Hyland Facility Associates

HYLAND FACILITY ASSOCIATES
LANDFILL EXPANSION
OPERATION AND MAINTENANCE MANUAL
APPENDIX B
ENVIRONMENTAL MONITORING PLAN

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1.0 INTRODUCTION

McMahon & Mann Consulting Engineers, P.C. (MMCE) prepared this report for Hyland Facility Associates (Hyland). This document presents the Environmental Monitoring Plan (EMP) for the Hyland Facility in Angelica, New York (see Figure 1-1). The monitoring program covers both the original permitted facility (Cells 1 and 2) and the proposed 48-acre landfill expansion (see Figures 1-2 and 1-3).

Upon approval by the New York State Department of Environmental Conservation (NYSDEC), this document will replace the current Environmental Monitoring Plan for the facility (Reference 1) and serve as the manual for the monitoring program at the Hyland Facility.

1.1 Purpose and Report Organization

The goal of this monitoring program is to assess the potential impacts of the Hyland Facility on surface water, ground water, soil gas and the immediate environment surrounding the facility. The assessment of potential impacts will be done by monitoring conditions in the vicinity of the site and by monitoring the site environmental controls.

Periodic revisions to this plan will occur with changing regulations, permit conditions or company policies. Any revisions to this plan will be submitted to the NYSDEC as addenda for review and approval before their implementation.

This report is organized in a format consistent with that described in 6 NYCRR Part 360 Section 2.11(c). Additional monitoring requirements for the facility are contained in the Special Conditions of DEC Permit No. 9-0232-00003/00002. These requirements are discussed in the EMP.

Section 2.0 provides a summary of the site conditions and a description of the environmental monitoring program for the existing facility. Section 3.0 describes the facility design and environmental controls and Section 4.0 presents the water quality monitoring program. The gas monitoring program is described in Section 5.0.

2.0 EXISTING SITE CONDITIONS

2.1 Regional Setting

The site is located on the Appalachian Plateau in the Town of Angelica, New York. The geology of this area is typified by hills and valleys comprised of glacial tills over sedimentary bedrock. The Genesee River Valley is located to the west of the site (see Figure 2-1). The ground surface elevation in the Genesee Valley near the site ranges from about 1320 to 1400 feet (the elevation datum is National Geodetic Vertical Datum of 1929 – NGVD29).

The topography of the site and the surrounding area is shown on Figure 2-1. The site is located in an upland valley created by two peaks of Peacock Hill. The southern portion of this natural upland valley area, facing away from the Village of Angelica, is the area in which landfill operations are being conducted. The ground surface elevations at the site range from about 1850 to 1950 feet. The hill to the east has a top elevation of about 2100 feet MSL and the hill to the west has a top elevation of about 2020 feet.

Surface water flows from the higher elevations of the valley (El. 2100 feet near the site) toward the valley lows at approximately El. 1300 feet. Angelica Creek is located north of the site and flows from east to west through the Village of Angelica, discharging into the Genesee River west of Angelica.

North of the landfill, an existing wetland mitigation area and parking areas drain into an intermittent stream, which then flows across the extreme northern boundary of the property. This stream carries runoff from the northern face of Peacock Hill down into Angelica Creek. The confluence of this stream with Angelica Creek is in the Village of Angelica. This intermittent stream (a stream of seasonal flow) is identified as 117-155-4B and has a NYSDEC water quality classification of D. The best usage of Class D waters is for fishing and the water quality should also be suitable for primary (e.g., swimming) and secondary (e.g., boating) contact recreation even though other factors (such as water depth or access) may limit its use for these purposes.

A watershed divide, shown on Figure 1-2, delineates the area from which surface runoff flows toward the landfill cell area. Surface water originating on the landfill site area flows to the south towards two sedimentation ponds through a series of diversion ditches. Two ditches intercept surface water flow originating on the hills to the east and west of the facility. These ditches flow into the sedimentation ponds. Surface water runoff from precipitation events from within the proposed facility area also flows into the sedimentation basins. Discharge from the sedimentation basins enters stream 117-157.

Surface water originating from the clay mine area flows through sediment control structures and discharges to either stream 117-157 or 117-157-4. Streams 117-157 and 117-157-4 combine and exit as one across the southern boundary of the property. The combined stream then meanders west for almost four miles, joined by other intermittent streams along the way, before discharging to the Genesee River (see Figure 2-1).

Streams 117-157 and 117-157-4 have a water quality classification of C. The best usage of Class C waters is for fishing and fish propagation and the water quality should also be suitable for primary and secondary contact recreation even though other factors (such as water depth or access) may limit its use for this purpose.

2.2 Groundwater Use

As required by 6 NYCRR Part 360-2.11 (a)(5), a survey of existing residential water supply wells was conducted within a one-mile radius of the site as part of the Hydrogeologic Study. (Reference 2). A residential well summary table is included in Appendix B of Reference 2, listing the wells and springs identified in the survey that are used for water supply within a one-mile radius of the facility. Figure 5 in Reference 2 shows the locations of the water supply wells identified by the survey.

Several respondents to the survey indicated that they utilize a public water supply. MMCE contacted the Village of Angelica regarding the source of the public water supply. The Village of Angelica water supply is collected from a spring in West Almond, approximately 5 miles west of the Village on County Road 16. The Village also has two backup wells located on High Street in the Village. The Village utilizes a 1.1 million gallon holding reservoir located at the Allegany County Fairgrounds for water storage. A residential well sampling program will be implemented as described in Section 4.2 and in Appendix B of this report.

2.3 Subsurface Conditions

Subsurface conditions at the site were investigated between 1988 and 2003 as described in Reference 2. The hydrogeologic studies (References 2 and 3) conclude that the critical stratigraphic section for the site consists of the glacial till below the facility and the underlying bedrock. The glacial till overburden includes altered till underlain by unaltered till. Bedrock beneath the site includes shale and sandstone of the Cuba and Machias Formations.

2.3.1 Overburden

The overburden soils consist of a relatively thin zone of altered till underlain by a thick deposit of unaltered till. Occasional thin zones of silt, sand and/or gravel were observed in several borings in the expansion area, however, these zones are isolated and do not represent a continuous deposit.

Altered and Unaltered Till

The altered till varies from a few feet up to about 20 feet thick at the site. The unaltered till extends to bedrock and varies from less than 20 feet thick in the clay mine area to more than 150 feet thick in the valley in the northern and central portion of the site. At the southern end of the expansion area the till is about 220 feet thick in the middle of the valley and 60 to 80 feet thick on the valley sides.

The altered and unaltered till have very similar soil physical properties (i.e., particle size distribution and Atterberg Limits), the primary difference being the soil structure. The upper altered till contains desiccation cracks giving it a prismatic blocky structure while the deeper unaltered till has no desiccation cracks and a massive soil structure.

As indicated by the summary tables in Reference 2 (Appendix H), the glacial till soils are a dense mixture of sand, gravel, silt and clay. The desiccation cracks within the altered till cause some monitoring wells screened within the altered till zone to exhibit higher hydraulic conductivity values than wells screened in the unaltered till. Estimates of lateral hydraulic conductivity in site-wide wells screened in the altered till based on variable head tests in the wells vary from 3.7×10^{-4} to 3.2×10^{-9} cm/sec with a geometric mean of 5.6×10^{-7} cm/sec (see Reference 2, Tables F1 and F2 in Appendix F). Estimates of lateral hydraulic conductivity in site-wide wells screened in the unaltered till based on variable head tests in the wells vary from 1.7×10^{-5} to 3.4×10^{-8} cm/sec with a geometric mean of 3.6×10^{-7} cm/sec (see Reference 2, Tables F1 and F2 in Appendix F).

Samples from test pits (see Reference 2 Appendix H for details) were tested for gradation, Atterberg Limits and permeability characteristics. The results of vertical hydraulic conductivity tests indicate permeability values between 1.5×10^{-7} to 1.5×10^{-8} cm/sec with a geometric mean of 3.6×10^{-8}. This low permeability characteristic is consistent with the many samples from the mining area tested during construction of Cells 1 and 2.

Discrete Granular Deposits

Discrete granular deposits were observed in several test borings completed for the hydrogeologic studies. These deposits are characterized by discontinuous silty sand and gravel lenses within the glacial till. The thickness of the granular sediments was observed to range from < 0.5 to 11 feet. The range in calculated hydraulic conductivity values based on variable head tests of the site-wide wells that contain discrete granular deposits in their screen zone was 2.2×10^{-4} to 1.6×10^{-6} cm/sec with a geometric mean of 3.1×10^{-5} cm/sec.

2.3.2 Bedrock

Bedrock formations in the vicinity of the site include the Wellsville Formation beneath the higher elevations on Peacock Hill, underlain by the Cuba Formation followed by the Machias Formation. The majority of the facility is underlain by bedrock of the Machias Formation. A portion of the facility area near the north-west corner is underlain by the Cuba Formation (see Figure 2-2). The Machias and Cuba Formations are part of the critical stratigraphic section and are discussed further below.

Cuba Formation

In the vicinity of the facility the Cuba Formation is a 35 to 40 foot thick shale and sandstone sequence. The sandstone beds ranged from about 2 to 8 feet in thickness and the shale layers range from about 2 to 12 feet in thickness. The upper 12 feet of the formation is weathered and highly fractured. One well, MW-14, was installed in the Cuba Formation as part of the hydrogeologic studies done at the site. The hydraulic conductivity calculated based on a variable head test done in this well was 1.8×10^{-4} cm/sec.

Machias Formation

The Machias Formation consists of 400 feet of interbedded sandstone, siltstone and shale. A 220 foot section of the Machias Formation was investigated as part of the hydrogeologic studies. The upper 80 feet of the Machias is similar to the overlying Cuba Formation in that it consists of alternating layers of sandstone and shale. The underlying 65 feet consists of thin to medium bedded sandstone. The remaining 75 feet of the Machias was similar to the upper 80 feet and the Cuba Formation.

Two marker beds within the Machias Formation including a "crinoid" marker bed and a shale marker indicate that the beds dip to the northwest approximately one degree. This is consistent with the regional observation that the site is located on the western limb of a gentle anticlinal fold that trends NE-SW.

The calculated hydraulic conductivity based on variable head tests for site-wide wells screened in the Machias Formation ranges from 2.4×10^{-3} cm/sec to 1.2×10^{-6} cm/sec with a geometric mean of 7.8×10^{-5} cm/sec.

2.4 Groundwater Conditions

2.4.1 Water Table

Groundwater contour maps for wells screened in the overburden are presented in Reference 2 on Sheets 7 and 8 using data collected in 2002 and 2003. Figure 2-3, adapted from Reference 2, depicts the typical groundwater table contours. The groundwater table flow patterns on this map are similar to those on the water table map presented in Reference 1 based on data collected in January 1996. The flow patterns are also similar to those on the water table map prepared using data collected in April and May 2001 and submitted in a response letter dated June 5, 2001 to NYSDEC regarding groundwater monitoring at the Hyland Facility.

The groundwater table contour maps indicate that the horizontal flow component is from higher elevations on the hills to the east and west of the facility toward the valley. As groundwater approaches the center of the valley it flows to the south.

Both contour maps (Reference 2, Sheets 7 and 8) indicate a lower gradient on the eastern side of the site compared with the western and southwest portions of the site. The horizontal gradient varies between about 0.04 on the east side of the site and 0.20 on the west side on the two measurement dates.

It is noted that the elevation of the groundwater table approaches the top of rock to the east, west, and north of the facility. Therefore, wells screened in the till in these areas often do not contain water. For example, MW-B located to the west of the facility is screened from a depth of 7.5 feet down to 12.5 feet where refusal was encountered. Groundwater elevations measured in this well indicate that the water table elevation is often below the bottom of the well in late summer and in the fall. The maximum height of water above the bottom of the well was 2.1 feet. Other wells screened in the overburden located to the east, west and north of the facility such as MW-18A and MW-L are also often dry. The locations of wells MW-B, MW-18A and MW-L are shown on Figure 1-3.

2.4.2 Bedrock Potentiometric Surface

Bedrock potentiometric surface maps were prepared using data for wells screened in the upper 20 feet of the bedrock. The December and April 2003 data are presented in Reference 2, Sheets 7 and 8. Figure 2-4, adapted from Reference 2, depict the typical bedrock potentiometric surface contours.

Groundwater flow patterns in the bedrock are similar to those of the water table. The bedrock potentiometric surface map indicates that flow is from the higher elevations on the hills to the east and west of the facility toward the valley. As groundwater flow approaches the center of the valley, it flows to the south. The bedrock potentiometric surfaces prepared using the December and April 2003 data are similar to those on the map presented in Reference 1 that was prepared using data collected in January 1996 and to a top of bedrock potentiometric surface map prepared using data collected in April and May 2001.

Both contour maps (Reference 2, Sheets 7 and 8) indicate a lower gradient in the northeast corner of the expansion area compared with the western and southern portions of the site. The horizontal gradient in the northeast corner is about 0.05 and in the western and southern portions of the site the gradients are steeper, about 0.1 and 0.2.

2.4.3 Groundwater Flow

Groundwater flows from the higher elevations surrounding the site toward the lower elevations generally following the ground surface and bedrock topography. Groundwater within the till is recharged by infiltration and from rainfall on the slopes and on the higher elevations surrounding the site. The groundwater table maps (Reference 2, Sheets 7 and 8) and sections (Reference 2, Sheets 3 through 5) indicate that the flow direction is toward the valley center and then follows the valley toward the southwest and eventually discharges into the sand and gravel aquifer in the Genesee Valley.

Groundwater in the bedrock is recharged by infiltration from the higher slope areas where the till is thin or absent. Toward the center of the valley the till thickens, limiting infiltration through the till to bedrock. Groundwater in the bedrock flows from the higher elevations toward the buried bedrock valley generally following the shape of the bedrock topography, as indicated on the potentiometric surface maps (Reference 2, Sheets 7 and 8) and on the subsurface cross sections (Reference 2, Sheets 3 through 5). Flow in the bedrock occurs in the upper fractured portion of the bedrock following the buried bedrock valley to the southwest eventually discharging to the Genesee Valley.

Groundwater flow in the bedrock also has a westward component following joints and bedding features in the bedrock and discharging to the valley west of the site (Reference 2). The westward flow component may provide an outlet for bedrock flow on the west side of the site resulting in lower heads in the bedrock on the west side of the valley.

The groundwater table is generally higher than the bedrock potentiometric surface. This indicates that flow through the till has a downward component with the potential for discharge from the till to bedrock. An exception to this downward flow occurs in the north central portion of the expansion area where the overburden has been removed and processed for use as clay liner soil in the existing facility. In this area the bedrock potentiometric surface is higher than the groundwater table indicating an upward component of flow from the bedrock to the till. This condition is evident at the locations of well clusters MW-29/29A and MW-37/37A, where the potentiometric surface is higher than that of the water table and also higher than the ground surface.

As summarized in Reference 2, the groundwater flow velocity in the till is very low, estimated to be less than 1 foot per year while the groundwater flow velocity in the bedrock is higher, in the range of 27 to 270 feet per year. The slow groundwater flow velocity in the till makes this unit an aquitard, limiting groundwater flow to or from the top of bedrock.

2.5 Current Environmental Monitoring Program

2.5.1 Overview and Monitoring Locations

The locations of existing monitoring points are shown on Figure 1-3. The monitoring for the existing facility (Reference 1) includes sampling and testing groundwater, primary and secondary leachate, soil gas and surface water and sediment. Groundwater samples are collected from monitoring wells that include upgradient and downgradient wells screened in the overburden and the bedrock and from the groundwater collection system that underlies the facility. Additionally, if requested by the property owner, Hyland collects and tests samples from residential wells within one mile of the project site. Hyland also collects and tests air samples from gas probes that surround the cell area (Figure 1-3) to monitor for potential migration of landfill gases.

2.5.2 Groundwater

Figure 1-3 shows the location of the existing overburden and bedrock wells in the monitoring program and the summary table in Appendix A provides a summary of the well details. Samples are collected quarterly and analyzed for the 6 NYCRR Part 360 "baseline" parameter list (1 quarter) and for the 6 NYCRR Part 360 "routine" parameter list (3 quarters). The wells have been monitored quarterly, resulting in the background water quality information for the site (see Section 4.0 for discussion of background data).

In assessing whether a significant increase has occurred, the current groundwater quality value for each parameter at each monitoring well is compared to the existing water quality value of that parameter. According to 6 NYCRR Part 360-2.11(c)(5)(ii)(d)(2) a significant increase has occurred if the current water quality for a parameter at a monitoring well exceeds the existing water quality value of that parameter by three standard deviations or the test result for a parameter at a monitoring well exceeds the existing water quality value for that parameter (e.g., the mean value), and exceeds the water quality standard for that parameter. Summary tables are prepared each quarter indicating any parameters for which an increase is observed.

In addition to the groundwater monitoring wells, a groundwater collection system underlies the facility and is monitored to detect potential impacts that might be caused by leakage through the liner system. Figure 4-4 depicts the groundwater collection system sampling locations for Cells 1 and 2.

Groundwater is collected from Cell 1 and from Cell 2 E/F and Cell 2 G/H. Sampling ports for these cells are provided in the riser house as shown on Figure 4-4, however samples are currently collected directly from where the groundwater pipes discharge to the diversion ditch that flows to the sedimentation ponds. Samples from the groundwater collection systems are collected quarterly and analyzed for the same parameters as the samples collected from the groundwater wells (i.e., baseline parameters (1 quarter) and routine parameters (3 quarters).

If requested by the property owner, Hyland collects and tests samples from residential wells within one mile of the project site as required by Special Condition No. 12 of the 6 NYCRR Part 360 Permit. Appendix B describes the residential water supply sampling plan.

2.5.3 Leachate

Samples are also collected from the secondary leachate collection systems to detect impact due to potential leakage through the primary liner system. Figure 4-4 depicts the secondary collection system sampling locations for Cells 1 and 2. Secondary leachate is collected from Cell 1 A/B, Cell 1C/D, Cell 2 E/F and Cell 2 G/H. Sampling ports for these cells are provided in the riser house as shown on Figure 4-4, however samples are currently collected by removing the covers from the secondary riser pipes, disconnecting the secondary discharge pipe, activating the pump and collecting the sample. Secondary leachate samples are collected semi-annually and analyzed for the 6 NYCRR Part 360 "expanded" parameter list.

Samples are also collected and analyzed to monitor the leachate collected in the primary leachate collection system of Cell 1 and Cell 2. The combined Cell 1 and Cell 2 primary leachate sample is collected from the leachate storage tanks. A leachate sample from the primary system is collected semi-annually and analyzed for the 6 NYCRR Part 360 "expanded" parameter list.

2.5.4 Surface Water and Sediment

Figure 1-3 shows the location of the existing surface sampling locations. Samples are collected quarterly from the east and west diversion ditches and from the discharge from the east and west sediment ponds. The samples are analyzed for the same parameters as the samples collected from the groundwater wells (i.e., baseline parameters (1 quarter) and routine parameters (3 quarters)).

2.5.5 Landfill Gas Migration

Gas probes are located around the facility at a spacing of approximately 400 to 500 feet around the landfill perimeter as shown on Figure 1-3. The landfill gas probes are be monitored on a quarterly basis by HFA for: 1) combustible gas concentrations; 2) pressure; and 3) liquid level. The results of the landfill gas monitoring program are included in each of the quarterly reports for the facility.

3.0 FACILITY CONSTRUCTION

3.1 Site Layout

The proposed site plan is shown in Figure 3-1. This figure shows the existing 28.27-acre cell area, as well as the contiguous 48-acre proposed expansion cell area. More detailed drawings of the proposed site layout can be found in the engineering plans, which are part of the 6 NYCRR Part 360 Application for a Solid Waste Permit Modification.

The existing Hyland Landfill has an approved design capacity of 745 tons per day (TPD). At this rate of disposal, the currently permitted cells will reach capacity (be filled with waste) in the year 2006. The proposed 48-acre cell expansion will add approximately 11 million cubic yards of disposal capacity, which will extend the site life by approximately 20 to 25 years, depending on the rate of waste receipt. The proposed design capacity (i.e., fill rate) for the expanded facility is 1000 TPD.

The 48-acre development will be constructed sequentially beginning with Cell 3, then Cell 4 and finally Cell 5. Each cell is further divided into subcells. Subcell construction will begin on the west side of each cell at the sump location and proceed toward the east.

3.2 Environmental Controls

The environmental controls currently in place for the existing facility will continue to be implemented for the expansion. The environmental controls include:

- Waste Stream Control,
- Double-Composite Liner System,
- Leachate Collection System,
- Surface Water Collection System, and
- Final Cover System.

3.2.1 Waste Stream Control

Hyland Facility Associates will continue to implement a waste stream control system to preclude the disposal of unauthorized waste at the Hyland Facility. The waste stream control system at the

Hyland Facility consists of:

- Securing the perimeter of the facility through fencing and natural barriers;
- A single site access point;
- A scale system to record incoming and outgoing vehicle weight;
- A waste monitoring program which screens any prohibited waste from the facility; and
- Random load inspections.

3.2.2 Liner and Leachate Collection System

A double composite liner as required by the 6 NYCRR Part 360 (Part 360) Regulations was constructed beneath Cells 1 and 2. Additionally, a groundwater collection system was constructed below the secondary composite liner to ensure that separation between the bottom of the liner and groundwater is maintained.

The proposed liner system for the expansion cells will also be a double composite liner as described below and designed in accordance with the requirements of Part 360. The expansion cells will also include a groundwater collection system beneath the secondary composite liner.

The double composite liner system in the base areas will include two composite liners and two leachate collection systems. The 2-foot thick secondary soil liner will be constructed over a drainage geocomposite (the groundwater collection system), above the till subgrade, and will consist of compacted low-permeability soil with a maximum permeability of 1 x 10^{-7} cm/sec. A 60-mil HDPE geomembrane will be installed directly above the secondary soil liner. The secondary leachate collection layer will consist of a geocomposite installed immediately above the secondary geomembrane.

The primary soil liner will be constructed immediately above the secondary leachate collection layer, and consists of a geosynthetic clay liner (GCL) placed directly over a 1-foot layer of compacted structural fill. A 60-mil HDPE geomembrane will then be installed above the primary soil liner. The primary leachate collection layer will be constructed above the primary geomembrane, and consists of a 2-foot granular soil drainage layer. Alternatively, Hyland may replace the top 12 inches of this granular soil drainage layer with a 16-inch layer of tire chips.

The side slope liner system includes a primary 60-mil HDPE geomembrane overlying a secondary geocomposite drainage layer. The geosynthetic clay liner (GCL) and 12-inch thick structural fill layer will not be included in the side-slope primary liner. The side slope secondary composite liner system is identical to the base liner system. The side slope primary and secondary leachate collection layers are also identical to the base system.

The purpose of the primary leachate collection system is to collect all leachate flowing through the waste due to infiltration and percolation of precipitation and moisture in the waste, and to convey this leachate to the leachate collection pipes and then to the storage facilities. The secondary leachate collection system is isolated from the primary system so that it can be monitored to determine the presence of leachate in the secondary system. In this way, leachate that leaks through the primary liner can be detected and collected before it passes through the secondary liner.

The primary leachate collection system includes a series of perforated drain pipes embedded in layers of highly permeable gravel. The drain pipes are located directly above the composite liners and drain to sumps located on the west side of each expansion cell. Collections pipes are also located in the secondary collection later and drain to sumps similar to the primary collection pipes. Leachate will be pumped from the sumps through a riser house to a leachate surface impoundment.

The leachate surface impoundment, as well as the piping system connecting the leachate lift station with the holding surface impoundment, will have double-containment provisions to prevent potential release to the environment. The secondary containment system for the piping system (which will consist of a second, outer pipe) will be monitored for liquid. Should liquid be found, testing will determine if it is leachate or groundwater, thus determining which pipe is leaking, and the necessary corrective measures to be taken.

The leachate surface impoundment will contain high level alarms to alert operators when the stored volume approaches capacity. The design of the leachate surface impoundment includes a secondary containment system, consisting of a composite liner. Any potential leaks from the surface impoundment would be contained by the secondary containment system, and would be detected before release of leachate to the environment could occur.

3.2.3 Surface Water Collection System

Control of uncontaminated surface water runoff from undisturbed areas outside the cell area is accomplished through the use of diversion ditches or swales, located where necessary to divert surface runoff away from the disposal and operations areas. Additional ditches within the disturbed areas, collect sediment laden runoff and convey it to on-site detention basins. During construction, internal berms, flaps, or tarps will be used to prevent stormwater in constructed, but not yet active, landfill areas from becoming leachate. These structures will reduce the amount of leachate produced by managing the flow of water within the cells.

Runoff from areas within the cells that has not come in contact with waste will be directed to the sedimentation ponds, rather than to the leachate collection system.

The constructed ditches will be lined with stone, or protected from erosion by the use of stone check dams, or other appropriate erosion protection measures. These measures will reduce the amount of sediment transported to the sedimentation ponds.

3.2.4 Final Cover System

A conceptual closure plan for construction of the final cover is included in the 6 NYCRR Part 360 Application Package. The final closure plan will be submitted to NYSDEC at least 60-days prior to last receipt of waste. In general terms, the final cover will consist of a gas-venting layer on top of the waste, under a low permeability layer designed to reduce infiltration of precipitation. Over these two layers, there will be a 24-inch barrier protection layer of unclassified soils, and a 6-inch layer of topsoil. The gas-venting layer in the cover will consist of a geocomposite, over the entire area of the final cover. Following placement of the topsoil layer for final cover, vegetative cover will be established and maintained to prevent erosion of the final cover.

4.0 WATER QUALITY MONITORING PROGRAM

The following section describes the water quality monitoring plan to be implemented at the site. This section is structured in accordance with the Part 360 regulations and includes four subsections; existing water quality, operational water quality, contingency water quality, and reporting of data.

4.1 Existing Water Quality

Background water quality values have been established for the existing landfill by sampling each well in the monitoring program for parameters listed on the 6 NYCRR Part 360 baseline parameter list. The existing water quality sampling and analysis methods are described in the Hyland Facility Site Analytical Plan (Reference 4), including third party data validation. Background water quality values have been established for both the overburden and bedrock wells using pre-operational data collected quarterly from January 1990 to September 2001. Wells and sampling intervals used to establish the pre-operational water quality are listed on Table 1.

Existing water quality values were initially presented in a letter to the NYSDEC dated December 1, 1998. As discussed in the December 1998 letter, the data indicated that there are instances where the parameters exceeded the 6 NYCRR Part 360 criteria due to natural variation in the data. These existing water quality values were updated in May 2002 to reflect data collected from wells associated with Cell 2. The current preoperational water quality data for overburden wells is listed in Table 2 and for bedrock wells in Table 3.

As requested by NYSDEC in their July 9, 2002 letter to Hyland, two existing water quality values are presented for pre-operational water quality data for inorganic parameters. The first value displayed in Tables 2 and 3 corresponds to Cell 1 and Cell 2 pre-operational data from samples with turbidities less than 50 NTU and is compared with operational metals data from wells having turbidities less than 50 NTU. The second value displayed corresponds to Cell 1 and Cell 2 pre-operational data for each sample collected (e.g., including samples with a turbidity greater than 50 NTU) and is compared with samples that have turbidities greater than 50 NTU.

The following section, describing the operational water quality program, outlines the sequence of monitoring well installation as Cells 3, 4 and 5 are added to the facility. With the construction of each cell, new monitoring wells will be installed and sampled. Four rounds of samples will be collected and tested prior to waste deposition in each new cell. The samples will be tested for the 6 NYCRR Part 360 "expanded" parameter list (1 round) and for the 6 NYCRR Part 360 "baseline" parameter list (3 rounds). This data, collected prior to waste deposition, will be incorporated into the existing preoperational database and the preoperational data will be revised and submitted to the NYSDEC.

4.2 Operational Water Quality

An operational water quality monitoring program will be implemented during operation, closure and post closure of the facility.

4.2.1 Groundwater Monitoring Schedule and Parameters

Operational water quality monitoring will commence in a phased manner dependent upon the construction of new cells for waste disposal. Figures 4-1 through 4-3 illustrate the sequence of well installation and decommissioning as Cells 3 through 5 are developed. Figures 4-1 through 4-3 also depict the monitoring wells that will be monitored upon completion of Cells 3, 4 and 5, respectively of the 48-acre expansion.

Notes are included on each figure summarizing the wells that will be installed and which will be decommissioned as each cell is constructed. Tables 4 through 6 correspond to Figures 4-1 through 4-3, respectively, and provide additional information regarding well installation and abandonment as the landfill is expanded. The tables also provide information for those wells that are currently installed and will be incorporated into the monitoring program as the cells are developed.

The overburden till is the first water bearing unit of the critical stratigraphic section. 6 NYCRR Part 360-2.11(c)(1)(i) requires that monitoring well spacing in the first water bearing zone not exceed 500 feet along the downgradient perimeter of the facility. Hyland will utilize the existing upgradient wells in the overburden well data and the background water quality data for these wells (updated to incorporate new background data) as part of the monitoring program for the expansion. New wells will be installed in the overburden downgradient (south) of each cell in accordance with the Part 360 requirements. Where appropriate, wells installed for the expansion Hydrogeologic Study will be incorporated into the monitoring program.

The upper bedrock is the second water bearing unit of the critical stratigraphic section. 6 NYCRR Part 360-2.11(c)(1)(i) requires that subsequent water bearing zones be monitored as required by the department based on the potential for contaminant migration to that unit. Well spacing in subsequent water bearing zones will include at least one upgradient and three downgradient wells as required by the Regulations.

Hyland plans to utilize the existing upgradient wells in the bedrock and the background water quality data for these wells (updated to incorporate new background data) as part of the monitoring program for the expansion. Considering the low permeability and flow velocities in the till, the potential for contaminant migration into the bedrock is remote. Therefore, Hyland plans to monitor locations in the bedrock downgradient from Cells 3, 4 and 5 as shown on Figures 4-1, 4-2 and 4-3 and listed on Tables 4 through 6.

In identifying the overburden and bedrock monitoring well locations for each phase of the 48-acre expansion, consideration was given to distance between wells and their proximity to the limits of waste, as well as attempting to maintain the integrity of each well during construction. Reasons for monitoring well locations that are greater than 50 feet from the limit of waste include maintaining wells with a history of preoperational analytical data and avoiding installation of wells in areas of large fill placements during construction, where well integrity problems may arise as a result of the need for well extensions.

Included in the monitoring of each phase of the 48-acre expansion are existing upgradient overburden wells MW-26 and MW-36A and upgradient bedrock wells MW-14, MW-19 and MW-31. Also consistent for each development phase are downgradient bedrock monitoring well MW-34 (presently installed and to be used as contingency well for Cell 3), downgradient bedrock monitoring well MW-40 and surface impoundment overburden monitoring wells MW-40A (presently installed upgradient well), MW-41A (downgradient) and MW-42A (downgradient). Monitoring wells MW-40, MW-41A and MW-42A will be constructed at least 1 year prior to the placement of waste in Cell 3. Each of these wells are included on Tables 4 through 6 and Figures 4-1 through 4-3.

Downgradient overburden monitoring well locations for each phase of the 48-acre expansion were selected by superimposing the groundwater contours (see Figure 2-3) on each phase of expansion and placing an overburden well downgradient of the sump. Additional overburden wells, each less than 500 feet from the adjacent overburden well, were located to monitor conditions downgradient of the waste disposal area.

Downgradient overburden monitoring wells MW-37A and MW-38A, both presently installed, and MW-39A and MW-47A, to be constructed at least 1 year prior to the placement of waste in Cell 3, will be used to monitor the overburden downgradient of Cell 3. Additional details of the location and sampling of these wells are included in Table 4 and on Figure 4-1. Wells MW-38A and MW-39A are located approximately 400 feet apart, wells MW-39A and MW-37A are located approximately 380 feet apart and wells MW-37A and MW-47A are located approximately 220 feet apart.

Downgradient bedrock monitoring wells MW-37 and MW-38, both presently installed, will be used to monitor the bedrock downgradient of Cell 3. Additional details of the location and sampling of these wells are included in Table 4 and on Figure 4-1.

Downgradient overburden monitoring wells MW-43A and MW-44A, to be constructed at least 1 year prior to the placement of waste in Cell 4, will be installed to monitor Cell 4. Additional details of the location and sampling of these wells are included in Table 5 and on Figure 4-2. Wells MW-43A and MW-44A are located approximately 350 feet apart.

Downgradient bedrock monitoring wells MW-37, presently installed, and MW-43, to be constructed at least 1 year prior to the placement of waste in Cell 4, will be utilized to monitor the bedrock downgradient of Cell 4. Additional details of the location and sampling of these wells are included in Table 5 and on Figure 4-2.

Downgradient overburden monitoring wells MW-34A, presently installed, MW-45A, MW-46A, MW-48A, MW-49A and MW-50A, to be constructed at least 1 year prior to the placement of waste in Cell 5, will be utilized to monitor Cell 5. Additional details of the location and sampling of these wells are included in Table 6 and on Figure 4-3. Wells MW-48A and MW-45A are located approximately 355 feet apart, wells MW-45A and MW-34A are located approximately 470 feet apart, wells MW-34A and MW-46A are approximately 440 feet apart, wells MW-46A and MW-50A are approximately 415 feet apart and wells MW-50A and MW-49A are approximately 415 feet apart.

Downgradient bedrock monitoring wells MW-48 and MW-50, to be constructed at least 1 year prior to the placement of waste in Cell 5, will be utilized to monitor the bedrock downgradient of Cell 5. Additional details of the location and sampling of these wells are included in Table 6 and on Figure 4-3.

Monitoring wells will be added to the monitoring program approximately one year before the disposal of waste in adjacent cells as outlined in Tables 4 through 6. During the first year, each well that will be used to monitor new cells being constructed will be analyzed such that they have been tested once for expanded parameters and three times for baseline parameters (Appendix C). These data will be used to update the existing water quality database as discussed previously in Section 4.1.

Following the first year of monitoring, each well will be analyzed quarterly, once for baseline parameters and three times for routine parameters, with the baseline sampling event rotated to a different quarter each year. A schedule for completion of each round of sampling is included in Table 7.

In addition to conducting the groundwater quality monitoring activities described above, groundwater level measurements will be obtained quarterly from each of the wells in the program. The water levels obtained will be reviewed to evaluate groundwater flow patterns in the vicinity of the Hyland Facility.

4.2.2 Groundwater Monitoring Well Construction

The monitoring wells on the south side of Cells 2, 3 and 4 will be decommissioned prior to constructing subsequent cells as shown on Figures 4-1 through 4-3. The wells will be decommissioned following the requirements of 6 NYCRR Part 360-2.11(a)(8)(iv).

The new wells will be installed in accordance with the requirements of 6 NYCRR Part 360-2.11(a)(8)(ii). Overburden wells will be screened across the water table. Bedrock wells will be screened across the upper 20 feet of bedrock similar to the existing bedrock wells. A monitoring well installation plan is included in Appendix D.

4.2.3 Groundwater Monitoring Well Maintenance

Groundwater monitoring wells which are currently installed but are not scheduled for inclusion into the monitoring program at this point in time will be inspected and maintained yearly. This yearly maintenance will consist of a visual inspection of the protective casing and surface seal, re-development of the wells, and the measurement of field parameters (groundwater elevation, temperature, pH, specific conductivity, and turbidity) before during and after the re-development. Any noted damage to the wells will be repaired and significant deviations in the measured field parameters will be brought to the attention of the Hyland General Manager.

4.2.4 Environmental Monitoring Points

The following provides a summary of the environmental monitoring points to be employed as a part of the Operational Water Quality Monitoring Program, including the monitoring frequency and parameters for analysis.

Groundwater

The operational groundwater monitoring program will consist of the monitoring wells shown on Figures 4-1 through 4-3. These wells will be included in the operational monitoring program in accordance with the schedule presented in Tables 4 through 6. Each of the wells will be sampled once for expanded parameters and three times for baseline parameters prior to deposition of waste in the adjacent cells. Yearly operational monitoring will then consist of one round of baseline parameters and three rounds of routine parameters, with the baseline parameters rotated to a different quarter each year (see Table 7). Parameter lists are presented in Appendix C.

Hyland will continue the residential well sampling and testing program. If requested by the property owner, Hyland will collect and test samples from residential wells within one mile of the project site as required by Special Condition No. 12 of the 6 NYCRR Part 360 Permit. Appendix B describes the residential water supply sampling plan.

Groundwater Collection System

Samples of the liquid discharging from the groundwater suppression system will be collected quarterly and analyzed for the same parameters as the groundwater samples.

As requested by NYSDEC, the groundwater collection system has been designed to allow for separate sampling of each of the Cells. As discussed in Section 2, monitoring of the groundwater collection system beneath Cells 1 and 2 will continue as shown on Figure 4-4. For Cells 3 and 4, the groundwater transfer pipe flows to a pump station (see Figures 4-1 and 4-2 for location) and is then pumped to a sedimentation pond. The groundwater samples will be collected from the inlet to the pump station as shown on the detail on Figure 4-5. Upon completion of Cell 5 construction, the groundwater transfer pipes for Cells 3, 4 and 5 (labeled "Groundwater Collection Point" on Figure 4-3) will discharge to the swale south of Cell 5 and the groundwater samples will be collected directly from the discharge pipes.

The collection of a sample will be dependent upon a measurable discharge from the groundwater collection system at the time of sampling. If the discharge is somewhat cyclic, then the sampling event will be scheduled such that a sample may be obtained. However, if the flow is observed to be sporadic, such that flow rates may not be predicted, a sample will only be collected if there is a discharge from the pipe at the time of sampling.

Surface Water

Surface water and surface water sediment samples will be collected quarterly from the locations shown on Figures 4-1 through 4-3. These locations are along the ditches that intercept surface water flow to the east and west of the proposed facility and at the outfalls of the sedimentation basins.

During routine monitoring events at the groundwater monitoring wells, surface water and sediment sample locations will be sampled for the Routine Parameters listed in Appendix C. During baseline monitoring events at the groundwater monitoring wells, surface water and sediment sample locations will be sampled for the Baseline Parameters listed in Appendix C.

Monitoring the surface water discharges quarterly exceeds the semi-annual monitoring required under the facility's current State Discharge Pollutant Elimination System (SPDES) permit as described in the Stormwater Pollution Prevention Plan (SWPPP) for the expansion.

Special Condition 43 of the Permit to Construct and Operate the facility requires contingency surface water monitoring in addition to the surface water monitoring discussed above for the east and west ditches. It is not anticipated that the ditches to be constructed around the perimeter of the individual cells will contain water except during rainfall runoff events. However, in accordance with Special Condition 43, if surface water contamination is suspected "due to severe erosion of the intermediate/final cover, leaking of leachate from vehicles, presence of ash exterior to the landfill cells, or other physical evidence of waste release" sampling will be completed. Samples will be analyzed for the Baseline Parameters listed in Appendix C.

If this testing indicates the presence of parameters at a concentration exceeding the surface water quality standards in 6 NYCRR Part 703 the surface water shall be collected and either treated until it is suitable for release or hauled off-site for treatment.

If the testing described above indicates the presence of parameters exceeding the groundwater effluent standards (6 NYCRR 703.6) in the surface water samples at locations overlying the Cuba Formation, then the data collected from well MW-14 will be evaluated for the presence of the parameters that exceed the groundwater effluent standards. It is noted that MW-14 is included in the environmental monitoring program for the facility. As such, data will be collected from this location quarterly. Therefore, if surface water impact is indicated, the historical data from MW-14 will be compared to the most recent sampling results for the parameters that exceed the groundwater effluent standards. If a statistically significant difference is indicated, then contingency water quality monitoring will be initiated for MW-14 in the Cuba Formation.

Leachate

Leachate in the primary and secondary leachate collection and removal system will be collected and analyzed on a semi-annual basis for Expanded Parameters (Appendix C). Separate samples of liquid from the secondary leachate collection system will be collected from each Cell as shown on Figure 4-6. There will be independent leachate side riser buildings constructed for Cells 3, 4 and 5. The typical side riser building piping for Cells 3, 4 and 5 shown on Figure 4-6 depicts how each will be constructed. Note that the side riser building details for Cell 5 contains two secondary riser pipes. One pipe serves as the collection pipe for liquids collected from the western portion of Cell 5 while the second pipe serves as the collection pipe for liquids collected from the eastern portion of Cell 5. Additionally, the secondary collection system beneath the leachate surface impoundment will be sampled as indicated on Figure 4-7.

The sample from the primary leachate collection system will be a composite of the liquid from the entire landfill. Samples from the secondary collection system will be analyzed individually.

4.2.5 Data Evaluation

The following section provides the basis for evaluation of the water quality data to evaluate if a significant increase in the groundwater quality parameters has occurred. The following sections are only applicable to the groundwater quality data. Analytical data obtained from surface water sampling, groundwater collection system sampling or leachate sampling will be evaluated on an qualitative basis by comparing the data collected through time and not from the statistical basis discussed herein.

An additional distinction between groundwater and surface water data to data collected from other environmental monitoring points is the applicability of standards. For example, groundwater and surface water samples may be compared not only to existing water quality but also to standards as established in Parts 701, 702 and 703. These standards, however, are not directly applicable to leachate samples or samples collected from the sediment ponds which are all treatment units associated with the operation of the facility. Data collected from such units must be evaluated qualitatively.

Determination of Significant Increases in Groundwater

The groundwater quality data collected for each quarter will be screened for any parameter which exceeds the existing water quality value for that parameter by three standard deviations or exceeds the existing water quality value and the water quality standards for that parameter as specified in Parts 701, 702, and 703 (Part 360-2.11(c)(5)(ii)(d)(2)(i) and (ii)). If no exceedances are found and there is no significant increases, the results will be reported to the NYSDEC as discussed in Section 4.4.

If exceedances are found for one or more parameters, as identified above, the data will be evaluated in accordance with one or more of the following procedures. These procedures will form the basis for a determination as to whether the exceedance is a significant increase from the existing water quality value:

- Analytical data obtained from leachate collected from the leachate collection system will be compared to the groundwater quality data. If the parameters identified as indicating a statistically significant difference are not found in the leachate, the increase is not landfill derived and the results are reported to NYSDEC as discussed in Section 4.4. If the parameter(s) of interest are in the leachate, then:

- The parameters of interest will be compared to the mean and mean plus three standard deviations for that parameter as calculated from the existing water quality data collected from that well (i.e. intra-well comparison). If the measured value is below the criteria as presented in Part 360-2.11(c)(5)(ii)(d)(2)(i) and (ii), there is no significant increase and the results are reported to the NYSDEC as discussed in Section 4.4. If a significant increase is found, then:

- Data from upgradient monitoring wells will be reviewed. An intra-well comparison will be made at each upgradient well location for the parameter of interest. If the intra-well comparison indicates concentrations of the parameter of interest in an upgradient well that exceeds the criteria as presented in Part 360-2.11(c)(5)(ii)(d)(2)(i) and (ii), then the results will be reported to the NYSDEC as discussed in Section 4.4; or,

- The existing water quality data will be evaluated for normality and prediction limits will be calculated in accordance with the distribution of the data and the number of quantified values. If the measured values are below the calculated prediction limits, there is no significant increase and the results are reported to the NYSDEC as discussed in Section 4.4.

If the methods of data evaluation described above all indicate a significant increase, the NYSDEC will be notified within 14 days of this finding and baseline monitoring will then be completed (verification sampling) for the wells in question. If the verification sample results for all parameters of interest do not indicate a significant increase, the NYSDEC will be notified and operational water quality monitoring will then continue. All the data will be reported to the NYSDEC.

If the values measured during the verification sampling are above the prediction limits calculated above, the NYSDEC will be notified within 14 days of this finding and a Contingency Monitoring Program, as described in Section 4.3, will be initiated.

4.3 Contingency Water Quality Monitoring

Contingency water quality monitoring will be initiated upon the determination that a significant increase has occurred for one or more of the baseline parameters as described in Section 4.2.5. Contingency water quality monitoring will be implemented as follows:

4.3.1 Additional Monitoring Wells

A plan will be prepared describing additional monitoring wells to be constructed in the event that contingency water quality monitoring is initiated as required by Special Condition 21 of the Permit. The monitoring well installation plan will be submitted to NYSDEC for acceptance prior to construction of the wells.

4.3.2 Sampling and Analysis

Within 90 days of implementing a contingency water quality monitoring program, groundwater samples will be collected from all monitoring wells which are actively part of the groundwater monitoring system, and analyzed for expanded parameters. If any constituents are detected in the downgradient well(s) as a result of the expanded parameter analysis, a minimum of two independent samples will be collected from each well within 30 days of obtaining the results of the expanded parameter analysis, and analyzed for the detected constituents. These samples will be collected within two weeks of each other and then compared to the existing groundwater quality values established as discussed in Section 4.1. If an increase in the existing water quality values in the upgradient well(s) is indicated by this comparison, the existing water quality values for these parameters will be revised to be the arithmetic mean of the results of each parameter from the upgradient wells within that flow regime. If it can be shown that selected expanded parameters are not reasonably expected to be in, or derived from, the waste contained in the landfill, based on the leachate sampling discussed in Section 4.2.4, the NYSDEC will be petitioned to delete these parameters from the required analysis.

Within 14 days of receiving the data obtained from the above sampling, the NYSDEC will be notified of the identity of any expanded parameters that have been detected. In addition, quarterly sampling from that point on, for all currently active monitoring wells, will consist of three quarters of baseline parameters plus those expanded parameters detected as a result of the expanded parameter sampling, and one quarter of sampling and analysis for expanded parameters. Groundwater protection standards for the detected expanded parameters will be established in accordance with 6 NYCRR Part 360-2.11(c)(5)(iii)(f).

If the concentrations of any of the expanded parameters, included in the above monitoring program, are shown to be at or below existing water quality values for two consecutive sampling events, the NYSDEC will be notified and a petition to remove that parameter(s) from the contingency water quality monitoring program will be submitted for approval. If the concentrations of all the expanded parameters are shown to be at or below existing water quality values for two consecutive sampling events, the NYSDEC will be notified and a petition to return to operational water quality monitoring will be presented for approval.

If the concentrations of any expanded parameters are above existing water quality values, but all concentrations are below the groundwater protection standard established above, then contingency water quality monitoring will continue as described above.

However, if one or more expanded parameters are detected at significant levels above the groundwater protection standards in any sampling event, the NYSDEC will be notified within 14 days of this finding to identify the expanded parameters that have exceeded the groundwater protection standard. In addition, in accordance with 6 NYCRR Part 360-2.11(c)(5)(iii)(e), efforts will be undertaken to either: A) characterize the nature and extent of the release by installing additional monitoring wells, install at least one additional well at the facility boundary in the direction of migration, notify all persons who own land or reside over any part of the plume and initiate an assessment of corrective actions or B) submit documentation that a source other than the landfill caused the contamination.

4.4 Reporting of Data

Data obtained from the operational water quality monitoring program will be reported to the NYSDEC with the quarterly report for the facility, unless more rapid reporting is identified as the result of a significant increases discussed above. The reporting of analytical data will be completed in accordance with 6 NYCRR Part 360-2.11(c)(5)(iv) and will include a description of sample collection methodologies, field forms, chain-of-custody, quality assurance/quality control documentation, identification of sampling locations, data summary tables and a discussion of the collected data, including a data quality assessment report. Data will be reported to both the NYSDEC Division of Solid Waste Bureau of Municipal Waste Permitting in Albany and the Region 9 Solid Waste Engineer in Buffalo. In addition, an annual report will also be submitted which summarizes the data collected over the previous year, including discussions regarding observed changes in groundwater, surface water, leachate, etc.

Copies of the quarterly analytical reports will be kept at the Hyland Facility Associates office in Angelica, New York.

5.0 LANDFILL GAS MONITORING

A gas probe network will continue to be installed around the landfill to monitor for the presence of landfill gas. The proposed landfill gas monitoring system will consist of landfill gas probes installed at a spacing of approximately 400 to 500 feet around the landfill perimeter.

The gas probes will be installed according to the procedures included in Appendix E. The gas probes will be installed above the water table or to a depth of 25 feet whichever is less. The proposed locations are illustrated on Figures 4-1 through 4-3. Upon completion, gas probe construction summaries will be appended to this document.

The results of the landfill gas monitoring program will be included in the quarterly report described in Section 4.4.

5.1 Gas Monitoring Procedures, Parameters and Frequency

The landfill gas probes will be monitored on a quarterly basis by Hyland. The probes will be monitored for three parameters: 1) combustible gas concentrations; 2) pressure; and 3) liquid level.

Landfill gas monitoring will be done with a dual range methane indicator that measures concentration as percent by volume of methane equivalents. Two ranges of detection will be available: 0 percent to 5 percent and 0 percent to 100 percent methane by volume. Combustible gas monitoring procedures will be measured initially with the high range. If the reading is less than 5 percent, the procedure will be repeated at the low range. Hyland will monitor the gas probes for the Lower Explosive Limit (LEL) of methane in air, or 5 percent methane in air with 20.5 percent oxygen. The alert level used by Hyland for landfill gas monitoring results is 25 percent of the LEL or 1.25 percent methane in air.

Pressure readings in the probes provide data for assessing the migration of combustible gas and are expressed in inches of water column. Pressure will be measured by attaching a gage to a fitting on the gas probe cap.

Liquid level measurements will be considered in evaluating the performance of probes. If the liquid levels are above the screened portion of the probe, then the probe is to be considered temporarily ineffective and the monitoring data for that monitoring event will be considered invalid. Liquid levels obtained during probe installations will be considered when determining the screened length of the probe.

The following procedures will be implemented to monitor the probes:

1. Obtain pressure reading;
2. Purge a predetermined volume of gas from the gas probe;
3. Observe the gas concentration after purging and record the steady state (continuous) gas reading; and
4. Obtain liquid level readings.

When the percentage of gas, liquid level and pressure have been obtained, one of four general categories will be applied to evaluate the data:

1. <u>High Percent Gas and High Pressure</u>

   In this situation, there is an indication of combustible gas accumulation and migration attributed to elevated pressure. NYSDEC will be notified within seven days of the detection of these conditions along with a description of the short term measures taken to protect human health. A plan describing the nature, extent and proposed remedy for the explosive gas release will be submitted to NYSDEC within 45 days of the detection along with a schedule for implementation within 60 days of the detected release. Additional investigation may be required to determine the extent of migration.

2. <u>High Percent Gas and No/Low Pressure</u>

   In this situation, there is an indication of combustible gas accumulation and migration attributed to diffusion (movement from higher concentration to lower concentration) rather than pressure. Although this does not present an immediate concern, the analyst should note trends in the data collected subsequently. If the explosive gas concentration in the probes exceeds the lower explosive limit, then the procedures described under item 1 will be implemented.

3. No/Low Percent Gas and High Pressure

   In this situation, the pressure observed may be attributed to the water level rising above the screened section of the probe or to the barometric pressure of that particular day. The analyst should observe the liquid level measurements and note if the screened portion is below the liquid level.

4. No Percent Gas and No Pressure

   In this situation, there is no evidence of combustible gas accumulation within the probe.

6.0 REFERENCES

1. McMahon & Mann Consulting Engineers, P.C., "Environmental Monitoring Plan," Hyland Facility, Angelica, New York February 1997, Revised October 1997.

2. McMahon & Mann Consulting Engineers, P.C., "Hydrogeologic Report (2 Volumes)," Hyland Facility Associates, Landfill Expansion Project, Part III of 6 NYCRR Part 360 Solid Waste Management Permit Modification Application, August 2004.

3. Earth Investigations Ltd., and the University of Rochester Department of Geological Sciences, "Site Investigation Report for the Proposed Hyland Ash Monofill," October 1990.

4. McMahon & Mann Consulting Engineers, P.C., "Site Analytical Plan, Hyland Ash Monofill Project, Angelica, New York, February 1997.

TABLES

Table 1 - Summary of Wells Used for Existing Water Quality

Monitoring Well	Period of Preoperational Data Collection
Overburden	
MW-H	Jan. 1990 - Dec. 1996
MW-G	Oct. 1991 - Dec. 1996
MW-20A	Dec. 1993 - July 1998
MW-15A	March 1994 - June 1994
MW-21AR	July 1998 - April 1999
MW-F	Sept. 1999 - Jan. 2000
MW-26	Sept. 1999 - Jan. 2000
MW-27A	July 2001 - Sept. 2001
MW-28A	July 2001 - Sept. 2001
MW-29A	July 2001 - Sept. 2001
MW-30A	July 2001 - Sept. 2001
Bedrock	
MW-14	Oct. 1991 - July 1998
MW-19	Dec. 1993 - July 1998
MW-20	Dec. 1993 - July 1998
MW-17	Jan. 1994 - March 1994
MW-15	Jan. 1994 - June 1994
MW-16	Jan. 1994 - June 1994
MW-21	Jan. 1994 - June 1996
MW-22	June 1996 - March 2000
MW-21R	July 1998 - April 1999
MW-23	Sept. 1999 - March 2000
MW-27	July 2001 - Sept. 2001
MW-28	July 2001 - Sept. 2001
MW-29	July 2001 - Sept. 2001
MW-30	July 2001 - Sept. 2001
MW-31	July 2001 - Sept. 2001

Table 2 - Summary of Preoperational Water Quality Data (Overburden Wells)

Parameter List	Number of Times Tested	Number of Times Not Detected	Number of Times Detected	Arithmatic Mean	Standard Deviation	Mean + 3 Standard Deviation	Water Quality Standards
Field Parameters:							
Specific Conductivity (umHos/cm)	46	0	46	679.7	254.7	1443.8	
Sampling Depth	43	0	43	19.8	12.6	57.5	
Depth to Groundwater (ft.)	47	0	47	13.9	10.2	44.5	
Eh (MV)	33	0	33	87.7	104.9	402.4	
pH	46	0	46	7.579	0.2	8.3	6.5 - 8.5
Temperature (deg. C)	45	0	45	10.7	2.3	17.6	
Turbidity (NTU)	39	0	39	289.7	468.8	1696.0	5
Dissolved Oxygen	0	0					
Leachate Indicators (mg/l):							
TOC	45	6	39	4.2	5.6	21.2	
Alkalinity as CaCo3	45	0	45	288.6	65.6	485.5	
Ammonia as N	43	21	22	0.2	0.2	0.66	2.0
Biochemical Oxygen Demand	40	36	4	3.2	0.8	5.6	
Chloride	45	2	43	9.2	11.8	44.4	250
Chemical Oxygen Demand	46	33	13	17.5	20.0	77.5	
Color (Pt. Co. U.)	38	0	38	174.5	261.5	958.9	15
Nitrate as N	45	28	17	0.3	0.5	1.7	10
Total Hardness as CaCo3	46	0	46	316.0	87.1	577.4	
Kjeldahl Nitrogen as N	41	24	17	1.9	1.9	7.6	
Phenolics, total	42	16	26	0.0042	0.0	0.017	0.001
Solids, dissolved	46	0	46	446.7	273.4	1266.8	500
Sulfate as SO4	45	0	45	85.7	118.5	441.2	250
Bromide	40	37	3	1.2	1.2	4.9	
Bicarbonate	2	0	2	245.5	31.8	341.0	
Carbonate	2	2	0	1.0	0.0	1.0	
Fluoride	0	0					1.5
Inorganic Parameters (mg/l):							
Aluminum	17 / 42	4 / 4	13 / 38	4.19 / 15.66	8.07 / 24.79	28.41 / 90.01	
Antimony	17 / 42	13 / 30	4 / 12	0.044 / 0.048	0.010 / 0.026	0.074 / 0.126	0.003
Arsenic	21 / 48	9 / 12	12 / 36	0.008 / 0.019	0.012 / 0.035	0.043 / 0.124	0.025
Barium	17 / 42	0 / 0	17 / 42	0.086 / 0.163	0.071 / 0.168	0.300 / 0.668	1.0
Beryllium	17 / 42	16 / 33	1 / 9	0.002 / 0.002	0.000 / 0.001	0.002 / 0.005	
Boron	17 / 42	4 / 13	13 / 29	0.058 / 0.075	0.011 / 0.056	0.091 / 0.243	1.0
Cadmium	23 / 51	17 / 32	6 / 19	0.004 / 0.004	0.002 / 0.002	0.009 / 0.010	0.005
Calcium	23 / 51	0 / 0	23 / 51	66.8 / 69.1	18.0 / 16.1	120.6 / 117.3	
Chromium	17 / 42	11 / 17	6 / 25	0.02 / 0.03	0.02 / 0.05	0.09 / 0.18	0.05
Cobalt	16 / 38	15 / 25	1 / 13	0.01 / 0.02	0.00 / 0.02	0.02 / 0.08	
Copper	17 / 42	10 / 21	7 / 21	0.018 / 0.029	0.009 / 0.025	0.045 / 0.103	0.2
Cyanide, total	14 / 38	12 / 34	2 / 4	0.01 / 0.01	0.00 / 0.00	0.02 / 0.02	0.2
Hexachromium	13 / 37	13 / 36	0 / 1	0.0100 / 0.0103	0.0000 / 0.0020	0.0100 / 0.0162	
Iron	23 / 51	2 / 2	21 / 49	8.05 / 30.04	17.28 / 47.86	59.88 / 173.62	0.3
Lead	23 / 51	3 / 3	20 / 48	0.006 / 0.013	0.005 / 0.016	0.021 / 0.060	0.025
Magnesium	23 / 51	0 / 0	23 / 51	29.87 / 34.45	13.54 / 15.34	70.50 / 80.48	
Manganese	23 / 51	2 / 2	21 / 49	0.38 / 0.92	0.38 / 1.13	1.50 / 4.32	0.30
Mercury	17 / 42	17 / 39	0 / 3	0.0002 / 0.0002	0.0000 / 0.0000	0.0002 / 0.0003	0.0007
Nickel	17 / 42	12 / 20	5 / 22	0.018 / 0.041	0.014 / 0.049	0.060 / 0.187	0.1
Potassium	23 / 51	0 / 0	23 / 51	13.24 / 12.43	22.95 / 16.18	82.10 / 60.97	
Selenium	17 / 42	15 / 40	2 / 2	0.003 / 0.002	0.001 / 0.001	0.006 / 0.005	0.01
Silver	17 / 42	15 / 36	2 / 6	0.009 / 0.009	0.002 / 0.002	0.015 / 0.015	0.05
Sodium	23 / 51	0 / 0	23 / 51	46.8 / 32.2	80.8 / 62.5	289.3 / 219.8	20
Sulfide	3 / 10	2 / 5	1 / 5	0.87 / 0.81	0.22 / 0.24	1.53 / 1.54	
Tin	4 / 11	4 / 11	0 / 0	0.80 / 0.80	0.00 / 0.00	0.80 / 0.80	
Thallium	16 / 40	16 / 39	0 / 1	0.001 / 0.001	0.000 / 0.001	0.001 / 0.003	
Vanadium	15 / 37	9 / 15	6 / 22	0.01 / 0.03	0.01 / 0.04	0.05 / 0.14	
Zinc	16 / 40	9 / 14	7 / 26	0.04 / 0.09	0.04 / 0.12	0.15 / 0.45	

NOTES:

1. The Water Quality Standards were obtained from the NYSDEC Water Quality Regulations Parts 700-705
2. For purposes of calculations, non-detected values were substituted with the Practical Quantitation Limit (PQL).
3. Two values are given for pre-operational water quality data trigger values for inorganic parameters. The first value displayed corresponds to Cell 1 and Cell 2 pre-operational metals data from wells with turbidities less than 50 NTU and is compared with operational metals data from wells having turbidities less than 50 NTU. The second value displayed corresponds to Cell 1 Cell 2 pre-operational data for each sample (e.g.turbidities greater than and less than 50 NTU) and is compared with samples that have turbidities greater than 50 NTU.

Table 3 - Summary of Preoperational Water Quality Data (Bedrock Wells)

Parameter List	Number of Times Tested	Number of Times Not Detected	Number of Times Detected	Arithmatic Mean	Standard Deviation	Mean + 3 Standard Deviation	Water Quality Standards
Field Parameters:							
Specific Conductivity (umHos/cm)	60	0	60	457.950	105.476	774.378	
Sampling Depth	60	0	60	44.097	30.555	135.761	
Depth to Groundwater (ft.)	65	0	65	38.369	29.606	127.188	
Eh (MV)	50	0	50	134.836	118.906	491.554	
pH	61	0	61	7.801	0.590	9.570	6.5 - 8.5
Temperature (deg. C)	60	0	60	9.840	2.499	17.337	
Turbidity (NTU)	61	0	61	109.534	147.834	553.035	5
Dissolved Oxygen		0					
Leachate Indicators (mg/l):							
TOC	58	13	45	2.052	1.650	7.003	
Alkalinity as CaCo3	59	0	59	206.210	54.948	371.054	
Ammonia as N	59	22	37	0.123	0.117	0.473	2
Biochemical Oxygen Demand	58	47	11	3.552	1.667	8.552	
Chloride	59	4	55	7.135	6.394	26.317	250
Chemical Oxygen Demand	59	47	12	14.475	11.262	48.261	
Color (Pt. Co. U.)	52	3	49	88.365	140.177	508.898	15
Nitrate as N	59	37	22	0.192	0.205	0.808	10
Total Hardness as CaCo3	59	0	59	247.051	59.169	424.557	
Kjeldahl Nitrogen as N	58	36	22	1.352	0.766	3.650	
Phenolics, total	56	24	32	0.005	0.008	0.028	0.001
Solids, dissolved	59	0	59	266.254	76.565	495.948	500
Sulfate as SO4	60	0	60	43.668	20.241	104.393	250
Bromide	58	52	6	1.342	3.600	12.141	
Bicarbonate	7	0	7	201.571	36.281	310.413	
Carbonate	7	6	1	1.000	0.000	1.000	
Fluoride	0	0					1.5
Inorganic Parameters (mg/l):							
Aluminum	31 / 55	6 / 6	25 / 49	1.89 / 5.71	3.95 / 9.29	13.74 / 33.57	
Antimony	31 / 55	22 / 42	9 / 13	0.045 / 0.041	0.009 / 0.011	0.073 / 0.075	0.003
Arsenic	31 / 56	20 / 23	11 / 33	0.004 / 0.012	0.004 / 0.040	0.015 / 0.131	0.025
Barium	31 / 55	0 / 0	31 / 55	0.068 / 0.097	0.045 / 0.110	0.202 / 0.425	1.0
Beryllium	31 / 55	30 / 50	1 / 5	0.002 / 0.002	0.000 / 0.001	0.002 / 0.004	
Boron	31 / 55	21 / 34	10 / 21	0.051 / 0.055	0.006 / 0.017	0.071 / 0.105	1.0
Cadmium	36 / 62	28 / 50	8 / 12	0.004 / 0.004	0.001 / 0.001	0.008 / 0.008	0.005
Calcium	36 / 62	0 / 0	36 / 62	58.8 / 57.7	12.6 / 15.4	96.5 / 104.0	
Chromium	31 / 55	20 / 27	11 / 28	0.01 / 0.02	0.01 / 0.03	0.04 / 0.12	0.05
Cobalt	28 / 43	26 / 33	2 / 10	0.01 / 0.01	0.00 / 0.01	0.02 / 0.05	
Copper	31 / 55	21 / 27	10 / 28	0.017 / 0.021	0.006 / 0.018	0.036 / 0.076	0.2
Cyanide, total	26 / 49	21 / 44	5 / 5	0.01 / 0.01	0.00 / 0.00	0.02 / 0.03	0.2
Hexachromium	27 / 50	25 / 48	2 / 2	0.0098 / 0.0099	0.0010 / 0.0007	0.0127 / 0.0120	
Iron	36 / 62	2 / 2	34 / 60	5.01 / 10.68	10.42 / 16.77	36.28 / 60.98	0.3
Lead	36 / 62	5 / 5	31 / 57	0.006 / 0.012	0.005 / 0.022	0.020 / 0.079	0.025
Magnesium	36 / 62	0 / 0	36 / 62	20.48 / 20.79	5.79 / 7.26	37.87 / 42.58	
Manganese	36 / 62	1 / 1	35 / 61	0.34 / 0.50	0.29 / 0.67	1.22 / 2.50	0.3
Mercury	31 / 55	29 / 53	2 / 2	0.0003 / 0.0002	0.0003 / 0.0002	0.0012 / 0.0010	0.0007
Nickel	32 / 56	22 / 29	10 / 27	0.015 / 0.025	0.008 / 0.025	0.038 / 0.100	0.1
Potassium	37 / 63	0 / 0	37 / 63	4.50 / 7.85	4.19 / 15.66	17.07 / 54.81	
Selenium	32 / 56	32 / 56	0 / 0	0.003 / 0.002	0.001 / 0.001	0.006 / 0.005	0.01
Silver	32 / 56	25 / 46	7 / 10	0.009 / 0.008	0.002 / 0.004	0.015 / 0.019	0.05
Sodium	37 / 63	0 / 0	37 / 63	10.5 / 9.8	5.7 / 5.7	27.5 / 27.0	20
Sulfide	7 / 14	3 / 8	4 / 6	0.61 / 0.82	0.33 / 0.39	1.60 /. 2.00	
Tin	9 / 16	8 / 15	1 / 1	0.80 / 0.80	0.00 / 0.00	0.80 / 0.80	
Thallium	32 / 56	32 / 55	0 / 1	0.001 / 0.001	0.000 / 0.001	0.001 / 0.003	
Vanadium	28 / 43	22 / 27	6 / 16	0.01 / 0.01	0.01 / 0.01	0.03 / 0.05	
Zinc	31 / 55	14 / 17	17 / 38	0.03 / 0.05	0.02 / 0.05	0.10 / 0.21	

NOTES:

1. The Water Quality Standards were obtained from the NYSDEC Water Quality Regulations Parts 700-705
2. For purposes of calculations, non-detected values were substituted with the Practical Quantitation Limit (PQL).
3. Two values are given for pre-operational water quality data trigger values for inorganic parameters. The first value displayed corresponds to Cell 1 and Cell 2 pre-operational metals data from wells with turbidities less than 50 NTU and is compared with operational metals data from wells having turbidities less than 50 NTU. The second value displayed corresponds to Cell 1 Cell 2 pre-operational data for each sample (e.g.turbidities greater than and less than 50 NTU) and is compared with samples that have turbidities greater than 50 NTU.

Table 4 - Groundwater Monitoring Well and Gas Probe Construction Sequence Cell 3

Monitoring Point	Approximate Location Northing	Approximate Location Easting	Installation Status	Sampling Status	Approximate Distance to Limit of Waste (feet)	Ground Surface Notes
Overburden Wells (Leachate Surface Impoundment)						
MW-40A (upgradient)	832571	654299	Installed	1 expanded parameter and 3 baseline parameter events prior to waste in Cell 3		Current ground surface approximately 7 feet above final grade
MW-41A (downgradient)	832398	654357	1 year prior to waste in Cell 3	1 expanded parameter and 3 baseline parameter events prior to waste in Cell 3		Current ground surface approximately 6 feet below final grade
MW-42A (downgradient)	832270	654278	1 year prior to waste in Cell 3	1 expanded parameter and 3 baseline parameter events prior to waste in Cell 3		Current ground surface approximately 8 feet below final grade
Overburden Wells (Landfill)						
MW-26 (upgradient)	833052	655844	Installed	Currently sampled		
MW-36A (upgradient)	832185	655935	Installed	2 baseline parameter events prior to waste in Cell 3		Current ground surface approximately at final grade
MW-37A (downgradient)	832146	655424	Installed	1 expanded parameter and 3 baseline parameter events prior to waste in Cell 3	125	Current ground surface approximately 10 feet below final grade
MW-38A (downgradient)	832224	654649	Installed	1 expanded parameter and 3 baseline parameter events prior to waste in Cell 3	45	Current ground surface approximately 22 feet above final grade
MW-39A (downgradient)	832208	655041	1 year prior to waste in Cell 3	1 expanded parameter and 3 baseline parameter events prior to waste in Cell 3	50	Current ground surface approximately 17 feet above final grade
MW-47A (downgradient)	832127	655641	1 year prior to waste in Cell 3	1 expanded parameter and 3 baseline parameter events prior to waste in Cell 3	140	Current ground surface approximately 2 feet below final grade
Bedrock Wells (Landfill)						
MW-14 (upgradient)	833619	654398	Installed	Currently sampled		
MW-19 (upgradient)	833765	655471	Installed	Currently sampled		
MW-31 (upgradient)	832676	655883	Installed	Currently sampled		
MW-37 (downgradient)	832153	655422	Installed	1 expanded parameter and 2 baseline parameter events prior to waste in Cell 3		Current ground surface approximately 13 feet below final grade
MW-38 (downgradient)	832237	654647	Installed	1 expanded parameter and 2 baseline parameter events prior to waste in Cell 3		Current ground surface approximately 22 feet above final grade
MW-40 (downgradient)	832575	654311	1 year prior to waste in Cell 3	1 expanded parameter and 3 baseline parameter events prior to waste in Cell 3		Current ground surface approximately 5 feet above final grade
Gas Probes						
GP-1	833725	654807	Installed	Currently sampled		
GP-2	833719	655232	Installed	Currently sampled		
GP-3	833714	655625	Installed	Currently sampled		
GP-4	833354	655874	Installed	Currently sampled		Current ground surface approximately 7 feet above final grade
GP-5	833008	655840	Installed	Currently sampled		Current ground surface approximately 4 feet above final grade
GP-9	833092	654451	Installed	Currently sampled		Current ground surface approximately 2 feet below final grade
GP-10	833392	654451	Installed	Currently sampled		
GP-11	832642	654451	During Cell 3 construction	Begin concurrent to waste in Cell 3		
GP-12	832558	655840	During Cell 3 construction	Begin concurrent to waste in Cell 3		
GP-13	832246	655556	During Cell 3 construction	Begin concurrent to waste in Cell 3		
GP-14	832233	655115	During Cell 3 construction	Begin concurrent to waste in Cell 3		

Notes:

1. During cell 3 construction the following monitoring points will be decommissioned:
   Overburden Wells: MW-27A, 28A, 29A, 30AR; Bedrock Wells: MW-6, 27, 28, 29, 30, 36; Gas Probes: GP-6, 7, 8.

Table 5 - Groundwater Monitoring Well and Gas Probe Construction Sequence Cell 4

Monitoring Point	Approximate Location Northing	Approximate Location Easting	Installation Status	Sampling Status	Approximate Distance to Limit of Waste (feet)	Ground Surface Notes
Overburden Wells (Leachate Surface Impoundment)						
MW-40A (upgradient)	832571	654299	Installed	Follow sequence on Table 7		
MW-41A (downgradient)	832398	654357	Installed during Cell 3 phase (see Table 5)	Follow sequence on Table 7		
MW-42A (downgradient)	832270	654278	Installed during Cell 3 phase (see Table 5)	Follow sequence on Table 7		
Overburden Wells (Landfill)						
MW-26 (upgradient)			Installed	Currently sampled		
MW-36A (upgradient)	832185	655935	Installed	Follow sequence on Table 7		Current ground surface approximately at final grade
MW-37A (downgradient)	832146	655424	Installed	Follow sequence on Table 7		
MW-43A (downgradient)	831856	654549	1 year prior to waste in Cell 4	1 expanded parameter and 3 baseline parameter events prior to waste in Cell 4	20	Current ground surface approximately 33 feet above final grade
MW-44A (downgradient)	831867	654901	1 year prior to waste in Cell 4	1 expanded parameter and 3 baseline parameter events prior to waste in Cell 4	15	Current ground surface approximately 18 feet above final grade
MW-47A (downgradient)	832127	655641	1 year prior to waste in Cell 3	Follow sequence on Table 7		
Bedrock Wells (Landfill)						
MW-14 (upgradient)	833619	654398	Installed	Currently sampled		
MW-19 (upgradient)	833765	655471	Installed	Currently sampled		
MW-31 (upgradient)	832676	655883	Installed	Currently sampled		
MW-34 (downgradient)	831408	654859	Installed	2 baseline parameter events prior to waste in Cell 4		
MW-37 (downgradient)	832153	655422	Installed	Follow sequence on Table 7		
MW-40 (downgradient)	832547	654301	Installed during Cell 3 phase (see Table 5)	Follow sequence on Table 7		
MW-43 (downgradient)	831807	654671	Install 1 year prior to waste in Cell 4	1 expanded parameter and 3 baseline parameter events prior to waste in Cell 4		Current ground surface approximately 23 feet above final grade
Gas Probes						
GP-1	833725	654807	Installed	Currently sampled		
GP-2	833719	655232	Installed	Currently sampled		
GP-3	833714	655625	Installed	Currently sampled		
GP-4	833354	655874	Installed	Currently sampled		
GP-5	833008	655840	Installed	Currently sampled		
GP-9	833092	654451	Installed	Currently sampled		
GP-10	833392	654451	Installed	Currently sampled		
GP-11	832643	654479	Installed during Cell 3 phase (see Table 5)	Begun during Cell 3 phase		
GP-12	832558	655825	Installed during Cell 3 phase (see Table 5)	Begun during Cell 3 phase		
GP-13	832223	654319	Installed during Cell 3 phase (see Table 5)	Begun during Cell 3 phase		
GP-14	832241	655972	Installed during Cell 3 phase (see Table 5)	Begun during Cell 3 phase		
GP-15	831874	654035	During Cell 4 construction	Begin concurrent to waste in Cell 4		

Notes:

1. During cell 4 construction the following monitoring points will be decommissioned:
   Overburden Wells: MW-1A, 4A, 4B, K, 38A, 39A; Bedrock Wells: MW-1, 4, 38; Gas Probes: (none).

Table 6 - Groundwater Monitoring Well and Gas Probe Construction Sequence Cell 5

Monitoring Point	Approximate Location Northing	Approximate Location Easting	Installation Status	Sampling Status	Approximate Distance to Limit of Waste (feet)	Ground Surface Notes
Overburden Wells (Leachate Surface Impoundment)						
MW-40A (upgradient)	832571	654299	Installed	Follow sequence on Table 7		
MW-41A (downgradient)	832398	654357	Installed during Cell 3 phase (see Table 5)	Follow sequence on Table 7		
MW-42A (downgradient)	832270	654278	Installed during Cell 3 phase (see Table 5)	Follow sequence on Table 7		
Overburden Wells (Landfill)						
MW-26 (upgradient)			Installed	Currently sampled		
MW-36A (upgradient)	832185	655935	Installed	Follow sequence on Table 7		Current ground surface approximately at final grade
MW-34A (downgradient)	831397	654862	Installed	1 expanded parameter and 2 baseline parameter events prior to waste in Cell 5	90	Current ground surface approximately 2 feet below final grade
MW-45A (downgradient)	831436	654394	Install 1 year prior to waste in Cell 5	1 expanded parameter and 3 baseline parameter events prior to waste in Cell 5	50	Current ground surface approximately 11 feet below final grade
MW-46A (downgradient)	831439	655295	Install 1 year prior to waste in Cell 5	1 expanded parameter and 3 baseline parameter events prior to waste in Cell 5	50	Current ground surface approximately 7 foot below final grade
MW-48A (downgradient)	831440	654039	Install 1 year prior to waste in Cell 5	1 expanded parameter and 3 baseline parameter events prior to waste in Cell 5	20	Current ground surface approximately 6 foot below final grade
MW-49A (downgradient)	831448	656124	Install 1 year prior to waste in Cell 5	1 expanded parameter and 3 baseline parameter events prior to waste in Cell 5	37	Current ground surface approximately at final grade
MW-50A (downgradient)	831443	655709	Install 1 year prior to waste in Cell 5	1 expanded parameter and 3 baseline parameter events prior to waste in Cell 5	40	Current ground surface approximately at final grade
Bedrock Wells (Landfill)						
MW-14 (upgradient)	833619	654398	Installed	Currently sampled		
MW-19 (upgradient)	833765	655471	Installed	Currently sampled		
MW-31 (upgradient)	832676	655883	Installed	Currently sampled		
MW-34 (downgradient)	831408	654859	Installed	Follow sequence on Table 7		Current ground surface approximately 2 feet below final grade
MW-40 (downgradient)	832547	654301	Installed	Follow sequence on Table 7		
MW-48 (downgradient)	831441	654012	Install 1 year prior to waste in Cell 5	1 expanded parameter and 3 baseline parameter events prior to waste in Cell 5		Current ground surface approximately 6 foot below final grade
MW-50 (downgradient)	831443	655727	Install 1 year prior to waste in Cell 5	1 expanded parameter and 3 baseline parameter events prior to waste in Cell 5		Current ground surface approximately at final grade
Gas Probes						
GP-1	833725	654807	Installed	Currently sampled		
GP-2	833719	655232	Installed	Currently sampled		
GP-3	833714	655625	Installed	Currently sampled		
GP-4	833354	655874	Installed	Currently sampled		
GP-5	833008	655840	Installed	Currently sampled		
GP-9	833092	654451	Installed	Currently sampled		
GP-10	833392	654451	Installed	Currently sampled		
GP-11	832643	654479	Installed during Cell 3 phase (see Table 5)	Begun during Cell 3 phase		
GP-12	832558	655825	Installed during Cell 3 phase (see Table 5)	Begun during Cell 3 phase		
GP-13	832223	654319	Installed during Cell 3 phase (see Table 5)	Begun during Cell 3 phase		
GP-14	832241	655972	Installed during Cell 3 phase (see Table 5)	Begun during Cell 3 phase		
GP-15	831874	654035	Installed during Cell 4 phase (see Table 6)	Begun during Cell 4 phase		
GP-16	831917	656284	During Cell 5 construction	Begin concurrent to waste in Cell 5		
GP-17	831428	654095	During Cell 5 construction	Begin concurrent to waste in Cell 5		
GP-18	831437	654515	During Cell 5 construction	Begin concurrent to waste in Cell 5		
GP-19	831442	654935	During Cell 5 construction	Begin concurrent to waste in Cell 5		
GP-20	831454	655354	During Cell 5 construction	Begin concurrent to waste in Cell 5		
GP-21	831451	655771	During Cell 5 construction	Begin concurrent to waste in Cell 5		
GP-22	831450	656190	During Cell 5 construction	Begin concurrent to waste in Cell 5		

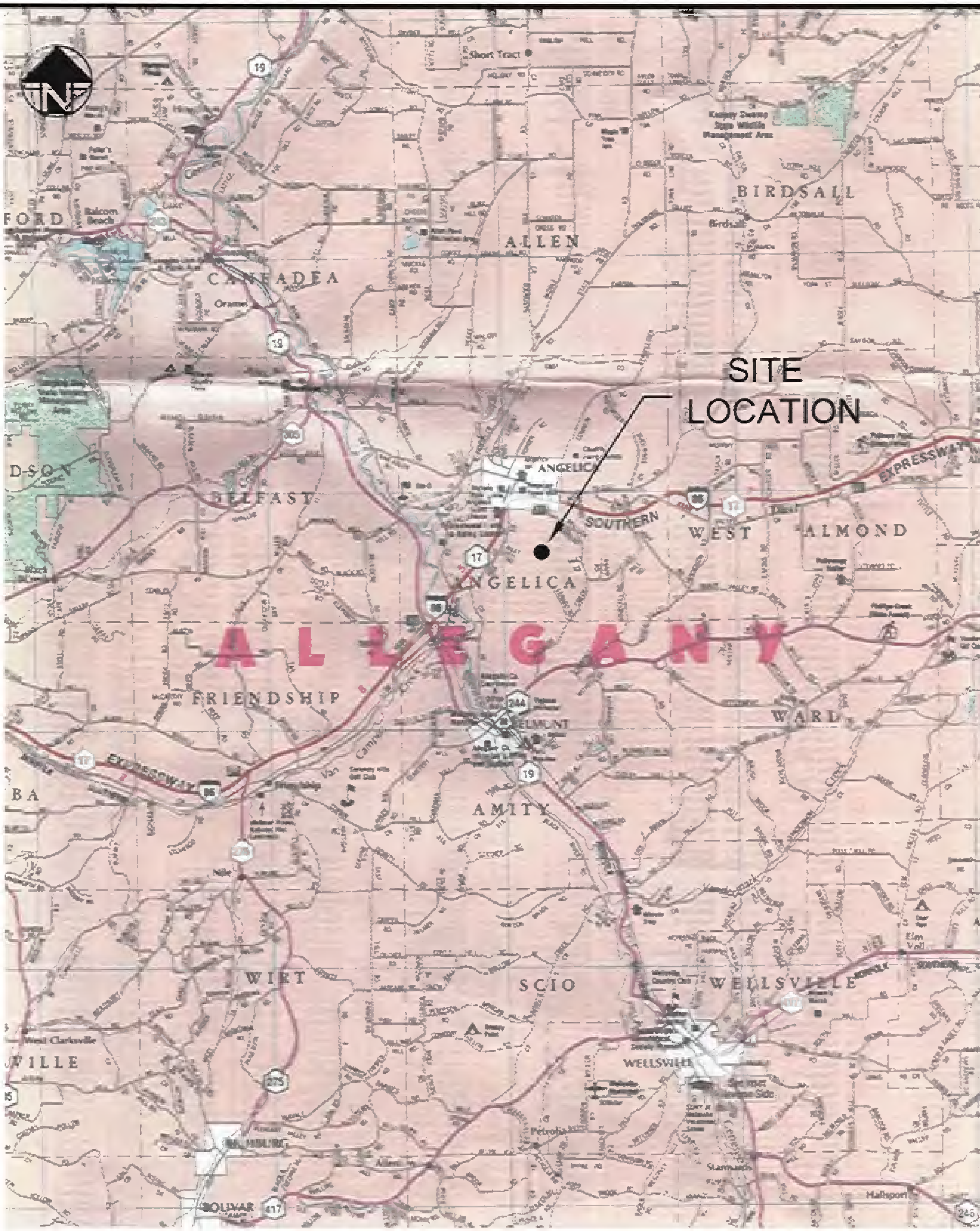
Notes:

1. During cell 5 construction the following monitoring points will be decommissioned:
   Overburden Wells: MW-33A, 33B, 35A, 37A, 43A, 44A, 47A; Bedrock Wells: MW-33, 35, 37, 43; Gas Probes: (none).

Table 7 - Water Quality Monitoring Schedule

YEAR	QUARTER	PARAMETER LIST
2004	First Quarter	Routine
	Second Quarter	Routine
	Third Quarter	Routine
	Fourth Quarter	Baseline
2005	First Quarter	Baseline
	Second Quarter	Routine
	Third Quarter	Routine
	Fourth Quarter	Routine
2006	First Quarter	Routine
	Second Quarter	Baseline
	Third Quarter	Routine
	Fourth Quarter	Routine
2007	First Quarter	Routine
	Second Quarter	Routine
	Third Quarter	Baseline
	Fourth Quarter	Routine
2008	First Quarter	Routine
	Second Quarter	Routine
	Third Quarter	Routine
	Fourth Quarter	Baseline
2009	First Quarter	Baseline
	Second Quarter	Routine
	Third Quarter	Routine
	Fourth Quarter	Routine
2010	First Quarter	Routine
	Second Quarter	Baseline
	Third Quarter	Routine
	Fourth Quarter	Routine

FIGURES

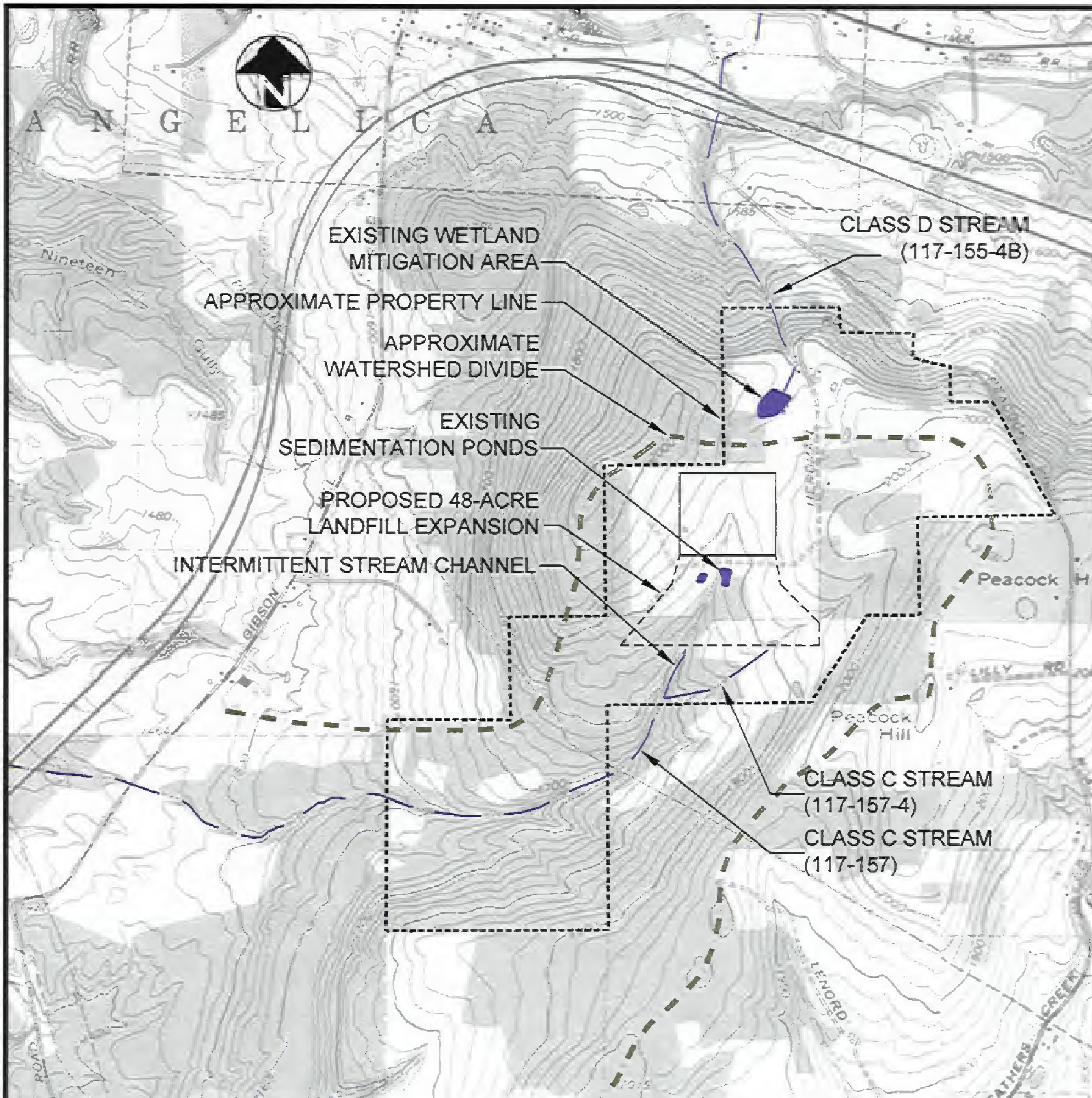


NOTE:

SCALE: N.T.S.

1. Base map created from AAA New York, Western Region Special Area Map (2001-2002 Edition).

SITE LOCATION MAP	HYLAND FACILITY	McMahon & Mann
DWG. NO. 93002-168	EMP	Consulting Engineers, P.C.
FIGURE 1-1	ALLEGANY COUNTY NEW YORK	2495 MAIN STREET, SUITE 432 BUFFALO, NY 14214 (716) 834-8932 FAX: (716) 834-8934



LEGEND

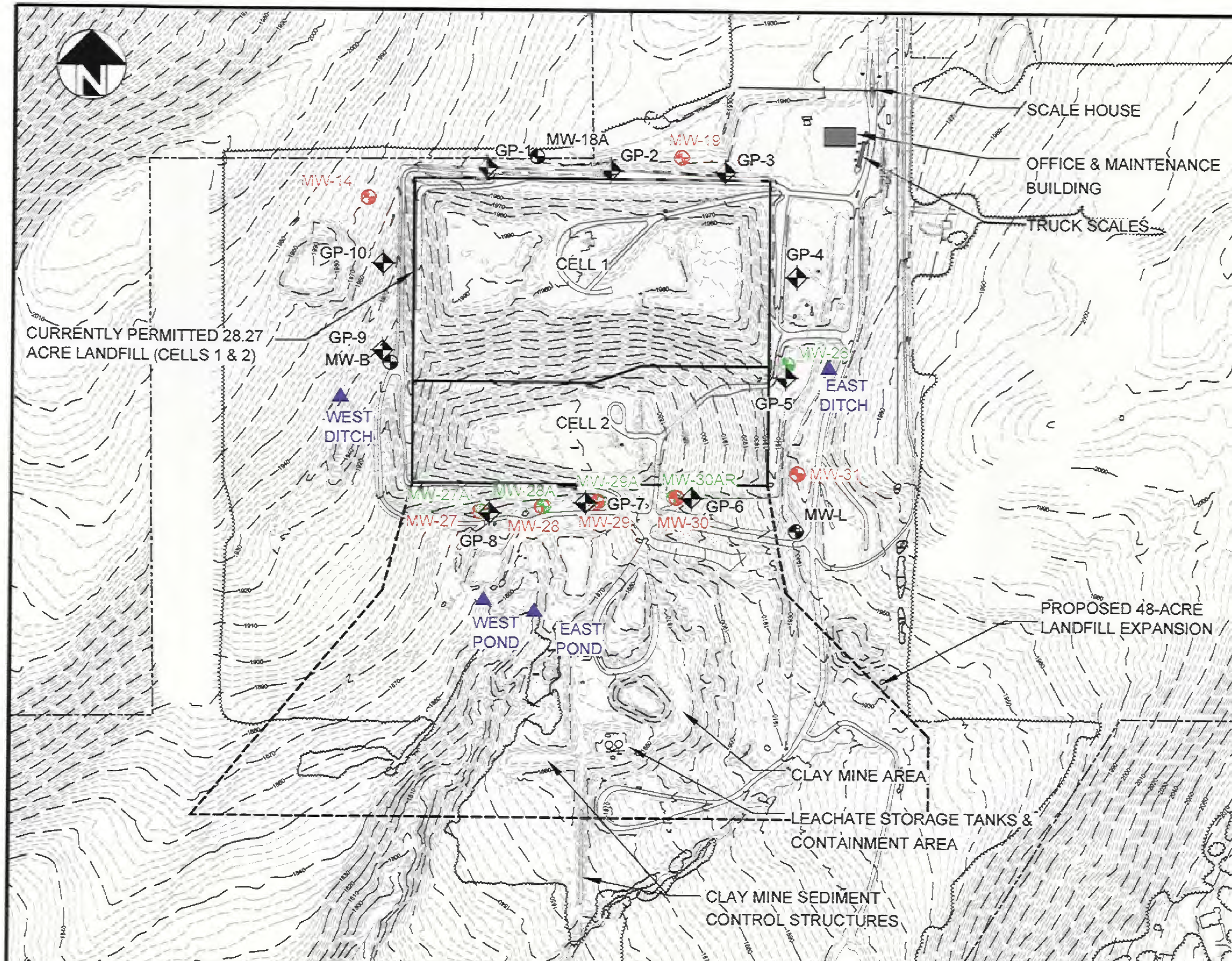
- - - - - - - -	APPROXIMATE PROPERTY LINE
— — —	INTERMITTENT STREAM CHANNEL
▬ ▬ ▬	WATERSHED DIVIDE
(pond symbol)	POND

SCALE: 1" = 2000'

NOTE:

1. Base map adapted from U.S.G.S maps titled "West Almond, N.Y.", dated 1964 and "Angelica, N.Y.", dated 1964.

WATERSHED MAP	HYLAND FACILITY EMP	McMahon & Mann Consulting Engineers, P.C.
DWG. NO. 93002-169		2495 MAIN STREET, SUITE 432 BUFFALO, NY 14214 (716) 834-8932 FAX: (716) 834-8934
FIGURE 1-2	ALLEGANY COUNTY NEW YORK	



LEGEND

MW-26	CURRENT OVERBURDEN MONITORING WELL
MW-31	CURRENT BEDROCK MONITORING WELL
GP-5	GAS PROBE
EAST DITCH	SURFACE WATER POINT
MW-18A	ADDITIONAL WELLS IN EMP REPORT TEXT
	CURRENT GROUND CONTOURS (SEE NOTE 1)
	APPROXIMATE TREE LINE
	APPROXIMATE PROPERTY LINE
	EXISTING LANDFILL BOUNDARY
	PROPOSED LANDFILL BOUNDARY

NOTES:

1. Existing ground contours are based on a combination of the following aerial photographs:
   A. Aerial photograph dated April 26, 2001 completed by Air Survey Photogrammetric Mapping Services
   B. Aerial photograph dated April 24, 2002 completed by TVGA Consultants.

HYLAND FACILITY

SCALE: 1" = 400'

NOTE: UNAUTHORIZED ALTERATION OR ADDITION TO ANY SURVEY, DRAWING, DESIGN, SPECIFICATION, PLAN, OR REPORT IS A VIOLATION OF SECTION 7209 PROVISION 2 OF THE NEW YORK STATE EDUCATION LAW.

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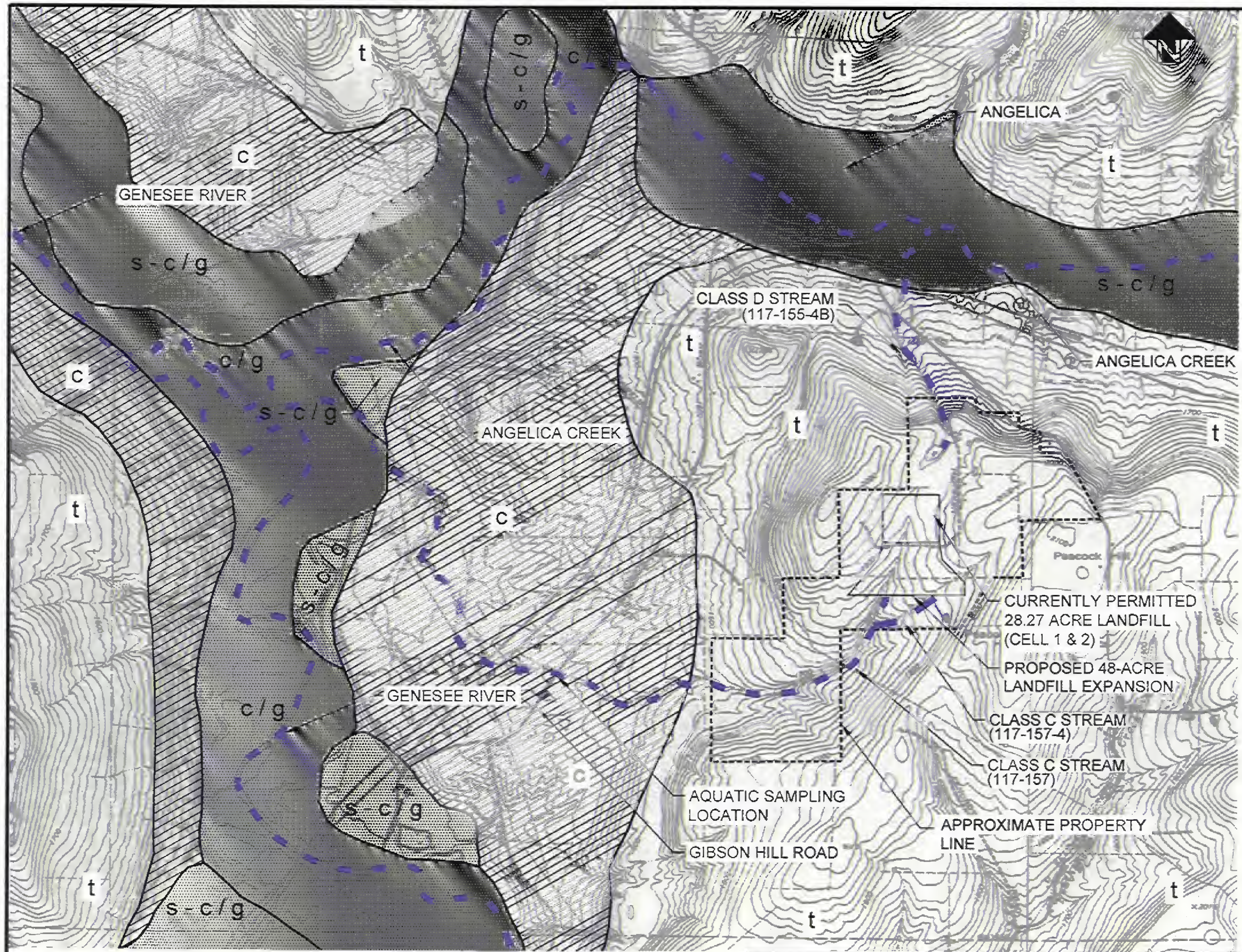
HYLAND FACILITY
EMP

ALLEGANY COUNTY NEW YORK

EXISTING SITE PLAN AND MONITORING LOCATIONS

DWG. NO. 93002-170

FIGURE 1-3



EXPLANATION

GEOLOGIC UNITS

t — ***TILL AND BEDROCK*** -- Till, an unsorted clay - sand - gravel mixture, forms the land surface in most upland areas and ranges in thickness from a few feet to more than 100 feet. Bedrock (shale, sandstone, limestone) underlies all unconsolidated deposits. Surface exposures of bedrock are uncommon except along steep roadcuts and some streambanks and channels. Some alluvial deposits in upstream parts of small valleys are included within the areas identified by this symbol.

c — ***FINE-GRAINED LACUSTRINE DEPOSITS*** -- Stratified clay, silt, and very fine-grained sand deposited in glacial lakes; includes quicksand. On most valley floors, thin deposits of alluvium cover these lake deposits.

c / g — ***SAND AND GRAVEL AQUIFERS BURIED BENEATH LACUSTRINE DEPOSITS*** -- Stratified sand and gravel of glacial origin, buried beneath finer grained materials such as clay, silt, and fine-grained sand.

s - c / g — ***SAND AND GRAVEL AQUIFERS BURIED BENEATH LACUSTRINE AND ALLUVIAL DEPOSITS*** -- Same as above, except that the finer grained materials are overlain by 5 to 20 feet of sand and gravel. These surficial beds of sand and gravel are saturated near the mouths of tributary streams; elsewhere may be largely unsaturated. Therefore, the buried sand and gravel deposit is the principal aquifer.

WELL - YIELD CAPACITY

(Stippled pattern) Yields of individual wells tapping sand and gravel aquifers. Areas identified by g, c/g, and s-c/g typically yield from 50 to 500 gallons per minute. Maximum dependable aquifer yield from wells in valleys containing such deposits are estimated to range from 0.2 to 5 million gallons per day per lineal mile of aquifer; this includes infiltration of water from the streams in some valleys.

(Hatched pattern) Generally fine-grained or thin deposits which yield less than 1 to 5 gallons per minute to wells. Small yields are obtainable from saturated deposits of very fine-grained sand, but development of wells in such deposits is seldom attempted because of the difficulty of obtaining clear, particle free water.

(Blank pattern) Yields from wells in till are very low, usually less than 1 gallon per minute. Yields from individual wells in bedrock underlying the till are usually less than 50 gallons per minute, although higher yields have been reported in some places.

NOTES:

1. Base map adapted from U.S.G.S. maps titled "West Almond, NY," dated 1964 and "Angelica, NY," dated 1964.
2. Geologic unit extents based on Water Resources Investigation Report 86-4048, Sheet 2 - Surficial Geology and Availability of Groundwater in the Southern Part of the Basin, titled "Ground-Water Availability in the Genesee River Basin in New York and Pennsylvania," by Kammerer and Hobba.

DRAWING SCALE APPROXIMATELY 1" = 2500'

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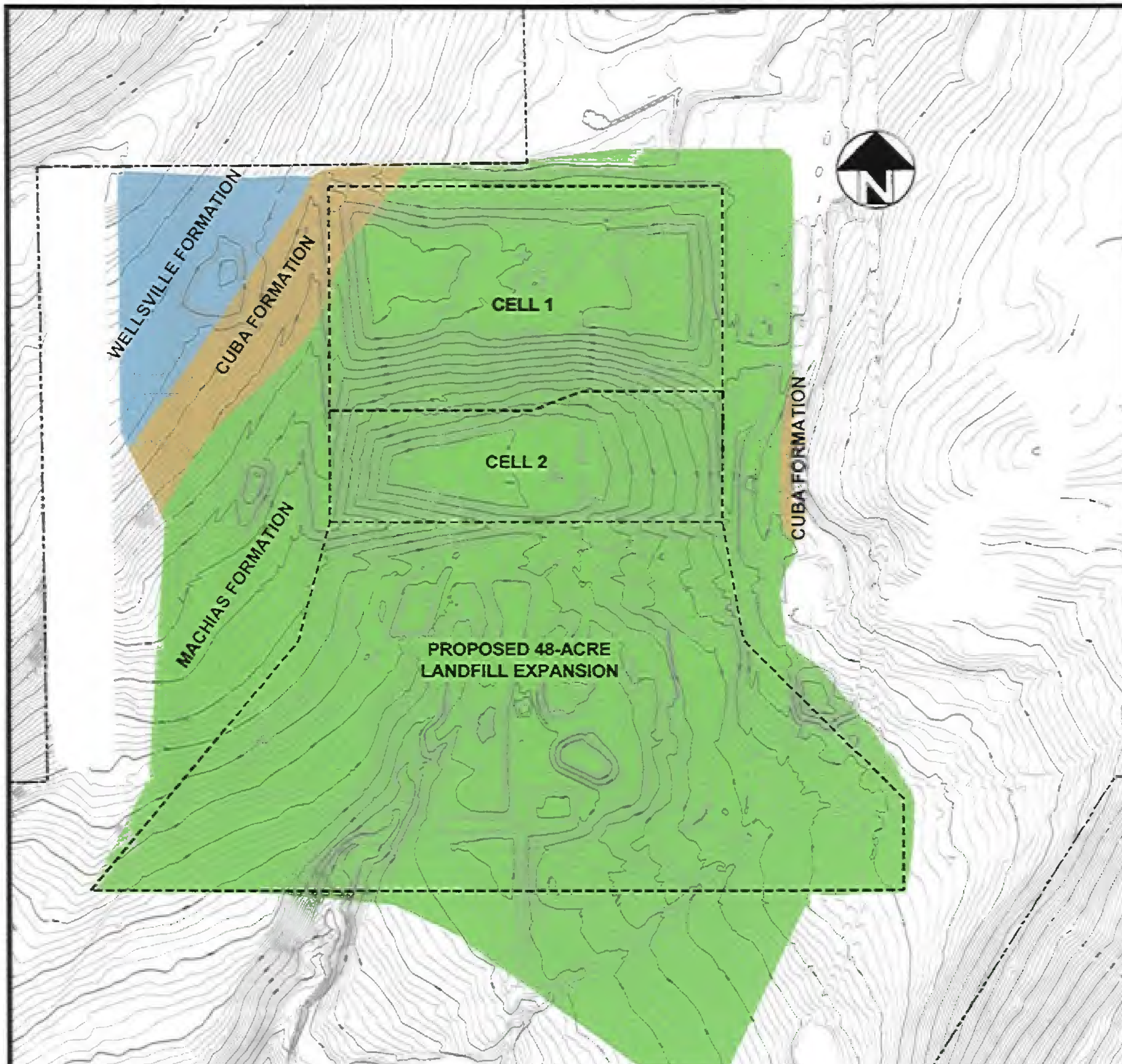
HYLAND FACILITY
EMP
ALLEGANY COUNTY NEW YORK

SURFICIAL GEOLOGY & REGIONAL SURFACE WATER MAP

DWG. NO. 93002-171

FIGURE 2-1



LEGEND	
—·—·—	APPROXIMATE PROPERTY LINE
(blue)	WELLSVILLE FORMATION
(tan)	CUBA FORMATION
(green)	MACHIAS FORMATION

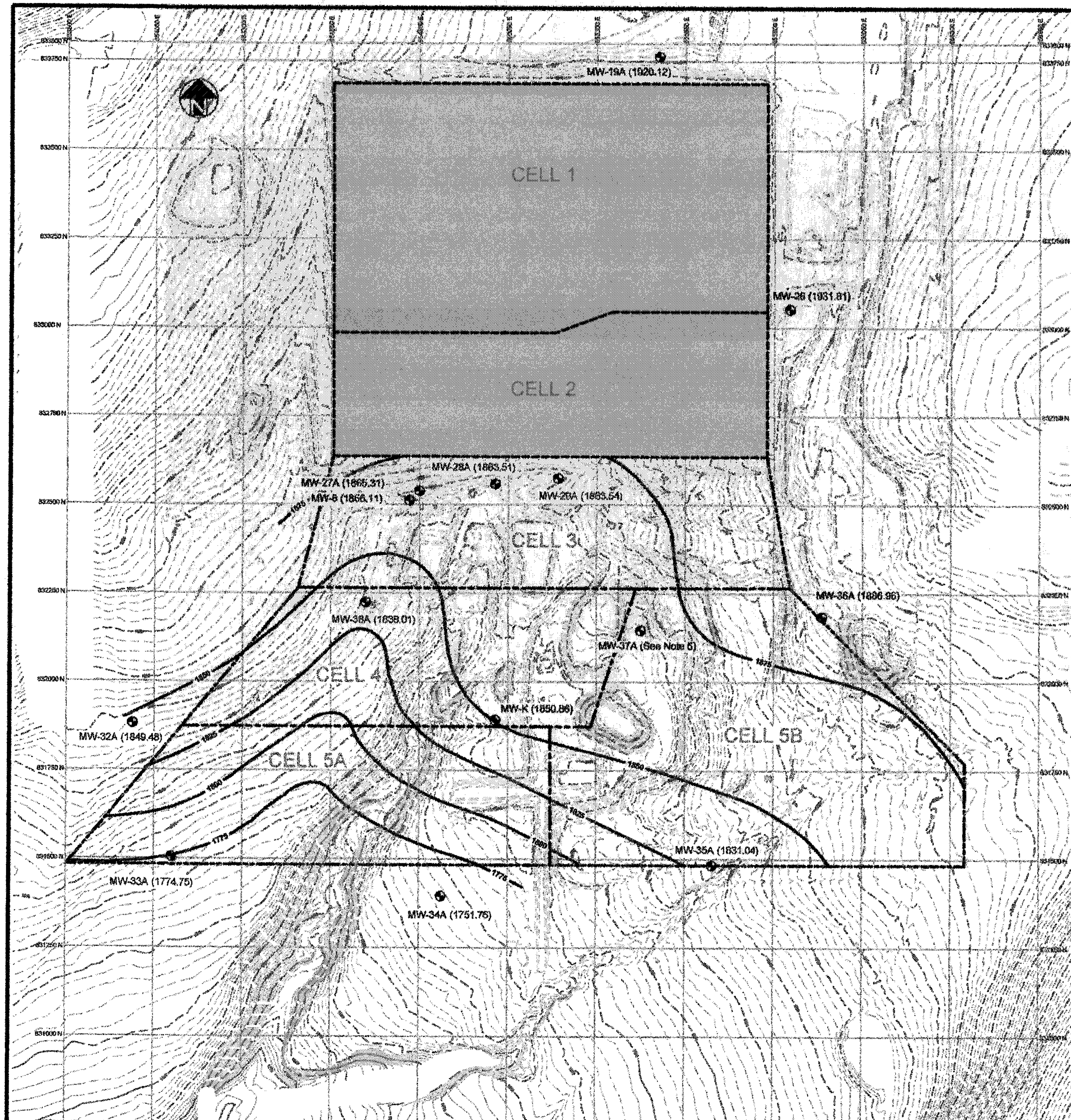
SCALE: 1" = 500'

NOTE:

1. Existing ground contours based on aerial photographs dated April 26, 2001 completed by Air Survey Photogrammetric Mapping Services and April 24, 2002 completed by TVGA Consultants.

2. Formation boundaries based on bedrock subsurface information collected at the Hyland Facility.

BEDROCK FORMATION PLAN	HYLAND FACILITY EMP	McMahon & Mann Consulting Engineers, P.C.
DWG. NO. 93002-172		2495 MAIN STREET, SUITE 432 BUFFALO, NY 14214 (716) 834-8932 FAX: (716) 834-8934
FIGURE 2-2	ALLEGANY NEW YORK	



LEGEND

(line sample)	EXISTING GROUND CONTOURS (SEE NOTE 1)
(line sample)	APPROXIMATE EXTENTS OF PROPOSED EXPANSION
(line sample)	EXTENTS OF PERMITTED LANDFILL (CELL 1 & CELL 2)
MW-28A (1863.51)	WELL LOCATION & GROUND WATER LEVEL (SEE NOTE 2)
1850	GROUNDWATER CONTOURS (SEE NOTE 3)
(shaded box)	EXISTING LANDFILL CELLS 1 & 2 (SEE NOTE 4)

DRAWING NOTES:

1. Existing ground contours are based on a combination of the following aerial photographs:
   A. Aerial photograph dated April 26, 2001 completed by Air Survey Photogrammetric Mapping Services
   B. Aerial photograph dated April 24, 2002 completed by TVGA Consultants.
   Mapping is based on the following control coordinates:
   Horizontal Datum: NAD 27
   Vertical Datum: NGVD 29
2. Groundwater elevations based on field measurements completed by McMahon & Mann Consulting Engineers, P.C. on January 9, 2003.
3. Groundwater contour surface is based on linear interpolation between known groundwater elevations. Refer to note 2 for more details.
4. Existing landfill Cells 1 & 2 underlain by a groundwater supression system.
5. Water level has not stabilized in MW-37A. This well was not used to create the groundwater surface.

APPROXIMATE SCALE: 1" = 350'

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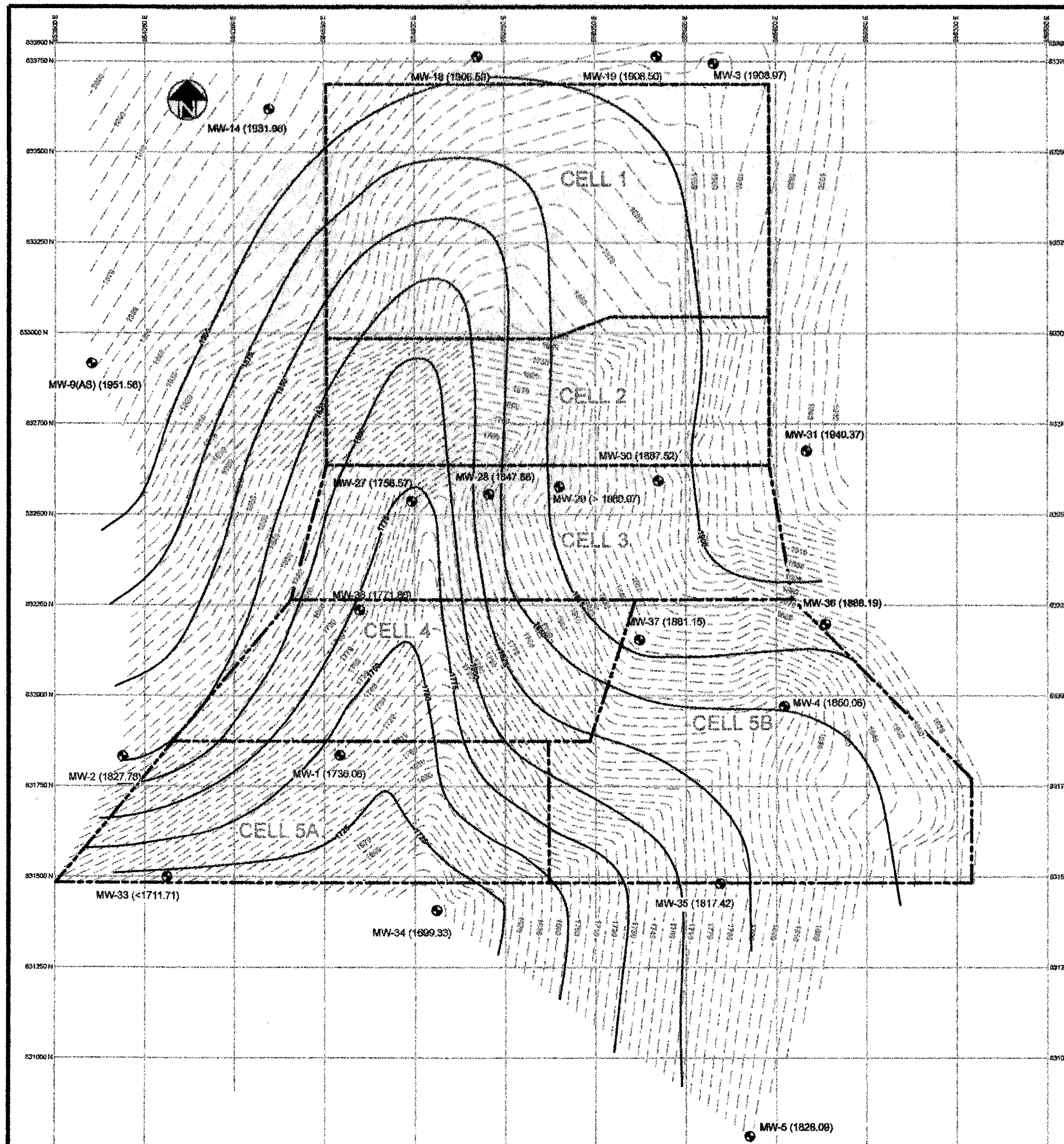
HYLAND FACILITY EMP

ALLEGANY COUNTY NEW YORK

TYPICAL GROUNDWATER TABLE PLAN

FIGURE 2-3

DWG. NO. 93002-196



LEGEND

— - — - —	APPROXIMATE EXTENTS OF PROPOSED EXPANSION
- - - - - -	EXTENTS OF PERMITTED LANDFILL (CELL 1 & CELL 2)
MW-38 (1771.86) ⊕	WELL LOCATION & BEDROCK WATER LEVEL (SEE NOTE 2)
1850 ———	BEDROCK EQUIPOTENTIAL CONTOURS (SEE NOTE 3)
- - - 1900 - - -	TOP OF BEDROCK CONTOURS (SEE NOTE 4)

DRAWING NOTES:

1. Mapping is based on the following control coordinates:
   Horizontal Datum: NAD 27
   Vertical Datum: NGVD 29
2. Bedrock water elevations based on field measurements completed by McMahon & Mann Consulting Engineers, P.C. on January 9, 2003.
3. Bedrock potentiometric surface is based on linear interpolation between known bedrock water elevations. Refer to note 2 for more details.
4. Top of bedrock surface is based on Sheet 6 of the Hydrogeologic Report titled "Top of Bedrock Contour Plan," Drawing Number 93002-103.

APPROXIMATE SCALE: 1" = 350'

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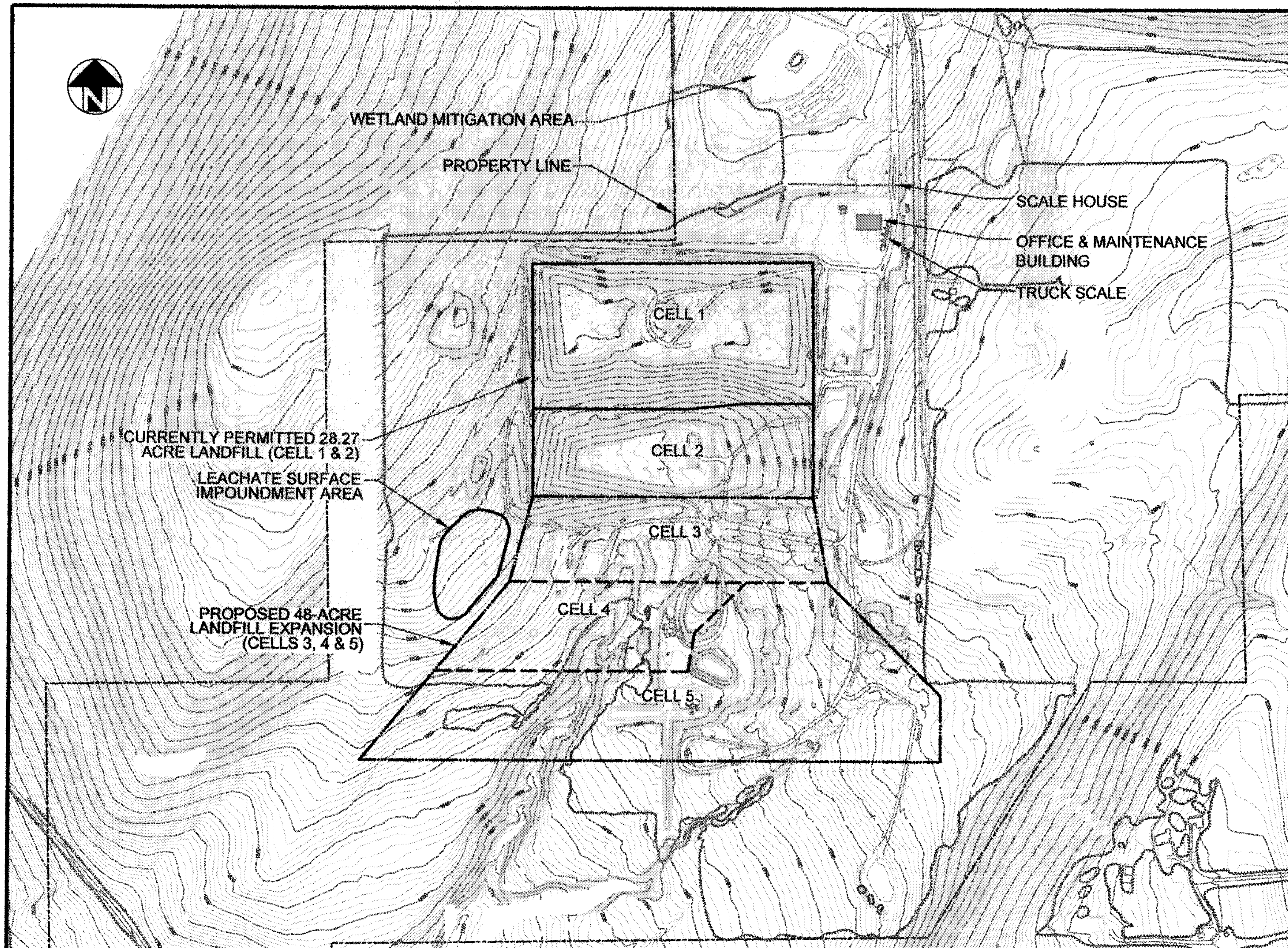
TYPICAL BEDROCK POTENTIOMETRIC TABLE PLAN

FIGURE 2-4

DWG. NO. 93002-197



LEGEND

———	48 ACRE EXPANSION FOOTPRINT AREA
~~	CURRENT GROUND CONTOURS (SEE NOTE 1)
······	APPROXIMATE TREE LINE
— - —	APPROXIMATE PROPERTY LINE

NOTES:

1. Existing ground contours are based on a combination of the following aerial photographs:
   A. Aerial photograph dated April 26, 2001 completed by Air Survey Photogrammetric Mapping Services
   B. Aerial photograph dated April 24, 2002 completed by TVGA Consultants.

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SCALE: 1" = 500'

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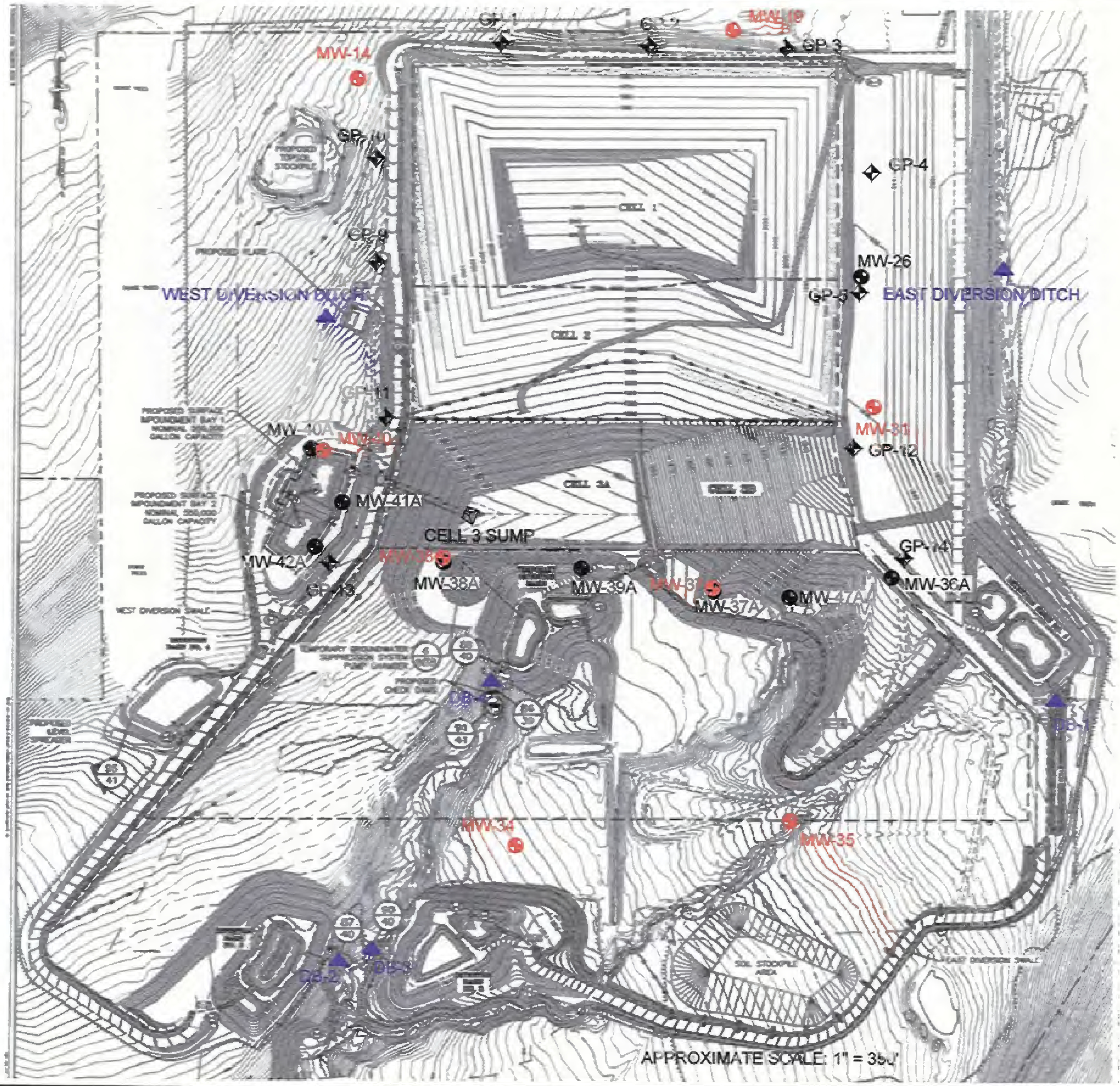
ALLEGANY COUNTY NEW YORK

CELL DEVELOPMENT

DWG. NO. 93002-173

FIGURE 3-1



LEGEND

MW-26	OVREBURDEN MONITORING WELL LOCATION & DESIGNATION
MW-31	BEDROCK MONITORING WELL LOCATION & DESIGNATION
GP-5	GAS PROBE LOCATION & DESIGNATION
DB-1	SURFACE WATER AND SEDIMENT SAMPLE LOCATION & DESIGNATION

NOTES:

1. Base map adapted from Permit Drawings titled, "Hyland Facility Associates Landfill Expansion, Cells 1 and 2 Interim Grading Plan", Sheet Number INT-1, prepared by Sanborn, Head Engineering, P.C. dated November 2005.

2. This plan depicts the locations of environmental monitoring locations. For additional details, refer to the plan mentioned above.

3. One year prior to the placement of waste into Cell 3, the following monitoring wells must be completed: MW-39A, MW-40, MW-41A, MW-42A and MW-47A. Additional gas probe completions during construction of Cell 3 include : GP-11, GP-12, GP-13 and GP-14.

4. During construction of Cell 3, the following monitoring wells and gas probes must be decommissioned: MW-6, MW-27, MW-27A, MW-28, MW-28A, MW-29, MW-29A, MW-30, MW-30AR, MW-36, GP-6, GP-7 and GP-8.

5. The table below summarizes the environmental monitoring locations to be implemented during the construction of Cell 3.

ENVIRONMENTAL MONITORING	LOCATION
OVERBURDEN WELLS	
UPGRADIENT	MW-26, 36A, 40A
DOWNGRADIENT	MW-37A, 38A, 39A, 41A, 42A, 47A
BEDROCK WELLS	
UPGRADIENT	MW-14, 19, 31
DOWNGRADIENT	MW-37, 38, 40
GAS PROBES	GP-1, 2, 3, 4, 5, 9, 10, 11, 12, 13, 14
SURFACE WATER	DB-1, 2, 3, 4, EAST DIVERSION DITCH, WEST DIVERSION DITCH

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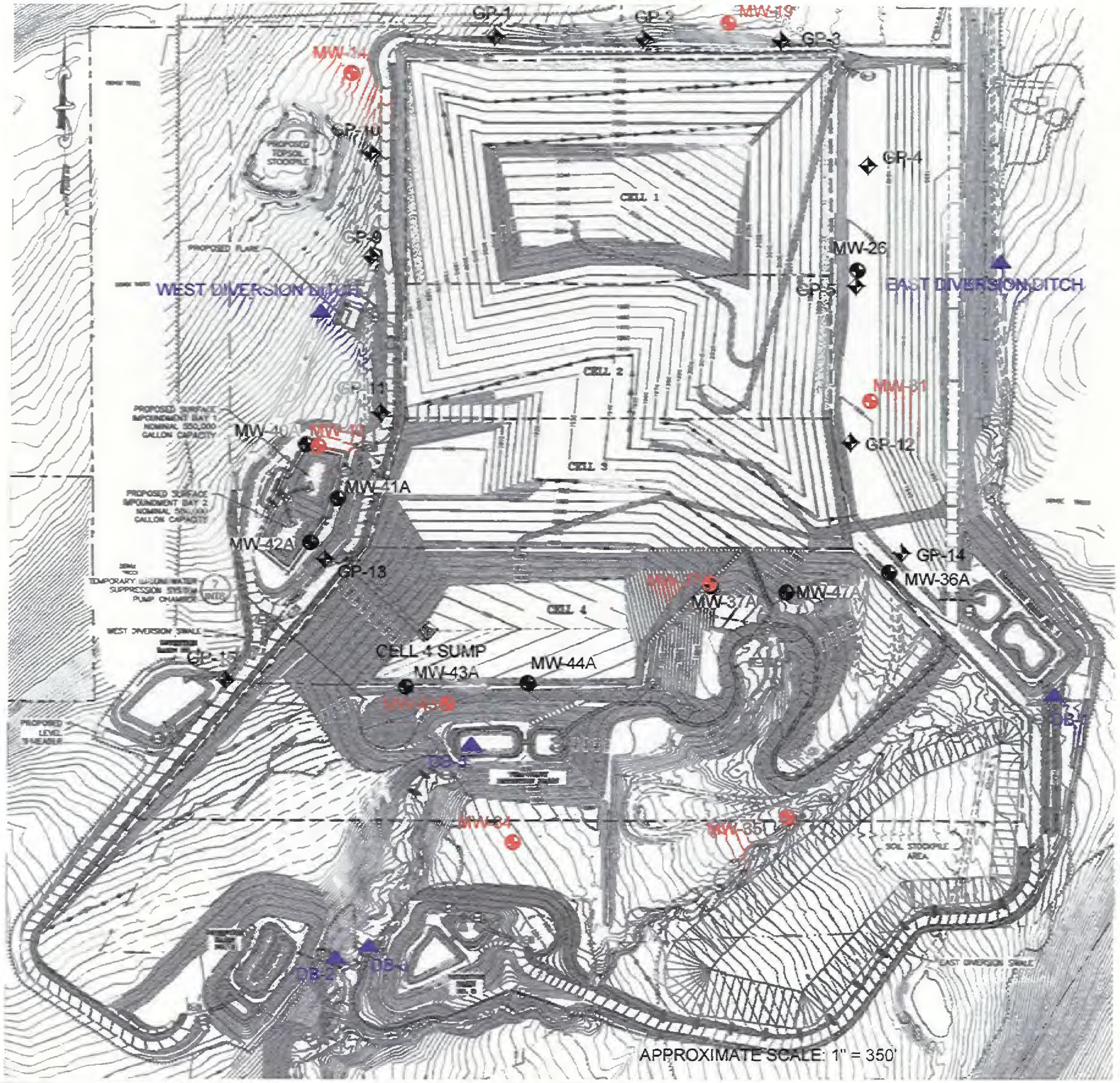
ENVIRONMENTAL MONITORING LOCATIONS
CELL 3

FIGURE 4-1

DWG. NO. 93002-193



LEGEND

MW-26	OVREBURDEN MONITORING WELL LOCATION & DESIGNATION
MW-31	BEDROCK MONITORING WELL LOCATION & DESIGNATION
GP-5	GAS PROBE LOCATION & DESIGNATION
DB-1	SURFACE WATER AND SEDIMENT SAMPLE LOCATION & DESIGNATION

NOTES:

1. Base map adapted from Permit Drawings titled, "Hyland Facility Associates Landfill Expansion, Cell 3 Interim Grading Plan", Sheet Number INT-2, prepared by Sanborn, Head Engineering, P.C. dated November 2005.

2. This plan depicts the locations of environmental monitoring locations. For additional details, refer to the plan mentioned above.

3. One year prior to the placement of waste into Cell 4, the following monitoring wells must be completed: MW-43, MW-43A and MW-44A. Additional gas probe completions during construction of Cell 3 include : GP-15.

4. During construction of Cell 4, the following monitoring wells and gas probes must be decommissioned: MW-1, MW-1A, MW-4, MW-4A, MW-4B, MW-K, MW-38, MW-38A and MW-39A.

5. The table below summarizes the environmental monitoring locations to be implemented during the construction of Cell 4.

ENVIRONMENTAL MONITORING	LOCATION
OVERBURDEN WELLS	
UPGRADIENT	MW-26, MW-36A, 40A
DOWNGRADIENT	MW-37A, 41A, 42A, 43A, 44A,47A
BEDROCK WELLS	
UPGRADIENT	MW-14, 19, 31
DOWNGRADIENT	MW-34, 37, 40, 43
GAS PROBES	GP-1, 2, 3, 4, 5, 9, 10, 11, 12, 13, 14, 15
SURFACE WATER	DB-1, 2, 3, 5, EAST DIVERSION DITCH, WEST DIVERSION DITCH

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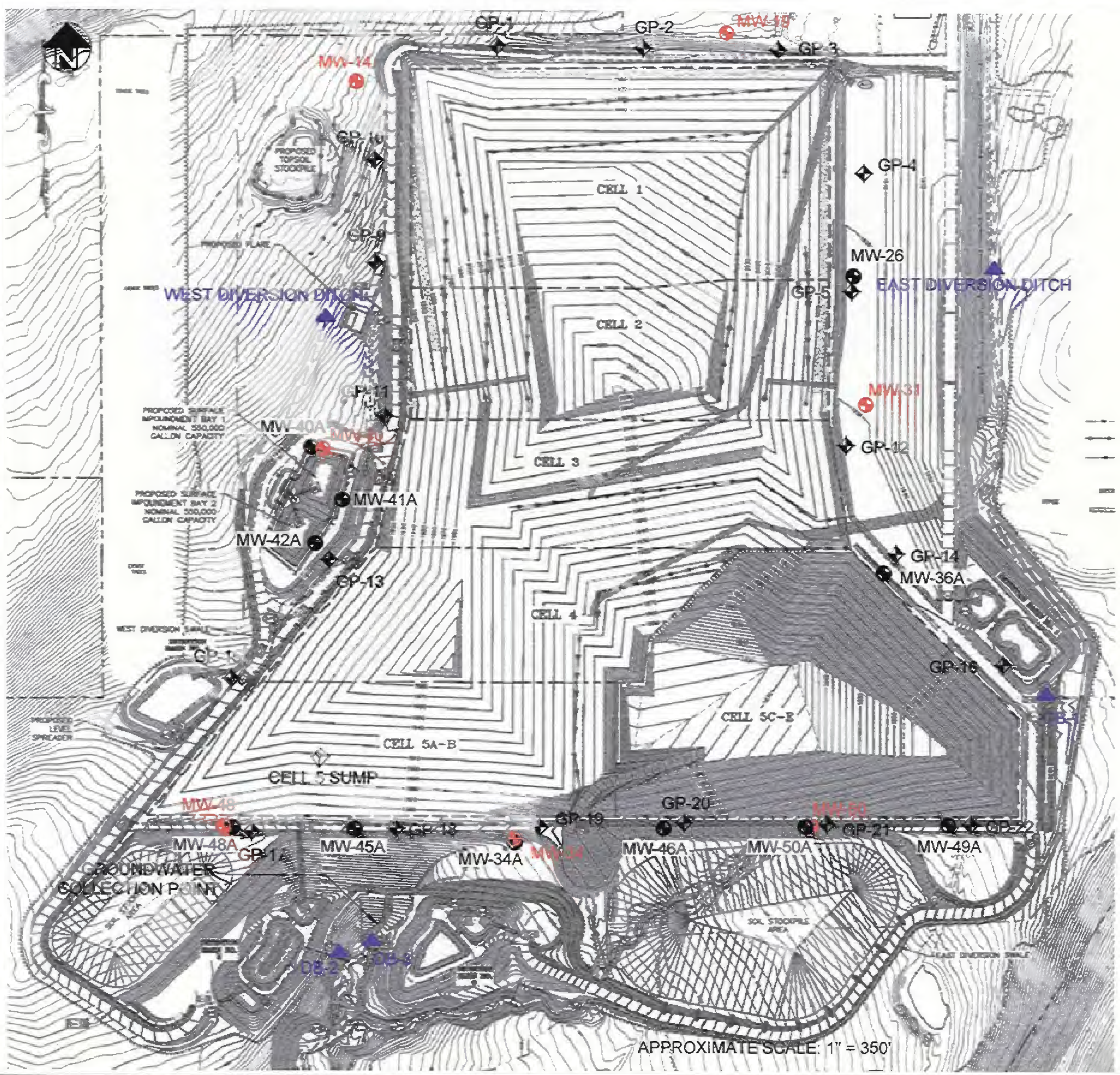
ENVIRONMENTAL MONITORING LOCATIONS
CELL 4

FIGURE 4-2

DWG. NO. 93002-194



LEGEND

MW-26	OVREBURDEN MONITORING WELL LOCATION & DESIGNATION
MW-31	BEDROCK MONITORING WELL LOCATION & DESIGNATION
GP-5	GAS PROBE LOCATION & DESIGNATION
DB-1	SURFACE WATER AND SEDIMENT SAMPLE LOCATION & DESIGNATION

NOTES:

1. Base map adapted from Permit Drawings titled, "Hyland Facility Associates Landfill Expansion,Cell 5A Interim Grading Plan", Sheet Number INT-4, prepared by Sanborn, Head Engineering, P.C. dated November 2005.

2. This plan depicts the locations of environmental monitoring locations. For additional details, refer to the plan mentioned above.

3. One year prior to the placement of waste into Cell 5, the following monitoring wells must be completed: MW-45A, MW-46A, MW-48, MW-48A, MW-49A, MW-50 and MW-50A. Additional gas probe completions during construction of Cell 5 include: GP-16, GP-17, GP-18, GP-19, GP-20, GP-21 and GP-22.

4. During construction of Cell 5, the following monitoring wells and gas probes must be decommissioned: MW-33, MW-33A, MW-33B, MW-35, MW-35A, MW-37, MW-37A, MW-43, MW-43A, MW-44A and MW-47A.

5. The table below summarizes the environmental monitoring locations to be implemented during the construction of Cell 5.

ENVIRONMENTAL MONITORING	LOCATION
OVERBURDEN WELLS	
UPGRADIENT	MW-26, 36A, 40A
DOWNGRADIENT	MW-34A, 41A, 42A, 45A, 46A, 48A, 49A, 50A
BEDROCK WELLS	
UPGRADIENT	MW-14, 19, 31
DOWNGRADIENT	MW-34, 40, 48, 50
GAS PROBES	GP-1, 2, 3, 4, 5, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22
SURFACE WATER	DB-1, 2, 3, EAST DIVERSION DITCH, WEST DIVERSION DITCH

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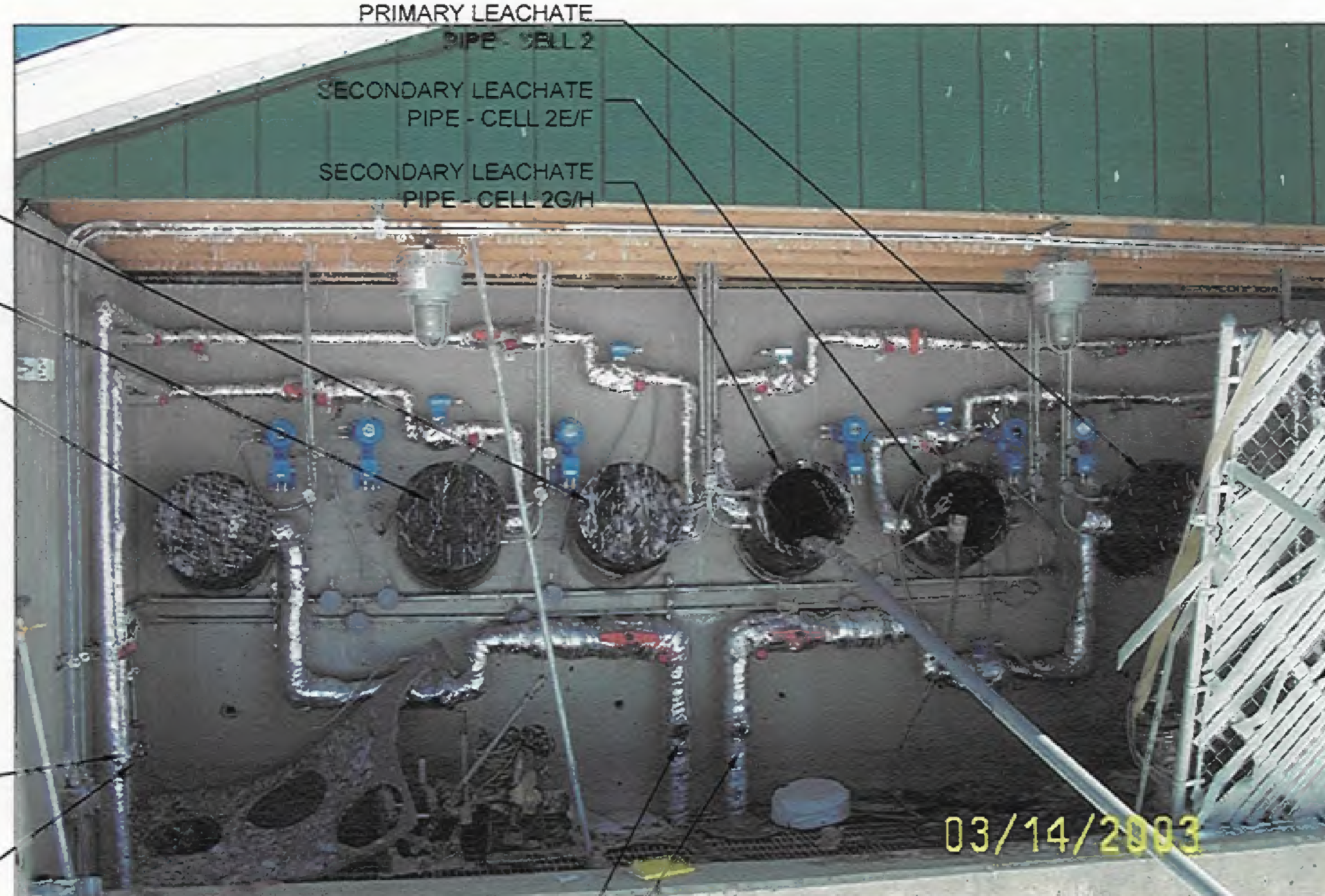
ENVIRONMENTAL MONITORING LOCATIONS
CELL 5

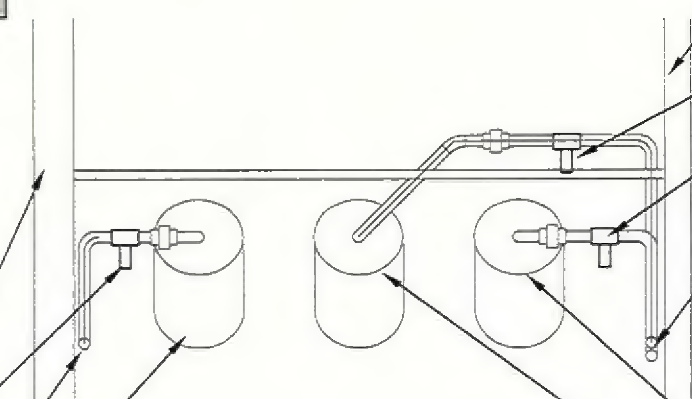
FIGURE 4-3

DWG. NO. 93002-195



SIDE RISER BUILDING - CELL 1 & 2 PHOTO LOOKING EAST
N.T.S.

SECONDARY LEACHATE SAMPLING PORT PHOTO (LOOKING SOUTH)
N.T.S.



GROUNDWATER PIPE LAYOUT CELL 1 & 2
N.T.S.

SECONDARY LEACHATE SAMPLING	GROUND WATER COLLECTION SYSTEM SAMPLING
CELL 1 A/B	CELL 1
CELL 1 C/D	CELL 2 E/F
CELL 2 E/F	CELL 2 G/H
CELL 2 G/H	

NOTES:
1. Groundwater piping details taken from design plans titled "Hyland Landfill - Cell 2 Design Drawings," prepared by G.N. Richardson & Associates, Inc and Earth Tech, dated May 2001. Hyland is currently sampling the groundwater at the perimeter ditch.

2. Photos taken on March 14, 2003 by McMahon & Mann Consulting Engineeers.

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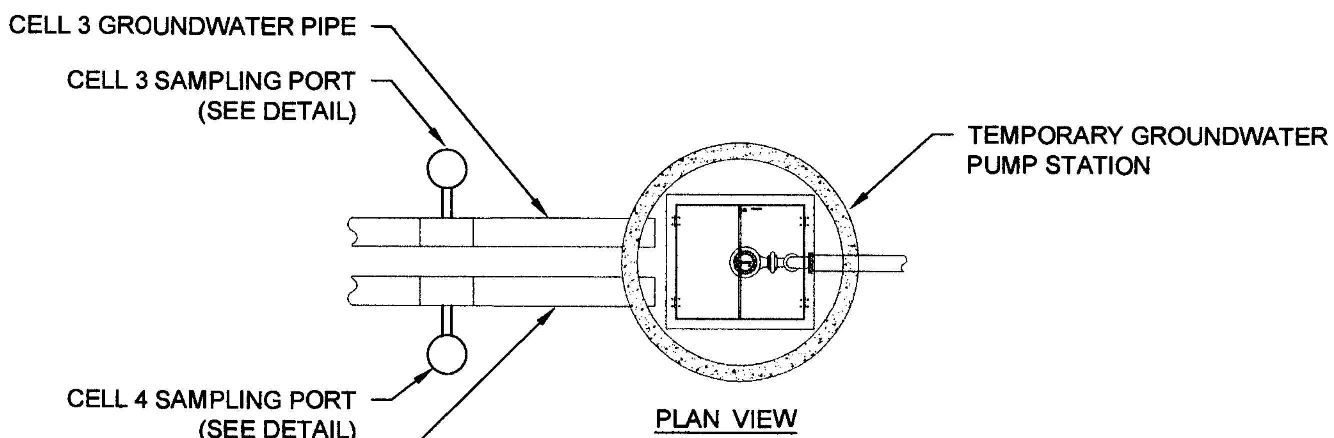
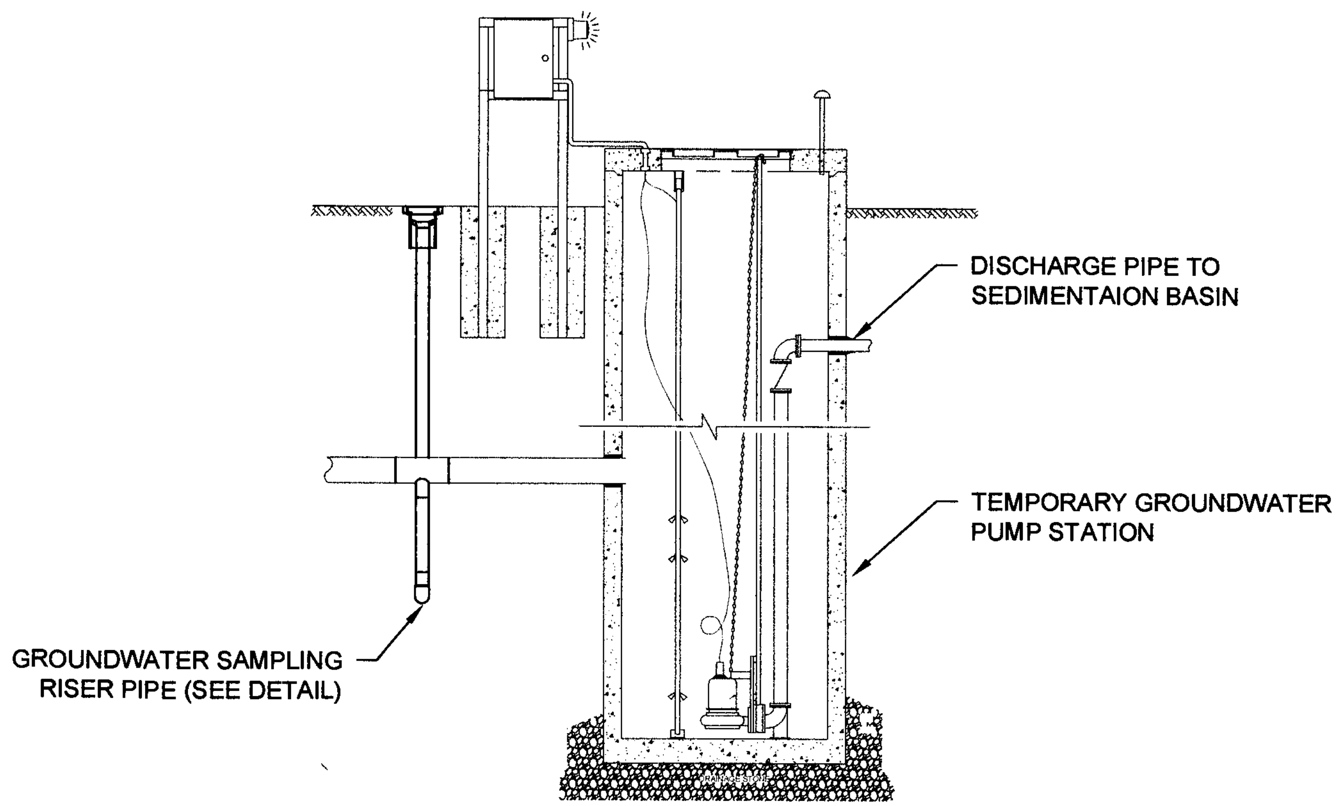
SAMPLING LOCATIONS CELLS 1 AND 2

DWG. NO. 93002-182c

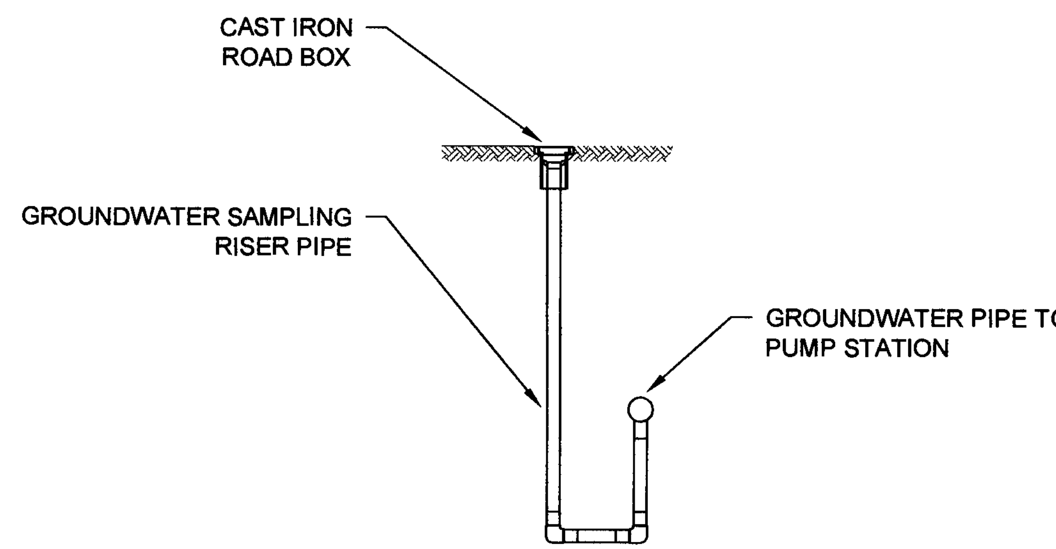
FIGURE 4-4



PLAN VIEW



SECTION VIEW



GROUNDWATER SAMPLING RISER DETAIL (TYPICAL OF TWO)

NOTES:

1. Temporary groundwater pump station details taken from Permit Drawing titled "Hyland Facility, Associates Landfill Expansion," prepared by Sanborn, Head Engineering, P.C. dated February 2004.

2. This plan depicts the location of the groundwater sampling ports. For additional details refer to plans mentioned above.

CELL 3 AND 4 TEMPORARY GROUNDWATER PUMP STATION

N.T.S.

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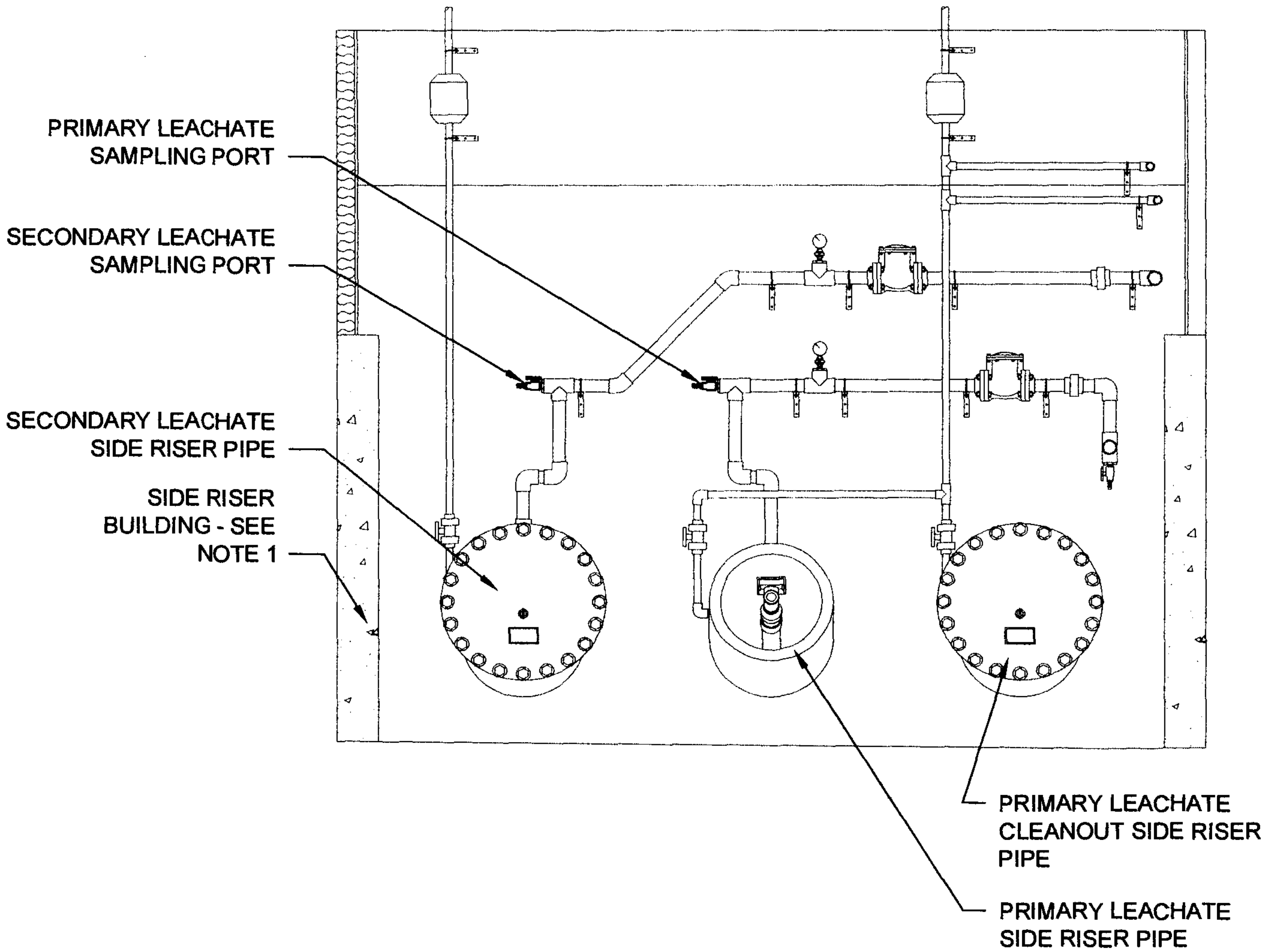
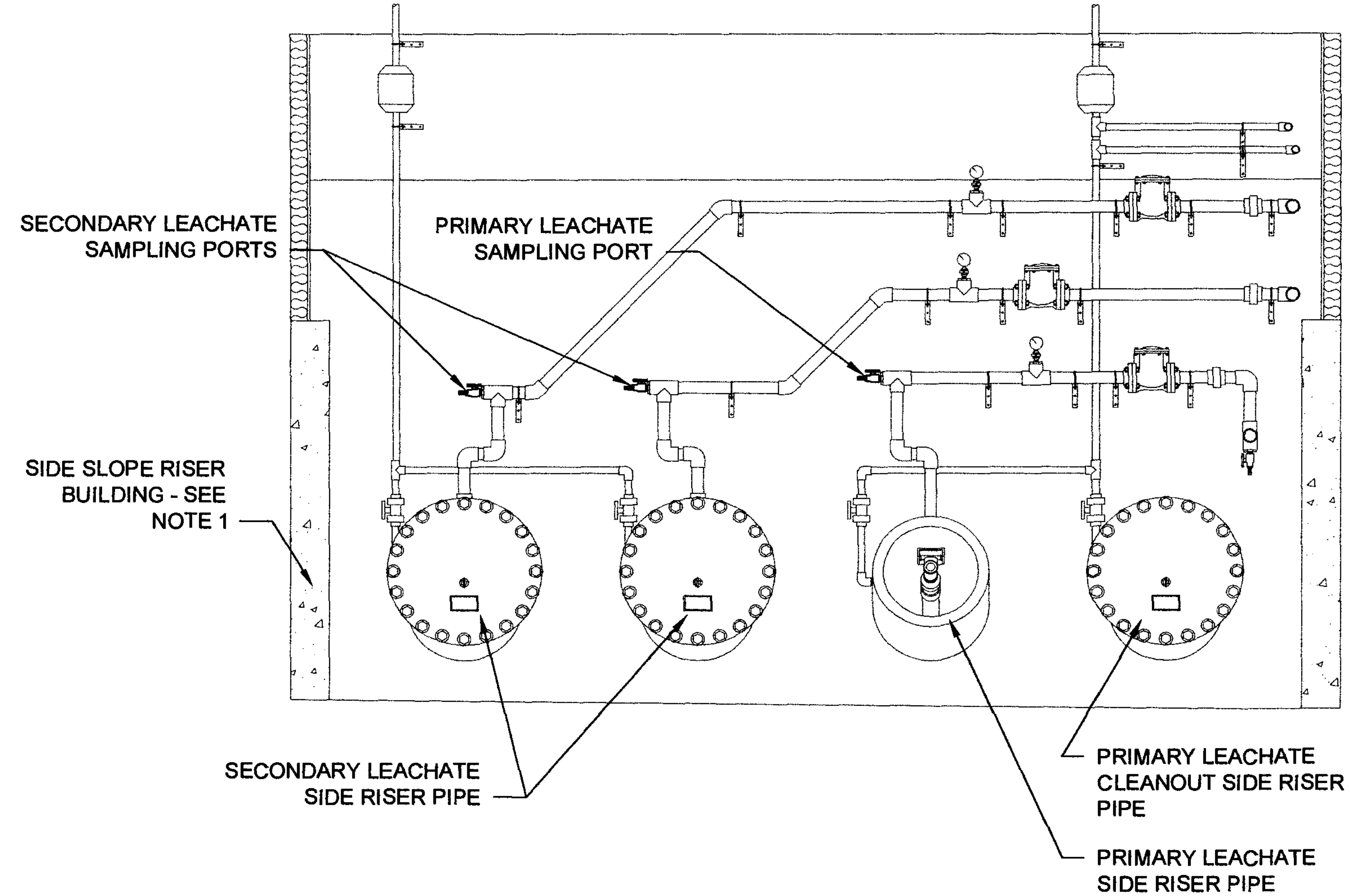
HYLAND FACILITY EMP ALLEGANY COUNTY NEW YORK	GROUNDWATER SAMPLING LOCATIONS - CELLS 3 AND 4	
	DWG. NO. 93002-183	FIGURE 4-5



TYPICAL SIDE RISER BUILDING PIPING
CELLS 3 AND 4
N.T.S.



SIDE RISER BUILDING PIPING
CELL 5
N.T.S.

NOTES:

1. Side riser building details taken from Permit Drawing titled "Hyland Facility, Associates Landfill Expansion," prepared by Sanborn, Head Engineering, P.C. dated February 2004.

2. This plan depicts the locations of the secondary and primary sampling ports. For additional details refer to plans mentioned above.

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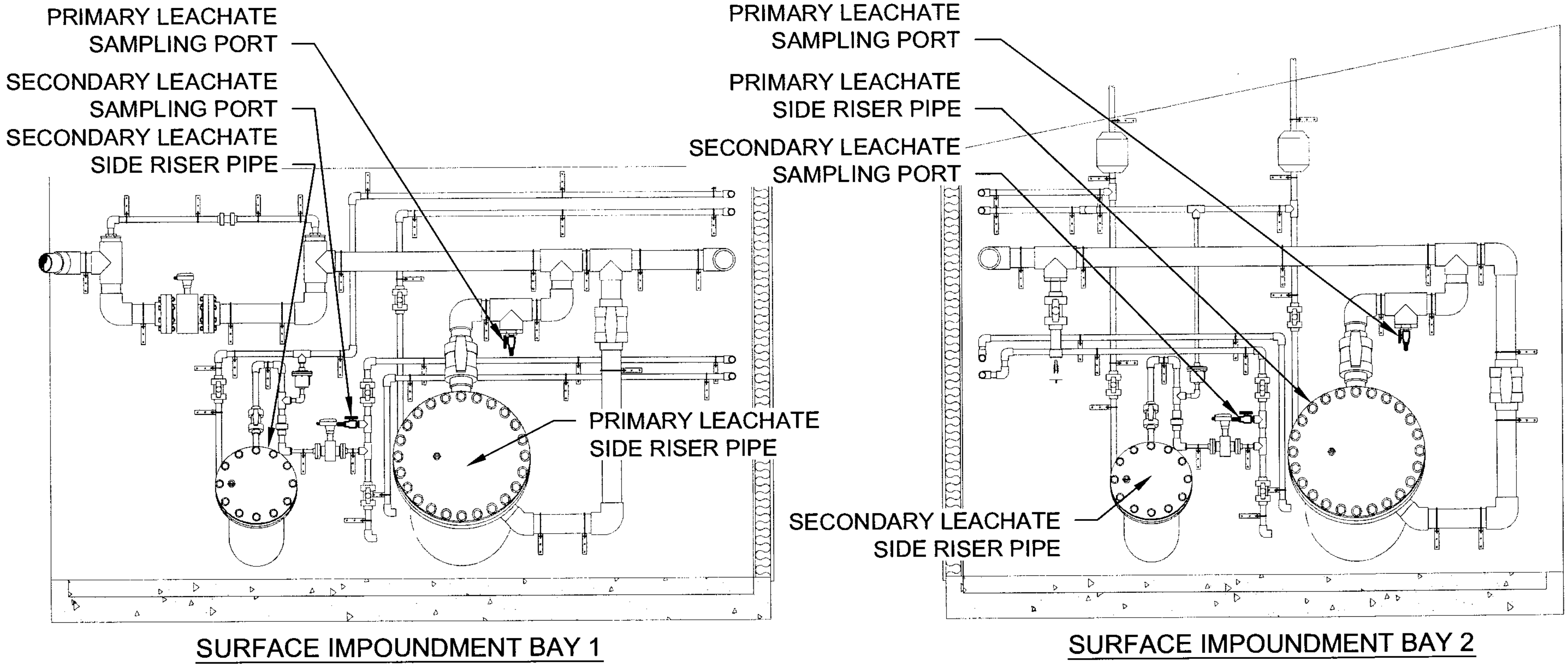
HYLAND FACILITY EMP ALLEGANY NEW YORK	PRIMARY AND SECONDARY LEACHATE SAMPLE LOCATIONS CELLS 3-5	
	DWG. NO. 93002-182a	FIGURE 4-6



SURFACE IMPOUNDMENT SIDE RISER BUILDING

N.T.S.

NOTES:

1. Side riser building details taken from Permit Drawings titled "Hyland Facility Associates Landfill Expansion," Sheet 25 titled "Surface Impoundment Details", prepared by Sanborn, Head Engineering, P.C. dated January 2006.

2. This plan depicts the locations of the secondary and primary sampling ports. For additional details refer to plans mentioned above.

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SURFACE IMPOUNDMENT SAMPLING LOCATION

DWG. NO.93002-189

FIGURE 4-7

APPENDIX A

SUMMARY OF EXISTING MONTORING WELL INSTALLATIONS AND SAMPLING EVENTS

Appendix A
Summary of Monitoring Well Installations

Monitoring Well Designation	Date Installed	Location and Elevation[1] Northing	Easting	Current Ground Elevation (ft)	Protective Steel Casing Elevation (ft)	PVC Casing Elevation (ft)	Reference (See Notes)	Original Ground[2] Elevation	Reference (See Notes)	PVC Screen Length (ft)	Bottom of PVC Screen Elevation (ft)	Top of PVC Screen Elevation (ft)	Screened Formation
MW-1	Mar-88	831839.26	654591.75	1859.9	1860.87	1860.81	1A	1859.51	1F	10	1730.11	1740.11	contact
MW-1AS	May-90	831845.60	654590.16	1860.4	1862.61	—	1A	—	—	2	—	—	overburden
MW-1AM	May-90	831845.60	654590.16	1860.4	1862.61	—	1A	—	—	5	—	—	overburden
MW-1AT	May-90	831845.80	654590.16	1860.4	1862.61	—	1A	—	—	5	—	—	overburden
MW-2	Mar-88	831832.89	653987.60	1884.4	1886.77	1886.57	1A	1884.33	1F	10	1823.13	1833.13	contact
MW-3	Mar-88	833744.82	655627.76	1940.7	1943.02	1941.43	1A	1931.93	1F	10	1899.93	1909.93	contact
MW-4	Apr-88	831971.33	655821.52	1917.1	1919.82	1918.88	1A	1917.15	1F	5	1791.75	1796.75	contact
MW-4AS	May-90	831971.72	655830.10	1917.7	1919.98	—	1A	—	—	5	—	—	overburden
MW-4AM	May-90	831971.72	855830.10	1917.7	1919.98	—	1A	—	—	5	—	—	overburden
MW-4AT	May-90	831971.72	655830.10	1917.7	1919.98	—	1A	—	—	5	—	—	overburden
MW-4BS	May-90	831983.24	655825.49	1916.6	1919.04	—	1A	—	—	5	—	—	overburden
MW-4BT	May-90	831983.24	655825.49	1916.6	1919.04	—	1A	—	—	5	—	—	overburden
MW-5	May-88	830764.58	655725.45	1873.4	1875.98	1875.30	1A	1873.16	1F	5	1799.86	1804.86	contact
MW-6	May-88	832512.19	654770.59	1880.1	1884.2	1882.04	1A	1880.18	1F	5	1861.98	1866.98	overburden
MW-7	Jul-88	832878.14	654527.64	—	Decommissioned	—	1A	1915.94	1F	20	1862.94	1882.94	bedrock
MW-8S	Aug-88	832864.92	654522.46	—	Decommissioned	—	1A	1913.92	1F	10	1713.13	1723.13	bedrock
MW-8M	Aug-88	832864.92	654522.46	—	Decommissioned	—	1A	1913.92	1F	10	1808.13	1818.13	bedrock
MW-8T	Aug-88	832864.92	654522.46	—	Decommissioned	—	1A	1913.92	1F	10	1846.52	1856.52	bedrock
MW-9T	Sep-89	832921.18	653900.34	1973.0	1975.86	1974.73	1A	1973.64	1F	10	1879.74	1889.74	bedrock
MW-9S	Sep-89	832921.18	653900.34	1973.0	1975.86	1974.37	1A	1973.64	1F	10	1851.64	1861.64	bedrock
MW-9AT	Sep-89	832918.43	653900.49	1972.7	1976.15	1974.28	1A	1972.94	1F	5	1962.44	1967.44	contact
MW-9AS	Sep-89	832918.43	653900.49	1972.7	1976.15	1974.68	1A	1972.94	1F	9.5	1946.94	1956.44	bedrock
MW-10S	Sep-89	833733.33	653892.93	2010.3	2012.14	2011.98	1A	2009.52	1F	10	1848.52	1858.52	bedrock
MW-10T	Sep-89	833733.33	653892.93	2010.3	2012.14	2012.14	1A	2009.52	1F	10	1875.02	1685.02	bedrock
MW-10AT	Sep-89	833736.58	653888.57	2010.7	2013.72	2013.23	1A	2010.78	1F	2	2004.88	2006.88	overburden
MW-10AM	Sep-89	833738.58	653888.57	2010.7	2013.72	2012.99	1A	2010.78	1F	10	1983.38	1993.38	bedrock
MW-10AS	Sep-89	833738.58	653888.57	2010.7	2013.72	2012.71	1A	2010.78	1F	9.5	1956.88	1966.78	bedrock
MW-11T	Oct-89	833705.47	654438.04	1968.5	1971.08		1A	1968.40	1F	10	1876.3	1886.3	bedrock
MW-11S	Oct-89	833705.47	654436.04	1968.5	1971.08		1A	1968.40	1F	10	1849.2	1859.2	bedrock
MW-12T	Nov-89	832881.97	655847.35	1940.6	1944.25	1943.17	1A	1941.20	1F	10	1881.2	1891.2	bedrock
MW-12S	Nov-89	832881.97	655847.35	1940.8	1944.25	1942.91	1A	1941.20	1F	10	1855.2	1865.2	bedrock
MW-13T	Oct-89	833748.27	655835.04	—	Decommissioned	—	1A	1935.20	1F	10	1848.9	1858.9	bedrock
MW-13S	Oct-89	833748.27	855835.04	—	Decommissioned	—	1A	1935.20	1F	10	1792.3	1802.3	bedrock
MW-14	Sep-81	833619.34	654398.08	1968.5	1970.67	1970.41	1A	1968.40	1F	10	1929.0	1939.0	bedrock
MW-15	Sep-93	832819.54	654969.99	—	Decommissioned	—	1A	1874.41	1G	10	1743.91	1753.91	bedrock
MW-15A	Oct-93	832818.83	654974.51	—	Decommissioned	—	1A	1873.9	1F	5	1844.2	1849.2	overburden
MW-16	Oct-93	832815.72	654725.05	—	Decommissioned	—	1A	1886.26	1G	10	1779.26	1789.26	bedrock
MW-17	Oct-93	832615.76	855464.88	—	Decommissioned	—	1A	1898.10	1G	10	1855.6	1865.6	bedrock
MW-18	Oct-93	833764.12	854975.80	1935.5	1938.31	1937.42	1A	1934.69	1G	10	1905.19	1915.19	bedrock
MW-18A	Oct-93	833764.07	654979.75	1935.5	1937.72	1935.90	1A	1934.70	1F	5	1922.20	1927.20	overburden
MW-19	Oct-93	833764.55	655470.94	1937.2	1939.14	1937.20	1A	1928.74	1G	10	1886.24	1896.24	bedrock
MW-19A	Oct-93	833783.33	655475.40	1937.2	1938.97	1938.81	1A	1929.00	1F	5	1917.50	1922.50	overburden
MW-20	Oct-93	832998.18	654976.23	—	Decommissioned	—	1A	1889.15	1G	10	1824.65	1834.65	bedrock
MW-20A	Oct-93	832999.48	654980.65	—	Decommissioned	—	1A	1899.16	1F	5	1886.66	1891.66	overburden
MW-21	Oct-93	832999.72	854724.57	—	Decommissioned	—	1A	1905.38	1G	10	1866.88	1876.88	bedrock
MW-21A	Oct-93	—	—	—	Decommissioned	—	—	1905.07	1F	5	1892.57	1897.57	overburden
MW-21R	Jun-98	832978.87	854726.15	—	Decommissioned	—	1A	—	—	5	—	—	bedrock
MW-21AR	Jun-98	832977.45	654731.19	—	Decommissioned	—	1A	—	—	5	—	—	overburden
MW-22	Oct-93	832998.25	655478.59	—	Decommissioned	—	1A	1908.77	1G	10	1844.77	1854.77	bedrock
MW-23	Aug-99	833004.72	655659.75	—	Decommissioned	—	1A	1926.2	1E	10	1881.7	1891.7	bedrock
MW-26	Sep-99	833052.48	655844.48	1943.6	1947.05	1946.37	1A	1943.8	1E	5	1929.8	1934.8	overburden
MW-27	Jun-01	832538.58	854791.49	1879.9	1882.49	1882.36	1A	1879.9	1A	10	1744.4	1754.40	bedrock
MW-27A	Jun-01	832538.56	854799.14	1879.4	1882.12	1882.10	1A	1879.4	1A	10	1857.4	1867.40	overburden
MW-28	Jul-01	832558.40	855005.30	1873.1	1875.97	1875.87	1A	1873.1	1A	10	1767.6	1777.60	bedrock
MW-28A	Jul-01	832558.75	655013.33	1873.5	1876.42	1876.32	1A	1873.5	1A	10	1834.0	1844.00	overburden
MW-29	Jun-01	832576.66	655200.68	1878.6	1881.10	1880.97	1A	1878.6	1A	10	1797.6	1807.60	bedrock
MW-29A	Jun-01	832574.39	655191.17	1878.4	1880.55	1880.33	1A	1878.4	1A	10	1848.9	1858.90	overburden
MW-30	Jun-01	832593.05	655473.99	1898.2	1901.42	1901.14	1A	1898.2	1A	10	1848.2	1858.20	bedrock
MW-30A	Jun-01	832590.45	655466.65	—	Decommissioned	—	1A	1898.2	1A	10	1867.7	1877.70	contact
MW-30AR	Jul-03	832592.84	655456.91	1898.34	1900.76	1900.58	1D	1898.34	1D	10	1873.84	1883.84	overburden
MW-31	Jul-01	832678.26	655882.84	1949.5	1952.96	1952.78	1A	1949.5	1A	10	1926.5	1936.50	bedrock
MW-32A	Aug-02	831881.83	653988.22	1887.87	1890.69	1890.52	1B	1887.87	1B	10	1847.87	1857.87	overburden
MW-33	Sep-02	831500.67	654112.69	1854.21	1857.08	1856.91	1B	1854.21	1B	10	1711.71	1721.71	bedrock
MW-33A	Sep-02	831505.82	654099.72	1855.30	1857.64	1857.26	1B	1855.30	1B	10	1770.30	1780.30	overburden
MW-33B	Sep-02	831513.99	654089.30	1856.70	1858.70	1858.48	1B	1856.70	1B	5	1836.83	1841.83	overburden
MW-34	Oct-02	831407.96	854859.25	1846.60	1849.49	1849.29	1B	1846.60	1B	10	1611.10	1621.10	bedrock
MW-34A	Nov-02	831396.73	854861.64	1848.20	1849.84	1849.22	1B	1846.20	1B	10	1746.70	1756.70	overburden
MW-35	Sep-02	831481.78	655644.34	1893.65	1896.47	1896.31	1B	1893.65	1B	10	1757.15	1767.15	bedrock
MW-35A	Sep-02	831483.58	855628.78	1892.40	1894.75	1894.59	1B	1892.40	1B	10	1822.04	1832.04	overburden
MW-36	Aug-02	832198.48	655935.69	1937.18	1940.38	1939.51	1B	1937.18	1B	10	1850.18	1860.18	bedrock
MW-36A	Aug-02	832185.27	655935.34	1936.86	1939.57	1938.88	1B	1936.86	1B	20	1875.38	1895.38	overburden
MW-37	Sep-02	832152.89	855422.21	1865.28	1868.94 (top steel cover)	1867.31 (top "T")	1B	1865.28	1B	10	1827.28	1837.28	bedrock
MW-37A	Sep-02	832145.60	655423.78	1866.10	1871.54	1871.53	1B	1866.10	1B	10	1846.60	1856.60	overburden
MW-38	Oct-02	832237.34	654647.25	1879.90	1882.52	1882.37	1B	1879.90	1B	10	1767.40	1777.40	bedrock
MW-38A	Oct-02	832224.28	654648.56	1878.90	1881.66	1881.16	1B	1878.90	1B	10	1833.40	1843.40	overburden
MW-40A	Jul-05	832571.22	654298.79	1919.86	1923.26	Not Recorded	1H	1919.86	1H	20	1883.36	1903.36	overburden
MW-A	Oct-89	833788.89	654785.90	1946.6	1949.55	1949.02	1A	1946.70	1F	4.8	1935.4	1940.2	overburden
MW-B	Sep-89	833050.49	654478.03	1932.1	1935.54	1934.89	1A	1932.41	1F	5	1919.91	1924.91	contact
MW-C	Sep-89	832573.47	654664.10	—	Decommissioned	—	1C	1889.96	1F	5	1872.16	1877.16	overburden
MW-C1	Sep-89	832578.34	654661.90	—	Decommissioned	—	1C	1890.01	1F	5	1879.11	1884.11	overburden
MW-D	Sep-89	832595.30	855158.75	—	Decommissioned	—	1C	1876.76	1F	5	1851.76	1856.76	overburden
MW-D1	Sep-89	832589.30	655157.53	—	Decommissioned	—	1C	1876.79	1F	5	1863.59	1868.59	overburden
MW-D2	Jun-90	832591.34	655164.17	—	Decommissioned	—	1C	1876.6	1F	5	1834.1	1839.1	overburden
MW-F	Sep-89	833008.92	655752.95	—	Decommissioned	—	1C	1931.0	1F	5	1919.3	1924.3	overburden
MW-G	Sep-89	833002.24	655503.36	—	Decommissioned	—	1C	1911.7	1F	5	1899.2	1904.2	overburden
MW-G(R)	Aug-99	832996.05	655508.95	—	Decommissioned	—	1E	1905	1E	10	1886	1896	overburden
MW-H	Sep-89	833000.36	655149.11	—	Decommissioned	—	1C	1887.36	1F	5	1863.66	1868.66	overburden
MW-H1	Sep-89	832995.53	655152.90	—	Decommissioned	—	1C	1887.49	1F	5	1875.59	1880.59	overburden
MW-I	Sep-89	832971.86	654718.34	—	Decommissioned	—	1C	1903.15	1F	5	1895.35	1900.35	overburden
MW-i2	Sep-89	832981.16	654702.78	—	Decommissioned	—	1C	1905.25	1F	5	1884.95	1889.95	overburden
MW-J	Sep-89	832381.59	655157.90	—	Decommissioned	—	1C	1878.56	1F	5	1844.86	1849.86	overburden
MW-K	Sep-89	831892.67	655013.71	1865.5	1868.71	1867.61	1A	1866.09	1F	5	1840.89	1845.89	overburden
MW-L	May-90	832477.35	655878.52	1939.5	1941.62	1941.36	1A	1939.50	1F	5	1925.5	1930.5	contact

NOTES:

1. Monitoring Well Locations and Elevations based on:
   - A. Survey Completed by B&R Surveying, L.L.C., dated May 10, 2001.
   - B. "Hyland Facility 2002 Ground Water Monitoring Well, Test Pit and Boring Location Plan," prepared by B&R Surveying, L.L.C. dated May 4, 2003.
   - C. Drawing by C&S Consulting Engineers - Hyland Ash Monofill, Construction and Operation Plans, Sheet2, dated December 1989.
   - D. Survey Completed by B&R Surveying, L.L.C., dated July 2003.
   - E. Hyland Facility letter to NYSDEC dated March 17, 2000.
   - F. Table received on September 28, 1994 provided by Hyland.
   - G. Ground surface on monitoring well log.
   - H. Survey Completed by B&R Surveying, L.L.C., dated August 16, 2005.
2. Original Ground Elevation Denotes the Elevation of the Ground Surface at the Time of Well Installation.

Appendix A
Summary of Exisiting Monitoring Well Installations (Existing Environmental Monitoring Program)

Monitoring Well Designation	Location and Elevations					Applicable Survey Note	Original Ground Elevation [3]	PVC Diameter (in)	PVC Screen Length (ft)	Bottom of PVC Screen Elevation (ft)	Top of PVC Screen Elevation (ft)	Depth to Bottom of PVC Screen from Ground Surface (ft)	Hydraulic Conductivity (cm/sec) [4]
	Northing	Easting	Ground Surface Elevation (ft)	Protective Steel Casing Elevation (ft)	PVC Casing Elevation (ft)								
BEDROCK WELLS													
MW-14 (upgradient)	833619.34	654398.08	1968.5	1970.67	1970.41	1	1968.40	2.0	10.0	1929.0	1939.00	39.5	1.8E-04
MW-19 (upgradient)	833764.55	655470.94	1937.2	1939.14	1937.20	1	1928.74	2.0	10.0	1886.24	1896.24	51.0	6.3E-04
MW-27 (downgradient)	832536.58	654791.49	1879.9	1882.49	1882.36	1	1879.9	2.0	10.0	1744.4	1754.40	135.5	2.9E-05
MW-28 (downgradient)	832556.40	655005.30	1873.1	1875.97	1875.87	1	1873.1	2.0	10.0	1767.6	1777.60	105.5	5.2E-04
MW-29 (downgradient)	832576.66	655200.68	1878.6	1881.10	1880.97	1	1878.6	2.0	10.0	1797.6	1807.60	81.0	1.7E-03
MW-30 (downgradient)	832593.05	655473.99	1898.2	1901.42	1901.14	1	1898.2	2.0	10.0	1848.2	1858.20	50.0	4.7E-04
MW-31 (upgradient)	832676.26	655882.84	1949.5	1952.96	1952.78	1	1949.5	2.0	10.0	1926.5	1936.50	23.0	2.4E-05
OVERBURDEN WELLS													
MW-26 (upgradient)	833052.48	655844.48	1943.6	1947.05	1946.37	1	1943.80	2.0	5.0	1929.80	1934.80	13.8	No data
MW-27A (downgradient)	832538.56	654799.14	1879.4	1882.12	1882.10	1	1879.4	2.0	10.0	1857.4	1867.40	22.0	4.7E-06
MW-28A (downgradient)	832558.75	655013.33	1873.5	1876.42	1876.32	1	1873.5	2.0	10.0	1834.0	1844.00	39.5	2.3E-06
MW-29A (downgradient)	832574.39	655191.17	1878.4	1880.55	1880.33	1	1878.4	2.0	10.0	1848.9	1858.90	29.5	6.4E-05
MW-30AR (downgradient)	832592.84	655456.91	1898.34	1900.76	1900.58	2	1898.34	2.0	10.0	1873.84	1883.84	24.5	No data

NOTES:
1. Monitoring well locations and elevations based on survey completed by B&R Surveying, L.L.C. dated May 10, 2001.
2. Monitoring well locations and elevations based on survey completed by B&R Surveying, L.L.C. dated July 2003.
3. Original ground elevation denotes the elevation of the ground surface at the time of well installation.
4. Hydraulic conductivity testing performed by MMCE as part of the Hydrogeologic Studies for the proposed expansion except for testing performed monitoring wells MW-14 and MW-19. Hydraulic conductivity values for these two wells was taken from "Hyland Ash Monofill Addendum to Permit Application Documents," TVGA Engineering, Surveying, P.C. dated 1993.

Appendix A
Summary of Existing Monitoring Well Installations (Future Environmnetal Monitoring Program)

Monitoring Well Designation	Location and Elevations: Northing	Easting	Ground Surface Elevation (ft)	Protective Steel Casing Elevation (ft)	PVC Casing Elevation (ft)	Applicable Survey Note	Original Ground Elevation [2]	PVC Diameter (in)	PVC Screen Length (ft)	Bottom of PVC Screen Elevation (ft)	Top of PVC Screen Elevation (ft)	Depth to Bottom of PVC Screen from Ground Surface (ft)	Hydraulic Conductivity (cm/sec) [4]
BEDROCK WELLS													
MW-34 (downgradient)	831407.96	654859.25	1846.60	1849.49	1849.29	1	1846.60	2	10	1611.10	1621.10	235.5	2.7E-05
MW-35 (downgradient)	831481.78	655644.34	1893.65	1896.47	1896.31	1	1893.65	2	10	1757.15	1767.15	136.5	4.5E-04
MW-37 (downgradient)	832152.89	655422.21	1865.28	1868.94 (top steel cover)	1867.31 (top "T")	1	1865.28	2	10	1827.28	1837.28	38.00	No Test
MW-38 (downgradient)	832237.34	654647.25	1879.90	1882.52	1882.37	1	1879.90	2	10	1767.40	1777.40	112.50	No Test
OVERBURDEN WELLS													
MW-34A (downgradient)	831396.73	654861.64	1846.20	1849.84	1849.22	1	1846.20	2	10	1746.70	1756.70	99.5	1.0E-07
MW-35A (downgradient)	831483.58	655626.76	1892.40	1894.75	1894.59	1	1892.40	2	10	1822.04 [2]	1832.04	70.4	8.9E-06
MW-36A (upgradient)	832185.27	655935.34	1936.86	1939.57	1938.88	1	1936.86	2	10	1875.38 [2]	1895.38	61.0	8.3E-08
MW-37A (downgradient)	832145.80	655423.78	1866.10	1871.54	1871.53	1	1866.10	2	10	1846.60	1856.60	19.5	No data
MW-38A (downgradient)	832224.26	654648.56	1878.90	1881.66	1881.16	1	1878.90	2	10	1833.40	1843.40	45.5	No data
MW-40A (upgradient)	832571.22	654298.79	1919.86	1923.26	Not Recorded	3	1919.86	2	20	1883.36	1903.36	36.5	No data

NOTES:
1. Monitoring well locations and elevations based on survey completed by B&R Surveying, L.L.C. dated May 4, 2003.
2. Original ground elevation denotes the elevation of the ground surface at the time of well installation.
3. Monitoring well locations and elevations based on survey completed by B&R Surveying, L.L.C. dated August 16, 2005.
4. Hydraulic conductivity testing performed by MMCE as part of the Hydrogeologic Studies for the proposed expansion.

Appendix A
Summary of Operational Water Quality Sampling Events

Bedrock Wells:

Well	Date Sampled	Analysis
MW-14	September-98	Routine Analysis
	December-98	Routine Analysis
	March-99	Routine Analysis
	June-99	Routine Analysis
	September-99	Baseline Analysis
	December-99	Routine Analysis
	March-00	Routine Analysis
	June-00	Routine Analysis
	September-00	Routine Analysis
	December-00	Baseline Analysis (partial)[1]
	February-01	Routine Analysis
	May-01	Baseline Analysis
	July-01	Routine Analysis
	October-01	Routine Analysis
	February-02	Routine Analysis
	May-02	Routine Analysis
	August-02	Baseline Analysis
	November-02	Routine Analysis
	February-03	(dry)
	May-03	Routine Analysis
	August-03	Routine Analysis
	November-03	Baseline Analysis
	February-04	Routine Analysis
	May-04	Routine Analysis
	August-04	Routine Analysis
	November-04	Baseline Analysis
	February-05	Baseline Analysis
	May-05	Routine Analysis
MW-19	September-98	Routine Analysis
	December-98	(dry)
	March-99	Routine Analysis
	June-99	Routine Analysis
	September-99	Baseline Analysis
	December-99	Routine Analysis
	March-00	Routine Analysis
	June-00	Routine Analysis
	September-00	Routine Analysis
	December-00	Baseline Analysis
	February-01	Routine Analysis
	May-01	Baseline Analysis

Appendix A

Summary of Operational Water Quality Sampling Events

MW-19 (continued)	July-01	Routine Analysis
	October-01	Routine Analysis
	February-02	Routine Analysis
	May-02	Routine Analysis
	August-02	Baseline Analysis
	November-02	Routine Analysis
	February-03	Routine Analysis
	May-03	Routine Analysis
	August-03	Routine Analysis
	November-03	Baseline Analysis
	February-04	Routine Analysis
	May-04	Routine Analysis
	August-04	Routine Analysis
	November-04	Baseline Analysis
	February-05	Baseline Analysis
	May-05	Routine Analysis
MW-20	September-98	Routine Analysis
	December-98	Routine Analysis (partial)[1]
	March-99	Routine Analysis
	June-99	Routine Analysis
	September-99	Baseline Analysis
	December-99	Routine Analysis
	March-00	Routine Analysis
	June-00	Routine Analysis
	September-00	Routine Analysis
	December-00	Baseline Analysis
	February-01	Routine Analysis
	May-01	Baseline Analysis
	July-01	Routine Analysis
	Decommissioned July 2001	
MW-22	June-00	Routine Analysis
	September-00	Routine Analysis
	December-00	Baseline Analysis
	February-01	Routine Analysis
	May-01	Baseline Analysis
	July-01	Routine Analysis
	October-01	Routine Analysis
	Decommissioned May 2002	
MW-23	June-00	Routine Analysis
	September-00	Routine Analysis
	December-00	Baseline Analysis
	February-01	Routine Analysis
	May-01	Baseline Analysis
	July-01	Routine Analysis

Appendix A
Summary of Operational Water Quality Sampling Events

MW-23 (continued)	October-01	Routine Analysis
	Decommissioned April 2002	
MW-27	February-02	Routine Analysis
	May-02	Routine Analysis
	August-02	Baseline Analysis
	November-02	Routine Analysis
	February-03	Routine Analysis
	May-03	Routine Analysis
	August-03	Routine Analysis
	November-03	Baseline Analysis
	February-04	Routine Analysis
	May-04	Routine Analysis
	August-04	Routine Analysis
	November-04	Baseline Analysis
	February-05	Baseline Analysis
	May-05	Routine Analysis
MW-28	February-02	Routine Analysis
	May-02	Routine Analysis
	August-02	Baseline Analysis
	November-02	Routine Analysis
	February-03	Routine Analysis
	May-03	Routine Analysis
	August-03	Routine Analysis
	November-03	Baseline Analysis
	February-04	Routine Analysis
	May-04	Routine Analysis
	August-04	Routine Analysis
	November-04	Baseline Analysis
	February-05	Baseline Analysis
	May-05	Routine Analysis
MW-29	February-02	Routine Analysis
	May-02	Routine Analysis
	August-02	Baseline Analysis
	November-02	Routine Analysis
	February-03	Routine Analysis
	May-03	Routine Analysis
	August-03	Routine Analysis
	November-03	Baseline Analysis
	February-04	Routine Analysis
	May-04	Routine Analysis
	August-04	Routine Analysis
	November-04	Baseline Analysis
	February-05	Baseline Analysis
	May-05	Routine Analysis

Appendix A
Summary of Operational Water Quality Sampling Events

MW-30

February-02	Routine Analysis
May-02	Routine Analysis
August-02	Baseline Analysis
November-02	Routine Analysis
February-03	Routine Analysis
May-03	Routine Analysis
August-03	Routine Analysis
November-03	Baseline Analysis
February-04	Routine Analysis
May-04	Routine Analysis
August-04	Routine Analysis
November-04	Baseline Analysis
February-05	Baseline Analysis
May-05	Routine Analysis

MW-31

February-02	Routine Analysis
May-02	Routine Analysis
August-02	Baseline Analysis
November-02	Routine Analysis
February-03	Routine Analysis
May-03	Routine Analysis
August-03	Routine Analysis
November-03	Baseline Analysis
February-04	Routine Analysis
May-04	Routine Analysis
August-04	Routine Analysis
November-04	Baseline Analysis
February-05	Baseline Analysis
May-05	Routine Analysis

Overburden Wells:

MW-G

September-98	Routine Analysis
December-98	Routine Analysis
March-99	Routine Analysis
June-99	Routine Analysis
September-99	(dry)
December-99	(dry)
March-00	(dry)
June-00	(dry)
September-00	(dry)
December-00	(dry)
February-01	(dry)
May-01	(dry)
July-01	(dry)
Decommissioned May 2002	

Appendix A
Summary of Operational Water Quality Sampling Events

MW-H	September-98	Routine Analysis
	December-98	Routine Analysis (partial)[1]
	March-99	Routine Analysis
	June-99	Routine Analysis
	September-99	Baseline Analysis
	December-99	Routine Analysis
	March-00	Routine Analysis
	June-00	Routine Analysis
	September-00	(dry)
	December-00	Baseline Analysis (partial)[1]
	February-01	Routine Analysis
	May-01	Baseline Analysis
	July-01	Routine Analysis
	Decommissioned July 2001	
MW-20A	September-98	(dry)
	December-98	(dry)
	March-99	(dry)
	June-99	Routine Analysis
	September-99	(dry)
	December-99	(dry)
	March-00	Routine Analysis
	June-00	Routine Analysis
	September-00	(dry)
	December-00	(dry)
	February-01	(dry)
	May-01	Baseline Analysis
	July-01	Routine Analysis
	Decommissioned July 2001	
MW-21AR	June-99	Routine Analysis
	September-99	Baseline Analysis
	December-99	Routine Analysis
	March-00	Routine Analysis
	June-00	Routine Analysis
	September-00	(dry)
	December-00	(dry)
	February-01	Routine Analysis
	May-01	Baseline Analysis
	July-01	Routine Analysis
	Decommissioned July 2001	
MW-F	June-00	(dry)
	September-00	Routine Analysis
	December-00	(dry)
	February-01	(dry)

Appendix A
Summary of Operational Water Quality Sampling Events

MW-F (continued)	May-01	(dry)
	July-01	(dry)
	October-01	(dry)
	Decommissioned May 2002	
MW-26	June-00	Routine Analysis
	September-00	Routine Analysis
	December-00	(dry)
	February-01	Routine Analysis
	May-01	Baseline Analysis
	July-01	Routine Analysis
	October-01	Routine Analysis
	February-02	Routine Analysis
	May-02	Routine Analysis
	August-02	Baseline Analysis
	November-02	Routine Analysis
	February-03	Routine Analysis
	May-03	Routine Analysis
	August-03	Routine Analysis
	November-03	Baseline Analysis
	February-04	Routine Analysis
	May-04	Routine Analysis
	August-04	Routine Analysis
	November-04	Baseline Analysis
	February-05	Baseline Analysis
	May-05	Routine Analysis
MW-27A	February-02	Routine Analysis
	May-02	Routine Analysis
	August-02	Baseline Analysis
	November-02	Routine Analysis
	February-03	Routine Analysis
	May-03	Routine Analysis
	August-03	Routine Analysis
	November-03	Baseline Analysis
	February-04	Routine Analysis
	May-04	Routine Analysis
	August-04	Routine Analysis
	November-04	Baseline Analysis
	February-05	Baseline Analysis
	May-05	Routine Analysis
MW-28A	February-02	Routine Analysis
	May-02	Routine Analysis
	August-02	Baseline Analysis
	November-02	Routine Analysis
	February-03	Routine Analysis

Appendix A
Summary of Operational Water Quality Sampling Events

MW-28A (continued)	May-03	Routine Analysis
	August-03	Routine Analysis
	November-03	Baseline Analysis
	February-04	Routine Analysis
	May-04	Routine Analysis
	August-04	Routine Analysis
	November-04	Baseline Analysis
	February-05	Baseline Analysis
	May-05	Routine Analysis
MW-29A	February-02	Routine Analysis
	May-02	Routine Analysis
	August-02	Baseline Analysis
	November-02	Routine Analysis
	February-03	Routine Analysis
	May-03	Routine Analysis
	August-03	Routine Analysis
	November-03	Baseline Analysis
	February-04	Routine Analysis
	May-04	Routine Analysis
	August-04	Routine Analysis
	November-04	Baseline Analysis
	February-05	Baseline Analysis
	May-05	Routine Analysis
MW-30A	February-02	Routine Analysis
	May-02	Routine Analysis
	August-02	Baseline Analysis
	November-02	Routine Analysis
	February-03	Routine Analysis
	May-03	Routine Analysis
	Decommissioned July 2003	
MW-30AR	November-03	Baseline Analysis
	February-04	Routine Analysis
	May-04	Routine Analysis
	August-04	Routine Analysis
	November-04	Baseline Analysis
	February-05	Baseline Analysis
	May-05	Routine Analysis

APPENDIX B

RESIDENTIAL WATER SUPPLY SAMPLING PLAN

APPENDIX B
RESIDENTIAL WATER SUPPLY SAMPLING PLAN

1.00 INTRODUCTION

Hyland will collect samples from residential water supplies located within a radius of 1-mile downgradient of the facility if requested by the resident. These residences obtain their water from either springs or wells. The procedures described below will be used to collect the samples and complete field analysis. Residential water supply sampling and analysis will be done by a contracted laboratory.

2.00 COORDINATION

Hyland will provide the laboratory with a list of residents where sampling is to be completed. The laboratory will contact the homeowner to coordinate the sampling schedule. Based upon discussions between Hyland personnel and the local residents it is understood that the residents do not want the NYS or local Health Departments to be notified when samples of their water are collected for analysis.

The laboratory will send a copy of the analytical test results directly to the homeowner and Hyland. The data obtained from the residential wells will be kept at the Hyland facility and may be reviewed by the NYSDEC at their convenience. Hyland will notify the NYSDEC when residential sampling is to be conducted and inform the NYSDEC as to when the data is available for review.

3.00 ANALYTICAL TESTING

Residential well sampling will be completed on a yearly basis for 6 NYCRR Part 360 baseline parameters. The data quality objectives stated in the "Hyland Ash Monofill Site Analytical Plan" will apply to this work.

4.00 SAMPLING PROCEDURES

4.10 Pre-Sampling Preparation

1. **Health and Safety:** The Hyland Facility Health And Safety Plan will be followed by all personnel engaged in sampling.

2. **Authorized Personnel:** All individuals involved in the sampling will have read this sampling protocol, be technically qualified, and follow the protocol.

3. **Staging:** Prior to any sampling event, the following steps will be taken by personnel responsible for sampling.

a. Review the sampling procedures.

b. Assemble and inspect field equipment necessary for sample collection, verify that equipment is clean and in proper working order.

c. Calibrate equipment to manufacturer's specifications.

d. Examine shuttles, bottles, preservatives; contact laboratory immediately if any problems are found.

e. Confirm sample delivery time and method of shipment with the laboratory.

f. Establish a sampling team of at least two people.

g. Establish a schedule for the activities of the day.

h. Residential water supply sampling will be coordinated with the homeowners.

4.20 Sampling

1. Examination of the Sampling Point

a. Identify the sampling point and record the identification number on the sampling record.

b. Verify that the sampling point is not damaged.

2. Sample Collection

a. Samples will be collected directly from the well or spring if possible. It is likely that it will not be possible to access the well or spring directly. In these cases samples will be collected from as near the water supply source as possible and before it is softened, filtered or heated. If possible, the sample will be collected before it enters the pressure tank.

b. Steps will be taken obtain a fresh representative sample. These steps will include removing aerators, filters or other devices from taps, running taps to clear lines or pressure tanks, and evacuating wells.

c. Water samples will be collected with pre-cleaned, PVC bailers or another appropriate sampling device.

d. Sample collection will follow the sequence below:

1. Volatiles
2. Organics
3. Metals
4. Inorganics

e. The physical appearance of the sample observed during the sampling will be recorded.

3. Sample Containers

a. All sample containers will be provided by the laboratory.

b. If glass bottles are used, extra glass bottles will be obtained from the laboratory to allow for accidental breakage that may occur.

c. Preservatives in the sample bottles will not be poured or rinsed out.

4. Holding Times and Laboratory Protocols

a. All samples will be shipped to the analytical laboratory the same day they are obtained.

b. The samples will be stored at or near 4°C and analyzed within proper holding times.

5. Sample Preservation and Shipment

a. Immediately following collection of the samples, they are to be placed in a cooler with "freezer-pacs" in order to maintain sample integrity. Any preservatives required will be added by the analytical laboratory prior to sampling. All volatile sample bottles are to be filled to capacity with no headspace for volatilization. If necessary to meet a recommended holding time, the samples are to be shipped by overnight courier to the laboratory or delivered in person.

b. The shipping containers used will be designed to prevent breakage, spills and contamination of the samples. Tight packing material is to be provided around each sample container and any void around the freezer-pacs. The container is to be securely sealed, clearly labeled, and accompanied by a chain-of-custody record. Separate shipping containers should be used for "clean" and heavily contaminated samples.

4.30 Quality Assurance and Control

1. Procedures for Maintaining Sample Control and Chain-of-Custody

a. To provide for proper identification in the field and proper tracking in the laboratory, all samples will be labeled in a clear and consistent fashion.

b. Sample labels will be waterproof.

c. Field personnel will maintain a field notebook. Field activities will be sequentially recorded in the notebook.

d. The notebook, along with the chain-of-custody form, will contain sufficient information to allow reconstruction of the sample collection and handling procedure at a later time.

e. Each sample location will have a corresponding notebook entry which includes:

    Sample ID Number
    Sample Point Location and Number
    Date and Time
    Analysis for which sample was collected
    Additional comments as necessary
    Sampler's names

f. Each sample location will have a corresponding entry on a chain-of-custody form.

g. The chain-of-custody form entry for sampling at any one sample point is to be completed before sampling is initiated by the same sampling team at any other sample point.

h. In cases where the samples leave the immediate control of the sampling team (i.e. shipment via a common carrier), the shipping container will be sealed.

i. Define noted problems and corrective actions.

2. Additional Samples

a. A trip blank will be prepared by the laboratory for sampling events that include laboratory analysis for volatile organic compounds.

4.40 Post-Sampling Procedures

1. Clean Up and Security

a. The area around the sampling point will be cleaned up and the sample point secured before proceeding to the next sample point.

b. Bailers (if used) will be returned to dedicated plastic sheaths for cleaning prior to reuse.

APPENDIX C

WATER QUALITY PARAMETER LIST

GROUNDWATER ANALYSIS TABLES

ROUTINE PARAMETERS

Common Name[1]	CAS RN[2]
Field Parameters:	
Static water level........ (in wells and sumps)	
Specific Conductance......	
Temperature...............	
Floaters or Sinkers[3]......	
pH......................	
Eh.......................	
Field Observations[4].......	
Turbidity................	
Leachate Indicators:	
Total Kjeldahl Nitrogen...	
Ammonia..................	7664-41-7
Nitrate..................	
Chemical Oxygen Demand....	
Biochemical Oxygen Demand (BOD_5)..................	
Total Organic Carbon......	
Total Dissolved Solids....	
Sulfate..................	
Alkalinity...............	
Phenols..................	108-95-2
Chloride.................	
Bromide..................	
Total hardness as $CaCO_3$...	

ROUTINE PARAMETERS

Common Name[2]	CAS RN[3]
Inorganic Parameters:	
Cadmium..................	(Total)
Calcium...................	(Total)
Iron.....................	(Total)
Lead......................	(Total)
Magnesium.................	(Total)
Manganese.................	(Total)
Potassium.................	(Total)
Sodium....................	(Total)

Notes

1. Common names are those widely used in government regulations, scientific publications, and commerce; synonyms exist for many chemicals.

2. Chemical Abstracts Service Registry Number. Where "Total" is entered, all species in the groundwater that contain this element are included.

3. Any floaters or sinkers found must be analyzed separately for baseline parameters.

4. Any unusual conditions (colors, odors, surface sheens, etc.) noticed during well development, purging, or sampling must be reported.

BASELINE PARAMETERS

Common Name[1]	CAS RN[2]
Field Parameters:	
Static water level........ (in wells and sumps)	
Specific Conductance......	
Temperature...............	
Floaters or Sinkers[3]......	
pH........................	
Eh........................	
Field Observations[4].......	
Turbidity.................	
Leachate Indicators:	
Total Kjeldahl Nitrogen...	
Ammonia...................	7664-41-7
Nitrate...................	
Chemical Oxygen Demand....	
Biochemical Oxygen Demand (BOD_5)..................	
Total Organic Carbon......	
Total Dissolved Solids....	
Sulfate...................	
Alkalinity................	
Phenols...................	108-95-2
Chloride..................	
Bromide...................	24959-67-9
Total hardness as $CaCO_3$...	
Color.....................	
Boron.....................	7440-42-8

BASELINE PARAMETERS[1]

Common Name[2]	CAS RN[3]
Inorganic Parameters:	
Aluminum..................	(Total)
Antimony..................	(Total)
Arsenic...................	(Total)
Barium....................	(Total)
Beryllium.................	(Total)
Cadmium...................	(Total)
Calcium...................	(Total)
Chromium..................	(Total)
Chromium (Hexavalent)*....	18540-29-9
Cobalt....................	(Total)
Copper....................	(Total)
Cyanide...................	(Total)
Iron......................	(Total)
Lead......................	(Total)
Magnesium.................	(Total)
Manganese.................	(Total)
Mercury...................	(Total)
Nickel....................	(Total)
Potassium.................	(Total)

BASELINE PARAMETERS

Common Name[1]	CAS RN[2]
Selenium..................	(Total)
Silver....................	(Total)
Sodium....................	(Total)
Thallium..................	(Total)
Vanadium..................	(Total)
Zinc......................	(Total)
Organic Parameters:	
Acetone...................	67-64-1
Acrylonitrile.............	107-13-1
Benzene...................	71-43-2
Bromochloromethane........	74-97-5
Bromodichloromethane......	75-27-4
Bromoform; Tribromomethane	75-25-2
Carbon disulfide..........	75-15-0
Carbon tetrachloride......	56-23-5
Chlorobenzene.............	108-90-7
Chloroethane; Ethyl chloride.........	75-00-3

BASELINE PARAMETERS

Common Name[1]	CAS RN[2]
Chloroform; Trichloromethane........	67-66-3
Dibromochloromethane; Chlorodibromomethane....	124-48-1
1,2-Dibromo-3-chloropropane; DBCP..............	96-12-8
1,2-Dibromoethane; Ethylene dibromide; EDB......	106-93-4
o-Dichlorobenzene; 1,2-Dichlorobenzene.....	95-50-1
p-Dichlorobenzene; 1,4-Dichlorobenzene.....	106-46-7
trans-1,4-Dichloro-2-butene....................	110-57-6
1,1-Dichloroethane; Ethylidene chloride.....	75-34-3
1,2-Dichloroethane; Ethylene dichloride.....	107-06-2
1,1-Dichloroethylene; 1,1-Dichloroethene; Vinylidene chloride.....	75-35-4
cis-1,2-Dichloroethylene; cis-1,2-Dichloroethene..	156-59-2
trans-1,2-Dichloroethylene; trans-1,2-Dichloroethene.................	156-60-5
1,2-Dichloropropane; Propylene dichloride.......	78-87-5
cis-1,3-Dichloropropene...	10061-01-5
trans-1,3-Dichloropropene.	10061-02-6

BASELINE PARAMETERS

Common Name[1]	CAS RN[2]
Ethylbenzene..............	100-41-4
2-Hexanone; Methyl butyl ketone..................	591-78-6
Methyl bromide; Bromomethane.................	74-83-9
Methyl chloride; Chloromethane.................	74-87-3
Methylene bromide; Dibromomethane...............	74-95-3
Methylene chloride; Dichloromethane.........	75-09-2
Methyl ethyl ketone; MEK; 2-Butanone..............	78-93-3
Methyl iodide; Iodomethane	74-88-4
4-Methyl-2-pentanone; Methyl isobutyl ketone..	108-10-1
Styrene..................	100-42-5
1,1,1,2-Tetrachloroethane.	630-20-6
1,1,2,2-Tetrachloroethane.	79-34-5
Tetrachloroethylene; Tetrachloroethene; Perchloroethylene..........	127-18-4
Toluene..................	108-88-3
1,1,1-Trichloroethane; Methylchloroform........	71-55-6
1,1,2-Trichloroethane.....	79-00-5
Trichloroethylene; Trichloroethene...........	79-01-6
Trichlorofluoromethane; CFC-11.................	75-69-4

BASELINE PARAMETERS

Common Name[1]	CAS RN[2]
1,2,3-Trichloropropane....	96-18-4
Vinyl acetate............	108-05-4
Vinyl chloride; Chloroethene..................	75-01-4
Xylenes..................	1330-20-7

Notes

1. Common names are those widely used in government regulations, scientific publications, and commerce; synonyms exist for many chemicals.

2. Chemical Abstracts Service Registry Number. Where "Total" is entered, all species in the groundwater that contain this element are included.

3. Any floaters or sinkers found must be analyzed separately for baseline parameters.

4. Any unusual conditions (colors, odors, surface sheens, etc.) noticed during well development, purging, or sampling must be reported.

*The department may waive the requirement to analyze Hexavalent Chromium provided that Total and Hexavalent and Trivalent Chromium values do not exceed 0.05 mg/l.

EXPANDED PARAMETERS[1]

Common Name[1]	CAS RN[2]
Field Parameters:	
Static water level........ (in wells and sumps)	
Specific Conductance......	
Temperature...............	
Floaters or Sinkers[3]......	
pH.......................	
Eh.......................	
Field Observations[4].......	
Turbidity................	
Leachate Indicators:	
Total Kjeldahl Nitrogen...	
Ammonia..................	7664-41-7
Nitrate..................	
Chemical Oxygen Demand....	
Biochemical Oxygen Demand (BOD_5).................	
Total Organic Carbon......	
Total Dissolved Solids....	
Sulfate..................	
Alkalinity...............	
Phenols..................	108-95-2
Chloride.................	
Bromide..................	24959-67-9
Total hardness as $CaCO_3$...	
Color....................	
Boron....................	7440-42-8

EXPANDED PARAMETERS

Common Name[1]	CAS RN[2]
Inorganic Parameters:	
Aluminum..................	(Total)
Antimony.................	(Total)
Arsenic..................	(Total)
Barium....................	(Total)
Beryllium................	(Total)
Cadmium..................	(Total)
Calcium..................	(Total)
Chromium.................	(Total)
Chromium (Hexavalent)*....	18540-29-9
Cobalt....................	(Total)
Copper....................	(Total)
Cyanide..................	(Total)
Iron.....................	(Total)
Lead.....................	(Total)
Magnesium................	(Total)
Manganese................	(Total)
Mercury..................	(Total)

EXPANDED PARAMETERS

Common Name[1]	CAS RN[2]
Nickel....................	(Total)
Potassium.................	(TotaL)
Selenium..................	(Total)
Silver....................	(Total)
Sodium....................	(Total)
Sulfide...................	18496-25-8
Thallium..................	(Total)
Tin.......................	(Total)
Vanadium..................	Total)
Zinc......................	(Total)
Organic Parameters:	
Acenaphthene..............	83-32-9
Acenaphthylene............	208-96-8
Acetone...................	67-64-1
Acetonitrile; Methyl cyanide................	75-05-8
Acetophenone..............	98-86-2
2-Acetylaminofluorene; 2-AAF..................	53-96-3
Acrolein..................	107-02-8
Acrylonitrile.............	107-13-1
Aldrin....................	309-00-2
Allyl chloride............	107-05-1
4-Aminobiphenyl...........	92-67-1
Anthracene................	120-12-7

EXPANDED PARAMETERS

Common Name[1]	CAS RN[2]
Benzene..................	71-43-2
Benzo[a]anthracene; Benzanthracene..........	56-55-3
Benzo[b]fluoranthene......	205-99-2
Benzo[k]fluoranthene......	207-08-9
Benzo[ghi]perylene........	191-24-2
Benzo[a]pyrene............	50-32-8
Benzyl alcohol............	100-51-6
alpha-BHC.................	319-84-6
beta-BHC..................	319-85-7
delta-BHC.................	319-86-8
gamma-BHC; Lindane........	58-89-9
Bis(2-chloroethoxy)methane	111-91-1
Bis(2-chloroethyl) ether; Dichloroethyl ether.....	111-44-4
Bis-(2-chloro-1-methylethyl) ether; 2,2'-Dichlorodiisopropylether; DCIP, See note 5.......	108-60-1
Bis(2-ethylhexyl)phthalate	117-81-7
Bromochloromethane; Chlorobromomethane......	74-97-5
Bromodichloromethane; Dibromochloromethane....	75-27-4
Bromoform; Tribromomethane	75-25-2
4-Bromophenyl phenyl ether	101-55-3
Butyl benzyl phthalate; Benzyl butyl phthalate..	85-68-7
Carbon disulfide..........	75-15-0
Carbon tetrachloride......	56-23-5

EXPANDED PARAMETERS

Common Name[1]	CAS RN[2]
Chlordane................	See Note 6
p-Chloroaniline...........	106-47-8
Chlorobenzene.............	108-90-7
Chlorobenzilate...........	510-15-6
p-Chloro-m-cresol; 4-Chloro-3-methylphenol.	59-50-7
Chloroethane; Ethyl chloride..........	75-00-3
Chloroform; Trichloromethane........	67-66-3
2-Chloronaphthalene.......	91-58-7
2-Chlorophenol............	95-57-8
4-Chlorophenyl phenyl ether............	7005-72-3
Chloroprene..............	126-99-8
Chrysene.................	218-01-9
m-Cresol; 3-methylphenol..	108-39-4
o-Cresol; 2-methylphenol..	95-48-7
p-Cresol; 4-methylphenol..	106-44-5
2,4-D; 2,4-Dichlorophenoxyaceticacid.........	94-75-7
4,4′-DDD.................	72-54-8
4,4′-DDE.................	72-55-9
4,4′-DDT.................	50-29-3
Diallate.................	2303-16-4
Dibenz[a,h]anthracene.....	53-70-3
Dibenzofuran.............	132-64-9
Dibromochloromethane; Chlorodibromomethane....	124-48-1

EXPANDED PARAMETERS

Common Name[1]	CAS RN[2]
1,2-Dibromo-3-chloro-propane; DBCP..........	96-12-8
1,2-Dibromoethane; Ethylene dibromide; EDB.	106-93-4
Di-n-butyl phthalate......	84-74-2
o-Dichlorobenzene; 1,2-Dichlorobenzene.....	95-50-1
m-Dichlorobenzene; 1,3-Dichlorobenzene.....	541-73-1
p-Dichlorobenzene; 1,4-dichlorobenzene.....	106-46-7
3,3'-Dichlorobenzidine....	91-94-1
trans-1,4-Dichloro-2-butene................	110-57-6
Dichlorodifluoromethane; CFC12.................	75-71-8
1,1-Dichloroethane; Ethyldidene chloride....	75-34-3
1,2-Dichloroethane; Ethylene dichloride.....	107-06-2
1,1-Dichloroethylene; 1,1-Dichloroethene; Vinylidene chloride.....	75-35-4
cis-1,2-Dichloroethylene; cis-1,2-Dichloroethene..	156-59-2
trans-1,2-Dichloroethylene trans-1,2-Dichloroethene	156-60-5
2,4-Dichlorophenol........	120-83-2

EXPANDED PARAMETERS

Common Name[1]	CAS RN[2]
2,6-Dichlorophenol........	87-65-0
1,2-Dichloropropane; Propylene dichloride....	78-87-5
1,3-Dichloropropane; Trimethylene dichloride.	142-28-9
2,2-Dichloropropane; Isopropylidene	594-20-7
chloride.	563-58-6
1,1-Dichloropropene	
cis-1,3-Dichloropropene...	10061-01-5
trans-1,3-Dichloropropene.	10061-02-6
Dieldrin..................	60-57-1
Diethyl phthalate.........	84-66-2
0,0-Diethyl 0-2-pyrazinyl phosphorothioate;	297-97-2
Thionazin...............	60-51-5
Dimethoate................	
p-(Dimethylamino)azo-benzene.................	60-11-7
7,12-Dimethylbenz[a]-	57-97-6
anthracene..............	119-93-7
3,3[1]-Dimethylbenzidine....	105-67-9
2,4-Dimethylphenol; m-Xylenol..............	131-11-3
Dimethyl phthalate........	
m-Dinitrobenzene..........	99-65-0
4,6-Dinitro-o-cresol 4,6-Dinitro-2-	534-52-1
methylphenol..	51-28-5
2,4-Dinitrophenol.........	
2,4-Dinitrotoluene........	121-14-2
2,6-Dinitrotoluene........	606-20-2
Dinoseb; DNBP; 2-sec-Butyl-4,6-dinitrophenol.	88-85-7
Di-n-octyl phthalate......	117-84-0

EXPANDED PARAMETERS

Common Name[1]	CAS RN[2]
Diphenylamine	122-39-4
Disulfoton	298-04-4
Endosulfan I	959-98-8
Endosulfan II	33213-65-9
Endosulfan sulfate	1031-07-8
Endrin	72-20-8
Endrin aldehyde	7421-93-4
Ethylbenzene	100-41-4
Ethyl methacrylate	97-63-2
Ethyl methanesulfonate	62-50-0
Famphur	52-85-7
Fluoranthene	206-44-0
Fluorene	86-73-7
Heptachlor	76-44-8
Heptachlor epoxide	1024-57-3
Hexachlorobenzene	118-74-1
Hexachlorobutadiene	87-68-3
Hexachlorocyclopentadiene	77-47-4
Hexachloroethane	67-72-1
Hexachloropropene	1888-71-7
2-Hexanone; Methyl butyl ketone	591-78-6
Indeno(1,2,3-cd)pyrene	193-39-5

EXPANDED PARAMETERS

Common Name[1]	CAS RN[2]
Isobutyl alcohol..........	78-83-1
Isodrin..................	465-73-6
Isophorone................	78-59-1
Isosafrole................	120-58-1
Kepone....................	143-50-0
Methacrylonitrile.........	126-98-7
Methapyrilene.............	91-80-5
Methoxychlor..............	72-43-5
Methyl bromide; Bromomethane............	74-83-9
Methyl chloride; Chloromethane...........	74-87-3
3-Methylcholanthrene......	56-49-5
Methyl ethyl ketone; MEK; 2-Butanone..............	78-93-3
Methyl iodide; Iodomethane	74-88-4
Methyl methacrylate.......	80-62-6
Methyl methanesulfonate...	66-27-3
2-Methylnaphthalene.......	91-57-6
Methyl parathion; Parathion methyl........	298-00-0
4-Methyl-2-pentanone; Methyl isobutyl ketone..	108-10-1
Methylene bromide; Dibromomethane..........	74-95-3
Methylene chloride; Dichloromethane.........	75-09-2
Naphthalene..............	91-20-3
1,4-Naphthoquinone........	130-15-4
1-Naphthylamine...........	134-32-7
2-Naphthylamine...........	91-59-8
o-Nitroaniline; 2-Nitroaniline..........	88-74-4

EXPANDED PARAMETERS

Common Name[1]	CAS RN[2]
m-Nitroaniline; 3-Nitroanile............	99-09-2
p-Nitroaniline; 4-Nitroaniline..........	100-01-6
Nitrobenzene.............	98-95-3
o-Nitrophenol; 2-Nitrophenol...........	88-75-5
p-Nitrophenol; 4-Nitrophenol...........	100-02-7
N-Nitrosodi-n-butylamine..	924-16-3
N-Nitrosodiethylamine.....	55-18-5
N-Nitrosodimethylamine....	62-75-9
N-Nitrosodiphenylamine....	86-30-6
N-Nitrosodipropylamine; N-Nitroso-N-dipropylamine; Di-n-propylnitrosamine...............	621-64-7
N-Nitrosomethylethalamine.	10595-95-6
N-Nitrosopiperidine.......	100-75-4
N-Nitrosopyrrolidine......	930-55-2
5-Nitro-o-toluidine.......	99-55-8
Parathion.................	56-38-2
Pentachlorobenzene........	608-93-5
Pentachloronitrobenzene...	82-68-8
Pentachlorophenol.........	87-86-5
Phenacetin................	62-44-2
Phenanthrene.............	85-01-8
Phenol....................	108-95-2
p-Phenylenediamine........	106-50-3
Phorate..................	298-02-2
Polychlorinated biphenyls; PCB's; Aroclors.........	See Note 7
Polychlorinated dibenzo-p-dioxins; PCDD's.........	See Note 8
Polychlorinated dibenzofurans; PCDF's..........	See Note 9
Pronamide.................	23950-58-5
Propionitrile; Ethyl cyanide...........	107-12-0
Pyrene....................	129-00-0

EXPANDED PARAMETERS

Common Name[1]	CAS RN[2]
Safrole....................	94-59-7
Silvex; 2,4,5-TP..........	93-72-1
Styrene...................	100-42-5
2,4,5-T; 2,4,5-trichloro-phenoxyacetic acid......	93-76-5
1,2,4,5-Tetrachlorobenzene	95-94-3
2,3,7,8-Tetrachlorodi-benzo-p-dioxin; 2,3,7,8-TCDD............	1746-01-6
1,1,1,2-Tetrachloroethane.	630-20-6
1,1,2,2-Tetrachloroethane.	79-34-5
Tetrachloroethylene; Tetrachloroethene; Perchloroethylene.......	127-18-4
2,3,4,6-Tetrachlorophenol.	58-90-2
Toluene...................	108-88-3
o-Toluidine...............	95-53-4
Toxaphene.................	See Note 10
1,2,4-Trichlorobenzene....	120-82-1
1,1,1-Trichloroethane; Methylchloroform........	71-55-6
1,1,2-Trichloroethane.....	79-00-5
Trichloroethylene; Trichloroethene.........	79-01-6
Trichlorofluoromethane; CFC-11..................	75-69-4
2,4,5-Trichlorophenol.....	95-95-4
2,4,6-Trichlorophenol.....	88-06-2
1,2,3-Trichloropropane....	96-18-4

EXPANDED PARAMETERS

Common Name[1]	CAS RN[2]
0,0,0-Triethyl phosphorothioate.................	126-68-1
sym-Trinitrobenzene.......	99-35-4
Vinyl acetate............	108-05-4
Vinyl chloride; Chloroethene............	75-01-4
Xylene (total)...........	See Note 11

EXPANDED PARAMETERS[1]

Notes

1. Common names are those widely used in government regulations, scientific publications, and commerce; synonyms exist for many chemicals.

2. Chemical Abstracts Service registry number. Where "Total" is entered, all species in the groundwater that contain this element are included.

3. Any floaters or sinkers found must be analyzed separately for baseline parameters.

4. Any unusual conditions (colors, odors, surface sheens, etc.) noticed during well development, purging, or sampling must be reported.

5. This substance is often called Bis(2-chloroisopropyl) ether, the name Chemical Abstracts Service applies to its noncommercial isomer, Propane, 2,2"-oxybis[2-chloro- (CAS RN 39638-32-9).

6. Chlordane: This entry includes alpha-chlordane (CAS RN 5103-71-9), beta-chlordane (CAS RN 5103-74-2), gamma-chlordane (CAS RN 5566-34-7), and constituents of chlordane (CAS RN 57-74-9 and CAS RN 12789-03-6). PQL shown is for technical chlordane. PQLs of specific isomers are about 20 µg/l by method 8270.

7. Polychlorinated biphenyls (CAS RN 1336-36-3): This category contains congener chemicals, including constituents of Aroclor 1016 (CAS RN 12674-11-2), Aroclor 1221 (CAS RN 11104-28-2), Aroclor 1232 (CAS RN 11141-16-5), Aroclor 1242 (CAS RN 53469-21-9), Aroclor 1248 (CAS RN 12672-29-6), Aroclor 1254 (CAS RN 11097-69-1), and Aroclor 1260 (CAS RN 11096-82-5). The PQL shown is an average value for PCB congeners.

8. Polychlorinated dibenzo-p-dioxins: This category contains congener chemicals, including tetrachlorodibenzo-p-dioxins (see also 2,3,7,8-TCDD), pentachlorodibenzo-p-dioxins, and hexachlorodibenzo-p-dioxins. The PQL shown is an average value for PCDD congeners. Upon request of the applicant, the department may waive the requirement to analyze for dioxins, where appropriate.

9. Polychlorinated dibenzofurans: This category contains congener chemicals, including tetrachlrodibenzofurans, pentachlorodibenzofurans, and hexachlorodibenzofurans. The PQL shown is an average value for PCDF congeners. Upon request of the applicant, the department may waive the requirement to analyze for furans, where appropriate.

10.Toxaphene: This entry includes congener chemicals contained in technical toxaphene (CAS RN 8001-35-2), i.e., chlorinated camphene.

11. Xylene (total): This entry includes o-xylene (CAS RN 96-47-6), m-xylene (CAS RN 108-38-3), p-xylene (CAS RN 106-42-3), and unspecified xylenes (dimethylbenzenes) (CAS RN 1330-20-7). PQLs for method 8021 are 0.2 for o-xylene and 0.1 for m- or p-xylene. The PQL for m-xylene is 2.0 µg/L by method 8020 or 8260.

*The department may waive the requirement to analyze Hexavalent Chromium provided that Total and Hexavalent and Trivalent Chromium values do not exceed 0.05 mg/l.

APPENDIX D

MONITORING WELL INSTALLATION PLAN

APPENDIX D
MONITORING WELL INSTALLATION PLAN

The Environmental Monitoring Plan for the Hyland Facility requires the installation of several new monitoring wells to supplement the existing monitoring system. Monitoring wells intended to collect samples from the water table in the till overburden and the top of bedrock are included in the program. The procedures described below will be used to construct the new monitoring wells. Proposed installation diagrams for the new overburden (see Figure D-1) and top of bedrock (see Figure D-2) monitoring wells are included in this appendix.

CONSTRUCTION IN GENERAL

Construction techniques are designed such that groundwater samples and groundwater elevation measurements characterize discrete stratigraphic intervals within the till overburden and bedrock; and to prevent leakage of groundwater or contaminants along the well annulus.

Precautions will be taken during drilling and construction of monitoring wells to avoid introducing contaminants into a borehole. Potable water of known chemistry will be used in drilling monitoring wells. Historically, the source of potable water used during drilling operations at the facility has been a spigot/hose located in the Hyland Facility garage. It is anticipated that the same source will be used during future drilling activities. Samples will be collected from the potable water source and sent to a laboratory and analyzed for compounds listed on the NYSDEC "baseline parameter" list. Results of these analyses will be submitted to the NYSDEC prior to drilling activities.

Equipment placed into the boring will be properly decontaminated before use at the site and between boreholes. The initial cleaning at the site will prevent contaminants from the last site drilled from being introduced into the borings. Equipment will be steam cleaned between holes. Where possible, upgradient wells will be drilled first. Drilling muds, air systems and drilling lubricants will not be used.

Well borings will have an inside diameter at least two inches larger than the outside diameter of the casing and screen to allow placement of materials around the well casing with a tremie tube. The borings will be drilled with 4 1/4 inch inside diameter (minimum) hollow stem augers. At bedrock well locations, the augers will be advanced to the top of rock and rock core samples will be collected to the appropriate depth. These drilling methods have been used successfully in the past at the site.

Drilling and monitoring well construction will be done under the on-site supervision of a qualified engineer or geologist who will also prepare the boring logs and well installation diagrams.

CONSTRUCTION OF MONITORING WELLS AND PIEZOMETERS

Well screens and risers will be constructed of schedule 80 polyvinyl chloride (PVC). Joints, caps, and end plugs are to be secured threads with Teflon tape, or force fittings. Solvents and glues or other adhesives will be prohibited. Caps will be vented to allow for proper pressure equalization. The inside diameter of each well screen or riser pipe will be nominally two inches in diameter to allow for development, survey and sampling equipment to be used within the screen and casing. A permanent mark will be made at the top of the riser pipe to provide a datum for subsequent water level measurements.

Well screens will be factory constructed nonsolvent welded/bonded continuous slot wire wrap screens of a material appropriate for long term monitoring without contributing contaminants to or removing contaminants from the groundwater. The slot size of the screen will be compatible with the sand pack gradation. Water table variations, site stratigraphy, and groundwater flow will be considered in determining the screen length, materials, and position.

The sand pack surrounding the well screen will consist of clean, inert, siliceous material. The gradation of the sand pack will be based upon the gradation of the soil to be monitored. The gradation of selected soil samples from test borings MW-15 through MW-21 was measured previously. These data were used to design the filter pack requirements based upon "Standard Practice for Design and Installation of Monitoring Wells in Aquifers", ASTM D5902.

The ASTM filter pack design is based upon the d-30 (i.e., the size where 30 percent by weight of the sample is finer) of the formation soil. The d-30 of the filter is required to be six to ten times the d-30 of the formation and have a uniformity coefficient of 2.5. The d-30 of the soil samples from the Hyland site range from $2x10^{-3}$ millimeters (mm) to $1x10^{-1}$ mm and averaged $1.9x10^{-2}$ mm. As such the d-30 of the filter pack should be between one and $1.2x10^{-2}$ mm. Filter material designated Morie #00 most closely meet this requirement.

The sand pack will be placed in the annular space around the well screen and extend two feet or 20 percent of the screen length (whichever is greater) above the top, and six inches below the bottom, of the screen. The sand pack material will be placed using the tremie method. The sand pack will be checked for proper placement. A finer grained sand pack material (100 percent passing the No. 30 sieve and less than two percent passing the No. 200 sieve) six inches thick will be placed at the top of the sand pack between the sand and the bentonite seal.

Bentonite chips will be will be slowly poured into the annulus between the PVC well riser and the inside of the in-place augers to form a seal at least three feet thick above the sand pack. If room permits, the bentonite seal may be increased in thickness to help prevent grout contamination of the sand pack around the screen. A 6 to 12 inch fine-grained sand pack will be placed above the bentonite seal to minimize grout infiltration. If pellets or chips are used, sufficient time will be allotted to allow for hydration of the bentonite prior to emplacement of overlying materials. The hydration time for the bentonite is approximately one half of an hour.

Grout of cement/bentonite will fill the remaining annular space to the surface seal. The grout mixture will displace water in the annular space to ensure a continuous seal. The grout mixture, consisting of approximately 94 pounds of Portland cement and approximately 3 to 4 pounds of powdered bentonite mixed with approximately 6.2 gallons of potable water, will be placed using a tremie pipe. Auger flights or casing will be left in the hole before grouting to prevent caving. As the cement-bentonite grout is placed in the annular space through the tremie pipe, the auger flights will be raised and removed from the borehole. The bottom of the deepest auger will not be raised above the top of the grout throughout the procedure.

A protective steel casing, at least two inches larger in diameter than the well casing, will be placed over the well casing or riser pipe and secured in a surface well seal to adequately protect the well casing. A distinctive, readily visible marker will be permanently affixed to the protective casing or near the well to identify the well number and ensure visibility even in periods of high snow cover. A drain hole will be drilled at the base of the protective casing. A vent hole will be located near the top of the protective casing to prevent explosive gas build up and to allow water levels to respond naturally to barometric pressure changes. The annulus of the protective casing will be filled with gravel. A locking cap will be installed with one to two inches clearance between the top of the well cap and the bottom of the locking cap when in the locked position and a weather resistant padlock will be placed on the protective casing and duplicate keys provided to the department.

A concrete surface seal designed to last throughout the planned life of the monitoring well will be constructed. The concrete surface seals, set inside 36" diameter sono tubes, will extend to a minimum depth of 4 feet below ground surface. The seal will be designed to prevent surface runoff from ponding and entering the well casing. In areas where traffic may cause damage to the well, bumperguards or other suitable protection for the well is required. Any damaged or deteriorated surface seals will be reported to the department and repaired or replaced in an appropriate manner.

WELL DEVELOPMENT

Wells will be developed as soon as possible after installation, but not before the well seal and grout have set. Water will not be introduced into the well for development. Wells will be developed by bailing water from the wells. Samples will be collected for turbidity, specific conductance and pH measurement after each well volume is withdrawn. Development will continue until the turbidity of the water is less than 50 NTU and measurements of specific conductance have stabilized to plus or minus 20 percent and pH measurements have stabilized to within plus or minus 0.2 units.

SURVEY

The locations and elevations of the new monitoring wells will be surveyed to obtain their location and plotted on a map. The vertical location of the ground surface and the mark made on the top of the monitoring well and piezometer risers will be accurately measured to the nearest 100th foot.

GEOLOGIC SAMPLING

Overburden and rock will be sampled continuously to the bottom of the boring. For well clusters, continuous samples will be collected from the surface to the base of the deepest well. Other wells in the cluster will be sampled at stratigraphic changes, and at the screened interval. Soil borings will be sampled using the split spoon method and bedrock or boulders will be sampled by coring with standard size NX or larger diameter core bits. Samples will be retained in labeled glass jars or wooden core boxes. Samples will be securely stored and accessible throughout the life of the facility.

LOGS

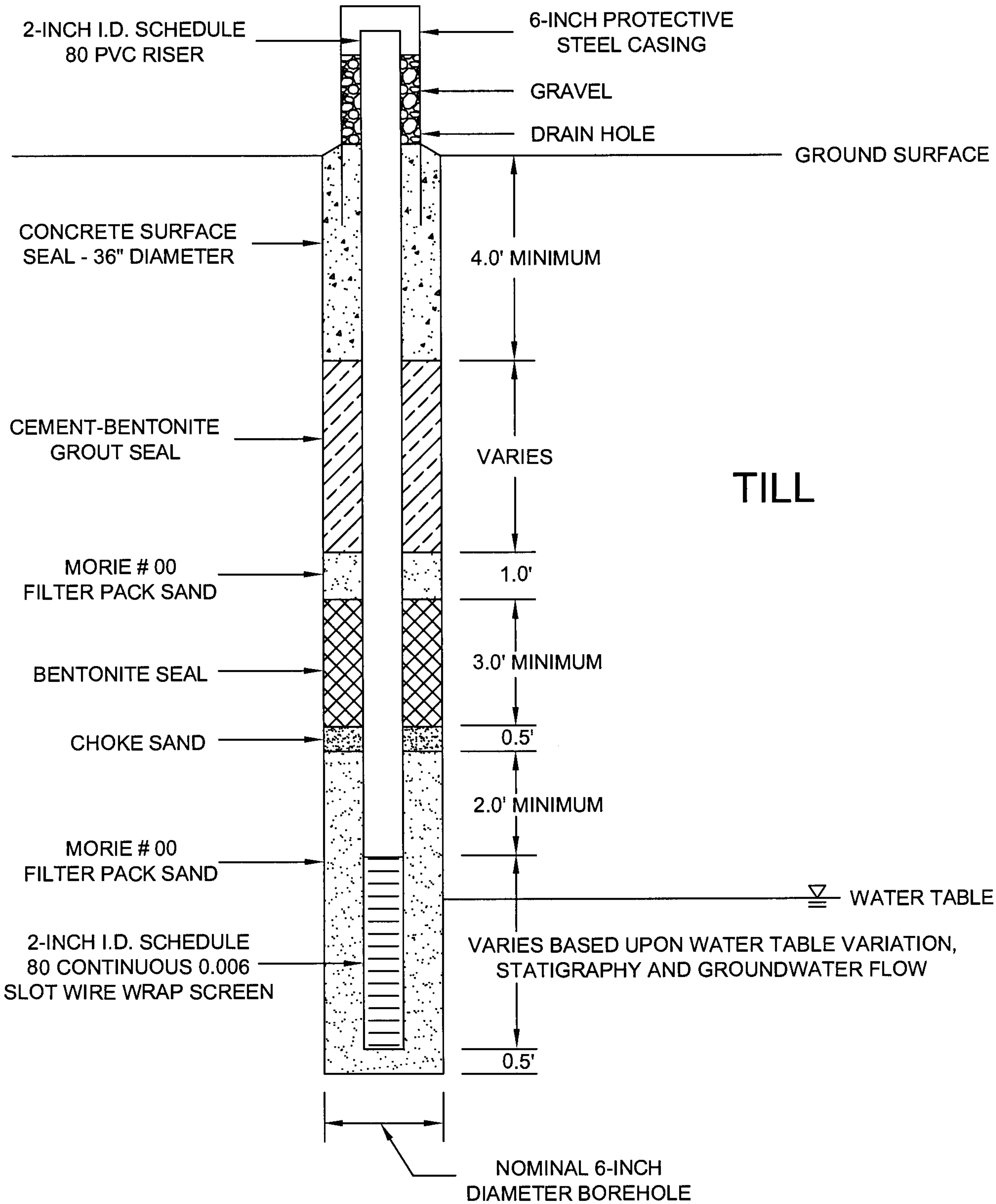
Drilling logs will be provided to NYSDEC for each soil boring. These logs will provide soil classification according to the Unified Soil Classification System (USCS). The USCS visual method will be used on all samples supplemented by the USCS laboratory tests on a representative number of samples from each stratigraphic unit and each screened interval. Logs also will contain a description of matrix and clasts, mineralogy, roundness, color, appearance, odor, and behavior of materials using an appropriate descriptive system. A clear description of the system used will be included with the logs. Well logs will contain drilling information as observed in the field including; moisture content; location of the water table during drilling, water loss during drilling; depth to significant changes in material and rock; sample recovery measured in tenths of a foot; hammer blow counts, and other pertinent comments; the method of drilling, anomalous features such as gas in the well, and the use and description of drilling fluids, including the source, and calculated and actual amounts of materials used.

Rock core logs will describe the lithology, mineralogy, degree of cementation, color, grain size, and any other physical characteristics of the rock; percent recovery and the rock quality designation (RQD); other primary and secondary features, and contain all drilling observations. A clear photograph of all labeled cores will also be taken and submitted with the logs.

Well completion logs will contain a diagram of the completed well, pertinent details on well construction, a description of the materials used, and elevations of well features.

IN-SITU HYDRAULIC CONDUCTIVITY TESTING

In situ hydraulic conductivity testing will be done in each new monitoring well. The testing method used will not introduce contaminants into the well. Hyland will measure the hydraulic conductivity of the new wells at the site. This testing will be done by placing a PVC slug into the well and measuring the subsequent drop in the water level with time. The slug will then be removed and the rise in the water level will be monitored. It is expected that transducers will be used to monitor the head in the wells and an electronic tape water level indicator will be used to measure water levels and correlate transducer readings to elevations.



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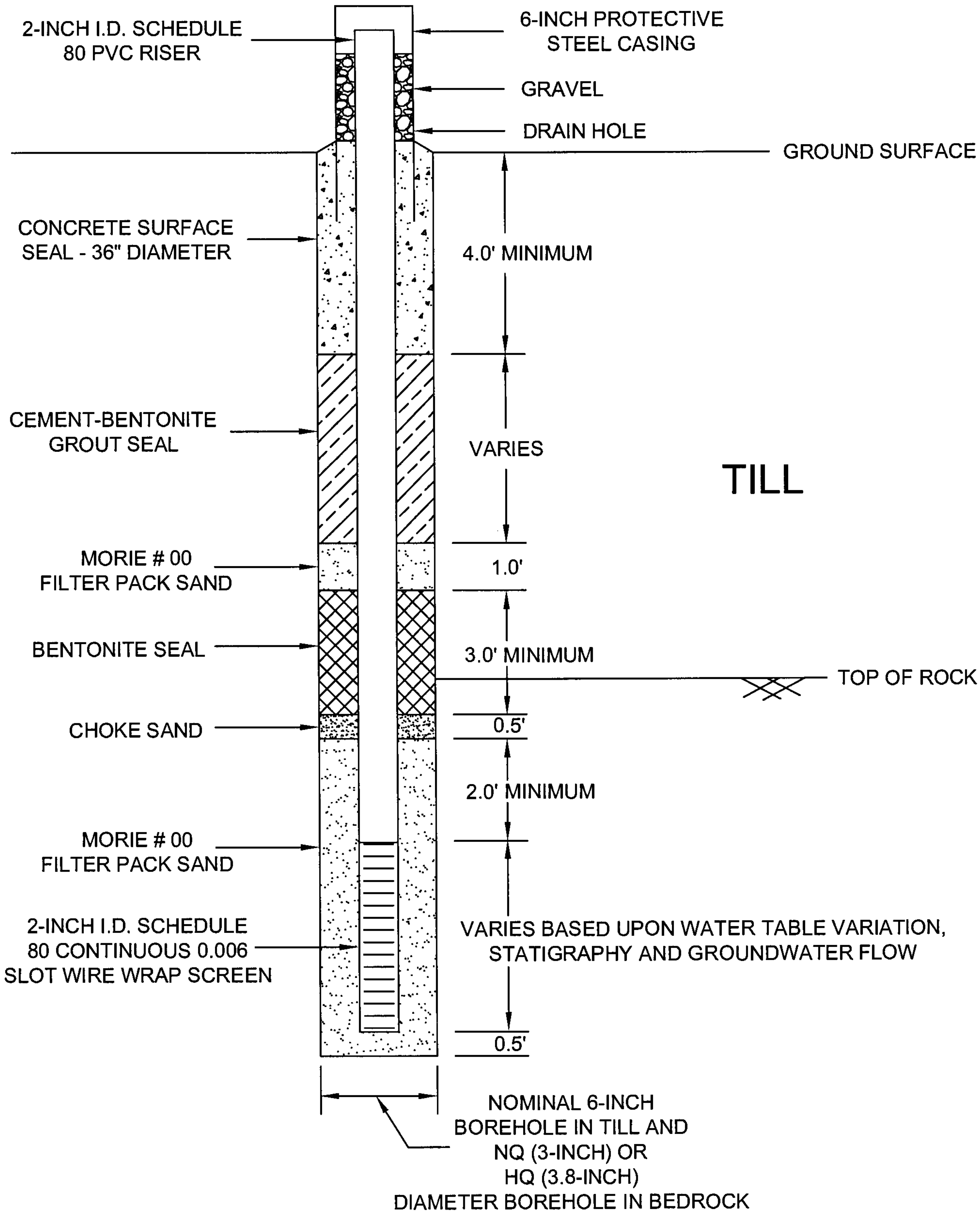
HYLAND FACILITY
EMP
ALLEGANY COUNTY NEW YORK

TYPICAL OVERBURDEN
MONITORING WELL DETAILS

DWG. NO. 93002-114C

FIGURE D-1



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HYLAND FACILITY
EMP

ALLEGANY COUNTY NEW YORK

TYPICAL BEDROCK
MONITORING WELL DETAILS

DWG. NO. 93002-114D

FIGURE D-2

APPENDIX E

GAS PROBE CONSTRUCTION

APPENDIX E
GAS PROBE CONSTRUCTION

The Environmental Monitoring Plan for the Hyland Facility requires the installation of several new gas probes. The gas probes are intended to collect soil gas samples from above the water table. The procedures described below will be used to construct the new gas probes. A proposed installation diagram (see Figure E-1) for the new gas probes is included in this appendix.

CONSTRUCTION IN GENERAL

Construction techniques are designed such that soil gas samples may be collected (see attached Figure). The gas probes will be installed above the water table or to a depth of 25 feet, whichever is less. Precautions will be taken during drilling and construction of gas probes to avoid introducing contaminants into a borehole. Equipment placed into the boring will be properly decontaminated before use at the site and between boreholes. Gas probe borings will have an inside diameter at least four inches. The borings will be drilled with 2 1/4 inch inside diameter (minimum) hollow stem augers. Drilling and gas probe construction will be done under the on-site supervision of a qualified engineer or geologist who will also prepare the boring logs and gas probe installation diagrams.

CONSTRUCTION OF GAS PROBES

Gas probe screens and risers will be constructed of schedule 40 polyvinyl chloride (PVC). Joints, caps, and end plugs are to be secured threads with Teflon tape, or force fittings. Solvents and glues or other adhesives will be prohibited. Caps will be fitted with ports that allow measurement of explosive gas concentrations, pressure and water level. The inside diameter of each gas probe screen or riser pipe will be nominally one inch. A permanent mark will be made at the top of the riser pipe to provide a datum for subsequent water level measurements.

Gas probe screens will be factory constructed nonsolvent welded slotted screens. The slot size of the screen will be compatible with the sand pack gradation. Water table variations, site stratigraphy, and groundwater flow will be considered in determining the screen length, materials, and position.

The filter pack surrounding the gas probe screen will consist of clean, inert, nominal 3/8 inch diameter filter material. The filter pack will be placed in the annular space around the gas probe and extend two feet above the top, and six inches below the bottom, of the screen. The sand pack will be checked for proper placement. A finer grained filter pack material six inches thick will be placed at the top of the filter pack between the filter material and the bentonite seal.

Bentonite will be placed above the sand pack to form a seal at least one foot thick. If pellets or chips are used, sufficient time will be allowed for hydration of the bentonite prior to emplacement of overlying materials.

Grout of cement/bentonite will fill the remaining annular space to the surface seal. The grout mixture will be placed using a tremie pipe. Auger flights or casing will be left in the hole before grouting to prevent caving.

A protective steel casing, at least two inches larger in diameter than the gas probe casing, will be placed over the gas probe casing and secured in a surface seal. A distinctive, readily visible marker will be permanently affixed to the protective casing or near the gas probe to identify the gas probe number. A drain hole will be drilled at the base of the protective casing. The annulus of the protective casing will be filled with gravel.

A concrete surface seal designed to last throughout the planned life of the gas probe will be constructed. Any damaged or deteriorated surface seals will be reported to the department and repaired or replaced in an appropriate manner.

SURVEY

The locations and elevations of the new gas probes will be surveyed to obtain their location and plotted on a map. The vertical location of the ground surface and the mark made on the top of the gas probe will be accurately measured to the nearest 100th foot.

GEOLOGIC SAMPLING

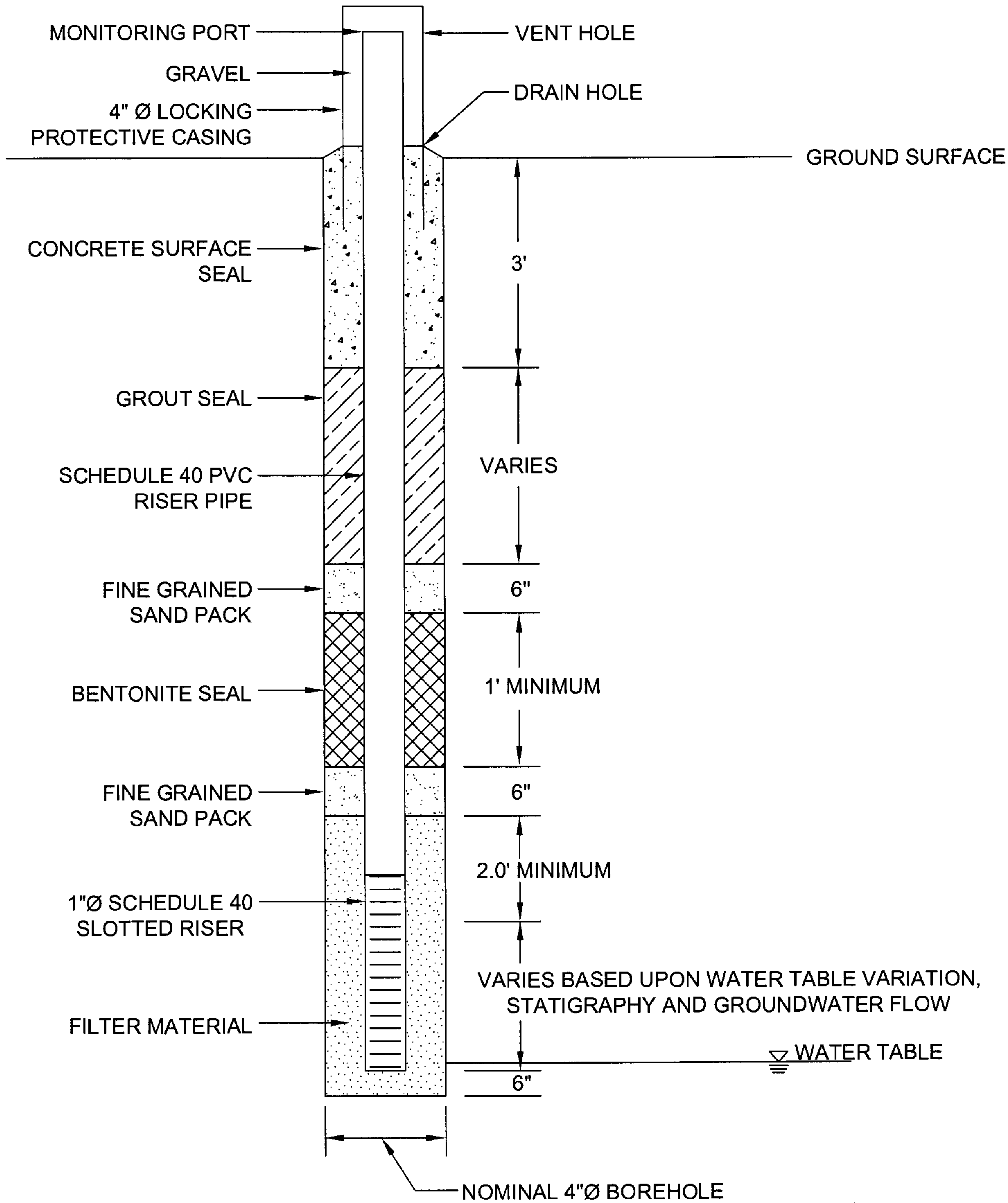
Overburden will be sampled continuously to the bottom of the boring. Soil borings will be sampled using the split spoon method and boulders will be sampled by coring with standard size NX or larger diameter core bits. Samples will be retained in labeled glass jars or wooden core boxes. Samples will be securely stored and accessible throughout the life of the facility.

LOGS

Drilling logs will be provided to NYSDEC for each soil boring. These logs will provide soil classification according to the Unified Soil Classification System (USCS). The USCS visual method will be used on all samples supplemented by the USCS laboratory tests on a representative number of samples from each stratigraphic unit and each screened interval. Logs also will contain a description of matrix and clasts, mineralogy, roundness, color, appearance, odor, and behavior of materials using an appropriate descriptive system. A clear description of the system used will be included with the logs.

Gas probe logs will contain drilling information as observed in the field including; moisture content; location of the water table during drilling, water loss during drilling; depth to significant changes in material; sample recovery measured in tenths of a foot; hammer blow counts, and other pertinent comments; the method of drilling, and anomalous features such as gas in the gas probe.

Gas probe completion logs will contain a diagram of the completed probe, pertinent details on construction, a description of the materials used, and elevations of gas probe features.



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HYLAND FACILITY
EMP

ALLEGANY COUNTY NEW YORK

TYPICAL GAS PROBE DETAILS

DWG. NO. 93002-191

FIGURE E-1

APPENDIX F

MONITORING WELL MODIFICATION AND DECOMMISSIONING PROCEDURES

APPENDIX F
MONITORING WELL MODIFICATION AND DECOMMISSIONING PROCEDURES

Monitoring well decommissioning is intended to remove potential pathways for the migration of fluids. According to 6 NYCRR Part 360, the abandoned wells must be fully sealed in a manner appropriate for the geologic conditions to prevent contamination migration through the borehole. Monitoring well decommissioning, extension (permanent wells and wells to be decommissioned in the future) and shortening procedures, as well as monitoring well surface completion, decommissioning and extension (permanent wells and wells to be decommissioned in the future) procedures under artesian conditions, are described below.

Monitoring Well Decommissioning Procedure

Monitoring well decommissioning will follow the procedure below.

1. The protective steel casing shall be removed using the drill rig's winch system.
2. A drill rod shall be lowered through the center of the PVC casing to help lead the augers to the bottom of the well.
3. The wells shall then be overdrilled using 6-1/4 inch hollow stem augers to the top of rock (if present).
4. The bedrock portion of the well (if present) shall then be overdrilled using a 3-7/8 inch tricone bit.
5. The well materials (PVC, grout, etc.) shall be pulled from the hole using the drill rig's winch system.
6. The hole shall then be tremie grouted to the ground surface.
7. Material meeting the project requirements shall be placed and compacted for subgrade to the ground surface or subgrade elevation.

Monitoring Well Extension Procedure

Monitoring well extension will follow the procedure below.

1. A portion of the area around the monitoring well shall be excavated to below the bottom of concrete surface seal. Care must be taken to avoid failure of the PVC riser due to the weight of the concrete surface seal and steel casing.
2. The PVC riser shall be cut below the bottom of the concrete surface seal and temporarily capped at the top of the PVC riser. The existing concrete surface seal and protective steel casing shall be removed.
3. The temporary cap at top of the PVC riser shall be removed. A 2 inch diameter compression coupling or equivalent shall be installed on the existing 2 inch diameter riser pipe end.

4. A new PVC riser pipe shall be placed in the 2 inch diameter PVC compression coupling mentioned above. The length of the pipe should be sufficient to achieve final elevation. If additional riser pipe is required, threaded pipes shall be used.
5. A 6 inch diameter steel casing shall be slipped around the new PVC riser pipe. The 6 inch diameter steel pipe shall extend to within 2 feet of the final proposed ground surface.
6. As lifts of material meeting the project requirements are placed and grade is raised, the soil shall be compacted around the steel casing with a hand tamper to the desired grade. The steel casing shall be left in the hole before grouting to prevent caving.
7. Grout shall be placed in the annulus between the 2 inch diameter PVC riser pipe and the 6 inch diameter steel casing using a tremie pipe. As the grout is placed in the annular space, the steel casing shall be raised and removed from the borehole. The bottom of the steel casing shall not be raised above the top of the grout throughout the procedure.
8. A new 6 inch diameter protective steel casing and concrete surface seal shall be placed at the proposed ground surface. The monitoring well surface seal and protective casing installation procedure, as outlined in Appendix D, shall be followed.

Material meeting the project requirements shall be placed and compacted for subgrade to the ground surface or subgrade elevation.

PVC cement or glue will not be used in extension of monitoring wells.

Monitoring Well Shortening Procedure (see Note 1 below)

Monitoring well shortening will follow the procedure below.

1. Leaving the ground surface at the monitoring well unchanged, the area adjacent to the monitoring well shall be excavated to the proposed grade, allowing the side slopes of the excavation to meet the ground surface at well.
2. The soil shall be carefully removed from around the existing surface seal.
3. The PVC riser shall be cut below the bottom of the concrete surface seal and the top of the PVC riser shall be capped. The existing concrete surface seal and protective steel casing shall be removed.
4. The soil shall continue to be carefully removed from around the PVC riser pipe and the surrounding grout to final grade.
5. The grout from outside of the PVC riser shall be removed, the PVC riser shall be cut and temporarily capped at modified top of riser elevation.
6. The monitoring well surface seal and protective casing installation procedure, as outlined in Appendix D, shall be followed.

7. Material meeting the project requirements shall be placed and compacted for subgrade to the ground surface or subgrade elevation.

PVC cement or glue shall not be used in shortening of monitoring wells.

Monitoring Well Surface Completion Procedure for Artesian Conditions

Monitoring well surface completion in cases where artesian conditions are encountered will follow the procedure below. A typical monitoring well surface completion is shown on the attached figure (Figure F-1) and will include:

- A PVC true union ball valve;
- A 2" diameter PVC tee;
- A ball valve, connected to one end of the tee, with tubing for sampling; and
- A pressure gage (with sufficient pressure capacity), tapped into the other end of the tee.

PVC cement shall not be used in constructing the well completion. To help resist freezing in the winter, the well head shall be encased in a 30-inch diameter protective casing and the grades around the well shall be sloped to the top of the 30-inch diameter protective casing.

Monitoring Well Decommissioning Procedure for Artesian Conditions

Monitoring well decommissioning in cases where artesian conditions are encountered will follow the procedure below.

1. The sampling equipment described in Monitoring Well Surface Completion Procedure for Artesian Conditions above shall be removed.
2. A riser pipe shall be installed to an elevation above the static groundwater elevation.
3. A tremie pipe shall be placed to the bottom of the well and a sufficient quantity of cement/bentonite grout shall be pumped into the well to fill it to above the screen depth.
4. The cement/bentonite grout shall be allowed to hydrate for a minimum of 24 hours.
5. The cement/bentonite grout seal shall be tested by bailing approximately three gallons of water from the well and measuring the water level in the well for a period of at least one hour. The grout seal will be considered adequate if the water level does not rise more than 0.1 feet over a one hour period. One foot of bentonite pellets shall be placed over the grout seal if the water level rises more than 0.1 feet.
6. The remaining portion of the well shall be filled with cement/bentonite grout to an elevation three feet below the current ground surface or subgrade elevation.

7. Material meeting the project requirements shall be placed and compacted for subgrade to the ground surface or subgrade elevation.

Monitoring Well Extension Procedure for Wells Under Artesian Conditions to be Extended Prior to Decommissioning (see Note 2 below)

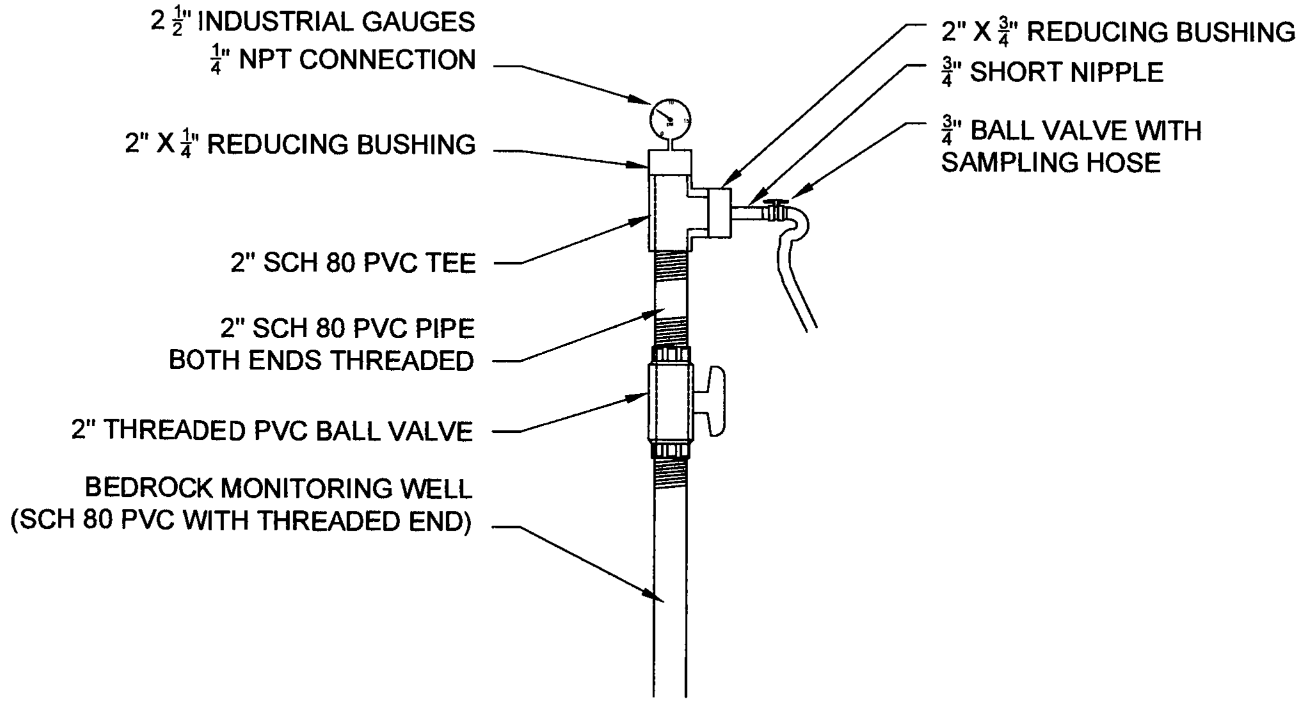
Monitoring well extension for wells where artesian conditions are encountered that will be extended but decommissioned at a later date will follow the procedure below.

1. The area around the concrete casing shall be excavated.
2. The protective steel cover shall be removed from the steel box encased in the concrete casing.
3. The concrete surrounding the steel box shall be carefully broken away and removed. After the concrete has been removed, the steel box shall be removed.
4. The 2 inch diameter threaded PVC ball valve shall be disconnected from the PVC riser pipe and the setup from the ball valve up shall be removed.
5. A new PVC riser pipe shall be connected to the existing threaded riser pipe. The length of the pipe should be sufficient to achieve final elevation. If additional riser pipe is required, threaded pipes shall be used.
6. A 6 inch diameter steel casing shall be slipped around the new PVC riser pipe. The 6 inch diameter steel pipe shall extend to within 2 feet of the final proposed ground surface.
7. As lifts of material meeting the project requirements are placed and grade is raised, the soil shall be compacted around the steel casing with a hand tamper to the desired grade. The steel casing shall be left in the hole before grouting to prevent caving.
8. Grout shall be placed in the annulus between the 2 inch diameter PVC riser pipe and the 6 inch diameter steel casing using a tremie pipe. As the grout is placed in the annular space, the steel casing shall be raised and removed from the borehole. The bottom of the steel casing shall not be raised above the top of the grout throughout the procedure.
9. A new 6 inch diameter protective steel casing and concrete surface seal shall be placed at the proposed ground surface. The monitoring well surface seal and protective casing installation procedure, as outlined in Appendix D, shall be followed.
10. Material meeting the project requirements shall be placed and compacted for subgrade to the ground surface or subgrade elevation.

PVC cement or glue shall not be used in extension of monitoring wells.

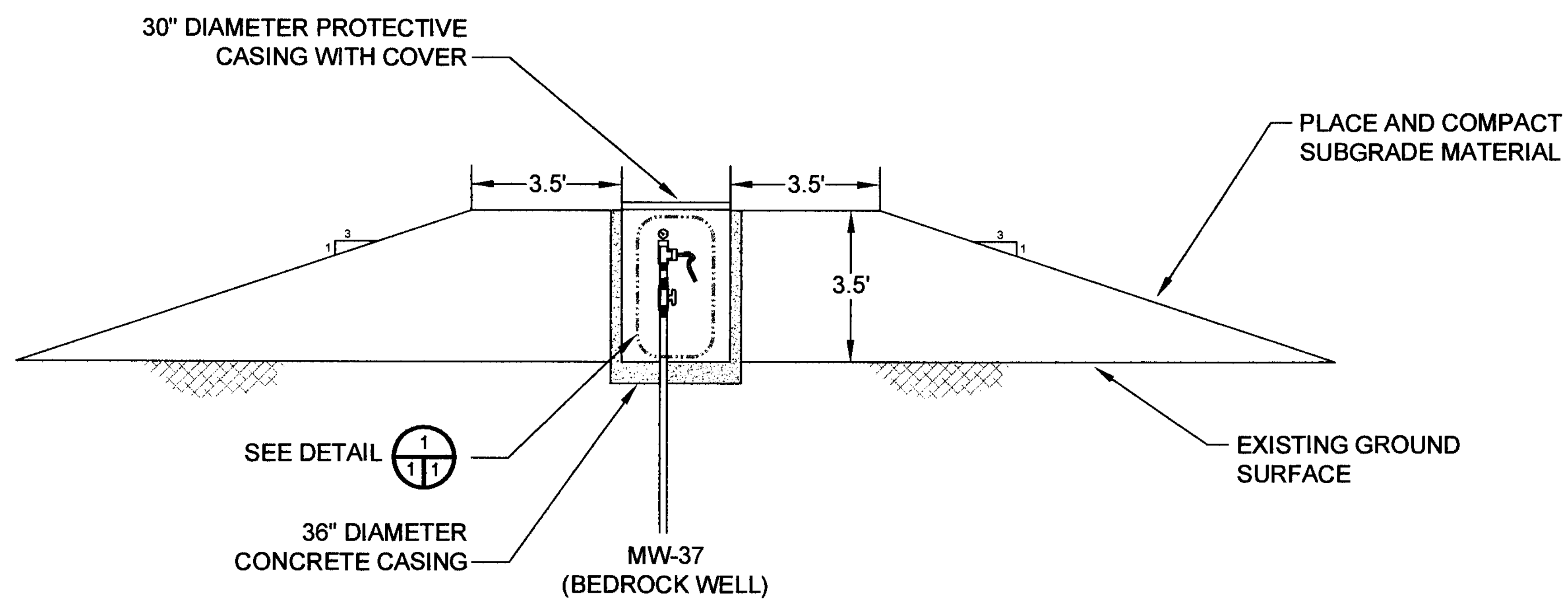
Notes:

1. Applies to bedrock monitoring well MW-38 and overburden monitoring wells MW-38A and MW-40A, which shall be shortened during excavation activities for Cell 3 (proposed excavation of approximately 22 feet at the location of MW-38 and 38A and approximately 7 feet at the location of MW-40A). Approximately 72 feet, 6 feet and 4 feet of bentonite/grout will remain in the annulus of MW-38, MW-38A and MW-40A, respectively, subsequent to well shortening.
2. Applies to bedrock monitoring well MW-37. If the ground surface elevation, to be raised approximately 13 feet during the construction activities for Cell 3, is below the highest groundwater elevation observed at MW-37, procedures described in "Monitoring Well Surface Completion Procedure for Artesian Conditions" section above shall be followed.



1 / 1|1 TOP OF MONITORING WELL DETAIL

SCALE: N.T.S.



TYPICAL SECTION THROUGH MONITORING WELL

SCALE: N.T.S.

NOTE:
UNAUTHORIZED ALTERATION OR ADDITION TO ANY SURVEY, DRAWING, DESIGN, SPECIFICATION, PLAN, OR REPORT IS A VIOLATION OF SECTION 7209 PROVISION 2 OF THE NEW YORK STATE EDUCATION LAW.

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NEW YORK

MONITORING WELL COMPLETION
UNDER ARTESIAN CONDITIONS

FIGURE F-1

DWG. NO. 93002-215