD: 2" dia. split spoons

LOGGED BY:
MAC

HAMMER WEIGHT: 140

DROP: 30" (Autohammer)

RESPONSIBLE PROFESSIONAL:
Richard H. Frappa

REG. NO.

DEPTH (feet)	SAMPLES			OVM (ppm)	DESCRIPTION NAME (USCS Symbol): color, moist, % by weight, plast., structure, cementation, react. w/HCl, geo. inter.	DRILLING REMARKS
	Sample No.	Sample	Blows/ foot			
1	1		3	NA		
2			4			
3	2		3	NA	Poorly graded SAND with GRAVEL (SP) , 7.5Y 5/3, moist, trace silt and low plasticity fines, firm (ABLATION TILL)	
4			4			
5	3		2	NA		
6			4			
7	4		9	NA	increasing medium angular weathered shale gravel. Dry, loose.	
8			17			
9			16			
10	5		6	NA		
11			9			
12	6		13	NA		
13			25			
14	7		7	NA		
15			14			
16	8		6	NA	Well graded SAND with SILT and GRAVEL (SW-SM) , 7.5Y5/3, moist, some low plasticity fines, stiff to very stiff (LODGEMENT TILL) thin saturated coarse sand seam at 15.5-15.75 'fbgs.	
17			8			
18	9		12	NA		
19			22			
20	10		16	NA		
21			22			
22	11		100/0.6	NA		
23			8			
24	12		15	NA	color grading to 7.5Y 5/1	
25			31			
26	13		26	NA		
27			22			
28			34	NA	increasing silt and low plasticity fines content below 23 fbgs.	
29			32			
30			27	NA		
31			26			
32			100/0.2	NA	dry, grey shale bedrock returned in sampler at 24 fbgs. Auger refusal at 24.8 fbgs. No weathered bedrock zone present.	
33						
34						
35						
36						
37						
38						
39						
40						

Surface Elevation: 671.04 fmsl



PROJECT: Mill Seat Landfill- Bovee Road Hydrogeological Investigation Riga, New York	Log of Boring No. SB-02 (2008)
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BORING LOCATION: Bovee Road Property	ELEVATION: 674.09 fmsl	DATUM: NAGVD-1983
DRILLING CONTRACTOR: Nothnagle Drilling, Inc.	DATE STARTED: 3/25/08	DATE FINISHED: 3/25/08
DRILLING METHOD: 2 3/4" ID HSA	TOTAL DEPTH: 39.2 fbgs	MEASURING POINT:
DRILLING EQUIPMENT: CME 850 ATV	DEPTH TO WATER: 11 feet	COMPL.
SAMPLING METHOD: 2" dia. split spoons	LOGGED BY: MAC	
HAMMER WEIGHT: 140	DROP: 30" (Autohammer)	RESPONSIBLE PROFESSIONAL: Richard H. Frappa
		REG. NO.

DEPTH (feet)	SAMPLES			OVM (ppm)	DESCRIPTION	DRILLING REMARKS
	Sample No.	Sample	Blows/ foot		NAME (USCS Symbol): color, moist, % by weight, plast., structure, cementation, react. w/HCl, geo. inter.	
					Surface Elevation: 674.09 fmsl	
1	1		3	NA	<p>Well graded GRAVEL with SILT and SAND (GW-GM) , mottled throughout 7.5YR scale, dry to moist, loose. (SAND and GRAVEL)</p>	
2			5	NA		
3	2		7	NA		
4			7	NA		
5	3		10	NA		
6			13	NA		
7	4		6	NA		
8			12	NA		
9	5		13	NA		
10			14	NA		
11	6		14	NA	<p>satuated at 11 fbgs.</p> <p>Poorly graded SAND (SP) , saturated, loose</p> <p>Well graded SAND with SILT and GRAVEL (SW-SM) , 7.5Y5/1, moist, some low plasticity fines, little fine to medium, angular shale gravel, very dense, (LODGEMENT TILL)</p>	
12			5	NA		
13	7		10	NA		
14			8	NA		
15	8		4	NA		
16			9	NA		
17	9		13	NA		
18			12	NA		
19	10		15	NA		
20			24	NA		
21	11		27	NA		
22			49	NA		
23	12		50	NA		
24			59	NA		
25	13		58	NA		
26			10	NA		
27	14		26	NA		
28			38	NA		
29	15		49	NA		
30			14	NA		
31	16		19	NA		
32			20	NA		
33	17		26	NA		
34			35	NA		
35	18		44	NA		
36			64	NA		
37	19		76	NA		
38			9	NA		
39	20		10	NA		
40			20	NA		
			100/0.2		<p>Poorly graded SAND (SP), 7.5Y 5/2, saturated fine to medium sand with trace silt , loose</p> <p>LODGEMENT TILL (as above)</p> <p>dry, grey shale bedrock returned in sampler at 24 fbgs. Auger refusal and sampler bouncing at 38.2 fbgs.</p>	

PROJECT: Mill Seat Landfill- Bovee Road Hydrogeological Investigation
Riga, New York

Log of Boring No. SB-03 (2008)

BORING LOCATION: Bovee Road Property		ELEVATION: 669.70 fmsl	DATUM: NAGVD-1983
DRILLING CONTRACTOR: Nothnagle Drilling, Inc.		DATE STARTED: 3/26/08	DATE FINISHED: 3/26/08
DRILLING METHOD: 2 3/4" ID HSA		TOTAL DEPTH: 23.2 fbgs	MEASURING POINT:
DRILLING EQUIPMENT: CME 850 ATV		DEPTH TO WATER: 12 feet	COMPL.
SAMPLING METHOD: 2" dia. split spoons		LOGGED BY: MAC	
HAMMER WEIGHT: 140	DROP: 30" (Autohammer)	RESPONSIBLE PROFESSIONAL: Richard H. Frappa	REG. NO.

DEPTH (feet)	SAMPLES			OVM (ppm)	DESCRIPTION <small>NAME (USCS Symbol); color, moist, % by weight, plast., structure, cementation, react. w/HCl, geo. inter.</small>	DRILLING REMARKS
	Sample No.	Sample	Blows/ foot			
Surface Elevation: 669.70 fmsl						
1	1		4	NA		
2			4			
3	2		7	NA	Well graded GRAVEL with SILT and SAND (GW-GM) , grey-green, saturated, weathered fine to medium angular shale bedrock gravel with sand and silt, locally weathered to clay, loose (Weathered Ablation Till).	
4			5			
5	3		8	NA		
6			12			
7	4		16	NA	Poorly graded SAND with GRAVEL (SP) , 7.5Y 5/3, moist, trace silt and low plasticity fines, firm (ABLATION TILL)	
8			19			
9	5		10	NA		
10			17			
11	6		7	NA	Loose fine to medium sand layer, saturated	
12			10			
13	7		10	NA		
14			16			
15	8		25	NA	ABLATION TILL (as above)	
16			42			
17	9		16	NA		
18			27			
19	10		14	NA		
20			24			
21	11		26	NA		
22	12		51	NA		
23			58			
24			100/0.3		sampler bouncing at 21.7 fbgs. Weathered grey-green shale bedrock. Auger refusal at 23.2 fbgs.	
25			100/0.2			
26						
27						
28						
29						
30						
31						
32						
33						
34						
35						
36						
37						
38						
39						
40						



PROJECT: Mill Seat Landfill- Bovee Road Hydrogeological Investigation
Riga, New York

Log of Boring No. SB-04 (2008)

BORING LOCATION: Bovee Road Property		ELEVATION: 676.01 fmsl	DATUM: NAGVD-1983
DRILLING CONTRACTOR: Nothnagle Drilling, Inc.		DATE STARTED: 3/26/08	DATE FINISHED: 3/26/08
DRILLING METHOD: 2 3/4" ID HSA		TOTAL DEPTH: 29.2 fbgs	MEASURING POINT:
DRILLING EQUIPMENT: CME 850 ATV		DEPTH TO WATER: NA	FIRST WATER: NA
SAMPLING METHOD: 2" dia. split spoons		LOGGED BY: MAC	
HAMMER WEIGHT: 140	DROP: 30" (Autohammer)	RESPONSIBLE PROFESSIONAL: Richard H. Frappa	REG. NO.

DEPTH (feet)	SAMPLES			OVM (ppm)	DESCRIPTION <small>NAME (USCS Symbol): color, moist, % by weight, plast., structure, cementation, react. w/HCl, geo. inter.</small>	DRILLING REMARKS
	Sample No.	Sample	Blows/ foot			
Surface Elevation: 676.01 fmsl						
1	1		1	NA	<p>Well graded GRAVEL with SILT and SAND (GW-GM) , weathered fine, angular shale gravel within sand and silt matrix, moist, loose. (SAND and GRAVEL)</p> <p>Poorly graded SAND with GRAVEL (SP) , 7.5Y 5/3, moist, fine to medium sand with fine angular to subangular gravel, trace silt and low plasticity fines, firm (ABLATION TILL)</p> <p>Well graded SAND with SILT and GRAVEL (SW-SM) , 10YR 5/2, dry to moist, some low plasticity fines, stiff to very stiff (LODGEMENT TILL)</p> <p>moist, grey-green shale bedrock returned in sampler., sampler bouncing at 29.1 fbgs. Auger refusal at 29.2 fbgs. 0.2' thick weathered bedrock zone.</p>	very slow drilling
2			4	NA		
3	2		5	NA		
4			10	NA		
5	3		9	NA		
6			7	NA		
7			4	NA		
8			11	NA		
9			50	NA		
10			26	NA		
11			19	NA		
12			14	NA		
13			17	NA		
14			17	NA		
15			15	NA		
16			16	NA		
17			13	NA		
18			17	NA		
19			14	NA		
20			19	NA		
21			25	NA		
22			31	NA		
23			9	NA		
24			16	NA		
25			17	NA		
26			14	NA		
27			42	NA		
28			25	NA		
29			25	NA		
30			3	NA		
31			7	NA		
32			12	NA		
33			18	NA		
34			29	NA		
35			60	NA		
36			51	NA		
37			48	NA		
38			58	NA		
39			11	NA		
40			22	NA		
			27	NA		
			26	NA		
			28	NA		
			44	NA		
			53	NA		
			51	NA		
			28	NA		
			36	NA		
			100/0.1	NA		

PROJECT: Mill Seat Landfill- Bovee Road Hydrogeological Investigation
Riga, New York

Log of Boring No. SB-05 (2008)

BORING LOCATION: Bovee Road Property		ELEVATION: 669.47 fmsl	DATUM: NAGVD-1983
DRILLING CONTRACTOR: Nothnagle Drilling, Inc.		DATE STARTED: 3/26/08	DATE FINISHED: 3/26/08
DRILLING METHOD: 2 3/4" ID HSA		TOTAL DEPTH: 14.0 fbg	MEASURING POINT:
DRILLING EQUIPMENT: CME 850 ATV		DEPTH TO FIRST WATER: 8 feet	COMPL.
SAMPLING METHOD: 2" dia. split spoons		LOGGED BY: MAC	
HAMMER WEIGHT: 140	DROP: 30" (Autohammer)	RESPONSIBLE PROFESSIONAL: Richard H. Frappa	REG. NO.

DEPTH (feet)	SAMPLES			OVM (ppm)	DESCRIPTION NAME (USCS Symbol): color, moist, % by weight, plast., structure, cementation, react. w/HCl, geo. inter.	DRILLING REMARKS
	Sample No.	Sample	Blows/foot			
Surface Elevation: 669.47 fmsl						
1	1		1	NA	<p>Poorly graded SAND with GRAVEL (SP), 7.5Y 5/3, moist, fine to medium sand with fine angular to subangular gravel, trace silt and low plasticity fines, firm (ABLATION TILL)</p> <p>occasional 1 to 2" thick loose sandy zones, wet</p>	
2			4	NA		
3	2		2	NA		
4			2	NA		
5	3		3	NA		
6			8	NA		
7	4		11	NA		
8			18	NA		
9	5		16	NA		
10			21	NA		
11	6		17	NA		
12			4	NA		
13	7		7	NA		
14			10	NA		
15			10/0.5	NA		
16				NA	Sampler bouncing at 14 fbg. Grey-green shale bedrock returned in sampler. No weathered bedrock zone present.	
17				NA		
18				NA		
19				NA		
20				NA		
21				NA		
22				NA		
23				NA		
24				NA		
25				NA		
26				NA		
27				NA		
28				NA		
29				NA		
30				NA		
31				NA		
32				NA		
33				NA		
34				NA		
35				NA		
36				NA		
37				NA		
38				NA		
39				NA		
40				NA		

PROJECT: Mill Seat Landfill- Bovee Road Hydrogeological Investigation
Riga, New York

Log of Boring No. SB-06 (2008)

BORING LOCATION: Bovee Road Property		ELEVATION: 672.16 fmsl	DATUM: NAGVD-1983
DRILLING CONTRACTOR: Nothnagle Drilling, Inc.		DATE STARTED: 3/27/08	DATE FINISHED: 3/27/08
DRILLING METHOD: 2 3/4" ID HSA		TOTAL DEPTH: 14.7 fbg	MEASURING POINT:
DRILLING EQUIPMENT: CME 850 ATV		DEPTH TO WATER:	FIRST 8 feet
SAMPLING METHOD: 2" dia. split spoons		LOGGED BY: MAC	
HAMMER WEIGHT: 140	DROP: 30" (Autohammer)	RESPONSIBLE PROFESSIONAL: Richard H. Frappa	REG. NO.

DEPTH (feet)	SAMPLES			OVM (ppm)	DESCRIPTION NAME (USCS Symbol): color, moist, % by weight, plast., structure, cementation, react. w/HCl, geo. inter.	DRILLING REMARKS
	Sample No.	Sample	Blows/ foot			
1	1		1	NA	<p>Surface Elevation: 672.16 fmsl</p> <p>Well graded GRAVEL with SILT and SAND (GW-GM) , moist weathered fine angular shale gravel (30%) in 7.5YR 5/3 fine sand and silt matrix, loose. (SAND and GRAVEL)</p> <p>Poorly graded SAND with GRAVEL (SP) , 7.5Y 5/3, moist, trace silt and low plasticity fines, firm (ABLATION TILL)</p> <p>Dry, tan-brown shale bedrock returned in sampler. Auger refusal at 14.7' bgs.</p>	
2			2	NA		
3	2		4	NA		
4			4	NA		
5	3		4	NA		
6			4	NA		
7	4		7	NA		
8			10	NA		
9	5		8	NA		
10			16	NA		
11	6		9	NA		
12			5	NA		
13	7		8	NA		
14			100/0.5	NA		
15	8		39	NA		
16			100/0.2	NA		
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PROJECT: Mill Seat Landfill- Bovee Road Hydrogeological Investigation
Riga, New York

Log of Boring No. SB-07 (2008)

BORING LOCATION: Bovee Road Property		ELEVATION: 664.82 fmsl	DATUM: NAGVD-1983
DRILLING CONTRACTOR: Nothnagle Drilling, Inc.		DATE STARTED: 3/27/08	DATE FINISHED: 3/27/08
DRILLING METHOD: 2 3/4" ID HSA		TOTAL DEPTH: 13.7 fbg	MEASURING POINT:
DRILLING EQUIPMENT: CME 850 ATV		DEPTH TO WATER: FIRST NA	COMPL.
SAMPLING METHOD: 2" dia. split spoons		LOGGED BY: MAC	
HAMMER WEIGHT: 140	DROP: 30" (Autohammer)	RESPONSIBLE PROFESSIONAL: Richard H. Frappa	REG. NO.

DEPTH (feet)	SAMPLES			OVM (ppm)	DESCRIPTION <small>NAME (USCS Symbol); color, moist, % by weight, plast., structure, cementation, react. w/HCl, geo. inter.</small>	DRILLING REMARKS
	Sample No.	Sample	Blows/foot			
1	1		2	NA	<p style="text-align: center;">Surface Elevation: 664.82 fmsl</p> <p>Poorly graded SAND with GRAVEL (SP), 7.5Y 5/3, moist, trace silt and low plasticity fines, firm (ABLATION TILL)</p>	<p style="text-align: center;">hard drilling</p>
2			3			
3	2		4	NA		
4			5			
5	3		8	NA		
6			17			
7	4		18	NA		
8			21			
9	5		12	NA		
10			9			
11	6		42	NA		
12			47			
13	7		11	NA		
14			21			
15			28			
16			30			
17			12	NA		
18			17			
19			19			
20			20			
21			24			
22			50/0.1			
23						
24						
25						
26						
27						
28						
29						
30						
31						
32						
33						
34						
35						
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Sampler bouncing hard at 13.7 fbg. Weathered red to tan-brown shale/siltstone bedrock returned in sampler.
Auger refusal at 13.7 fbg.

PROJECT: Mill Seat Landfill- Bovee Road Hydrogeological Investigation
Riga, New York

Log of Boring No. SB-08 (2008)

BORING LOCATION: Bovee Road Property		ELEVATION: 665.83 fmsl	DATUM: NAGVD-1983
DRILLING CONTRACTOR: Nothnagle Drilling, Inc.		DATE STARTED: 3/27/08	DATE FINISHED: 3/27/08
DRILLING METHOD: 2 3/4" ID HSA		TOTAL DEPTH: 18.0 fbg	MEASURING POINT:
DRILLING EQUIPMENT: CME 850 ATV		DEPTH TO WATER: 6 feet	COMPL.
SAMPLING METHOD: 2" dia. split spoons		LOGGED BY: MAC	
HAMMER WEIGHT: 140	DROP: 30" (Autohammer)	RESPONSIBLE PROFESSIONAL: Richard H. Frappa	REG. NO.

DEPTH (feet)	SAMPLES			OVM (ppm)	DESCRIPTION <small>NAME (USCS Symbol): color, moist, % by weight, plast., structure, cementation, react. w/HCl, geo. inter.</small>	DRILLING REMARKS
	Sample No.	Sample	Blows/foot			
Surface Elevation: 665.83 fmsl						
1	1		2	NA	<p>Poorly graded SAND with GRAVEL (SP), 7.5Y 5/3, dry to moist, trace silt and low plasticity fines, firm (ABLATION TILL)</p> <p>decreasing shale bedrock-derived gravel below 8 feet.</p> <p>Fine to medium sand zone, wet (14.0 to 16.0 fbg)</p> <p>Sampler bouncing. Weathered shale bedrock returned in sampler (moist). Auger refusal at 18 fbg.</p>	
2			4	NA		
3	2		4	NA		
4			5	NA		
5	3		11	NA		
6			14	NA		
7	4		4	NA		
8			7	NA		
9	5		15	NA		
10			25	NA		
11	6		9	NA		
12			22	NA		
13	7		36	NA		
14			34	NA		
15	8		8	NA		
16			9	NA		
17	9		16	NA		
18			24	NA		
19			18	NA		
20			22	NA		
21			32	NA		
22			36	NA		
23			27	NA		
24			28	NA		
25			57	NA		
26			100/0.2	NA		
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PROJECT: Mill Seat Landfill- Bovee Road Hydrogeological Investigation Riga, New York	Log of Boring No. SB-09 (2008)
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BORING LOCATION: Bovee Road Property	ELEVATION: 674.33 fmsl	DATUM: NAGVD-1983
DRILLING CONTRACTOR: Nothnagle Drilling, Inc.	DATE STARTED: 3/28/08	DATE FINISHED: 3/28/08
DRILLING METHOD: 2 3/4" ID HSA	TOTAL DEPTH: 10.0 fbgs	MEASURING POINT:
DRILLING EQUIPMENT: CME 850 ATV	DEPTH TO WATER: FIRST 24.5 feet	COMPL.
SAMPLING METHOD: 2" dia. split spoons	LOGGED BY: MAC	
HAMMER WEIGHT: 140	DROP: 30" (Autohammer)	RESPONSIBLE PROFESSIONAL: Richard H. Frappa
		REG. NO.

DEPTH (feet)	SAMPLES			OVM (ppm)	DESCRIPTION <small>NAME (USCS Symbol); color, moist, % by weight, plast., structure, cementation, react. w/HCl, geo. inter.</small>	DRILLING REMARKS
	Sample No.	Sample	Blows/ foot		Surface Elevation: 674.33 fmsl	
1	1		1	NA		
2			4			
3	2		15	NA	Well graded GRAVEL with SILT and SAND (GW-GM) , mottled throughout 7.5YR scale, dry to moist, loose. (SAND and GRAVEL)	
4			17			
5	3		8	NA		
6			3			
7	4		10	NA		
8			10			
9	5		5	NA		
10			18			
11	6		10	NA		
12			19			
13	7		20	NA		
14			38			
15	8		100/0.6	NA	Well graded SAND with SILT and GRAVEL (SW-SM) , 7.5Y5/3, moist, some low plasticity fines, stiff to very stiff (LODGEMENT TILL)	difficult drilling
16			18	NA		
17	9		65	NA		
18			100/0.4			
19	10		41	NA		
20			49			
21	11		44	NA		
22			46			
23	12		21	NA		
24			32			
25	13		33	NA		
26			49			
27	14		17	NA	few thin 1/4" thick silt lenses throughout.	
28			22			
29	15		41	NA		
30			54			
31			22	NA		
32			34			
33			43			
34			52			
35			27	NA		
36			31			
37			28			
38			33			
39			22			
40			35			
			60			
			100/0.2			
			27	NA	Sampler bouncing at 27.7 fbgs. Weathered dry grey shale bedrock returned in sampler.	
			48			
			100/0.5		Auger refusal at 30 fbgs.	

PROJECT: Mill Seat Landfill- Bovee Road Hydrogeological Investigation
Riga, New York

Log of Boring No. SB-11 (2008)

BORING LOCATION: Bovee Road Property

ELEVATION:
695.63 fmsl

DATUM:
NAGVD-1983

DRILLING CONTRACTOR: Nothnagle Drilling, Inc.

DATE STARTED:
3/31/08

DATE FINISHED:
3/31/08

DRILLING METHOD: 2 3/4" ID HSA

TOTAL DEPTH:
45.2 fbgs

MEASURING POINT:

DRILLING EQUIPMENT: CME 850 ATV

DEPTH TO FIRST
WATER: NA

COMPL.

SAMPLING METHOD: 2" dia. split spoons

LOGGED BY:
MAC

HAMMER WEIGHT: 140

DROP: 30" (Autohammer)

RESPONSIBLE PROFESSIONAL:
Richard H. Frappa

REG. NO.

DEPTH (feet)	SAMPLES			OVM (ppm)	DESCRIPTION NAME (USCS Symbol): color, moist, % by weight, plast., structure, cementation, react. w/HCl, geo. inter.	DRILLING REMARKS
	Sample No.	Sample	Blows/ foot			
Surface Elevation: 695.63 fmsl						
1	1		2	NA	<p>Poorly graded SAND with GRAVEL (SP), 7.5Y 5/3, moist, fine to medium sand with fine angular to subangular gravel, trace silt and low plasticity fines, firm (ABLATION TILL)</p>	
2			3	NA		
3	2		4	NA		
4			5	NA		
5	3		9	NA		
6			14	NA		
7	4		17	NA		
8			19	NA		
9	5		4	NA		
10			8	NA		
11	6		12	NA	decreasing fine angular gravel content.	hard drilling
12			14	NA		
13	7		16	NA		
14			20	NA		
15	8		6	NA		
16			12	NA		
17	9		14	NA	very dense, dry.	
18			23	NA		
19	10		32	NA		
20			42	NA		
21	11		39	NA		
22			18	NA		
23	12		28	NA		
24			28	NA		
25	13		38	NA		
26			44	NA		
27	14		21	NA		
28			40	NA		
29	15		41	NA		
30			32	NA		
31	16		23	NA		
32			31	NA		
33			51	NA		
34			61	NA		
35			21	NA		
36	17		34	NA		
37			37	NA		
38			66	NA		
39			24	NA		
40			44	NA		
			67	NA		
			100/0.5	NA		
			28	NA		
			32	NA		
			47	NA		
			100/0.5	NA		
			35	NA		
			29	NA		
			45	NA		
			64	NA		
			26	NA		
			30	NA		
			34	NA		
			100/0.2	NA		
			25	NA		
			20	NA		
			56	NA		
			51	NA		

BORING BORING LOGS.GPJ (6/08)



PROJECT: Mill Seat Landfill-
Bovee Road Hydrogeological Investigation
Riga, New York

Log of Boring No. SB-11 (2008) (cont'd)

DEPTH (feet)	SAMPLES			OVM (ppm)	DESCRIPTION NAME (USCS Symbol): color, moist, % by weight, plast., structure, cementation, react. w/HCl, geo. inter.	DRILLING REMARKS
	Sample No.	Sample	Blows/ foot			
41	18		16	NA		
42			22 31 31	NA		
43	19		38 48	NA		
44			51 52	NA		
45	20		91 69 100/0.2	NA		
46					Weathered shale bedrock returned in sampler at 45.2 fbgs. Auger refusal at 48 fbgs.	
47						
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PROJECT: Mill Seat Landfill- Bovee Road Hydrogeological Investigation
Riga, New York

Log of Boring No. SB-12 (2008)

BORING LOCATION: Bovee Road Property	ELEVATION: 657.75 fmsl	DATUM: NAGVD-1983
DRILLING CONTRACTOR: Nothnagle Drilling, Inc.	DATE STARTED: 3/31/08	DATE FINISHED: 3/31/08
DRILLING METHOD: 2 3/4" ID HSA	TOTAL DEPTH: 10.1 fbgs	MEASURING POINT:
DRILLING EQUIPMENT: CME 850 ATV	DEPTH TO WATER: NA	FIRST WATER: NA
SAMPLING METHOD: 2" dia. split spoons	LOGGED BY: MAC	
HAMMER WEIGHT: 140	DROP: 30" (Autohammer)	RESPONSIBLE PROFESSIONAL: Richard H. Frappa
		REG. NO.

DEPTH (feet)	SAMPLES			OVM (ppm)	DESCRIPTION	DRILLING REMARKS
	Sample No.	Sample	Blows/ foot		NAME (USCS Symbol): color, moist, % by weight, plast., structure, cementation, react. w/HCl, geo. inter.	
Surface Elevation: 657.75 fmsl						
1	1		1	NA	<p>Poorly graded SAND with GRAVEL (SP), 7.5Y 5/3, moist, fine to medium sand with fine angular to subangular gravel, trace silt and low plasticity fines, firm (ABLATION TILL)</p> <p>Weathered grey-green shale bedrock, dry, firm. Locally weathered to clay.</p> <p>Sampler bouncing and auger refusal at 10.1 fbgs.</p>	
2			2			
3	2		7	NA		
4			11			
5	3		11	NA		
6			7			
7	4		7	NA		
8			6			
9	5		10	NA		
10	6		15	NA		
11			15			
12			14			
13			13			
14			9			
15			15			
16			25			
17			51			
18			100/0.1			
19						
20						
21						
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PROJECT: Mill Seat Landfill- Bovee Road Hydrogeological Investigation Riga, New York		Log of Boring No. SB-13 (2008)	
BORING LOCATION: Bovee Road Property		ELEVATION: 655.62 fmsl	DATUM: NAGVD-1983
DRILLING CONTRACTOR: Nothnagle Drilling, Inc.		DATE STARTED: 3/31/08	DATE FINISHED: 3/31/08
DRILLING METHOD: 2 3/4" ID HSA		TOTAL DEPTH: 6.0 fbgs	MEASURING POINT:
DRILLING EQUIPMENT: CME 850 ATV		DEPTH TO WATER: 1 feet	COMPL.
SAMPLING METHOD: 2" dia. split spoons		LOGGED BY: MAC	
HAMMER WEIGHT: 140	DROP: 30" (Autohammer)	RESPONSIBLE PROFESSIONAL: Richard H. Frappa	REG. NO.

DEPTH (feet)	SAMPLES			OVM (ppm)	DESCRIPTION NAME (USCS Symbol): color, moist, % by weight, plast., structure, cementation, react. w/HCl, geo. inter.	DRILLING REMARKS
	Sample No.	Sample	Blows/ foot			
Surface Elevation: 655.62 fmsl						
1	1		1	NA	Poorly graded SAND with GRAVEL (SP) , 7.5Y 5/3, moist, fine to medium sand with fine angular to subangular gravel, trace silt and low plasticity fines, firm (ABLATION TILL)	
2			3			
3	2		4	NA		
4			5		Weathered grey-green shale bedrock, dry to moist, loose. Locally weathered to angular gravel and clay.	
5	3		8	NA		
6			10			
7			12		Sampler bouncing and auger refusal at 6.0 fbgs.	
8			3			
9			2			
10						
11						
12						
13						
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PROJECT: Mill Seat Landfill- Bovee Road Hydrogeological Investigation
Riga, New York

Log of Boring No. SB-14 (2008)

BORING LOCATION: Bovee Road Property		ELEVATION: 664.42 fmsl	DATUM: NAGVD-1983
DRILLING CONTRACTOR: Nothnagle Drilling, Inc.		DATE STARTED: 4/1/08	DATE FINISHED: 4/1/08
DRILLING METHOD: 2 3/4" ID HSA		TOTAL DEPTH: 9.2 fbgs	MEASURING POINT:
DRILLING EQUIPMENT: CME 850 ATV		DEPTH TO WATER:	FIRST 1 feet
SAMPLING METHOD: 2" dia. split spoons		LOGGED BY: MAC	
HAMMER WEIGHT: 140	DROP: 30" (Autohammer)	RESPONSIBLE PROFESSIONAL: Richard H. Frappa	REG. NO.

DEPTH (feet)	SAMPLES			OVM (ppm)	DESCRIPTION	DRILLING REMARKS
	Sample No.	Sample	Blows/ foot		NAME (USCS Symbol): color, moist, % by weight, plast., structure, cementation, react. w/HCl, geo. inter.	
Surface Elevation: 664.42 fmsl						
1	1		1	NA	Poorly graded SAND with GRAVEL (SP) , 7.5Y 5/3, moist, fine to medium sand with fine angular to subangular gravel, trace silt and low plasticity fines, firm (ABLATION TILL)	▽
2			2 3 3	NA		
3	2		8 21 12 22	NA		
4			13 17 15 15	NA	Weathered grey-green shale bedrock, dry, firm. Locally weathered to angular gravel and clay.	
5	3		8 6 7	NA		
6			10 18 31	NA	Sampler bouncing and auger refusal at 9.2 fbgs.	
7	4		100/0.2	NA		
8	5					
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PROJECT: Mill Seat Landfill- Bovee Road Hydrogeological Investigation
Riga, New York

Log of Boring No. SB-15 (2008)

BORING LOCATION: Bovee Road Property

ELEVATION:
661.71 fmsl

DATUM:
NAGVD-1983

DRILLING CONTRACTOR: Nothnagle Drilling, Inc.

DATE STARTED:
4/1/08

DATE FINISHED:
4/1/08

DRILLING METHOD: 2 3/4" ID HSA

TOTAL DEPTH:
6.7 fbgs

MEASURING POINT:

DRILLING EQUIPMENT: CME 850 ATV

DEPTH TO
WATER: FIRST
NA

COMPL.

SAMPLING METHOD: 2" dia. split spoons

LOGGED BY:
MAC

HAMMER WEIGHT: 140

DROP: 30" (Autohammer)

RESPONSIBLE PROFESSIONAL:
Richard H. Frappa

REG. NO.

DEPTH (feet)	SAMPLES			OVM (ppm)	DESCRIPTION NAME (USCS Symbol); color, moist, % by weight, plast., structure, cementation, react. w/HCl, geo. inter.	DRILLING REMARKS
	Sample No.	Sample	Blows/ foot			
					Surface Elevation: 661.71 fmsl	
1	1		1	NA	<p>Poorly graded SAND with GRAVEL (SP), 7.5Y 5/3, moist, fine to medium sand with fine angular to subangular gravel, trace silt and low plasticity fines, firm (ABLATION TILL)</p> <p>Weathered grey-green shale bedrock, dry, firm. Locally weathered to angular gravel and clay.</p> <p>Sampler bouncing and auger refusal at 6.7 fbgs.</p>	
2			2	NA		
3	2		8	NA		
4			16	NA		
5	3		15	NA		
6	4		22	NA		
7			23			
			1000.2			
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BORING BORING LOGS.GPJ (6/08)



PROJECT: Mill Seat Landfill- Bovee Road Hydrogeological Investigation
Riga, New York

Log of Boring No. SB-16 (2008)

BORING LOCATION: Bovee Road Property		ELEVATION: 662.16 fmsl	DATUM: NAGVD-1983
DRILLING CONTRACTOR: Nothnagle Drilling, Inc.		DATE STARTED: 4/1/08	DATE FINISHED: 4/1/08
DRILLING METHOD: 2 3/4" ID HSA		TOTAL DEPTH: 6.1 fbgs	MEASURING POINT:
DRILLING EQUIPMENT: CME 850 ATV		DEPTH TO WATER: FIRST NA	COMPL.
SAMPLING METHOD: 2" dia. split spoons		LOGGED BY: MAC	
HAMMER WEIGHT: 140	DROP: 30" (Autohammer)	RESPONSIBLE PROFESSIONAL: Richard H. Frappa	REG. NO.

DEPTH (feet)	SAMPLES			OVM (ppm)	DESCRIPTION <small>NAME (USCS Symbol): color, moist, % by weight, plast., structure, cementation, react. w/HCl, geo. inter.</small>	DRILLING REMARKS
	Sample No.	Sample	Blows/ foot			
Surface Elevation: 662.16 fmsl						
1	1		1	NA	<p>Poorly graded SAND with GRAVEL (SP), 7.5Y 5/3, moist, fine to medium sand with fine angular to subangular gravel, trace silt and low plasticity fines, firm (ABLATION TILL)</p> <p>Weathered grey-green shale bedrock, dry, firm. Locally weathered to angular gravel and clay.</p> <p>Sampler bouncing and auger refusal at 6.1 fbgs.</p>	
2			2	NA		
3	2		9	NA		
4			20	NA		
5	3		12	NA		
6	4		14	NA		
7			7			
8			10			
9			22			
10			61			
11			100/0.1			
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						
23						
24						
25						
26						
27						
28						
29						
30						
31						
32						
33						
34						
35						
36						
37						
38						
39						
40						

BORING BORING LOGS.GPJ (6/08)

PROJECT: Mill Seat Landfill- Bovee Road Hydrogeological Investigation
Riga, New York

Log of Boring No. SB-17 (2008)

BORING LOCATION: Bovee Road Property		ELEVATION: 652.44 fmsl	DATUM: NAGVD-1983
DRILLING CONTRACTOR: Nothnagle Drilling, Inc.		DATE STARTED: 3/28/08	DATE FINISHED: 3/28/08
DRILLING METHOD: 2 3/4" ID HSA		TOTAL DEPTH: 3.1 fbgs	MEASURING POINT:
DRILLING EQUIPMENT: CME 850 ATV		DEPTH TO WATER:	FIRST NA
SAMPLING METHOD: 2" dia. split spoons		LOGGED BY: MAC	
HAMMER WEIGHT: 140	DROP: 30" (Autohammer)	RESPONSIBLE PROFESSIONAL: Richard H. Frappa	REG. NO.

DEPTH (feet)	SAMPLES			OVM (ppm)	DESCRIPTION	DRILLING REMARKS
	Sample No.	Sample	Blows/ foot		NAME (USCS Symbol); color, moist, % by weight, plast., structure, cementation, react. w/HCl, geo. inter.	
					Surface Elevation: 652.44 fmsl	
1	1	[Symbol]	1	NA	Poorly graded SAND with GRAVEL (SP) 7.5Y 5/1, moist, trace silt and low plasticity fines, firm (ABLATION TILL)	
2	2	[Symbol]	3	NA		
3			6		Dry, grey shale bedrock returned in sampler at 2.0 fbgs.	
4			100/0.1		Auger refusal at 3.1 fbgs.	
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						
23						
24						
25						
26						
27						
28						
29						
30						
31						
32						
33						
34						
35						
36						
37						
38						
39						
40						

PROJECT: Mill Seat Landfill Riga, New York		Log of Boring No. SB-01 (2010)	
BORING LOCATION: South of Active Facility		ELEVATION: 672.48 fmsl	DATUM: NAD27
DRILLING CONTRACTOR: Nothnagle Drilling, Inc.		DATE STARTED: 8/10/10	DATE FINISHED: 8/10/10
DRILLING METHOD: 4 1/4" dia. Hollow Stem Auger		TOTAL DEPTH: 33.0 fbgs	MEASURING POINT: ground surface
DRILLING EQUIPMENT: CME 850 ATV		DEPTH TO WATER:	FIRST COMPL.
SAMPLING METHOD: 2" dia. SS split spoons		LOGGED BY: MAC	
HAMMER WEIGHT: Autohammer	DROP: 30"	RESPONSIBLE PROFESSIONAL: Richard H. Frappa	REG. NO.

DEPTH (feet)	SAMPLES			NA	DESCRIPTION NAME (USCS Symbol): color, moist, % by weight, plast., structure, cementation, react. w/HCl, geo. inter.	DRILLING REMARKS
	Sample No.	Sample	Blows/ foot			
Surface Elevation: 672.48 fmsl						
1	1		4	NA	Brown topsoil, wet, fine sand with silt and some vegetative matter, compact	
2			13			
3	2		10	NA	Well Graded SAND with GRAVEL (SW) red fine to med. sand with med. to coarse angular weathered bedrock gravel, moist, loose	
4			9			
5	3		13	NA		
6			12			
7	4		11	NA		
8			13			
9	5		17	NA		
10			15			
11	6		4	NA		
12			4			
13	7		6	NA		
14			10			
15	8		11	NA		
16			5			
17	9		7	NA		
18			6			
19	10		10	NA		
20			6			
21	11		10	NA	Dense Lodgment TILL-Sandy SILT (ML) 5YR 5/3 (brown) silt with fine sand, little fine to med. angular to rounded gravel (glacial erratics and shale bedrock-derived) and low plasticity fines, hard, dry throughout.	
22			8			
23	12		17	NA		
24			24			
25	13		41	NA		
26			57			
27	14		15	NA		
28			25			
29	15		39	NA		
30			45			
31	16		30	NA		
32			13			
33	17		13	NA	Weathered grey shale bedrock. Moist. Friable. Advance augers to 33' bgs through weathered bedrock zone. Augers grinding evenly on competent shale bedrock at 33' bgs.	
34			51			
35			30			
36			25			
37			30			
38			45			
39			35			
40			38			
			50			
			39			
			50/0.2			
			45			
			50/0.1			

BORING BORINGS, PZ AND MW LOGS.GPJ (9/10)



PROJECT: Mill Seat Landfill Riga, New York		Log of Boring No. SB-02 (2010)	
BORING LOCATION: South of Active Facility		ELEVATION: 666.11 fmsl	DATUM: NAD27
DRILLING CONTRACTOR: Nothnagle Drilling, Inc.		DATE STARTED: 8/10/10	DATE FINISHED: 8/10/10
DRILLING METHOD: 4 1/4" dia. Hollow Stem Auger		TOTAL DEPTH: 37.0 fbgs	MEASURING POINT: ground surface
DRILLING EQUIPMENT: CME 850 ATV		DEPTH TO WATER:	FIRST COMPL.
SAMPLING METHOD: 2" dia. SS split spoons		LOGGED BY: MAC	
HAMMER WEIGHT: Autohammer	DROP: 30"	RESPONSIBLE PROFESSIONAL: Richard H. Frappa	REG. NO.

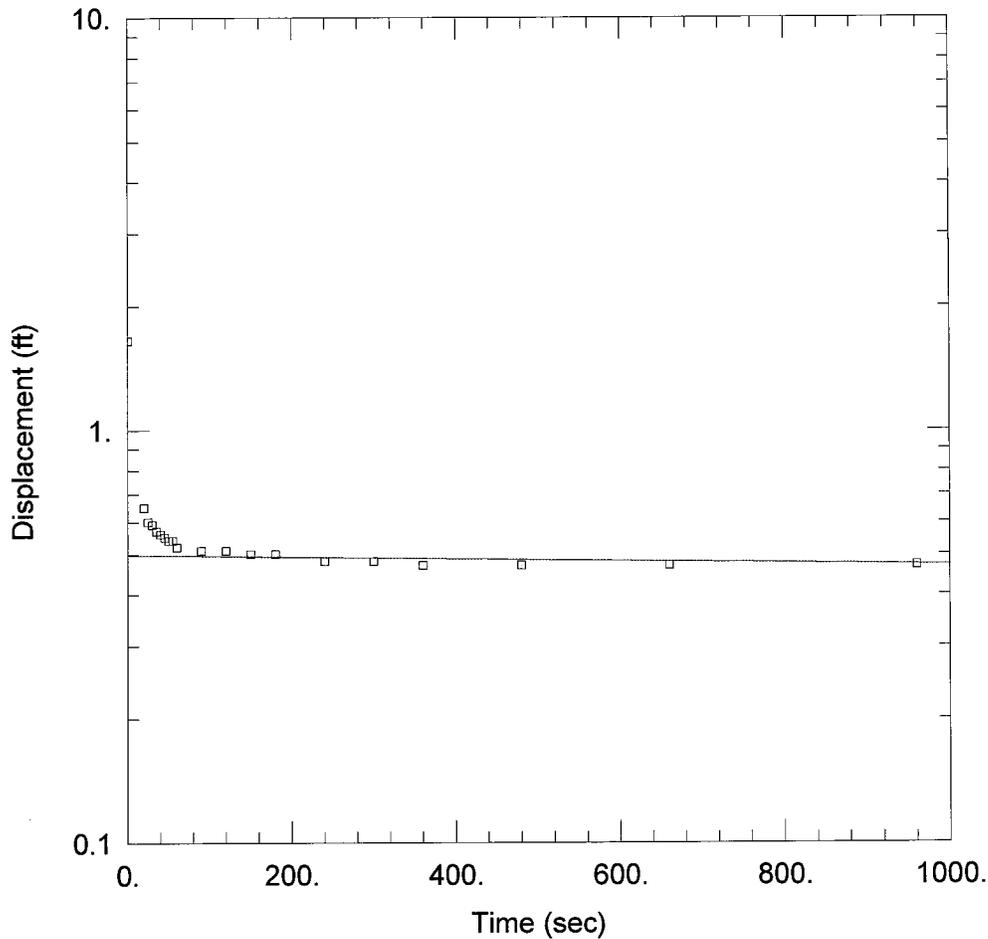
DEPTH (feet)	SAMPLES			NA	DESCRIPTION NAME (USCS Symbol): color, moist, % by weight, plast. structure, cementation, react. w/HCl, geo. inter.	DRILLING REMARKS
	Sample No.	Sample	Blows/foot			
Surface Elevation: 666.11 fmsl						
1	1		1	NA	Brown topsoil, wet, fine sand with silt and some vegetative matter, compact	
2			1	NA	Coarse Grained TILL- Sandy SILT (ML) 5YR 5/2 (dark reddish brown) silt with fine sand, trace low plasticity fines, trace fine rounded gravel, soft.	
3	2		6	NA		
4			11	NA		
5	3		14	NA		
6			20	NA		
7	4		27	NA		
8			34	NA		
9	5		40	NA		
10			42	NA		
11	6		49	NA	Dense Lodgment TILL-Sandy SILT (ML) 5YR 5/3 (brown) silt with fine sand, little fine to med. angular to rounded gravel (glacial erratics and shale bedrock-derived) and low plasticity fines, hard, dry throughout.	
12			31	NA		
13	7		28	NA		
14			55	NA		
15	8		60	NA	color grading to 2.5YR 5/1	
16			50	NA		
17	9		64	NA		
18			60	NA		
19	10		28	NA		
20			57	NA		
21	11		60/0.4	NA		
22			27	NA		
23	12		32	NA		
24			41	NA		
25	13		50	NA		
26			29	NA		
27	14		30	NA		
28			42	NA		
29	15		39	NA		
30			24	NA		
31	16		30	NA		
32			36	NA		
33	17		48	NA		
34	18		30	NA		
35			32	NA		
36			48	NA		
37			50	NA		
38			27	NA		
39			37	NA		
40			50/0.3	NA		
			38	NA		
			40	NA		
			39	NA		
			50/0.4	NA		
			35	NA		
			40	NA		
			47	NA		
			50	NA		
			34	NA		
			52	NA		
			54	NA		
			50/0.1	NA		
			50/0.1	NA		
				NA	Weathered grey shale bedrock. Moist. Friable. Advance augers to 27' bgs through weathered bedrock zone. Augers grinding evenly on competent shale bedrock at 37' bgs.	

PROJECT: Mill Seat Landfill Riga, New York		Log of Boring No. SB-03 (2010)	
BORING LOCATION: South of Active Facility		ELEVATION: 671.70 fmsl	DATUM: NAD27
DRILLING CONTRACTOR: Nothnagle Drilling, Inc.		DATE STARTED: 8/11/10	DATE FINISHED: 8/11/10
DRILLING METHOD: 4 1/4" dia. Hollow Stem Auger		TOTAL DEPTH: 28.8 fbgs	MEASURING POINT: ground surface
DRILLING EQUIPMENT: CME 850 ATV		DEPTH TO WATER:	FIRST COMPL.
SAMPLING METHOD: 2" dia. SS split spoons		LOGGED BY: MAC	
HAMMER WEIGHT: Autohammer	DROP: 30"	RESPONSIBLE PROFESSIONAL: Richard H. Frappa	REG. NO.

DEPTH (feet)	SAMPLES			NA	DESCRIPTION NAME (USCS Symbol): color, moist, % by weight, plast., structure, cementation, react. w/HCl, geo. inter.	DRILLING REMARKS
	Sample No.	Sample	Blows/foot			
Surface Elevation: 671.70 fmsl						
1	1		4	NA	Brown topsoil, wet, fine sand with silt and some vegetative matter, compact	
2			6			
3	2		10	NA	Dense Lodgment TILL-Sandy SILT (ML) 5YR 5/3 (brown) silt with fine sand, little fine to med. angular to rounded gravel (glacial erratics and shale bedrock-derived) and low plasticity fines, hard, dry throughout.	
4			14			
5			17			
6	3		20	NA		
7			27			
8			30			
9	4		17	NA		
10			25			
11			29			
12	5		20	NA	5 gallons of potable water added to facilitate drilling	
13			30			
14			40			
15	6		21	NA		
16			31			
17			28			
18			45			
19	7		19	NA		
20			35			
21			47			
22			50			
23	8		24	NA		
24			35			
25			50/0.4			
26			35			
27	9		35	NA		
28			45			
29			50/0.4			
30			19			
31	10		25	NA		
32			34			
33			47			
34			24			
35			29			
36			38			
37			47			
38			35			
39			40			
40			50/0.4			
			37			
	15		50/0.3	NA	Weathered grey shale bedrock. Moist. Friable. Augers grinding evenly on competent shale bedrock at 28' bgs.	

APPENDIX C

Hydraulic Conductivity Data Analyses



WELL TEST ANALYSIS

Data Set: I:\...\MW06-1S (test 1).aqt
 Date: 04/30/07

Time: 10:24:02

PROJECT INFORMATION

Company: Geomatrix Consultants, Inc.
 Client: WMNY
 Project: 12625.001
 Test Location: Mill Seat Sanitary Landfill
 Test Well: MW06-1S
 Test Date: 1/4/06

AQUIFER DATA

Saturated Thickness: 3.86 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW06-1S)

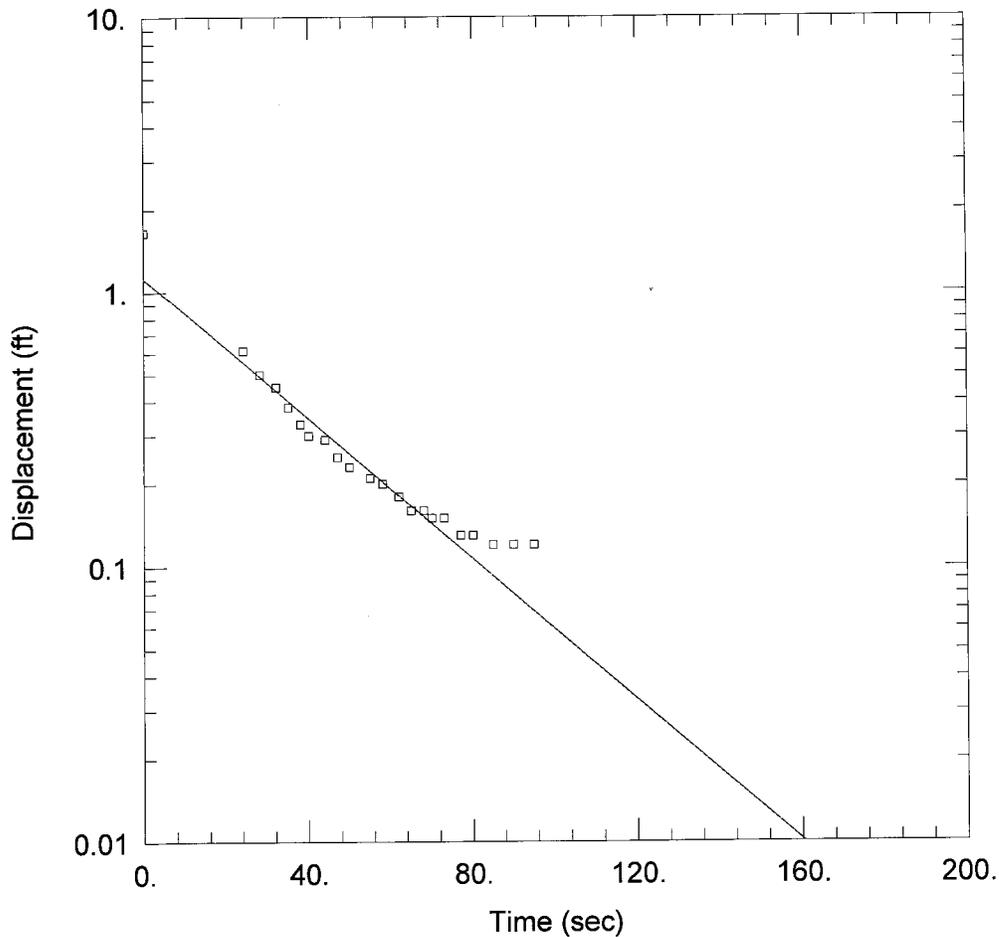
Initial Displacement: 1.65 ft
 Casing Radius: 0.08 ft
 Screen Length: 10. ft

Water Column Height: 3.86 ft
 Wellbore Radius: 0.4 ft
 Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
 K = 7.917E-06 cm/sec

Solution Method: Bouwer-Rice
 y0 = 0.4986 ft



WELL TEST ANALYSIS

Data Set: I:\...MW06-1D (test 3).aqt
 Date: 04/30/07

Time: 10:14:32

PROJECT INFORMATION

Company: Geomatrix Consultants, Inc.
 Client: WMNY
 Project: 12625.001
 Test Location: Mill Seat Sanitary Landfill
 Test Well: MW06-1D
 Test Date: 1/4/06

AQUIFER DATA

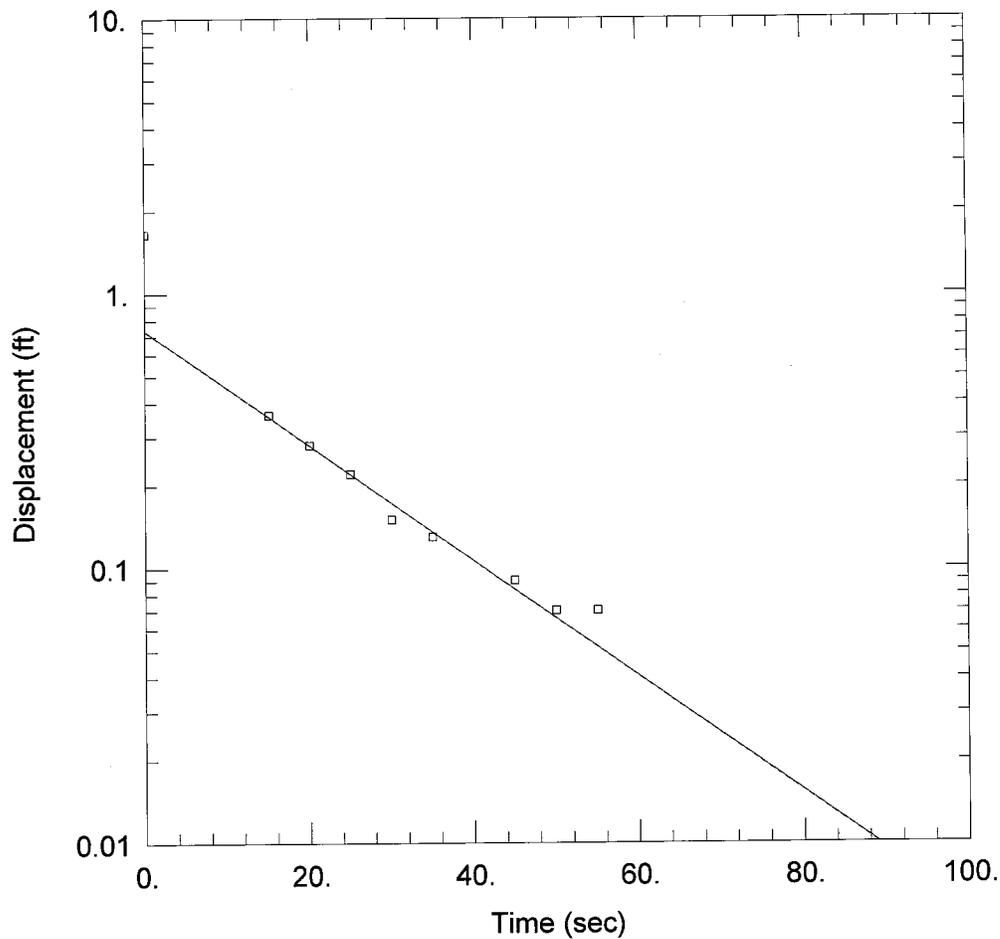
Saturated Thickness: 16.86 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW06-1D)

Initial Displacement: 1.65 ft Water Column Height: 16.86 ft
 Casing Radius: 0.08 ft Wellbore Radius: 0.4 ft
 Screen Length: 10. ft Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Confined Solution Method: Bower-Rice
 K = 0.006415 cm/sec y0 = 1.117 ft



WELL TEST ANALYSIS

Data Set: I:\Project\012625 Mill Seat Landfill\Hydrogeo Investigation\slug test data\MW06-2D.aqt
 Date: 04/30/07 Time: 10:14:50

PROJECT INFORMATION

Company: Geomatrix Consultants, Inc.
 Client: WMNY
 Project: 12625.001
 Test Location: Mill Seat Sanitary Landfill
 Test Well: MW06-2D
 Test Date: 1/4/06

AQUIFER DATA

Saturated Thickness: 11.9 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW06-1S)

Initial Displacement: 1.65 ft Water Column Height: 11.9 ft
 Casing Radius: 0.08 ft Wellbore Radius: 0.4 ft
 Screen Length: 10. ft Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice
 K = 0.009729 cm/sec y0 = 0.7311 ft

APPENDIX D

Soils Laboratory Analytical Data



580 Olean Road
East Aurora, NY 14052
Phone: (716)655.4933
Fax: (716)655.8638

April 17, 2008

Mr. Richard Frappa
Geomatrix Consultants, Inc.
90B John Muir Drive, Suite 104
Amherst, NY 14228

Re: Soil Testing Report & Associated Invoice

Dear Mr. Frappa:

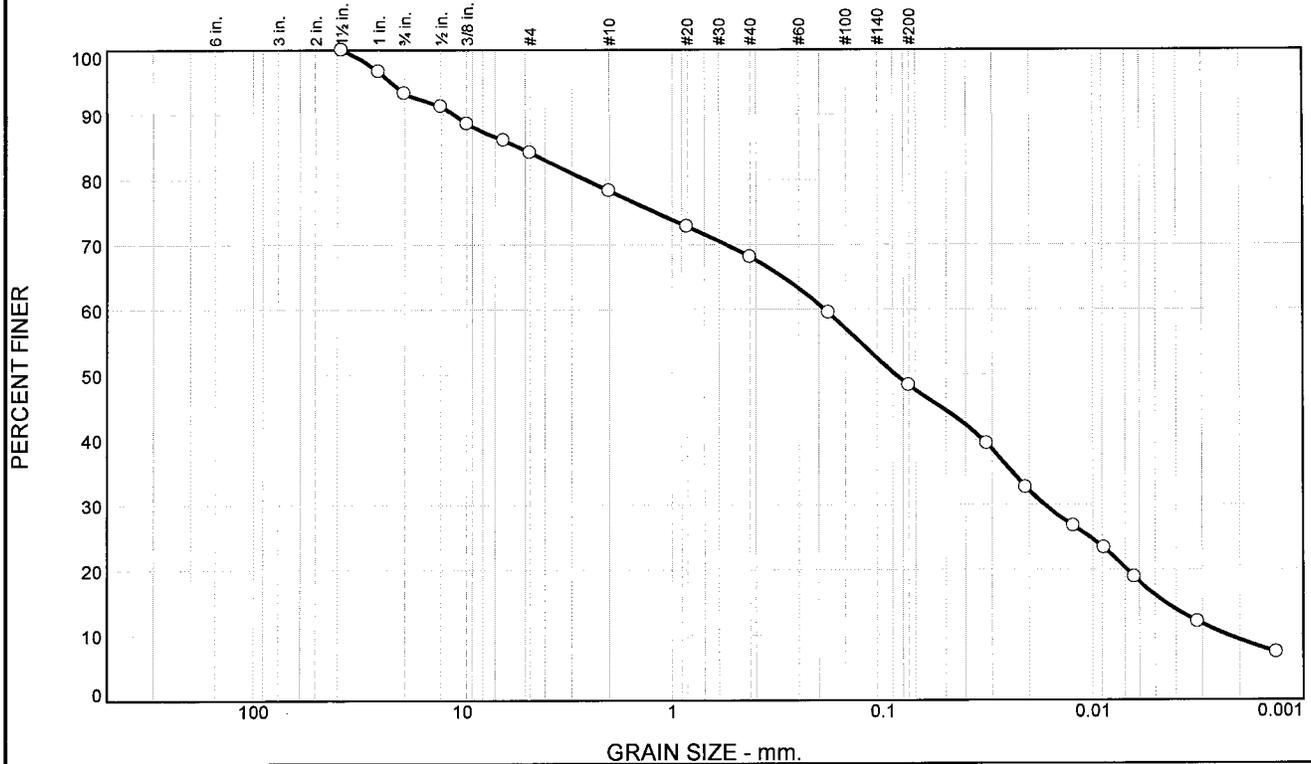
Enclosed are the testing results for 11 soil samples received by our laboratory on April 4, 2008. The sample results and invoice have been transmitted to you via electronic mail. If you have any questions or require additional information please call us.

Very truly yours,

A handwritten signature in cursive script that reads "Jeanne M. Asquith".

Jeanne M. Asquith
Soils Laboratory Manager

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	6.7	9.2	5.8	10.2	19.8	32.3	16.0

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5	100.0		
1	96.7		
.75	93.3		
.5	91.3		
.375	88.6		
.25	86.1		
#4	84.1		
#10	78.3		
#20	72.8		
#40	68.1		
#80	59.5		
#200	48.3		

Material Description

ID#08-062
 Gray Silty, clayey sand with gravel

Atterberg Limits (ASTM D 4318)

PL= 10.9 LL= 16.6 PI= 5.7

Classification

USCS= SC-SM AASHTO=

Coefficients

D₈₅= 5.3816 D₆₀= 0.1880 D₅₀= 0.0870
 D₃₀= 0.0170 D₁₅= 0.0045 D₁₀= 0.0023
 C_u= 81.38 C_c= 0.66

Date Tested: 4/14/08 Tested By: RP

Remarks

* (no specification provided)

Sample No.: SB-03(2008) Source of Sample: 2008 Testing
 Location: Title: LM
 Checked By: JMA

Date Sampled: Elev./Depth: 14-16'

3rd Rock, LLC

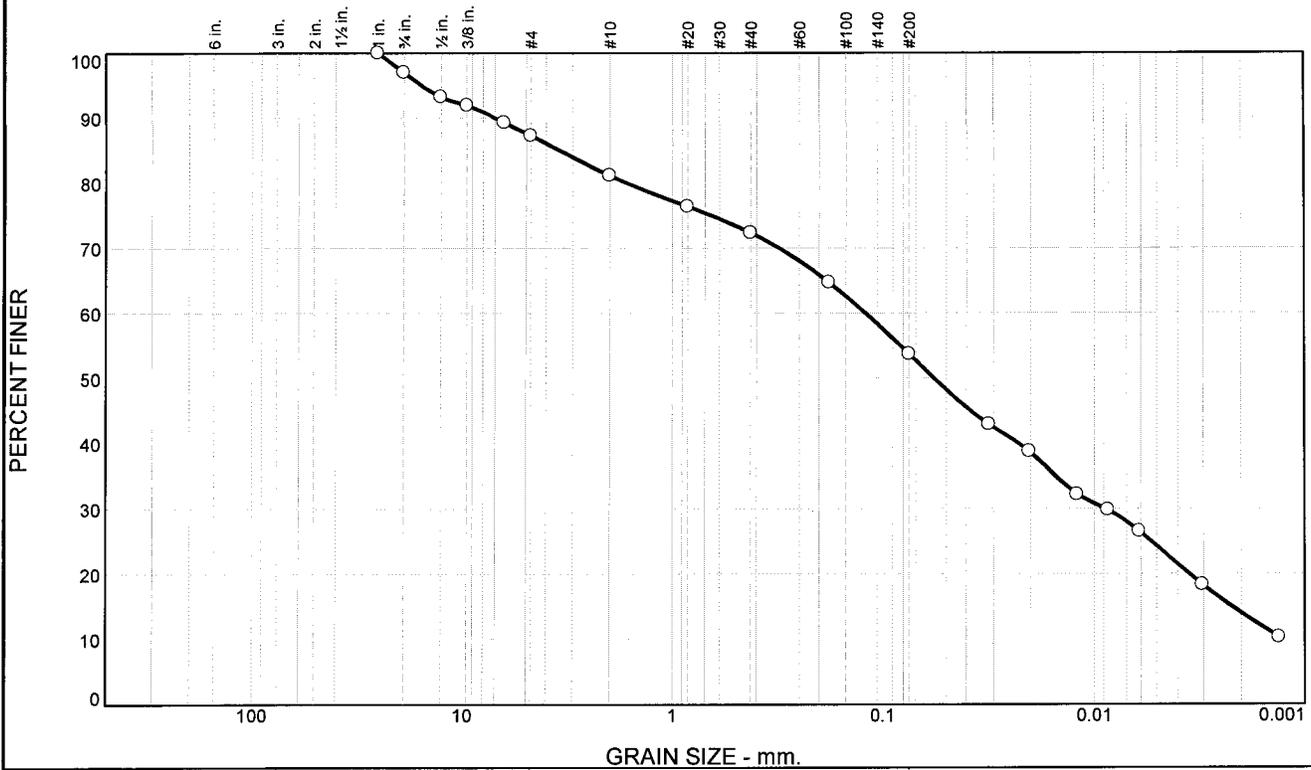
Client: Geomatrix Consultants
 Project: Mill Seat Landfill

East Aurora, NY

Project No: 08-013

Figure

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	3.0	9.7	6.1	8.9	18.6	29.5	24.2

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	97.0		
.5	93.2		
.375	91.9		
.25	89.3		
#4	87.3		
#10	81.2		
#20	76.4		
#40	72.3		
#80	64.7		
#200	53.7		

Material Description

ID#08-063
Brown Sandy lean clay

Atterberg Limits (ASTM D 4318)

PL= 12.3 LL= 21.3 PI= 9.0

Classification

USCS= CL AASHTO=

Coefficients

D₈₅= 3.4638 D₆₀= 0.1209 D₅₀= 0.0570
D₃₀= 0.0088 D₁₅= 0.0022 D₁₀=
C_u= C_c=

Date Tested: 4/14/08 Tested By: RP

Remarks

* (no specification provided)

Sample No.: SB-07(2008) Source of Sample: 2008 Testing
Location: Title: LM
Checked By: JMA

Date Sampled: Elev./Depth: 4-8'

3rd Rock, LLC

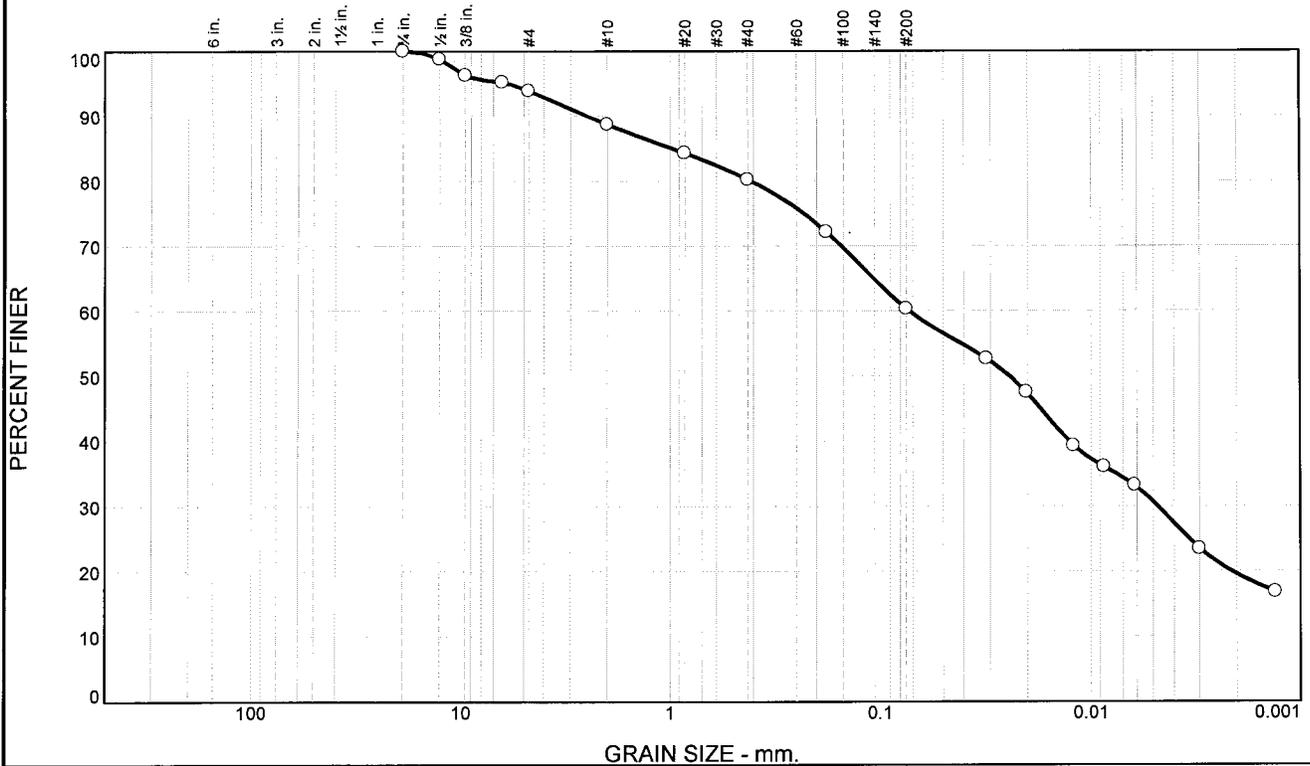
Client: Geomatrix Consultants
Project: Mill Seat Landfill

East Aurora, NY

Project No: 08-013

Figure

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	6.1	5.2	8.5	19.9	29.7	30.6

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75	100.0		
.5	98.8		
.375	96.3		
.25	95.2		
#4	93.9		
#10	88.7		
#20	84.3		
#40	80.2		
#80	72.2		
#200	60.3		

Material Description

ID#08-061
Brown Sandy lean clay

Atterberg Limits (ASTM D 4318)

PL= 10.9 LL= 19.4 PI= 8.5

Classification

USCS= CL AASHTO=

Coefficients

D₈₅= 0.9795 D₆₀= 0.0730 D₅₀= 0.0243
D₃₀= 0.0048 C_u= D₁₅= D₁₀=
C_c=

Date Tested: 4/14/08 Tested By: RP

Remarks

* (no specification provided)

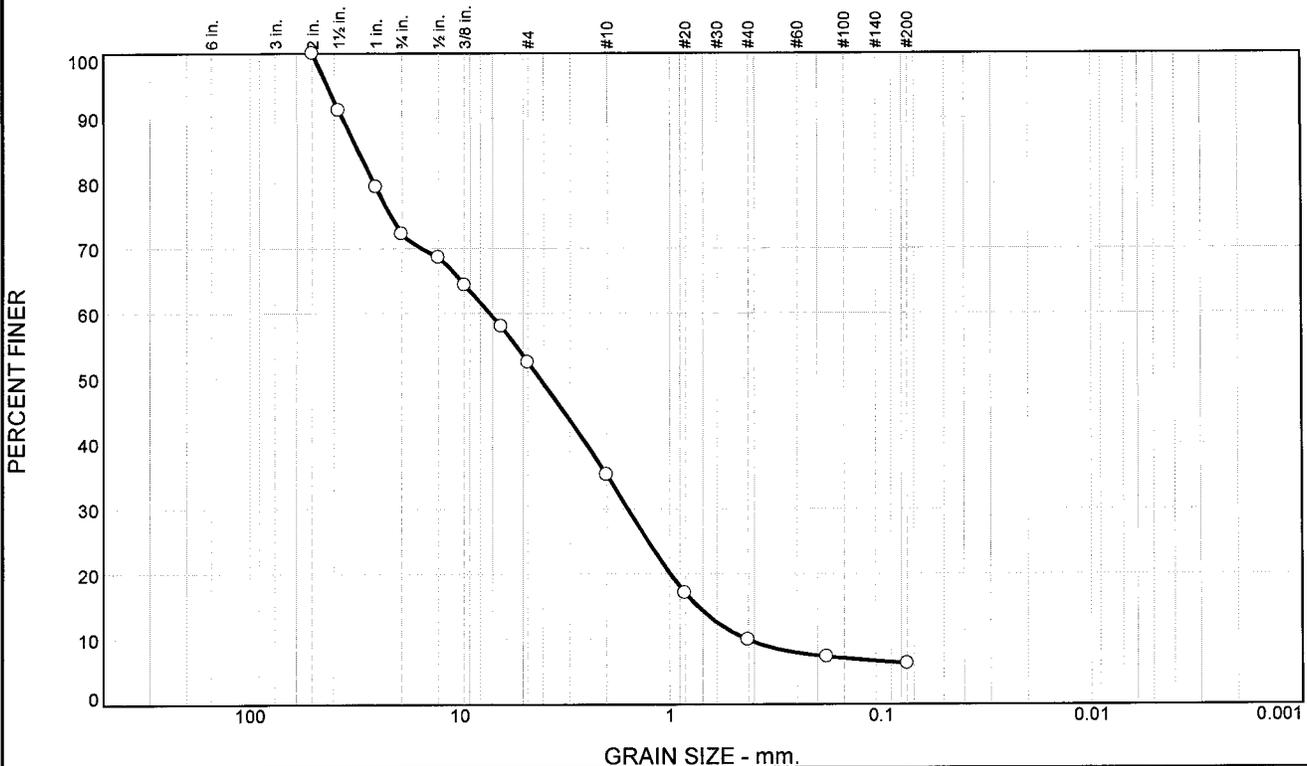
Sample No.: SB-09(2008) Source of Sample: 2008 Testing Date Sampled: Elev./Depth: 14-16'

Location: Title: LM

Checked By: JMA

<p>3rd Rock, LLC</p> <p>East Aurora, NY</p>	<p>Client: Geomatrix Consultants</p> <p>Project: Mill Seat Landfill</p> <p>Project No: 08-013</p>	<p>Figure</p>
---	--	----------------------

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	27.8	19.7	17.3	25.3	3.7	6.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2	100.0		
1.5	91.2		
1	79.5		
.75	72.2		
.5	68.6		
.375	64.4		
.25	58.0		
#4	52.5		
#10	35.2		
#20	17.1		
#40	9.9		
#80	7.3		
#200	6.2		

Material Description

ID#08-053
 Poorly graded gravel with silty clay and sand

Atterberg Limits (ASTM D 4318)

PL= 20.9 LL= 27.9 PI= 7.0

Classification

USCS= GP-GC AASHTO=

Coefficients

D₈₅= 30.7780 D₆₀= 7.1808 D₅₀= 4.1753
 D₃₀= 1.5853 D₁₅= 0.7386 D₁₀= 0.4340
 C_u= 16.54 C_c= 0.81

Date Tested: 4/9/08 Tested By: RP

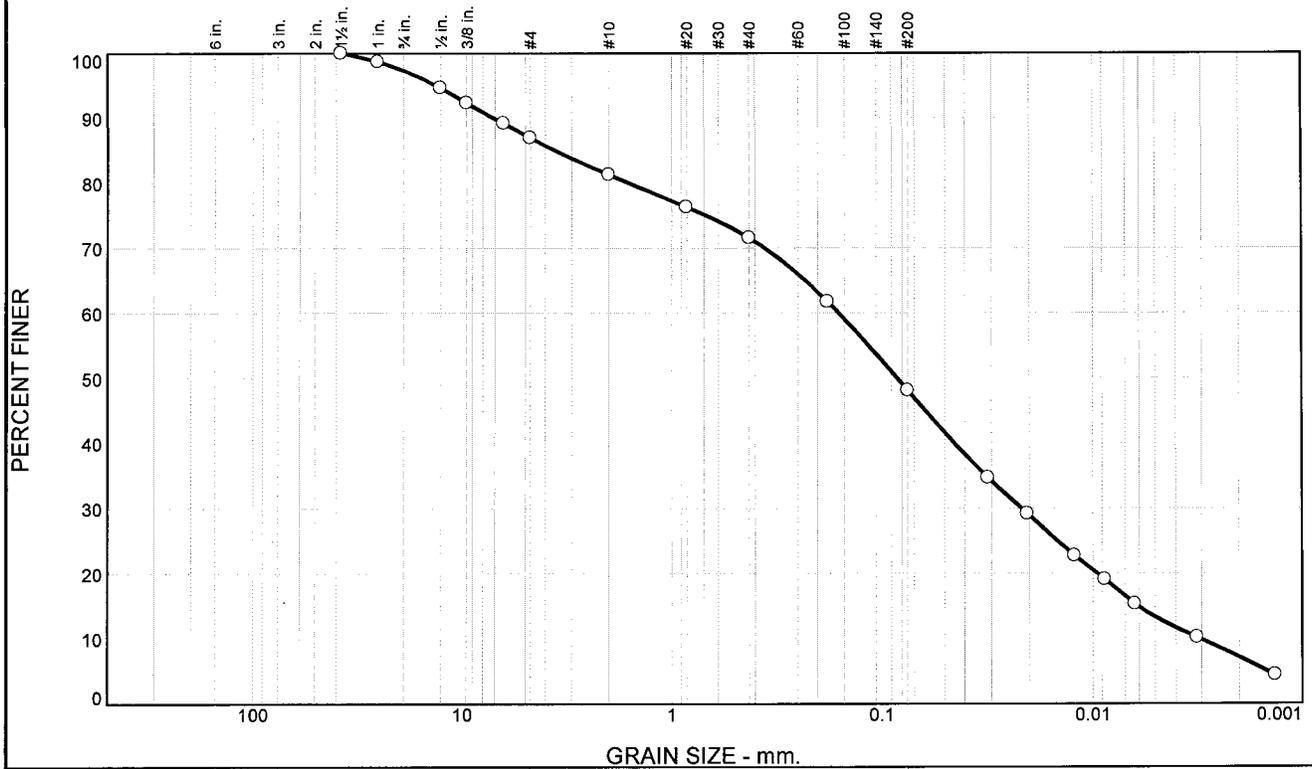
Remarks

* (no specification provided)

Sample No.: TP-1(2008) Source of Sample: 2008 Testing Date Sampled: Elev./Depth: 8-10'
 Location: Title: LM
 Checked By: JMA

3rd Rock, LLC East Aurora, NY	Client: Geomatrix Consultants Project: Mill Seat Landfill Project No: 08-013
Figure	

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	2.7	10.4	5.6	9.8	23.4	34.9	13.2

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5	100.0		
1	98.7		
.5	94.7		
.375	92.3		
.25	89.2		
#4	86.9		
#10	81.3		
#20	76.3		
#40	71.5		
#80	61.7		
#200	48.1		

Material Description

ID#08-054
Brown Silty sand

Atterberg Limits (ASTM D 4318)

PL= NP LL= NV PI= NP

Classification

USCS= SM AASHTO=

Coefficients

D₈₅= 3.6198 D₆₀= 0.1597 D₅₀= 0.0843
D₃₀= 0.0217 D₁₅= 0.0061 D₁₀= 0.0031
C_u= 51.71 C_c= 0.96

Date Tested: 4/8/08 **Tested By:** JMA

Remarks

* (no specification provided)

Sample No.: TP-2(2008) **Source of Sample:** 2008 Testing
Location: **Title:** LM
Checked By: JMA

Date Sampled:
Elev./Depth: 11-12'

3rd Rock, LLC

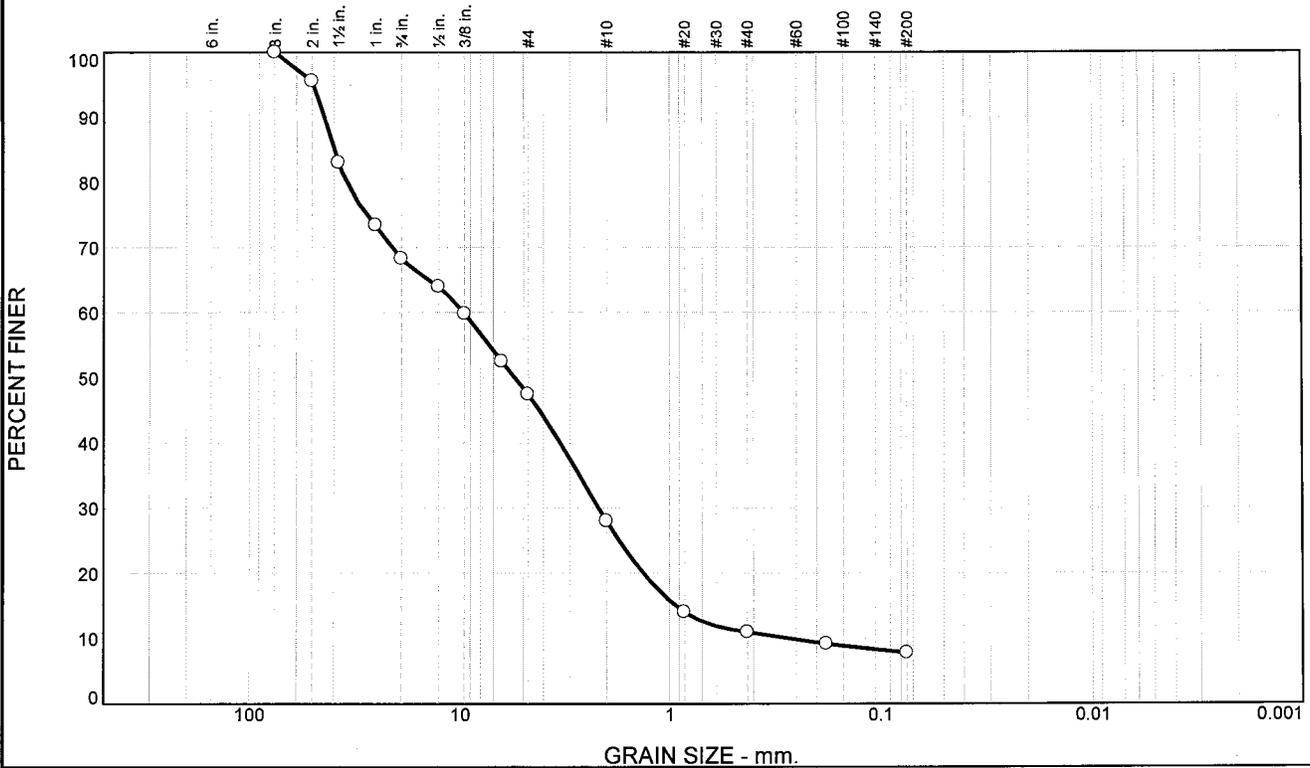
East Aurora, NY

Client: Geomatrix Consultants
Project: Mill Seat Landfill

Project No: 08-013

Figure

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	31.7	20.8	19.5	17.0	3.2	7.8	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3	100.0		
2	95.6		
1.5	83.0		
1	73.4		
.75	68.3		
.5	64.0		
.375	59.8		
.25	52.5		
#4	47.5		
#10	28.0		
#20	14.0		
#40	11.0		
#80	9.2		
#200	7.8		

Material Description

ID#08-055
Well-graded gravel with clay and sand

Atterberg Limits (ASTM D 4318)

PL= 16.4 LL= 23.7 PI= 7.3

Classification

USCS= GW-GC AASHTO=

Coefficients

D₈₅= 39.9135 D₆₀= 9.6349 D₅₀= 5.4820
D₃₀= 2.1839 D₁₅= 0.9368 D₁₀= 0.2698
C_u= 35.72 C_c= 1.83

Date Tested: 4/8/08 Tested By: JMA

Remarks

* (no specification provided)

Sample No.: TP-3(2008) Source of Sample: 2008 Testing

Date Sampled:

Location:

Elev./Depth: 8-10'

Checked By: JMA

Title: LM

3rd Rock, LLC

Client: Geomatrix Consultants

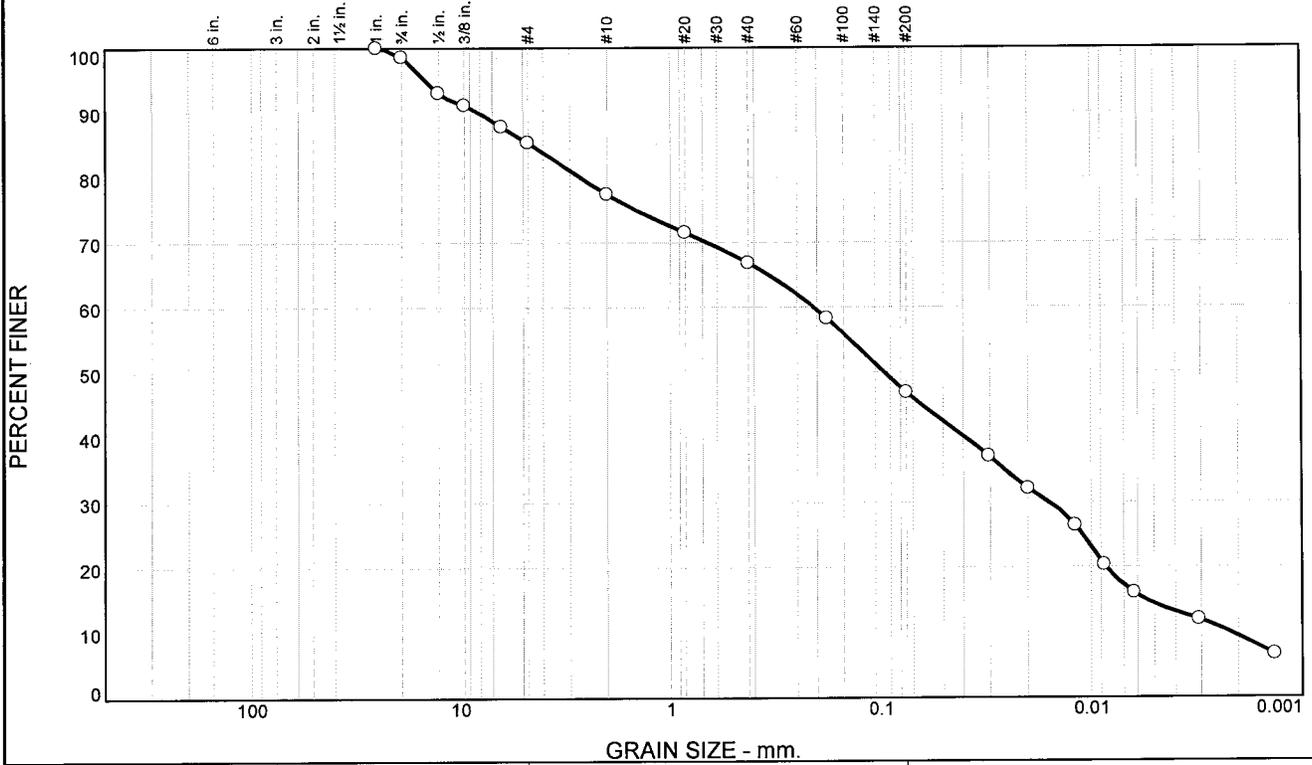
Project: Mill Seat Landfill

East Aurora, NY

Project No: 08-013

Figure

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	1.4	13.2	8.0	10.6	19.9	32.6	14.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	98.6		
.5	93.0		
.375	91.1		
.25	87.8		
#4	85.4		
#10	77.4		
#20	71.5		
#40	66.8		
#80	58.3		
#200	46.9		

Material Description

ID#08-056
Brownish Gray Silty, clayey sand

Atterberg Limits (ASTM D 4318)

PL= 11.2 LL= 14.9 PI= 3.7

Classification

USCS= SC-SM AASHTO=

Coefficients

D₈₅= 4.5607 D₆₀= 0.2082 D₅₀= 0.0962
D₃₀= 0.0159 D₁₅= 0.0055 D₁₀= 0.0022
C_u= 94.09 C_c= 0.55

Date Tested: 4/9/08 Tested By: RP

Remarks

* (no specification provided)

Sample No.: TP-5(2008) Source of Sample: 2008 Testing
 Location: Title: LM

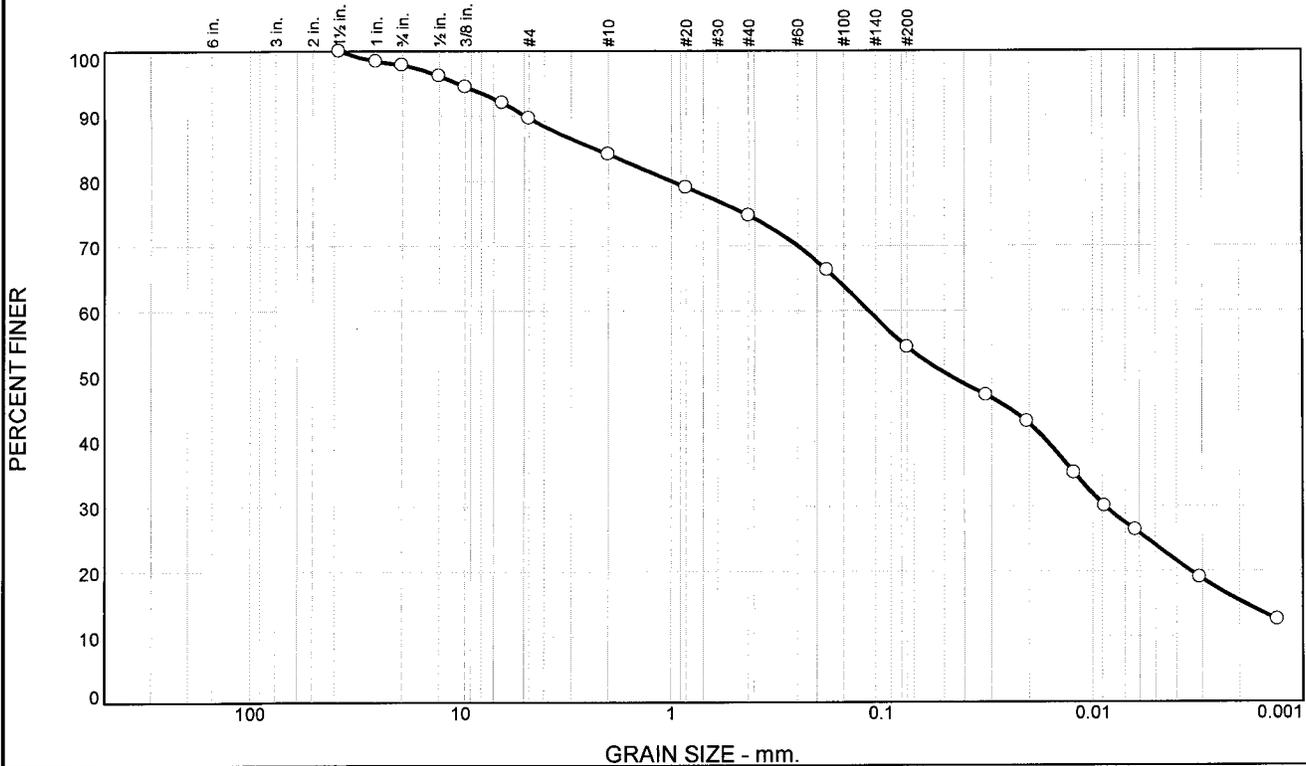
Date Sampled: Elev./Depth: 5-6'

Checked By: JMA

<p>3rd Rock, LLC</p> <p>East Aurora, NY</p>	<p>Client: Geomatrix Consultants Project: Mill Seat Landfill Project No: 08-013</p>
---	---

Figure

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	2.2	8.2	5.5	9.5	20.2	30.4	24.0

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5	100.0		
1	98.4		
.75	97.8		
.5	96.1		
.375	94.5		
.25	92.0		
#4	89.6		
#10	84.1		
#20	79.0		
#40	74.6		
#80	66.3		
#200	54.4		

Material Description

ID#08-057
Brown Sandy silty clay

Atterberg Limits (ASTM D 4318)

PL= 12.6 LL= 19.3 PI= 6.7

Classification

USCS= CL-ML AASHTO=

Coefficients

D₈₅= 2.3464 D₆₀= 0.1146 D₅₀= 0.0471
D₃₀= 0.0088 D₁₅= 0.0019 D₁₀=
C_u= C_c=

Date Tested: 4/14/08 **Tested By:** RP

Remarks

* (no specification provided)

Sample No.: TP-6(2008) **Source of Sample:** 2008 Testing
Location:
Checked By: JMA

Date Sampled:
Elev./Depth: 6-8'

Title: LM

3rd Rock, LLC

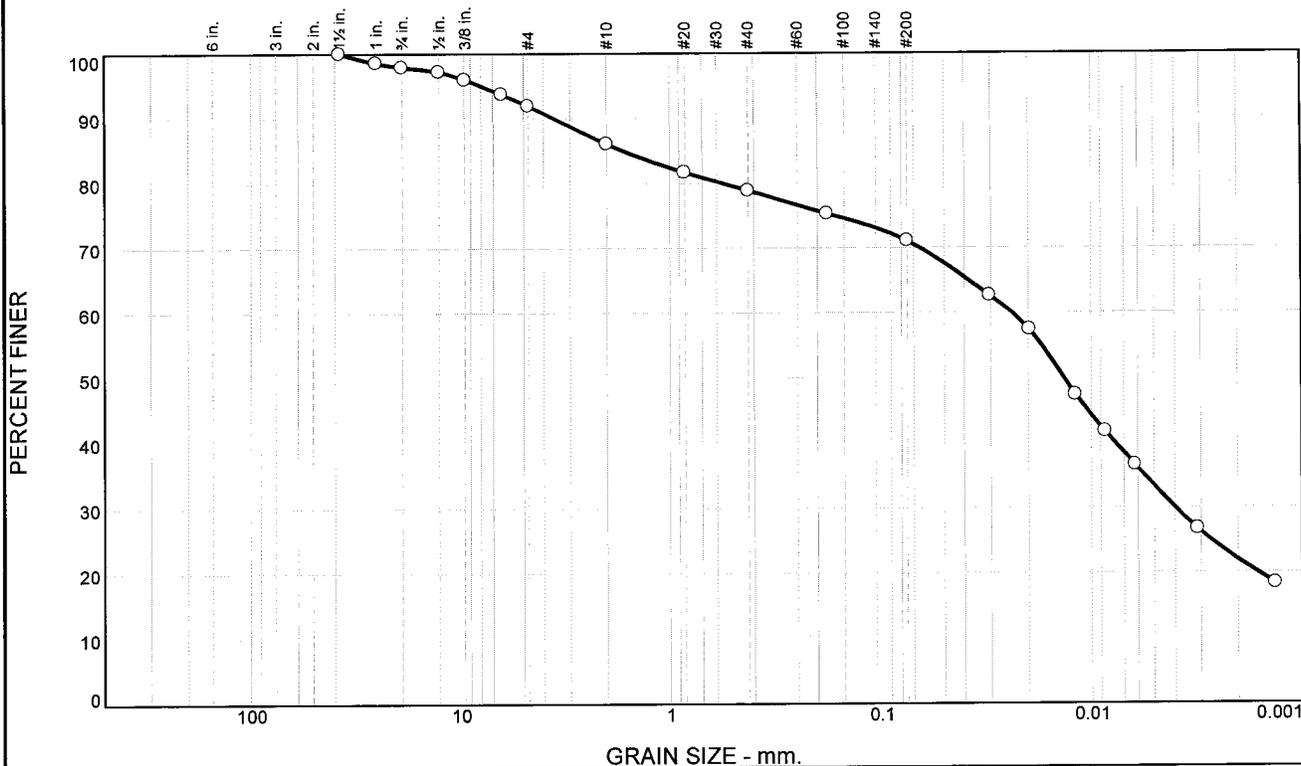
Client: Geomatrix Consultants
Project: Mill Seat Landfill

East Aurora, NY

Project No: 08-013

Figure

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	2.1	6.0	5.9	7.2	7.8	37.7	33.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5	100.0		
1	98.6		
.75	97.9		
.5	97.2		
.375	96.0		
.25	93.7		
#4	91.9		
#10	86.0		
#20	81.6		
#40	78.8		
#80	75.3		
#200	71.0		

Material Description

ID#08-058
Brown Lean clay with sand

Atterberg Limits (ASTM D 4318)

PL= 22.4 LL= 34.4 PI= 12.0

Classification

USCS= CL AASHTO=

Coefficients

D₈₅= 1.6794 D₆₀= 0.0238 D₅₀= 0.0136
D₃₀= 0.0040 D₁₅= D₁₀=
C_u= C_c=

Date Tested: 4/14/08 Tested By: JMA

Remarks

* (no specification provided)

Sample No.: TP-07(2008) Source of Sample: 2008 Testing Date Sampled: Elev./Depth: 4-5'

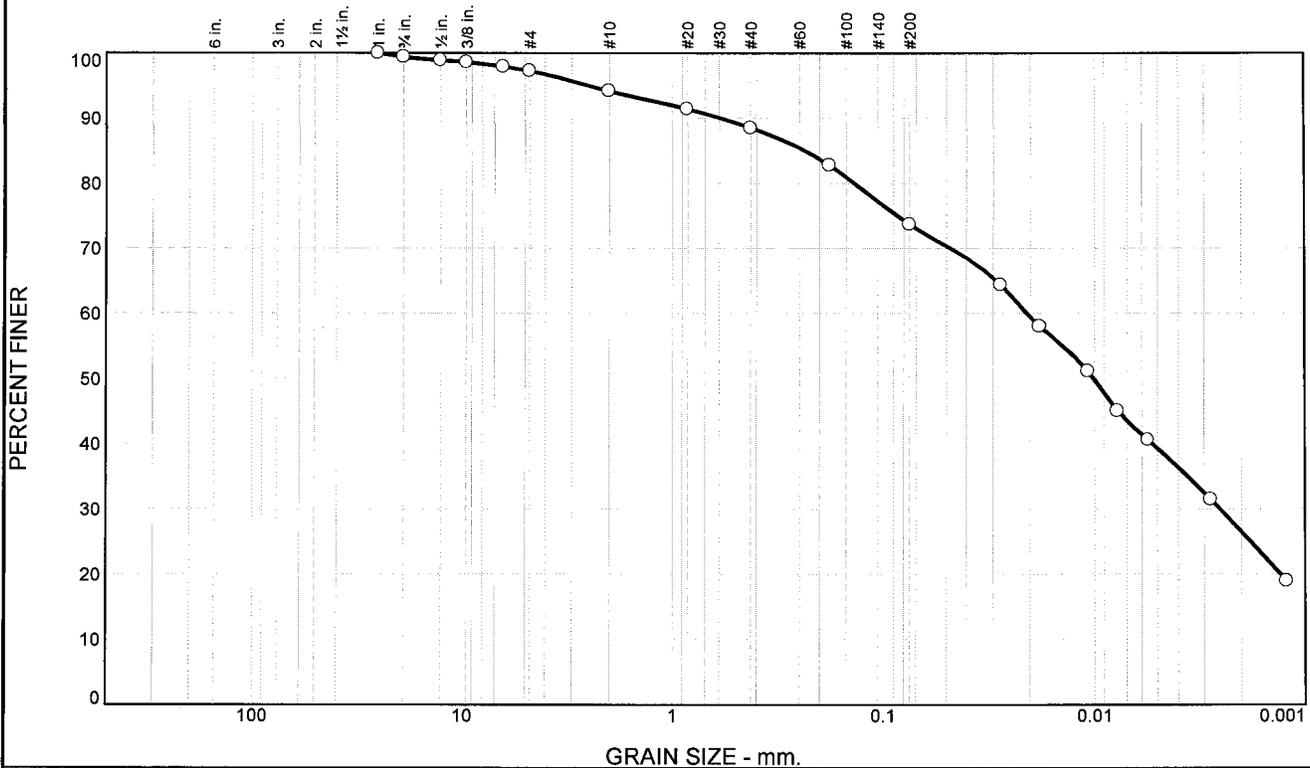
Location: Title: LM

Checked By: JMA

3rd Rock, LLC East Aurora, NY	Client: Geomatrix Consultants Project: Mill Seat Landfill Project No: 08-013
--	---

Figure

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.6	2.2	3.1	5.6	14.8	34.5	39.2

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	99.4		
.5	98.9		
.375	98.6		
.25	97.9		
#4	97.2		
#10	94.1		
#20	91.4		
#40	88.5		
#80	82.7		
#200	73.7		

Material Description

ID#08-060
Brown Lean clay with sand

Atterberg Limits (ASTM D 4318)

PL= 14.2 LL= 26.9 PI= 12.7

Classification

USCS= CL AASHTO=

Coefficients

D₈₅= 0.2366 D₆₀= 0.0207 D₅₀= 0.0101
D₃₀= 0.0025 D₁₅= D₁₀=
C_u= C_c=

Date Tested: 4/10/08 Tested By: RP

Remarks

* (no specification provided)

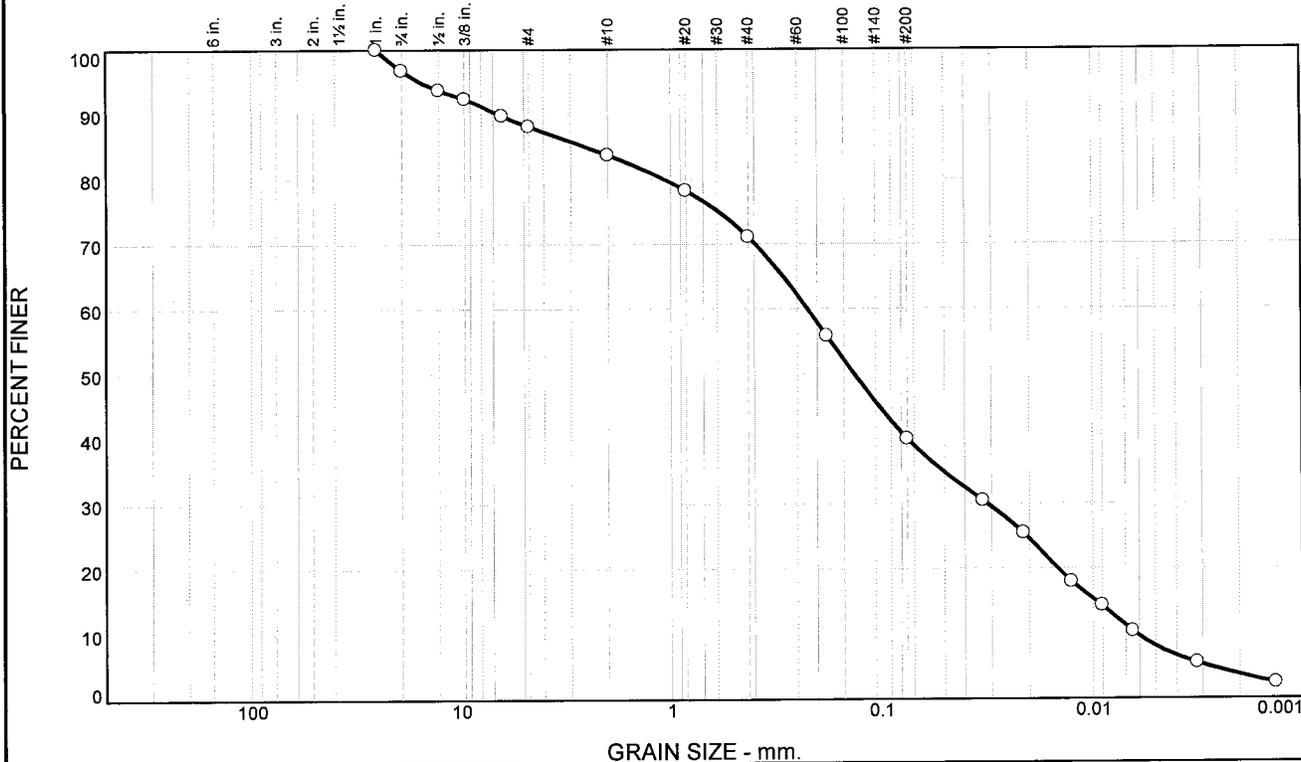
Sample No.: TP-10(2008) Source of Sample: 2008 Testing Date Sampled: Elev./Depth: 12-14'

Location: Title: LM

Checked By: JMA

<p>3rd Rock, LLC</p> <p>East Aurora, NY</p>	<p>Client: Geomatrix Consultants</p> <p>Project: Mill Seat Landfill</p> <p>Project No: 08-013</p>	<p>Figure</p>
---	---	---------------

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	3.2	8.7	4.4	12.7	31.1	31.9	8.0

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	96.8		
.5	93.7		
.375	92.4		
.25	89.8		
#4	88.1		
#10	83.7		
#20	78.2		
#40	71.0		
#80	55.8		
#200	39.9		

Material Description

ID#08-059
Brown Silty sand

Atterberg Limits (ASTM D 4318)

PL= 15.5 LL= 19.0 PI= 3.5

Classification

USCS= SM AASHTO=

Coefficients

D₈₅= 2.5531 D₆₀= 0.2231 D₅₀= 0.1339
D₃₀= 0.0315 D₁₅= 0.0097 D₁₀= 0.0063
C_u= 35.51 C_c= 0.71

Date Tested: 4/14/08 Tested By: RP

Remarks

* (no specification provided)

Sample No.: TP-B8(2008) Source of Sample: 2008 Testing
Location: Title: LM

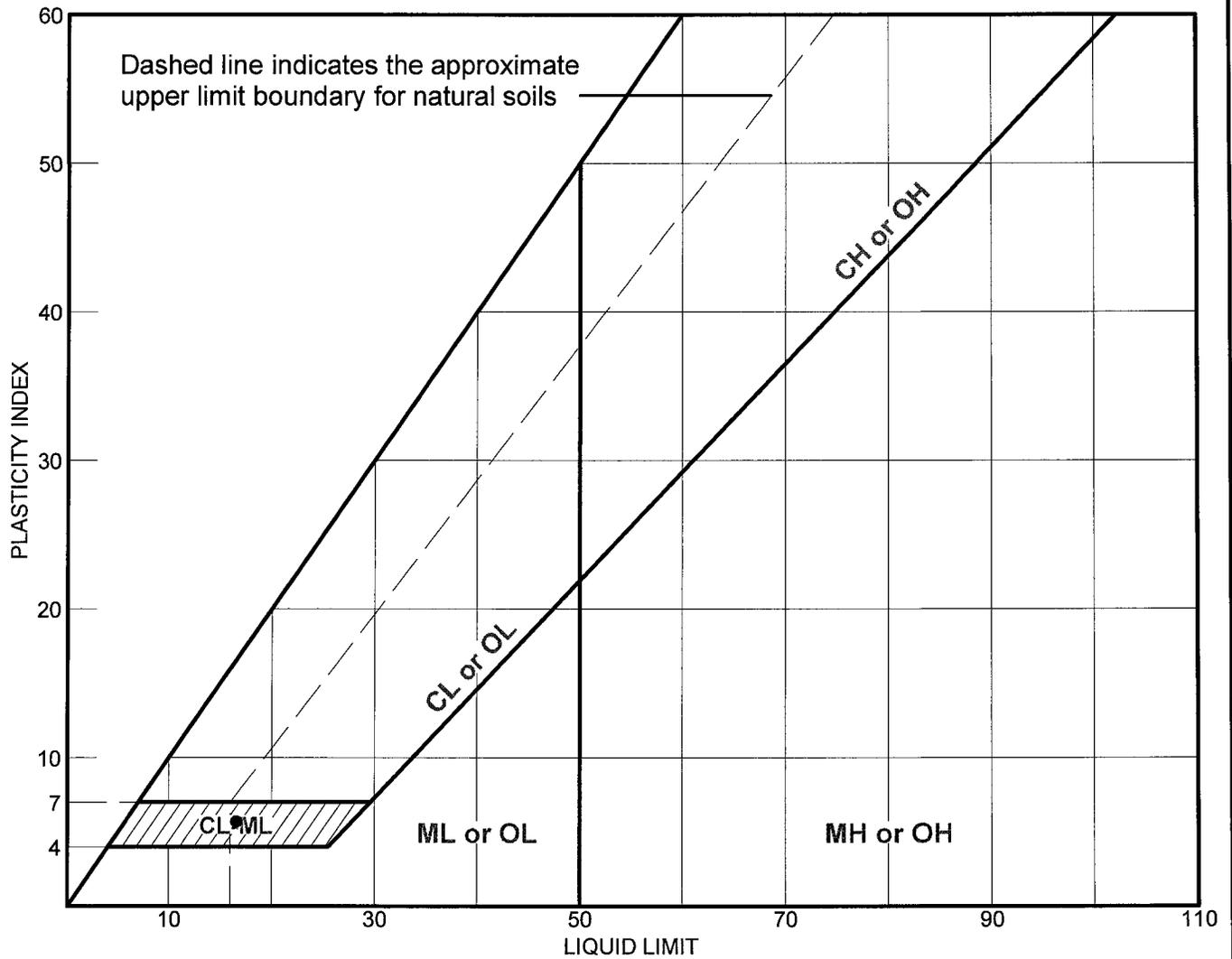
Date Sampled:
Elev./Depth: 8-10'

Checked By: JMA

<p>3rd Rock, LLC</p> <p>East Aurora, NY</p>	<p>Client: Geomatrix Consultants Project: Mill Seat Landfill</p> <p>Project No: 08-013</p>
---	---

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT



SOIL DATA								
SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
●	2008 Testing	SB-03(2008)	14-16'		10.9	16.6	5.7	SC-SM

LIQUID AND PLASTIC LIMITS TEST REPORT

3rd Rock, LLC
East Aurora, NY

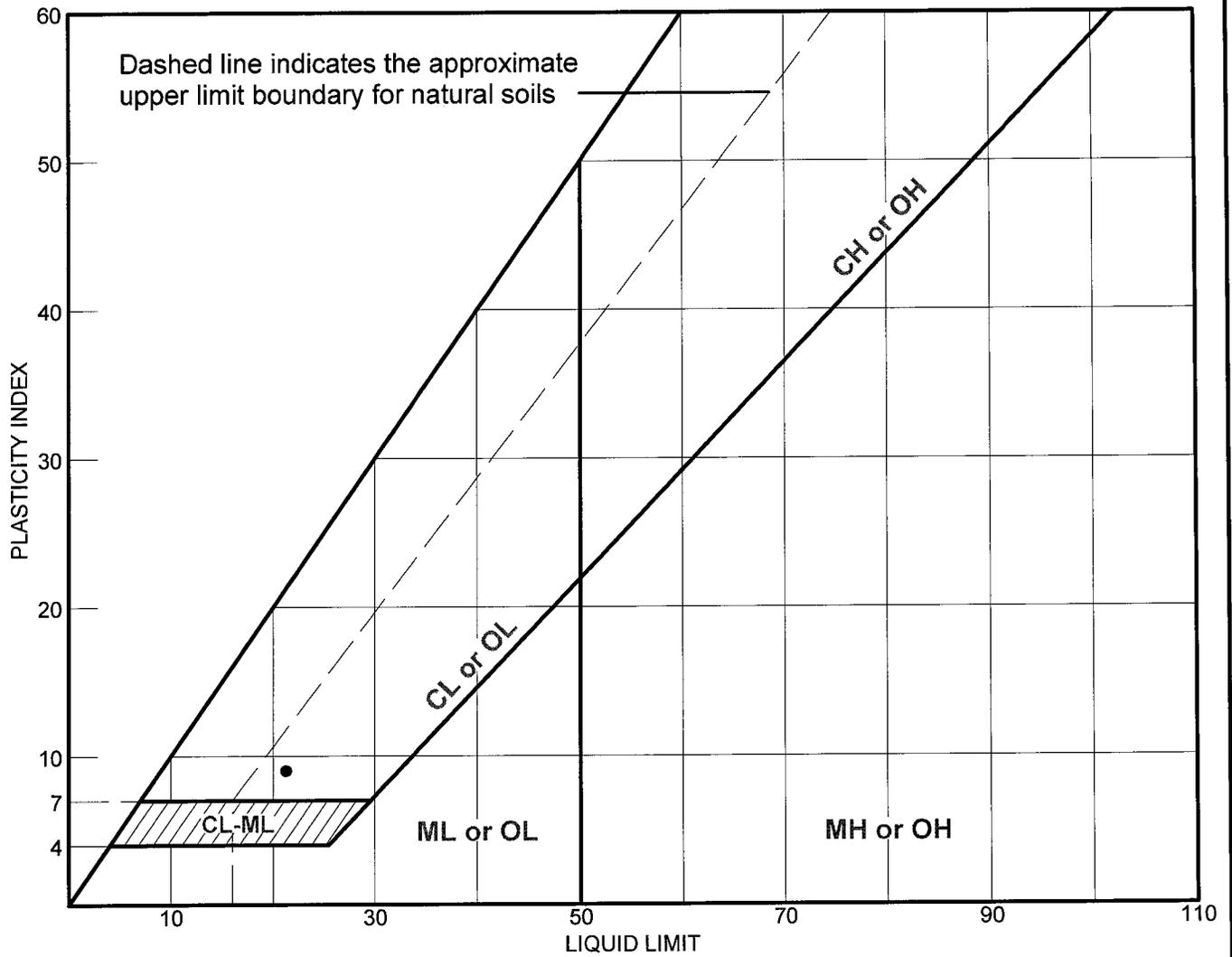
Client: Geomatrix Consultants

Project: Mill Seat Landfill

Project No.: 08-013

Figure 08-062

LIQUID AND PLASTIC LIMITS TEST REPORT



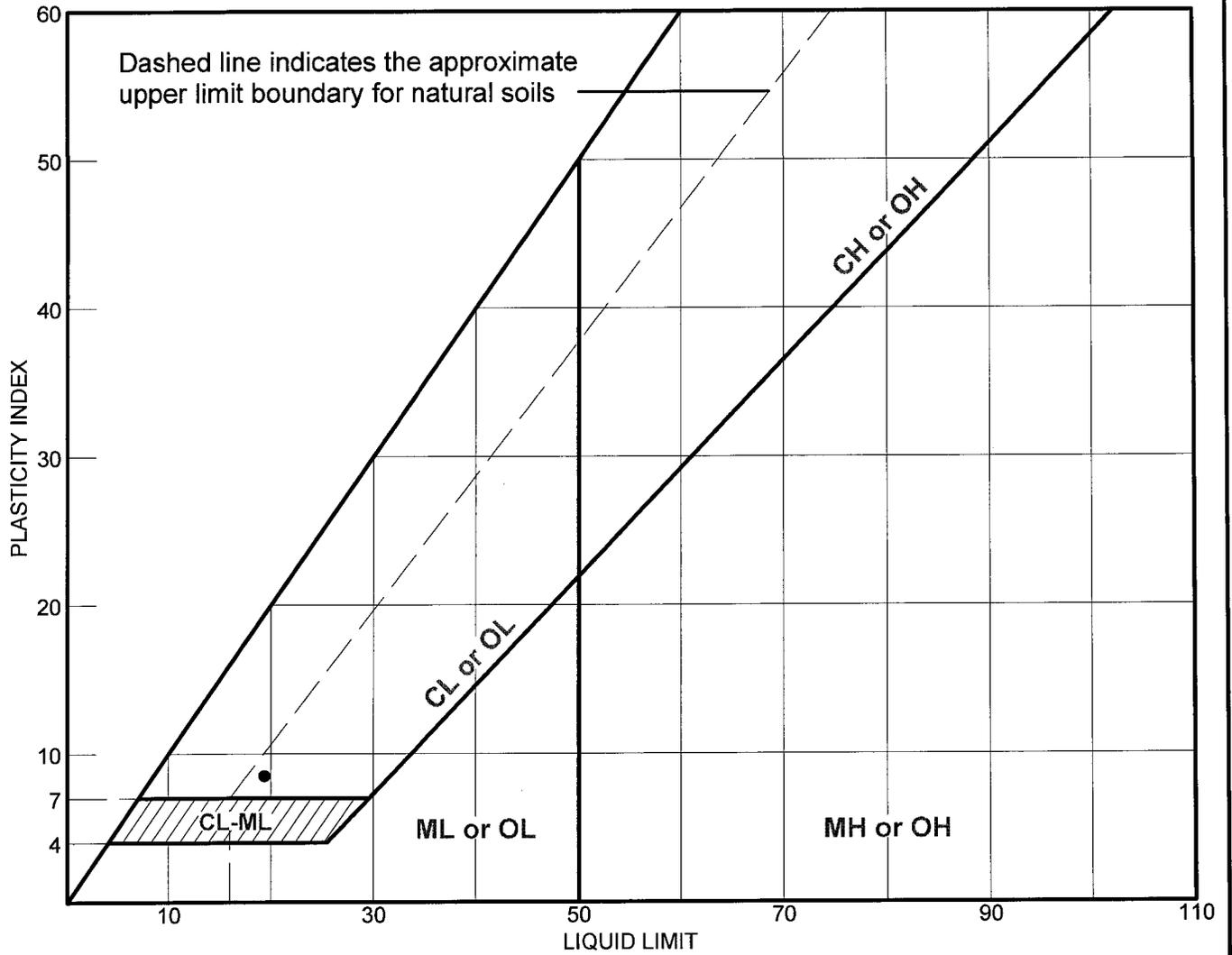
SOIL DATA								
SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
●	2008 Testing	SB-07(2008)	4-8'		12.3	21.3	9.0	CL

LIQUID AND PLASTIC LIMITS TEST REPORT
3rd Rock, LLC
East Aurora, NY

Client: Geomatrix Consultants
Project: Mill Seat Landfill
Project No.: 08-013

Figure 08-063

LIQUID AND PLASTIC LIMITS TEST REPORT



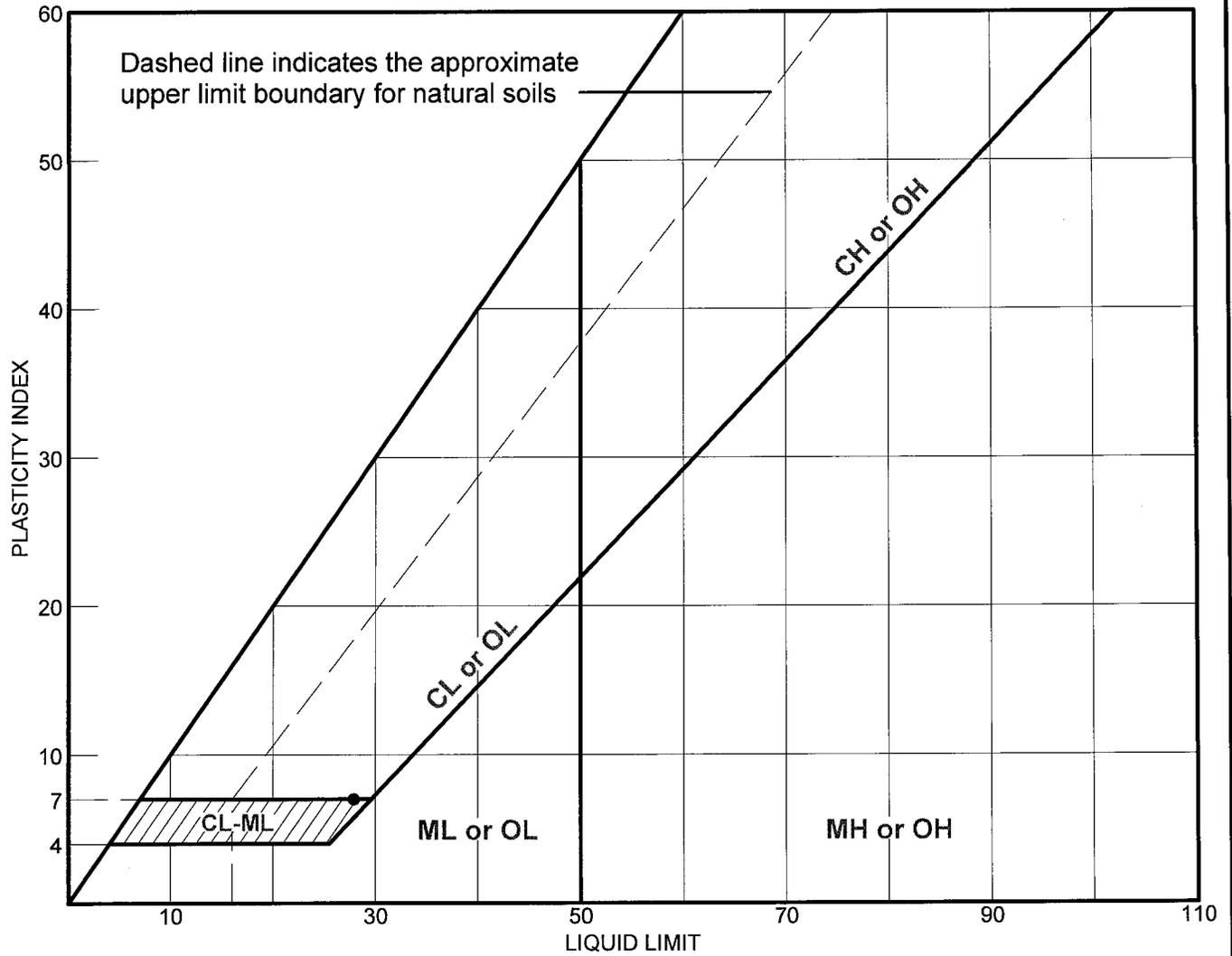
SOIL DATA								
SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
●	2008 Testing	SB-09(2008)	14-16'		10.9	19.4	8.5	CL

LIQUID AND PLASTIC LIMITS TEST REPORT
3rd Rock, LLC
East Aurora, NY

Client: Geomatrix Consultants
Project: Mill Seat Landfill
Project No.: 08-013

Figure 08-061

LIQUID AND PLASTIC LIMITS TEST REPORT



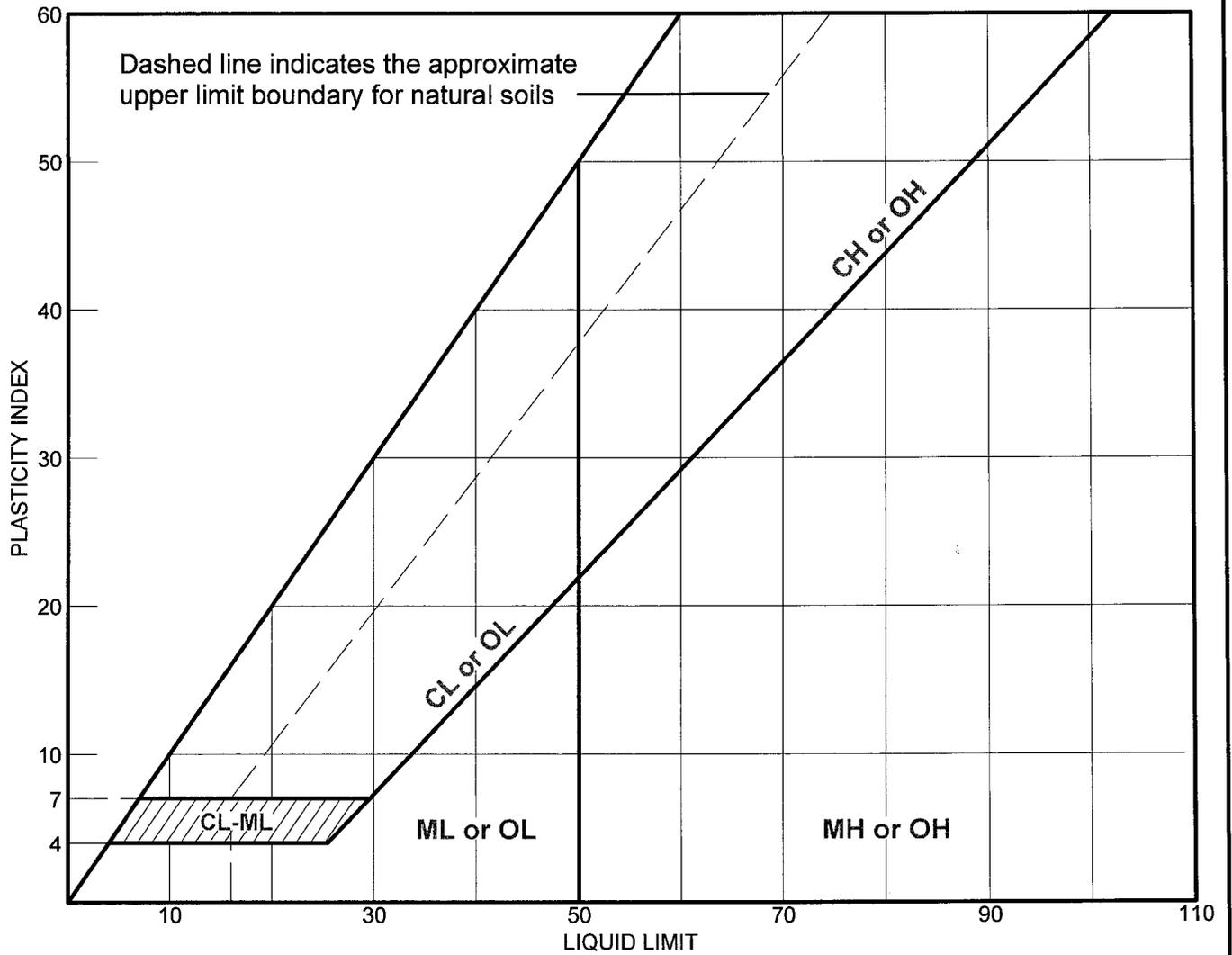
SOIL DATA								
SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
●	2008 Testing	TP-1(2008)	8-10'		20.9	27.9	7.0	GP-GC

LIQUID AND PLASTIC LIMITS TEST REPORT
3rd Rock, LLC
East Aurora, NY

Client: Geomatrix Consultants
Project: Mill Seat Landfill
Project No.: 08-013

Figure 08-053

LIQUID AND PLASTIC LIMITS TEST REPORT



SOIL DATA								
SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
●	2008 Testing	TP-2(2008)	11-12'		NP	NV	NP	SM

LIQUID AND PLASTIC LIMITS TEST REPORT

3rd Rock, LLC
East Aurora, NY

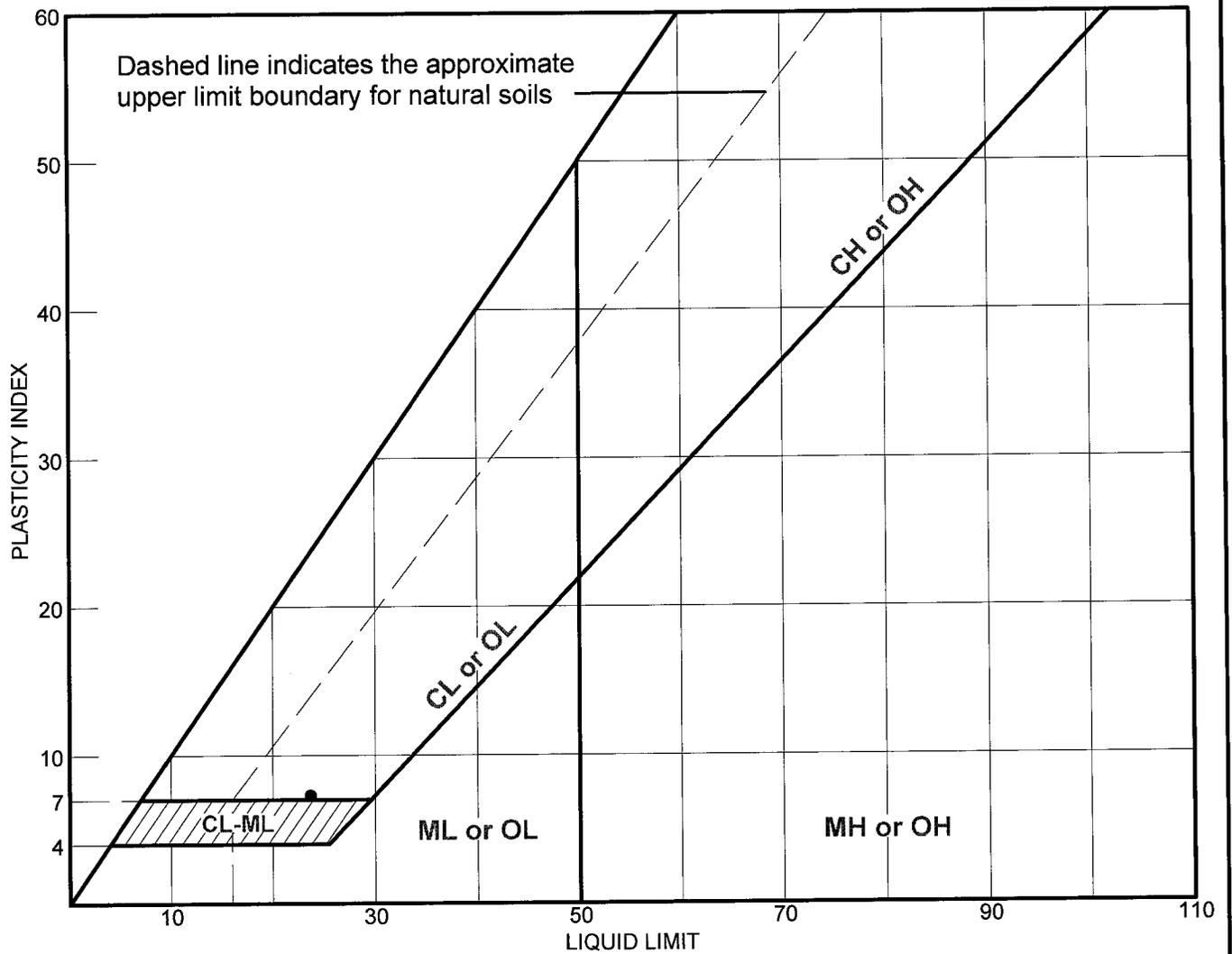
Client: Geomatrix Consultants

Project: Mill Seat Landfill

Project No.: 08-013

Figure 08-054

LIQUID AND PLASTIC LIMITS TEST REPORT



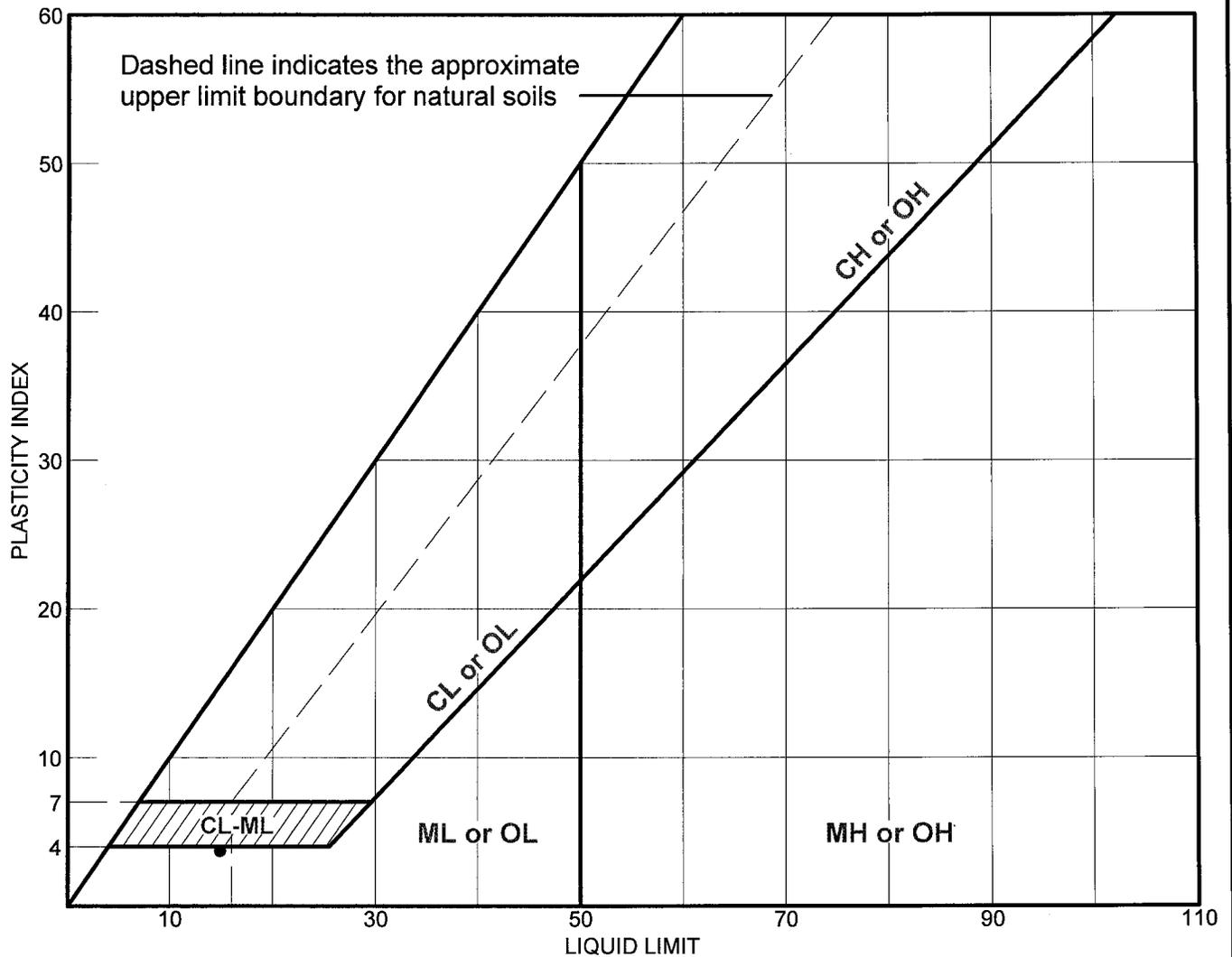
SOIL DATA								
SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
●	2008 Testing	TP-3(2008)	8-10'		16.4	23.7	7.3	GW-GC

LIQUID AND PLASTIC LIMITS TEST REPORT
3rd Rock, LLC
 East Aurora, NY

Client: Geomatrix Consultants
Project: Mill Seat Landfill
Project No.: 08-013

Figure 08-055

LIQUID AND PLASTIC LIMITS TEST REPORT



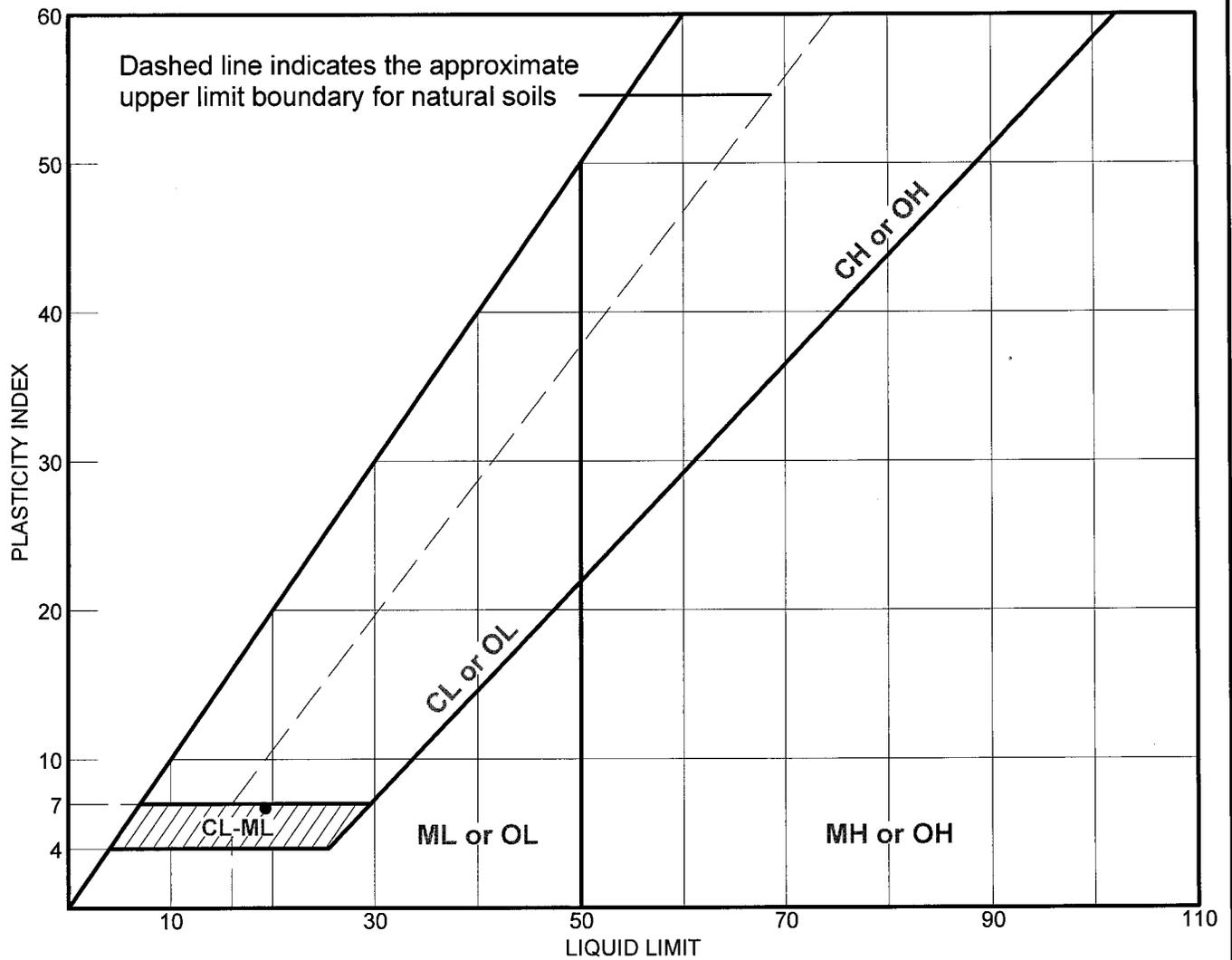
SOIL DATA								
SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
●	2008 Testing	TP-5(2008)	5-6'		11.2	14.9	3.7	SC-SM

LIQUID AND PLASTIC LIMITS TEST REPORT
3rd Rock, LLC
East Aurora, NY

Client: Geomatrix Consultants
Project: Mill Seat Landfill
Project No.: 08-013

Figure 08-056

LIQUID AND PLASTIC LIMITS TEST REPORT



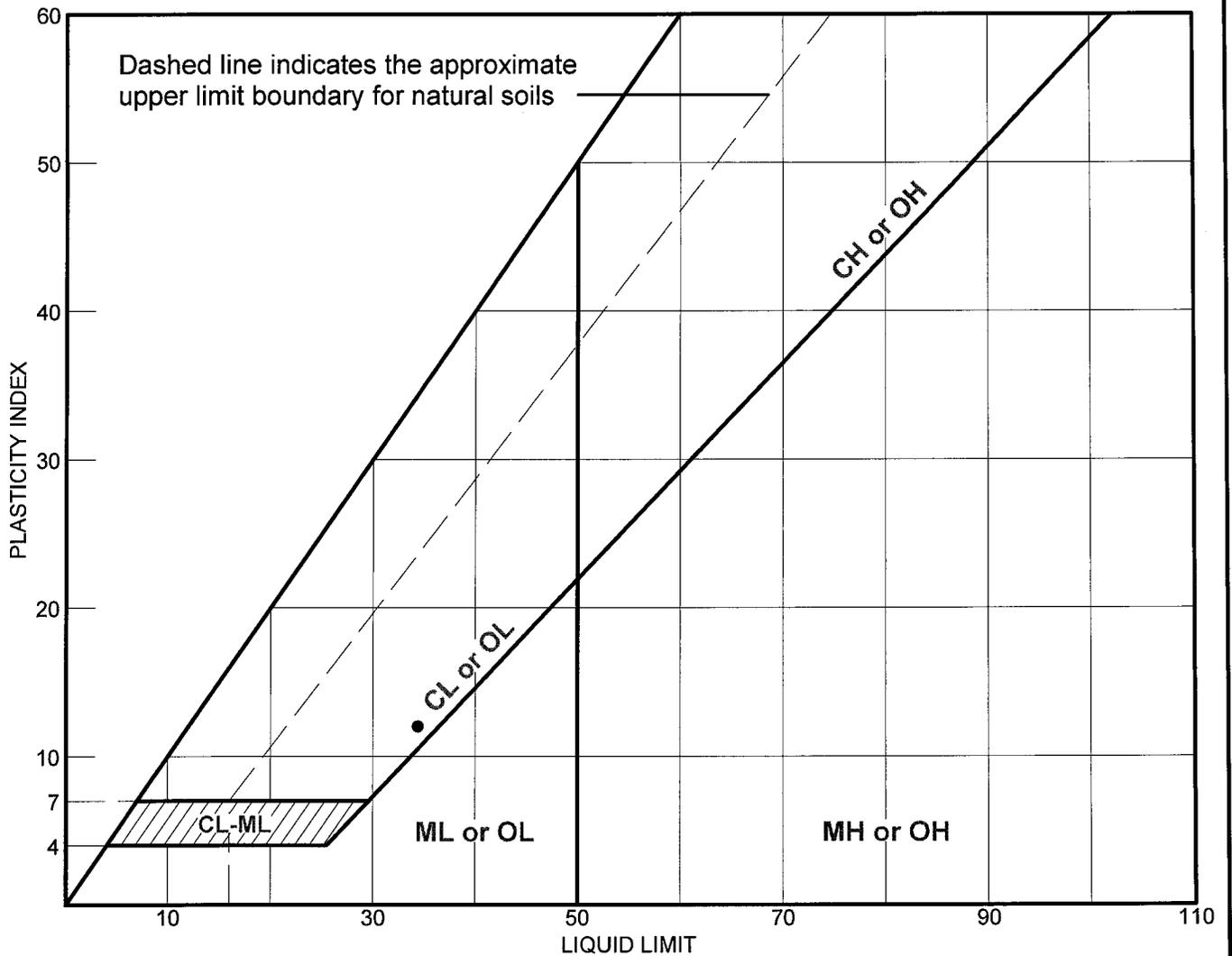
SOIL DATA								
SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
●	2008 Testing	TP-6(2008)	6-8'		12.6	19.3	6.7	CL-ML

LIQUID AND PLASTIC LIMITS TEST REPORT
3rd Rock, LLC
 East Aurora, NY

Client: Geomatrix Consultants
Project: Mill Seat Landfill
Project No.: 08-013

Figure 08-057

LIQUID AND PLASTIC LIMITS TEST REPORT



SOIL DATA								
SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
•	2008 Testing	TP-07(2008)	4-5'		22.4	34.4	12.0	CL

LIQUID AND PLASTIC LIMITS TEST REPORT

3rd Rock, LLC
East Aurora, NY

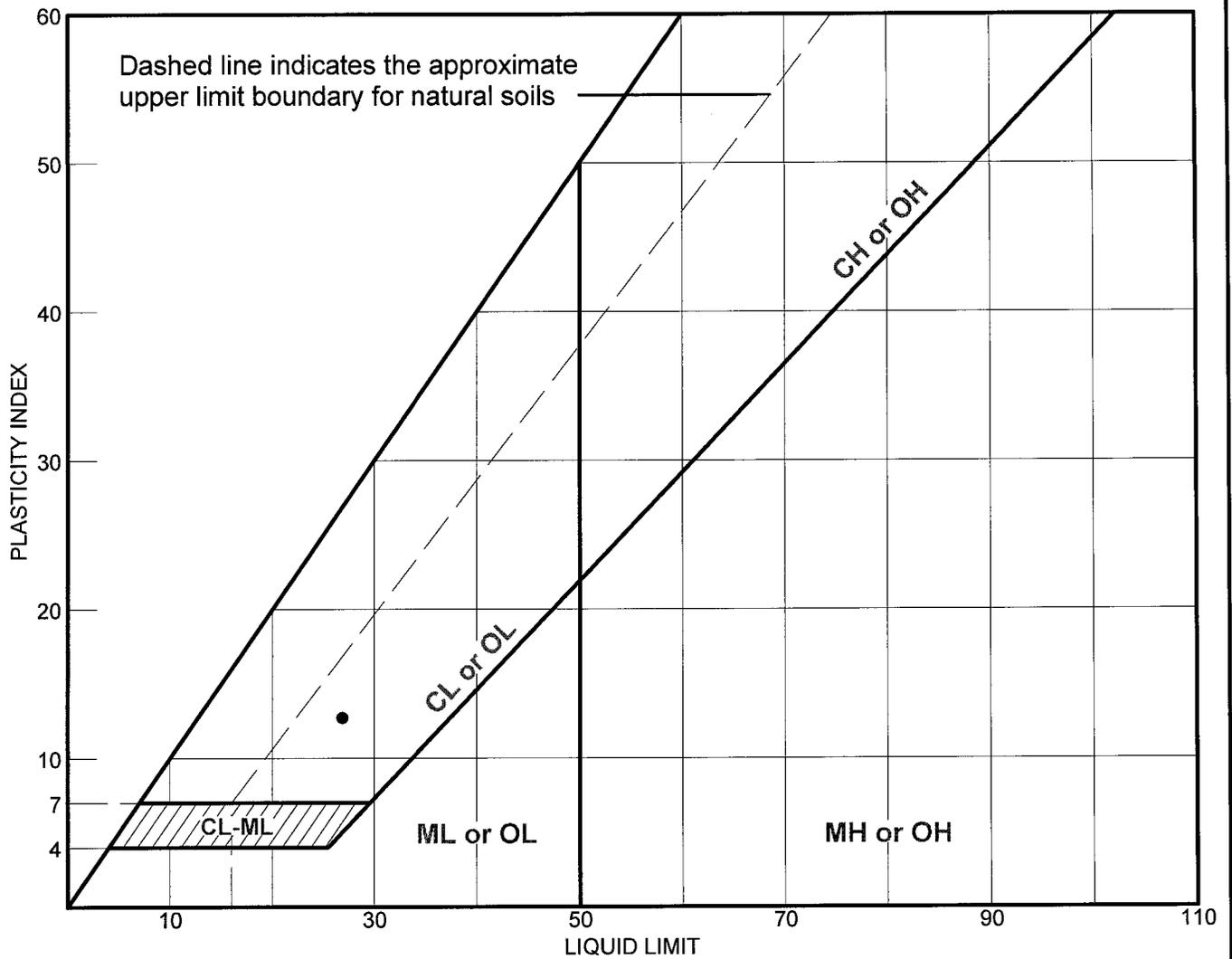
Client: Geomatrix Consultants

Project: Mill Seat Landfill

Project No.: 08-013

Figure 08-058

LIQUID AND PLASTIC LIMITS TEST REPORT



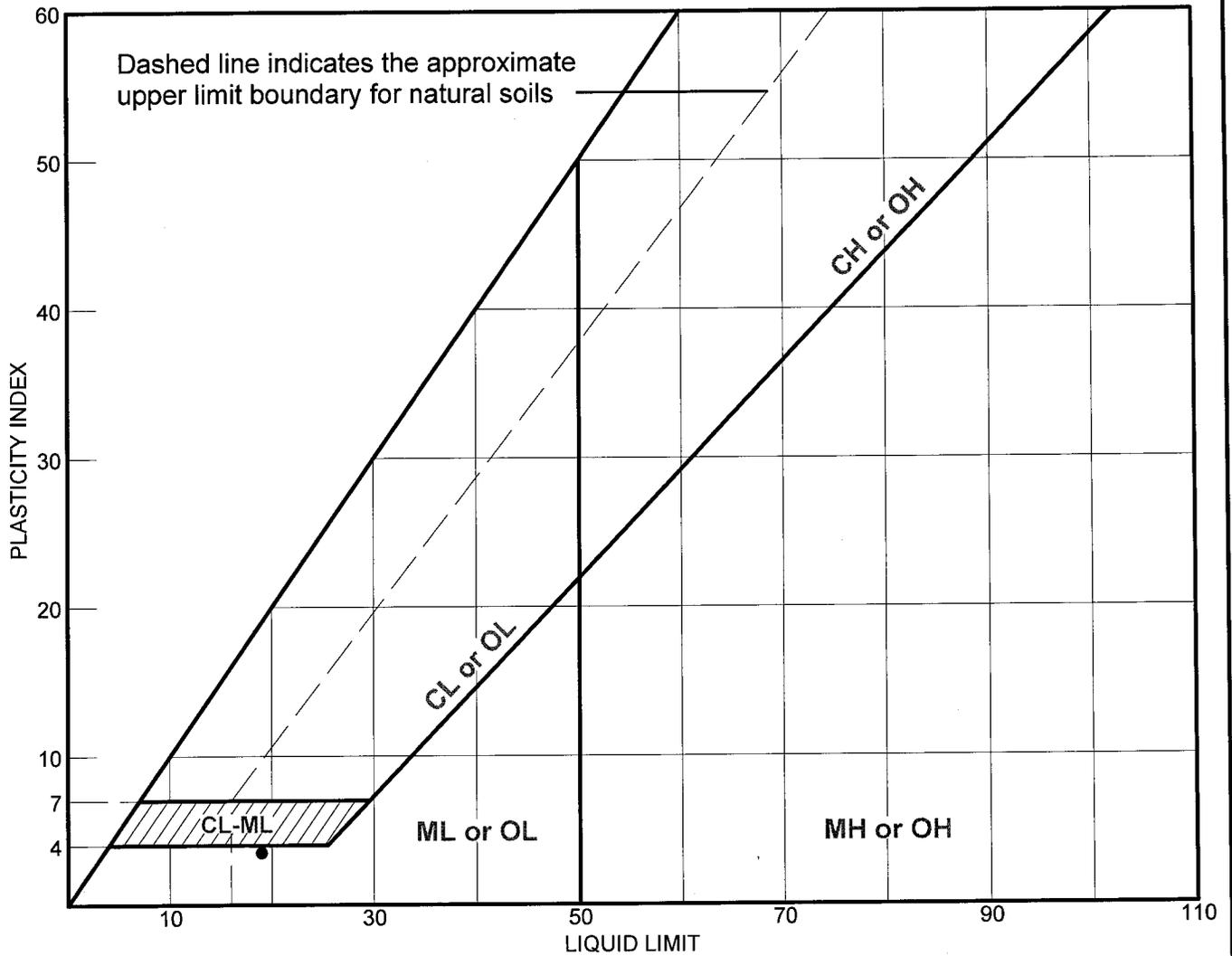
SOIL DATA								
SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
●	2008 Testing	TP-10(2008)	12-14'		14.2	26.9	12.7	CL

LIQUID AND PLASTIC LIMITS TEST REPORT
3rd Rock, LLC
East Aurora, NY

Client: Geomatrix Consultants
Project: Mill Seat Landfill
Project No.: 08-013

Figure 08-060

LIQUID AND PLASTIC LIMITS TEST REPORT



SOIL DATA								
SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
●	2008 Testing	TP-B8(2008)	8-10'		15.5	19.0	3.5	SM

LIQUID AND PLASTIC LIMITS TEST REPORT
3rd Rock, LLC
 East Aurora, NY

Client: Geomatrix Consultants
Project: Mill Seat Landfill
Project No.: 08-013

Figure 08-059

APPENDIX E

Comparison of Wetland RG-6 Recharge Rates

APPENDIX E

Comparison of Wetland RG-6 Recharge Rates

Recharge to Wetland RG-6 is primarily surface water runoff from precipitation that falls on the south side of the active landfill area and the discharge of groundwater from the Upper Water-Bearing Zone and the B-zone. This calculation quantifies the approximate volume of recharge contributed by both of these recharge mechanisms. While precipitation is somewhat uniformly distributed over an annual basis, groundwater discharge to the wetland occurs when the groundwater elevations in the area of the wetland are higher than the elevation of surface water in the wetland. It is possible for the wetland to recharge the groundwater when surface water elevations are higher than groundwater elevations. Evaluation of the temporal dynamics of wetland discharge through exfiltration, evapotranspiration, surface water outflow, and change in storage requires more refined inputs and a non-analytical solution (numerical model).

Figure E-1 supports this calculation.

Wetland RG-6 Recharge Rate = Recharge from Precipitation (QPr) + Recharge from Groundwater (QGw)

Recharge From Precipitation (QPr)

QPr = Volume of Direct Precipitation Falling on Wetland RG-6 (D_Pr) + Volume of Runoff from Precipitation that Flows to Wetland (Rf)

D_Pr = Wetland Surface Area (A) X Average Rainfall (P)

A = 882,000 sq ft calculated from Figure E-1
P = 33.94 in/yr (ROC Airport)

assume 20% of precipitation is intercepted by vegetation and does not reach surface water in wetland.

D_Pr = 882,000 sq ft X 33.94 in/yr / 12 in/ft X 0.80
D_Pr = 1,995,672 cubic ft/yr or
D_Pr = 5,468 cubic ft/day

Rf = P X Overland flow from Area 2, Area 4, and south side of landfill the flows to retention pond

Area 2 = 460,450 sq ft calculated from Figure E-1
Area 4 = 267,500 sq ft calculated from Figure E-1
South Side
of Landfill = 1,551,700 sq ft calculated from Figure E-1

*assume 25% of precipitation flows overland and reaches the wetland.

Rf = 460,450 + 267,500 + 1,551,700 sq ft
Rf = 33.94 /12 in/ft X 0.25* X 2,279,650 sq ft
Rf = 1,611,903 cubic ft/yr or
Rf = 4,416 cubic ft/day

QPr = D_Pr + Rf

Pr = 5,468 cubic ft/day + 4,416 cubic ft/day
Pr = 9,884 cubic ft/day

Recharge From Groundwater (QGw)

QGw = Volume of Groundwater Discharge

QGw = Hydraulic conductivity X Hydraulic Gradient X Saturated Cross-Sectional Area

K = hydraulic conductivity of till
 I = hydraulic gradient
 A = cross-sectional area

1.6E-7 cm/s (SB-7) to 7.9E-6 cm/s (MW06-1S); say 1 E-5 cm/s or 0.028 ft/day to be highly conservative

K =
 I = 0.03 ft/ft - PZ-2 to SW in RG-6

2000 lin feet along south, west, and north side of RG-6 X 12 feet average sat. thickness = 24,000

A =

QGw = K * I * A

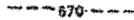
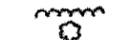
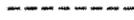
QGw = 0.028 ft/day X 0.03 ft/ft X 24000 sq. ft
 QGw = 20 cubic ft/day

Wetland RG-6 Recharge Rate = QPr + QGw

Wetland RG-6 Recharge Rate = 9,884 cubic ft/day + 20 cubic ft/day

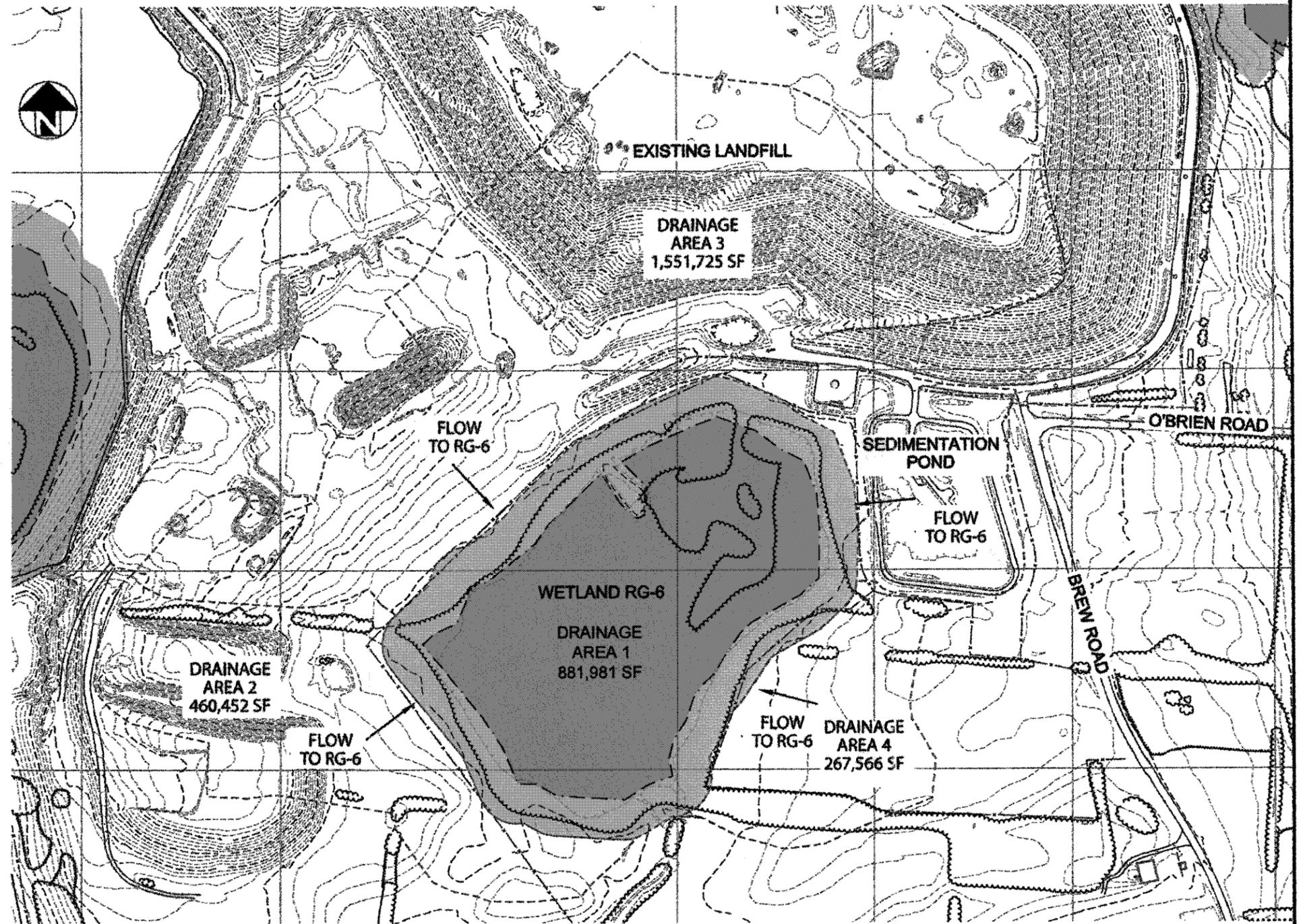
Wetland RG-6 Recharge Rate = 9,904 cubic ft/day

LEGEND

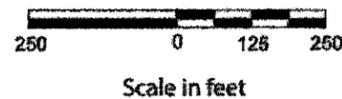
-  EXISTING CONTOURS (SEE NOTE 1)
-  EXISTING VEGETATION (SEE NOTE 1)
-  PROPERTY LINE (SEE NOTE 2)
-  DELINEATED WETLANDS (SEE NOTE 3)
-  100' WETLAND BUFFER (SEE NOTE 3)
-  EXISTING DRAINAGE AREAS

NOTES:

1. Existing site topography and features are based on aerial photography dated July 12, 2008 compiled by Air Survey Corp.
2. Property lines were provided by Golder Associates from drawing file X07386309A-Property Line.
3. Wetland boundaries and buffers are based on record drawings prepared by Clark Engineers & Associates titled "Site Plan 1 of 5 to Site Plan 5 of 5" dated 1994.
4. Figure reproduced from a drawing by McMahon & Mann Consulting Engineers, P.C.



EXISTING CONDITIONS PLAN



SURFACE WATER FLOW DIRECTIONS: BOVEE ROAD PROPERTY Mill Seat Landfill Bovee Road Property Hydrogeologic Investigation Town of Riga, New York		
By: DMH	Date: Nov. 2008	Project No. 12625
AMEC Geomatrix		Figure E-1