Seaton Neighbourhood 19
Hydrogeological Assessment

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Prepared for:

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Table of Contents

Table of Contents (Continued)

Tables

Figures

Appendices

1.0 Introduction

R.J. Burnside & Associates Limited (Burnside) was retained by the Seaton Neighbourhood 19 Landowners Group to complete the hydrogeological study components in support of the Neighbourhood Functional Servicing and Stormwater Report (NFSSR) prepared for the Neighbourhood 19 area also by Burnside. Hydrogeological monitoring of the Seaton area is completed by SPL Consulting Limited (SPL) and they have provided the groundwater elevation and surface water flow data for this study. The boundaries of the Seaton Neighbourhood 19 lands (subject lands) are shown on Figure 1.

As part of the Master Environmental Servicing Plan (MESP) studies for the Seaton area, extensive monitoring and hydrogeological studies to characterize the physical setting, geology, hydrogeology, wetland and surface water flow conditions were completed, along with detailed modeling of the surface water, groundwater and water balance conditions. The results of the studies are documented in the Phase 1 and Phase 2 MESP reports prepared by Sernas Associates et al., September 2008 and July 2010, respectively. Further, an amendment to the Phase 2 MESP was completed addressing agency comments and providing additional monitoring data and more comprehensive surface water and groundwater flow modelling for the area (MESPA, February 2013). Subsequently, a final MESPA document has been prepared by GHD et al., addressing all agency comments (July 2013).

The stormwater management plans recommended in the MESPA for the Seaton area include the use of Low Impact Development (LID) measures intended to maintain the water balance to the natural features and functions, and to promote infiltration to reduce stormwater runoff volumes and maintain groundwater recharge where possible. The purpose of this Neighbourhood hydrogeology study is to provide further detail on the Neighbourhood area-specific soil and groundwater conditions, and to identify opportunities and constraints for infiltration as input to the FSR for appropriate location and design of LID measures.

2.0 Physical Setting

2.1 Topography

The Neighbourhood area topography is shown on Figure 2. The subject lands have a rolling topography, with topographic lows along the watercourse valleys. The land surface regionally slopes to the south. There is a significant elevation drop at the southeast corner of the subject lands associated with the Iroquois Shoreline bluff. The highest elevations (up to 221 masl – metres above mean sea level) are found through

the northwestern portion of the Neighbourhood. The maximum relief amplitude across the Neighbourhood is 87 m, with the lowest elevations (134 masl) found along Ganatsekiagon Creek, at the southern tip of the subject lands (Figure 2).

2.2 Drainage

The subject lands are located within two subwatersheds: Ganatsekiagon Creek and Urfe Creek (Figure 2). Both of these creeks drain to the south. The subwatershed drainage divide is located along the area of higher topography though the eastern portion of the subject lands, with the lands to the east of the divide draining to Urfe Creek and the lands to the west of the divide draining to Ganatsekiagon Creek (Figure 2).

Surface water flow monitoring has been conducted since September 2008 by SPL along the main branch of Ganatsekiagon Creek. The flow monitoring locations in Neighbourhood 19 include three surface water flow locations along the main branch of Ganatsekiagon Creek (SS-G-02, SS-G-05 and SS-G-07; Figure 2) and one location on Ganatsekiagon Creek Tributary B (WSS-G-12; Figure 2). SS-G-02 is located at the south end of the Neighbourhood, just after Tributaries A and B converge with the main branch; SS-G-05 is located upstream, at Whitevale Road; and SS-G-07 is further upstream, at the northeast corner of the Neighbourhood (Figure 2). WSS-G-12 is located in the northern portion of the Neighbourhood, east of 24 Sideline, at Wetland G12. Each surface water flow monitoring location was instrumented with a staff gauge to record the water level in the creek. The staff gauge measurements are provided in Table N19-D2, Appendix N19-D for SS-G-02, SS-G-05 and SS-G-07 and in Table N19-E2, Appendix E for WSS-G-12. Surface water flow monitoring data have been summarized in Table N19-D3 in Appendix N19-D.

The SS-G-07 flow station has been found to be dry in the summer and/or early fall during each monitoring year, indicating intermittent flow at this location entering the Neighbourhood area. When present, the flow ranged from 0.04 L/s in November 2009 to 40 L/s in March 2011. In August 2009, there was no flow at SS-G-05, but standing water was observed. The creek was flowing at this location during all other monitoring events. The flow, when present at SS-G-05, ranged from 1 L/s in May 2009 and October 2009, to 61 L/s in March 2011. At SS-G-02 in the southern part of the Neighbourhood and downstream of the confluences of contributing tributaries (Figure 2), flow was present during all monitoring events, i.e., perennial conditions. The flows ranged from 1 L/s in May 2010 to 193 L/s in March 2011. This high range of flows is typical of surface water supported systems with such large contributing drainage areas and shows the response to seasonal conditions and precipitation events.

The increase in watercourse flows, and change from intermittent flow conditions at SS-G-07 to perennial flow conditions at SS-G-02, indicate that Ganatsekiagon Creek gains flow across the subject lands. This is consistent with the MESPA stream observations and the groundwater modelling results that showed groundwater discharge to the lower reaches of the tributaries in Neighbourhood 19.

2.3 Wetlands

There are a large number of wetland areas in Seaton that have been identified by the MNR and TRCA and most are located within the land areas set aside for the Natural Heritage System (NHS). The wetlands identified by the MNR and TRCA are described in detail in the MESP (July 2010) and the MESPA (July 2013).

Many of the wetlands have catchment areas entirely within the NHS; therefore, the water supplies to these features will not be affected by the proposed development of the Seaton area.

The wetlands that were identified in the MESPA as having catchment areas located within, or partially within, the proposed urban development areas were identified as 'Category D' wetlands and further analysis of the water balance conditions to these features was completed (MESPA, 2013). These wetlands were given wetland identification letters/numbers to reflect the subwatershed in which the wetland is located (e.g., G is Ganatsekiagon and U is Urfe Creek). There are seven Category D wetlands within the Neighbourhood 19 area identified as G5, G8, G9, G12, U2, U4 and U8 (wetland locations shown on Figure 2).

The MESPA (July 2013) concluded that these wetlands generally rely on surface water contributions (precipitation and surface water runoff). Groundwater contributions to the Category D wetlands within Neighbourhood 19 were reported not to exceed 5% of the net wetland water budget, however, it was recognized that high groundwater table conditions in wetland areas can contribute to surface water ponding and sustaining vegetation.

2.3.1 Wetland Monitoring Results

Piezometers and staff gauges were installed by SPL in wetlands G12, U2, and U8 (WPZ-G-12s/d, WPZ-U-02As/d, WPZ-U-02Bs/d and WPZ-U-08s/d) to confirm the groundwater/surface water interactions in these features. These monitoring locations are shown on Figure 5. The wetlands have been monitored by SPL since May 2011; the data tables and hydrographs are provided in Appendix N19-E.

The results of the wetland monitoring show the following:

- The groundwater level in the piezometers installed in Wetland G12 are consistently below the surface water level in this wetland, indicating a downward hydraulic gradient and recharge conditions (Figure N19-E1, Appendix N19-E). This wetland was found to be dry in October 2011, July 2012 and September 2012, indicating that this feature is only intermittently wet (Figure N19-E1; Appendix N19-E).

- The groundwater level in the shallower piezometer installed in the southwest portion of Wetland U2 (WPZ-U-02A) was typically lower than the groundwater level in the deeper piezometer at this location, and seasonally aboveground surface, indicating that there is an upward gradient and potential seasonal groundwater discharge conditions (Figure N19-E2, Appendix N19-E). The deeper piezometer was destroyed in the summer of 2012. The groundwater level in the deeper piezometer installed in the northeast portion of Wetland U2 (WPZ-U-02Bd) was slightly higher (up to 30 cm) than the shallower piezometer at this location in the spring and fall of 2011 and the spring of 2012, indicating seasonal upward gradients and, again, potential seasonal discharge conditions in this wetland (Figure N19-E3, Appendix N19-E). The depth to groundwater at WPZ-U-02Bs/d was found to vary seasonally between approximately 20 cm and 80 cm below ground surface. This suggests that the discharge gradients may not result in actual water seepage into this portion of the wetland, but will support the high water table and root zone for the wetland vegetation.

- The deeper piezometer installed in Wetland U8 (WPZ-U-08d) was consistently higher than the shallower piezometer and both were consistently aboveground surface, indicating an upward hydraulic gradient and discharge conditions in this feature (Figure N19-E4, Appendix N19-E).

2.4 Surficial Geology

The surficial geology mapping presented in the MESPA indicates that the subject lands are predominantly covered by Halton till, which has a sandy silt matrix. Alluvial deposits of sand, silt and gravel are mapped along Ganatsekiagon Creek along the southern boundary of the subject lands and lacustrine sands and silty sands are mapped in the southern portion of the subject lands (Figure 3). These lacustrine sediments are mapped as Iroquois Plain deposits (Ontario Geological Survey, 2003) that lie south of what is mapped as the Iroquois Shoreline – a physiographic feature marks the northern limit of an ancient lake (i.e., Lake Iroquois). A portion of the Shoreline bluff is evident in the southern portion of Neighbourhood 19 (Figure 3).

Geotechnical investigations involving borehole drilling and monitoring well installations have been completed on the subject lands by AME (2006a, 2006b, 2006c and 2006d, 2011a, 2011b), Trow Associates (2009a, 2009b, 2009c), V.A. Woods Associates Limited (2009), Soil Engineers Limited (2009, 2011), exp. (formerly Trow Associates; 2011), Golder Associates (2011) and SPL (2013). Several groundwater monitoring wells were also installed for the Interim Waste Authority (IWA) during studies completed in 1993. The locations of the boreholes drilled and monitoring wells installed as part of these investigations are shown on Figure 4 and borehole and well logs are provided in Appendix N19-B.

The results of the drilling investigations confirm that the surficial overburden materials on the subject lands are predominantly glacial till deposits. Some of the area shown as sand and silty sand in the southeastern portion of the subject lands on the published mapping was found to have till deposits at surface during the drilling investigations and a small sand deposit was found at surface at the south end of Mulberry Lane where the published mapping showed till deposits. Based on the site-specific borehole data, the surficial mapping for these areas has been re-interpreted as shown on Figure 3.

To illustrate the local geological conditions and shallow stratigraphy in Neighbourhood 19, schematic cross-sections through the subject lands have been prepared using the MOE well records (Appendix N19-A), the MESPA regional modelling, and the results of the geotechnical investigations (Appendix N19-B). The cross-section locations (A-A' and B-B') are shown on Figure 4 and the interpreted cross-sections are shown on Figures 6 and 7.

The MESPA described the stratigraphy in the area and identified the following stratigraphic units, from surface:

- Post Halton till sediments;
- Lake Iroquois deposits;
- Halton till;
- Mackinaw interstadial deposits;
- Newmarket till;
- Thorncliffe Formation (TAC);
- Sunnybrook till;
- Scarborough and Don Formations.

The stratigraphy comprises a layer of glacial till which is generally about 20 m to 30 m thick across the subject lands, however this surficial till deposit has been eroded to only a few metres or less in thickness near Urfe Creek at the east end of the Neighbourhood area (Figure 6), and in the southern portion of the Neighbourhood (Figure 7). The

shallow till deposits are interpreted as the Halton till and Newmarket till and are underlain by sand deposits, which are interpreted as the Thorncliffe Formation. Small areas of discontinuous sand layers or lenses, up to about 8 m in thickness, are found in various locations within the upper 20 m of the till deposits. These are interpreted as the Mackinaw Interstadial deposits. There is no specific area or depth at which these small sand layers are found within the study area.

2.5 Hydrogeology

2.5.1 Groundwater Levels

Groundwater levels have been measured by SPL in monitoring wells, stream piezometers and wetland piezometers across the Neighbourhood 19 area since April 2009. The monitoring locations are shown on Figure 5. Groundwater level monitoring data, including hydrographs, for the subject lands are summarized in Appendix N19-C,Table N19-C1 for monitoring wells; Appendix N19-D, Table N19-D1 for stream piezometers; and, Appendix N19-E, Table N19-E1 for wetland piezometers. In addition to the manual water level measurements recorded at each location, an automatic water level recorder was installed in each of MW-2-90-2, MW-2-91-3, MW-2-92-4, MW-3-10-8, MW-4-2-7, WSS-G-05, WSS-G-10, WSS-G-11 and SS-G-02 to record continuous water levels. The continuous hydrographs for these locations are provided in Appendix N19-C, N19-D and N19-E for the monitoring wells, stream piezometers and wetland piezometers, respectively.

The groundwater monitoring data show the following (refer to Figure 5 for the monitoring locations and the data tables and hydrographs in Appendices N19-C, N19-D and N19-E):

- The depth to the water table varies seasonally, however, the high water table is generally expected to be encountered within about 1 m of ground surface in the topographically lower areas. The groundwater levels are generally deeper below grade in the topographically higher areas of the Neighbourhood, particularly in the southeastern portion of the subject lands (MW1-11-2, MW1-11-10s/d, MW1-11-11, MW-2-90-2, MW-2-90-4, MW-2-90-8, MW19-3, MW19-4, MW19-5s/d and MW19-6s/d); the north central area of the subject lands (MW-2-92-4); and the southwestern portion of the subject lands (MW-4-2-7s/d, MW9-11-12A/B and MW-9-11-9). The areas where the high water table is generally expected to be less than 1 m below the existing grade have been hatched on Figure 10.

- Groundwater levels were measured above grade in the fall and spring months in the central portion of the subject lands, near Ganatsekiagon Creek Tributaries B and B1 (MW2-91-3 and MW2-92-1) and at the southwest corner of the Neighbourhood along

Ganatsekiagon Creek (MW-9-11-18 and MWL-2). The above-grade water levels indicate the potential for seasonal groundwater discharge in these areas.

- Nested wells (i.e., two wells installed in separate boreholes at the same location at different depths) were monitored at 14 locations to determine vertical hydraulic gradients. These are MW1-11-10s/d, MW-2-11-9s/d, MW2-11-12s/d, MW2-11-16s/d, MW-2-11-23s/d, MW-2-92-15s/d, MW-4-2-7s/d, MW-9-11-12A/B, MW-9-11-17A/B, MW-10-38A/B, MW19-5s/d, MW19-6s/d, MW19-7s/d and MW19-8s/d. At the majority of these locations, the shallower well has a higher groundwater elevation than the deeper well, indicating a downward hydraulic gradient and potential recharge conditions. The only exceptions are at the MW-4-2-7, MW-9-11-17, MW10-38, MW19-7 and MW19-8 nests. At the MW-4-2-7 nest, the shallow well has been dry for all monitoring events, so a vertical hydraulic gradient cannot be determined at this location. At the MW-9-11-17 nest, the deeper well (MW-9-11-17d) has a higher groundwater elevation than the shallower well (MW-9-11-17s), indicating an upward gradient. This well nest is located along Ganatsekiagon Creek Tributary B in the central portion of the study lands, north of Whitevale Road (Figure 5). Considering the monitoring well location and the measured water levels, discharge conditions likely prevail in the vicinity of this well nest. At the MW10-38, MW19-7 and MW19-8 nests there were gradient reversals, where upward gradients were measured in the spring of 2011 at MW19-7 and MW19-8 and in the fall of 2012 in MW10-38 and MW19-7. The periods of upward gradient indicate the potential for seasonal discharge conditions, reversing to recharge conditions during drier periods.

- One stream piezometer was monitored along Ganatsekiagon Creek at the northwest corner of the subject lands (SPZ-G-07, Figure 5). The water level in this piezometer is near ground surface, and above the water level in the creek, indicating an upward hydraulic gradient and the potential for groundwater discharge conditions (Figure N19-D1, Appendix N19-D). As noted in Section 2.2, however, there is no baseflow and the watercourse is intermittent in this location, suggesting that the low hydraulic conductivity till soils found in this area limit the volume of shallow groundwater discharge that may occur.

- Piezometers were installed in Wetland G12, in the northwestern portion of the Neighbourhood, U2, in the southeastern portion of the Neighbourhood and U8, in the northeastern portion of the Neighbourhood (Figure 5). The groundwater levels in the piezometers installed in G12 (WPZ-G-12s/d) are below the surface water level in the wetland, indicating recharge conditions, i.e., surface water that accumulates in the features may seep downwards to recharge the water table beneath the feature. The groundwater levels in the deeper piezometers installed in U2 (WPZ-U-02Ad and WPZ-U-02Bd) are higher than the corresponding shallower piezometers during the

spring and fall seasons, indicating the potential for seasonally upward gradients. The groundwater level in the deeper piezometer installed in Wetland U8 (WPZ-U-08d) is consistently higher than the corresponding shallower piezometer, indicating upward gradients at this location. As discussed in Section 2.3.1, the upward gradients (discharge conditions) may not result in actual water seepage into the wetland, but they are interpreted to support the high water table and root zone for the wetland vegetation. Seasonally upward gradients may also support the wetland conditions by limiting the downward recharge of surface water from the feature.

2.5.2 Groundwater Flow Conditions

Groundwater elevation data from November 2011 are shown on Figure 8, along with the interpreted groundwater elevation contours for the shallow overburden across the subject lands. This date was selected as representative of high water table conditions (the 2012 data were not mapped as 2012 had a very dry winter and spring, which resulted in lower than average groundwater levels throughout the year). The groundwater elevation contours have been plotted based on the interpretation that the shallow groundwater flow pattern reflects the surface topography with the high water table generally found less than 1 m below grade (as per the groundwater monitoring data discussed in Section 2.5.1), and often at or above grade in the low lying areas along the watercourse valleys. This type of contouring suggests that the shallow and local groundwater will essentially follow the surface water drainage patterns, with the flow moving from topographically higher areas to lower areas. There is an interpreted groundwater divide which is roughly coincident with the surface water divide through the subject lands (refer to Figures 2 and 8).

The groundwater monitoring data and the groundwater flow modelling in the MESPA showed that much of the proposed development area is in areas of downward gradient, i.e., recharge areas, where infiltrating groundwater will predominantly move downwards to recharge the underlying Thorncliffe Aquifer Complex (TAC). It is important to note, however, that the volume of groundwater recharge moving down through the thick, low hydraulic conductivity Halton till sediments is limited. It is anticipated that near ground surface, weathering and fracturing of the till layer will increase the effective hydraulic conductivity and that much of the interaction between groundwater and surface water features will occur in these soils very locally and at shallow depths. Lateral and vertical hydraulic gradients in the shallow overburden can fluctuate both temporally and by location. Thus, the volumes of groundwater contribution from the shallow groundwater flow systems to the surface water features also vary.

There may be local areas where small shallow sand layers and lenses at surface or within the till (Interstadial deposits) effect the local lateral movement of groundwater, however, the more substantial lateral flows occur regionally in the higher hydraulic conductivity sand sediments of the TAC. Lateral flow directions in the TAC are also regionally influenced by the topography, with flow interpreted to be towards the major watercourse valleys. As shown on Figures 6 and 7, the Thorncliffe sands are interpreted to intersect the Urfe Creek Tributaries A and B in the eastern portion of the study area and Ganatsekiagon Creek in the southern portion of the study area. Groundwater discharge from the TAC is interpreted to contribute to the watercourses and wetlands along the lower reaches of these creeks, and particularly to the wetlands below and along the Iroquois shoreline at the southern boundary of the study area.

3.0 Low Impact Development Considerations

3.1 MESPA Recommendations

Groundwater flow modelling was completed in the MESPA (July 2013) to predict the potential changes to groundwater recharge, groundwater levels in the Interstadial deposits and the TAC, and the resulting groundwater discharge to surface watercourses that may occur with development. These analyses were done primarily using a calibrated three-dimensional groundwater flow model that included analysis of the soil, groundwater and surface water monitoring results.

Based on the modelling results, the MESPA recommended that LID measures be incorporated into the stormwater management plans for development in Seaton as a mitigation strategy to maintain the existing groundwater infiltration conditions where possible and reduce the volume of runoff being generated as a result of urbanization. The report concluded that LID measures in till areas should focus on minimizing the impacts of increased runoff. The MESPA also recommended that LID measures specific to subsurface infiltration techniques should generally be focused in development areas where more permeable sand and gravel deposits are found at or near ground surface and where there is at least 1.5 m of unsaturated soil above the water table. One area meeting both these characteristics is found in the southern portion of Neighbourhood 19, west of Ganatsekiagon Creek Tributary B where surficial sands are encountered in the area highlighted on Figure 3 (refer to Section 2.4).

The majority of the Neighbourhood is covered by till soils, however, it is interpreted that much of the proposed development area will have sufficient depth to water table to be suitable for the use of LID measures for infiltration. The infiltration volumes that occur through the till tend to be more limited compared to sandier areas, however, the overall infiltration contribution is still considered important with respect to maintaining the natural

recharge conditions, particularly to the shallow surficial soils. This is because the surficial sandy till materials can have moderate infiltration capability due to "secondary hydraulic conductivity". Secondary hydraulic conductivity refers to features that improve the ability of water to move through the shallow subsurface, i.e., bedding planes, horizontal and vertical fractures, vegetation root networks, etc. These features are generally found in the upper weathered portions of the till and are expected to decrease with depth, so the overall deep recharge potential in till areas across the subject lands will be more limited than the surficial infiltration.

3.2 LID Measures for Infiltration

Measures to promote infiltration and reduce runoff include a variety of LID techniques as outlined in the TRCA Low Impact Development Stormwater Management Planning and Design Guide (2010). In residential areas, for example, surficial LID techniques to promote infiltration may include (but not be limited to) increasing topsoil depths, downspout disconnection, designing grades to direct roof runoff towards lawns and gardens, side and rear yard swales, boulevards, parks, and other open space areas throughout the development where possible, construction of bioswales or other water retention features, and the use of permeable pavers. For institutional and commercial areas, the use of permeable pavers and porous asphalt pavements may be considered, along with various bioretention features in parking lots. These types of LID techniques promote infiltration by providing additional water volumes to the pervious areas. This is particularly effective in the summer months, when natural infiltration would not generally occur. The redirection of this clean urban runoff to areas where it can be infiltrated utilizes a portion of the water surplus to overcome the normal soil moisture deficit.

Subsurface infiltration measures may include engineered infiltration basins, galleries and trenches, pervious storm pipe systems and soak-away pits. These types of LID measures tend to be most effective in areas of relatively permeable unsaturated soils. Although the till soils that cover the majority of Neighbourhood 19 are not ideal for large-scale subsurface infiltration facilities, in general, as noted above in Section 3.1 many portions of the Neighbourhood are expected to have sufficient permeability and depth to water table to accommodate various LID measures for infiltration.

Quantification of LID techniques (i.e., calculating an actual volume of water that may infiltrate) is challenging. The rate of infiltration will depend on a number of factors, including the primary and secondary hydraulic conductivity of the soils, the depth to the water table and the hydraulic gradients, and these factors may be highly variable across any given area. The general soil conditions and depth to water table in Neighbourhood 19 have been discussed above. The following report section discusses the results of the specific field testing completed to assess the hydraulic conductivity and infiltration potential of the surficial soils in Neighbourhood 19. These data may be used to support

the selection and final design of any LID infiltration measures implemented within the development area.

3.3 Soil Hydraulic Conductivity

The subject lands are predominantly covered by low hydraulic conductivity sandy silt to silty sand glacial till deposits. As discussed in Section 2.5.2, recharge gradients occur across most of the proposed development areas, however, the actual amount of water that infiltrates and moves through the shallow subsurface is generally limited by the clayey nature and low hydraulic conductivity of the surficial till sediments. As noted in Section 3.1, it is likely that infiltration and shallow groundwater movement in the till areas predominantly occurs as a result of secondary hydraulic conductivity features such as fractures, desiccation cracks, root layers, etc. The infiltration potential and groundwater movement will generally be higher in the areas of sandy soil.

There are various methods that can be used to assess soil hydraulic conductivity. Grain-size data and soil characteristics can be used to provide a general estimate of hydraulic conductivity. There are also field testing methods to assess in-situ conditions. These include single well response tests in groundwater observation wells to assess the bulk hydraulic conductivity and infiltrometer tests to assess the ability of the surficial soils to infiltrate water. Each of these methods was used to estimate the soil hydraulic conductivity and infiltration potential as discussed below.

During the geotechnical investigations, representative samples of the soils were collected and analyzed for grain-size distribution (Appendix N19-F). The Hazen method was used to estimate the hydraulic conductivity of the soils based on the grain-size distribution curves, and the results are summarized in Table 1.

To assess the in-situ hydraulic conductivity of the overburden sediments, single well response tests were completed at five wells screened in glacial till soils: MW-1-11-11, MW-2-11-23d, MW-2-93-1, MW-2-90-6, and MW5-1. The test results are provided in Appendix N19-F and the calculated hydraulic conductivity values are summarized in Table 1. The water level in each of these wells was slow to recover with the exception of MW-1-11-11. This well had a much faster recovery, and a higher hydraulic conductivity than the other wells tested (6.5×10^{-4} cm/sec, compared to 6.4×10^{-6} cm/sec to 2.4×10^{-6} cm/sec in the other wells). Although this well is screened in silty sand/sandy silt till, the upper till in this area typically contains sand and silt seams and layers. MW1-11-11 may have been screened across one of these more permeable layers, accounting for the faster rate of water level recovery.

As noted above, the groundwater movement in the surficial layers of soils may be increased where thin sand or silt layers, weathering, fracturing and ecological and

biological factors can increase the effective hydraulic conductivity of the material. To assess the in-situ surficial infiltration potential, a series of tests using a Turf-Tec double ring infiltrometer were completed at selected locations across the Neighbourhood (Figure N19-F1, Appendix N19-F1). The tests were completed by removing the topsoil in the test area and installing the infiltrometer in the underlying soil. Both rings of the infiltrometer were then filled with water and time for the water level in the inner ring to fall 10 mm was recorded. This was repeated until consistent readings were recorded for at least three consecutive intervals. The results of these tests were plotted and are provided in Appendix N19-F1.

Seven infiltrometer tests were attempted across the subject lands in late April 2011, however, only one test (N19-IF7) was successfully completed. The other six tests were unsuccessful due to either the excavation rapidly filling with water from the surrounding saturated topsoil (wet weather and spring freshet conditions were observed to saturate the area), or no infiltration being observed after 30 minutes of running the test (soils too 'tight' to quickly transmit water). Two of the tests were conducted again in drier conditions on June 26, 2011 (N19-IF2 and N19-IF5). The test conducted at N19-IF5 was successful on the second attempt, however, the test conducted at N19-IF2 again rapidly filled with water and no infiltration rate could be established. The results of the infiltration tests are summarized in Table 1 below.

Table 1 also provides a column of "design infiltration rate". This has been calculated based on the soil test information to provide an infiltration value that should be used for the design of subsurface infiltration measures such as galleries, soak away pits or infiltration trenches. Using the method outlined in the TRCA Stormwater Management Criteria (2012), the design infiltration rate uses a safety factor of 2.5 to account for a lowering of the permeability of the soils due to compaction and smearing during construction and possible build-up of sediment in the infiltration facility. The field testing indicates that the infiltration rate into the shallow soils is considerably higher in some locations than suggested by the hydraulic conductivity of the underlying till material. (e.g., the infiltration rate of 670 mm/hour (Table 1) would equate to a hydraulic conductivity of 10^{-2} cm/sec). These data support the conclusion that the infiltration and shallow water movement (interflow) is likely effected by secondary hydraulic conductivity within the shallow surficial soils. To be conservative for LID design purposes, it is recommended that the lower rate in the range should be used.

Table 1 Summary of Hydraulic Conductivity and Infiltration Rate Tests

Soil Type	Depth (mbgl)	Hydraulic Conductivity (cm/sec) – In-Situ Bail Test	Hydraulic Conductivity (cm/sec) – Hazen Method	Measured Field Infiltration (mm/hour) – Infiltrometer Tests	Design Infiltration Rate* (mm/hour)
Silty Clay Till	0 – 2	-	$<1 \times 10^{-6}$	-	<4.8
	> 5	5.2×10^{-6}	-	-	4.8
Sandy Silt to Silty Sand Till	0 – 2	-	$<1 \times 10^{-6}$ to 3.6×10^{-6}	670	4.8
	2 – 5	6.4×10^{-6} to 6.5×10^{-4}	$<1 \times 10^{-6}$ to 1.6×10^{-5}	-	4.8 to 20
	> 5	9.2×10^{-6} to 2.8×10^{-5}	$<1 \times 10^{-6}$	-	4.8 to 12
Sandy Silt/ Silty Sand	0 – 2	-	-	39	15
	2 – 5	-	7.3×10^{-4}	-	20
	> 5	-	5.6×10^{-5} to 4.0×10^{-4}	-	12 to 20

* calculated based on the TRCA Stormwater Criteria (2012), Appendix C

4.0 Summary of MESPA Feature Water Balance Assessments

4.1 Wetland Assessment Results

An assessment of the Category D wetlands, as described in Section 2.3, was undertaken in the MESPA (July 2013) to determine the need for water balance modelling for these features. The assessments considered land uses in the contributing drainage areas and individual wetland characteristics (e.g., topography, outlet condition, underlying soil types, habitat, surface water and groundwater conditions). Where it was determined that a SWMF could not outlet to a wetland, whether for grading reasons or because runoff volumes would increase substantially, alternative surface water sources to the wetlands were identified. A water augmentation feasibility analyses (WAFA) was completed in these cases to determine the volume of water required to achieve a water balance when a certain percentage of the wetland drainage area will be diverted away from the wetland due to tableland development, pond locations and servicing constraints.

In the Neighbourhood 19 area, Wetlands G5, G8, G9, G12, U2, and U8 were determined to require WAFA analysis. Wetland G5 was modelled, but was then also included in the WAFA analysis as the hydrologic modelling water balance found that discharge of the SWMF directly to the wetland would result in substantial increases in runoff volumes that would likely negatively impact the wetland form and function. For this wetland, it was

recommended that the SWMF be discharged downstream of the wetland area and water augmentation be achieved through the implementation of LID measures (e.g., that roof drainage or rear yard drainage be conveyed to the wetland to augment flows).

A summary of the MESPA water balance results for the Neighbourhood 19 wetlands is provided in Table 2 (following page).

Table 2 MESPA Summary of Wetland Conditions and Water Balance Results

Wetland ID	Existing Conditions Contributing Drainage Area (ha)	% Developable	Soils	Water Conditions	Water Balance Results
G5	5.3	32%	Till	Wetland predominantly relies on surface water inputs. No perennial open water, ephemeral moisture conditions.	Assessment recommends discharge of SWMF #24 away from Wetland G5 towards Reach G11. The recommended mitigation measures include discharge of ~0.2 ha of roof flows to G5 via the implementation of LIDs.
G8	5.6	12%	Till	Wetland predominantly relies on surface water inputs and backwater ponding. Perennial open water component on-stream occurs as a result of backwater from dam on reach BG1-1.	Assessment recommends discharge of roof or rear yard flows to Wetland G8 via the implementation of LIDs (~0.1 ha of roof drainage or 0.7 ha of rear yard drainage directed to the wetland will mitigate loss). Water augmentation to Wetland G8 to take into consideration water augmentation requirements for Woodland FC21.
G9	4.6	50%	Till	Wetland predominantly relies on surface water inputs. No perennial open water.	Assessment recommends discharge of roof or rear yard flows to G9 via the implementation of LIDs (~0.1 ha of roof drainage or 0.6 ha of rear yard drainage directed to the wetland from the west side and 0.2 ha of roof drainage or 1.7 ha of rear yard drainage from the east side will mitigate loss). Contributing drainage areas within the NHS impacted by proposed roads must be maintained to Wetland G9 or augmented accordingly.

Wetland ID	Existing Conditions Contributing Drainage Area (ha)	% Developable	Soils	Water Conditions	Water Balance Results
G12	15.7	46%	Till	Wetland predominantly relies on surface water inputs. No perennial open water.	The recommended mitigation measures include discharge of ~0.7 ha of roof flows from the west, and ~0.3 ha of roof flows from the east, to the wetland via the implementation of LIDs
U2	27.1	28%	Till, sand and gravel	Wetland relies on surface water and groundwater inputs. No perennial open water.	The recommended mitigation measures include discharge of ~0.7 ha of roof flows to the wetland via the implementation of LIDs.
U8	5.4	33%	Till over sand	Wetland predominantly relies on surface water inputs. No perennial open water.	Assessment recommends discharge of roof and/or rear yard flows to the wetland via the implementation of LIDs (~2000 m^2 of roof drainage or 1.8 ha of rear yard drainage directed to the wetland will mitigate loss).

4.1.1 Wetland Water Augmentation Requirements

As noted in Section 4.1, there were six wetlands in Neighbourhood 19 that were identified as requiring water augmentation through the implementation of LID measures. These wetlands include four in the Ganatsekiagon Creek subcatchment area (G5, G8, G9, and G12) and two in the Urfe Creek subwatershed (U2 and U8; refer to Figure 9 for wetland locations). LID measures are recommended to convey and distribute clean water to the wetlands. It was envisioned in the MESPA that third pipe systems would convey clean roof drainage from the development lands to LID measures such as infiltration trenches or bioswales located in wetland buffers. As such, the required water augmentation volumes were converted to an approximate area of roof discharge collection area for LID design purposes. The MESPA recommendations for water augmentation for these wetlands are summarized below in Table 3.

Table 3 Water Augmentation Requirements in Wetlands

Wetland ID	Area (ha)			Roof Area Required to Provide Water (ha)
	Existing Conditions Drainage Area	Proposed Conditions Drainage Area	% Difference	
Ganatsekiagon				
G5	5.3	3.6	-32%	0.2
G8	5.6	4.9	-12%	0.1
G9 West	2.3	0.6	-76%	0.2
G9 East	2.3	1.7	-26%	0.1
G12 West	11.1	6.0	-46%	0.7
G12 East	4.6	2.4	-46%	0.3
Urfe				
U2	27.1	21.3	-21%	0.7
U8	5.4	3.6	-33%	0.2

4.1.2 Wetland Areas – Infiltration Potential for LID Design

LID measures such as infiltration trenches and bioswales may be considered to distribute roof water supplied to the wetlands. As discussed in Sections 3.1 and 3.2, the effectiveness of infiltration methods will depend on the hydraulic conductivity of the local soils and the depth to the water table. Where low soil hydraulic conductivity and/or relatively high water table conditions present constraints for subsurface infiltration techniques, distribution of the surface water inputs to the features through the use of swales or other spreading techniques at surface is recommended.

Based on the detailed testing and monitoring completed for this study, the soil, groundwater and infiltration conditions in the vicinity of each of the wetlands has been summarized in

Table 4 (following page) along with an overall assessment of the suitability of the area for the use of infiltration LID measures (i.e., the opportunities and constraints for infiltration of stormwater runoff).

Table 4 Wetland LID – Surficial Infiltration Potential

Wetland I.D.		Surficial Soil Type	Depth to Groundwater (seasonal range, m)	Recommended Design Infiltration Rate (mm/hr)*	Comment on Opportunities and Constraints for Infiltration LIDs
G5		silty sand	2 to 2.5	12 to 20	Surficial infiltration rate and depth to water table is considered suitable for use of surface and subsurface infiltration methods.
G8		silty sand/ sandy silt till	0 to 0.75	4.8 to 12	Area generally considered unsuitable for effective subsurface infiltration methods due to high water table conditions (seasonally at grade); the use of surface spreaders may increase seasonal infiltration around the feature.
G9		silty sand/ sandy silt till	0.6	4.8 to 12	Area generally considered unsuitable for effective subsurface infiltration methods due to high water table conditions; the use of surface spreaders may increase seasonal infiltration around the feature.
G12	West	silty clay till	0 to 0.75	< 1 (N19-IF2)	Area unsuitable for effective subsurface infiltration methods due to high water table conditions and restricted infiltration rate.
	South	silty sand/ sandy silt till	0.7	4.8 to 12	Area generally considered unsuitable for effective subsurface infiltration methods due to high water table conditions; the use of surface spreaders may increase seasonal infiltration around the feature.

Wetland I.D.	Surficial Soil Type	Depth to Groundwater (seasonal range, m)	Recommended Design Infiltration Rate (mm/hr)*	Comment on Opportunities and Constraints for Infiltration LIDs
U2	silty sand/ sandy silt till	2 to 2.5	15 (N19-IF7)	Surficial infiltration rate and depth to water table is considered suitable for use of surface and subsurface infiltration methods.
U8	sandy silt till	1 to 2	4.8 to 12	Surficial infiltration rate and depth to water table is considered suitable for use of surface and subsurface infiltration methods.

*based on estimated infiltration rate for soil type, provided in Table 2

4.2 Woodlands Assessments

An assessment of the woodlands was undertaken in the MESPA (December 2011) to determine the need for water balance modelling for these features. The woodlands were divided into three categories (A, B and C) based on the catchment areas of the woodlands and proposed land use to determine which woodlands require individual detailed water balance analyses. Category A includes woodlands located in upland areas where surface drainage from the woodland flows toward the development area (i.e., there is no upstream drainage from a development area). Category B includes woodlands which have a catchment area within which no new development or only passive parkland/open space uses are proposed and/or there is an assessed wetland situated between the woodland and development area. Category C woodlands have surface catchment areas in which development is proposed.

It was determined that Category A and B woodlands do not require a water balance analysis. The Category C woodlands were further screened based on the topographic location, culvert locations and primary source of moisture to determine the need for a water balance analysis (refer to Section B9 of the MESPA).

Four woodlands located in Neighbourhood 19 were determined to require a water balance analysis. As SWMFs will not discharge directly to woodlands, the purpose of the water balance assessment was only to determine the water augmentation requirements (i.e., the implementation of LID measures), not the SWMF outlet location. The four woodlands requiring a water augmentation feasibility analysis (WAFA) are FC6a, FC6B, FC20 and FC21 (refer to Figure 9 for woodland locations).

Details of the woodland water balance results are provided in Table 5 (following page).

Table 5 MESPA Summary of Woodland Conditions and Water Balance Results

Woodland ID	Pre-Development Contributing Drainage Area (ha)	% Developable	Soils	Water Balance Results
FC6a	7.8	19%	Till	Assessment recommends discharge of roof flows to Woodlands FC6a and FC6b via the implementation of LIDs (~0.2 ha and 0.8 ha of roof drainage directed to Woodlands FC6a and FC6b, respectively, will mitigate loss). Water augmentation to Woodland FC6b to take into consideration water augmentation requirements for HDFC13.
FC6b	11.7	54%	Till	
FC20	15.1	80%	Till	The recommended mitigation measures include discharge of ~1.3 ha of roof flows to Woodland FC20 via the implementation of LIDs. Water augmentation to woodland to take into consideration water augmentation requirements for Wetland G5.
FC21	7.6	28%	Till	Assessment recommends discharge of roof flows or rear yard flows to Woodland FC21 via the implementation of LIDs (~0.3 ha of roof drainage or 2.1 ha of rear yard drainage directed to the woodland will mitigate loss). Water augmentation to Woodland FC21 to take into consideration water augmentation requirements for Wetland G8.

4.2.1 Woodlands Water Augmentation Requirements

For those woodlands requiring augmentation of flows to achieve a water balance, LID measures are recommended to convey and distribute clean water to the woodland. Just as described above for the wetland areas (Section 4.1.1), third pipe systems will convey clean roof drainage from the development lands to LID measures such as infiltration trenches or bioswales located in the woodland buffers. As such, the required water augmentation volumes for each feature were converted to an approximate area of roof discharge collection area for LID design purposes. The MESPA recommendations for water augmentation are summarized below in Table 6.

Table 6 Water Augmentation Requirements in Woodlands

Woodland ID	Area (ha)			Roof Area Required (ha)	Adjacent Features Requiring Water Balance
	Existing Conditions Drainage Area	Proposed Conditions Drainage Area	% Difference		
FC6a	7.8	6.6	-19%	0.2	
FC6b	11.7	5.4	-54%	0.8	HDFC13
FC20	15.1	3	-80%	1.5	G5
FC21	7.6	5.5	-28%	0.3	G8

4.2.2 Woodlands - Infiltration Potential for LID Design

As discussed for the wetlands in Section 4.1.2, LID measures such as infiltration trenches and bioswales may be considered to distribute and supply roof water to the woodlands. Where low soil hydraulic conductivity and/or relatively high water table conditions present constraints for subsurface infiltration techniques, distribution of the surface water inputs to the features through the use of swales or other spreading techniques at surface is recommended.

Based on the detailed testing and monitoring completed for this study, the soil, groundwater and infiltration conditions in the vicinity of each of the woodlands have been evaluated and the results are summarized in Table 7 (following page) along with an overall assessment of the suitability of the area for the use of infiltration LID measures.

Table 7 Woodland LID - Surficial Infiltration Potential

Woodland I.D.	Surficial Soil Type	Depth to Groundwater (seasonal range, m)	Recommended Design Infiltration Rate (mm/hr)*	Comment on Opportunities and Constraints for Infiltration LIDs
FC6a	silty clay till	0.1 to 0.75	<1 (N19-IF2)	Area generally considered unsuitable for effective subsurface infiltration methods due to high water table conditions (seasonally at grade) and restricted infiltration rates; the use of surface spreaders may increase seasonal infiltration around the feature.
FC6b	silty sand	2 to 3	12 to 20	Surficial infiltration rate and depth to water table is considered suitable for use of surface and subsurface infiltration methods.
FC20	sandy silt and sandy silt	0.5 to 2.0	<1 (N19-IF4)	Area generally considered unsuitable for effective subsurface infiltration methods due to high water table conditions and restricted infiltration rates; the use of surface spreaders may increase seasonal infiltration around the feature.
FC21	silty sand/ sandy silt till	2.5 to 5.0 (north side) above ground to 2.5 (west side)	4.8 to 12	Area north of FC21 considered suitable for use of surface and subsurface infiltration methods. Area west of FC21 considered unsuitable for effective subsurface infiltration methods due to high water table conditions (seasonally above grade); the use of surface spreaders may increase seasonal infiltration around the feature.

*when an I-test was not completed at specific location, an infiltration range for the soil type (based on other infiltration tests completed in similar soils) was used.

4.3 Headwater Drainage Features Assessment Results

An assessment of the headwater drainage features (HDFs) was undertaken in the MESPA (December 2011) to determine the need for water balance modelling for these features. The HDFs were divided into three categories (A, B and C) based on the catchment areas of the HDFs and proposed land use to determine which HDFs require individual detailed water balance analyses. Category A included HDFs with a surface catchment located entirely within the NHS, HDFs where no change is proposed to the drainage area and/or drainage patterns, and/or HDFs where no new development or only passive parkland/open space uses are proposed in the surface catchment. Category B included HDFs for which the water balance requirements have been addressed through wetland or woodland water balance assessments. Category C included HDFs in which development will occur within its surface catchment, or a change in drainage area and/or drainage patterns in the surface catchment is proposed.

Based on these Categories, it was determined that Category A and B HDFs do not require a water balance analysis. The Category C HDFs were further screened based on type of proposed land uses in the contributing drainage area, and HDF characterization including soils, monitoring data, land cover habitat in the vicinity, fisheries habitat, and channel conditions including slope and flow regime to determine the need for a water balance analysis. Based on this further screening, it was determined that three HDFs in Neighbourhood 19 required an individual water balance assessment. As SWMFs will not discharge directly to HDFs, the purpose of the water balance assessment was only to determine the water augmentation requirements (i.e., the implementation of LID measures), not the SWMF outlet location. The three HDFs requiring a water augmentation feasibility analysis (WAFA) are HDF13, HDF26 and HDF29 (refer to Figure 9 for locations).

Details of the HDF water balance assessment results are provided in Table 8 (following page).

Table 8 MESPA Summary of HDF Conditions and Water Balance Results

HDF ID	Location (Reach Identification Number)	Pre-Development Contributing Drainage Area (ha)	% Developable	Soils	Water Balance Results
HDFC13	GB8-1	10.9	55	till	The recommended mitigation measures include discharge of ~ 0.8 ha of roof flows to HDFC13 via the implementation of LIDs. Water augmentation to HDF to take into consideration water augmentation requirements for Woodland F_C6b.
HDFC26	G11-2	29.5	78	till	The recommended mitigation measures include discharge of ~2.5 ha of roof flows to HDFC26 via the implementation of LIDs.
HDFC29	U6-4	3.5	57	till	Assessment recommends discharge of roof or rear yard flows to HDFC29 via the implementation of LIDs (~0.2 ha of roof drainage or 2.0 ha of rear yard drainage directed to the headwater will mitigate loss). Water augmentation to HDFC29 to take into consideration water augmentation requirements for Wetland U2.

4.3.1 Headwater Drainage Features Water Augmentation Requirements

For those HDFs requiring augmentation of flows to achieve a water balance, LID measures are recommended to convey and distribute clean water to the HDF. It was envisioned in the MESPA that third pipe systems could convey clean roof drainage from the development lands to LID measures such as infiltration trenches or bioswales located in feature buffers. As such, the required water augmentation volumes were converted to an approximate area of roof discharge collection area for LID design purposes. The MESPA recommendations for water augmentation are summarized below in Table 9.

Table 9 Water Augmentation Requirements to HDFs

HDF ID	Area (ha)			Roof Area Required (ha)	Adjacent Features Requiring Water Balance
	Existing Conditions Drainage Area	Proposed Conditions Drainage Area	% Difference		
HDFC13	10.9	4.9	-55%	0.8	FC6b
HDFC26	29.5	6.6	-78%	2.5	
HDFC29	3.5	1.5	-57%	0.2	U2

4.3.2 Headwater Drainage Features - Infiltration Potential for LID Design

LID measures such as infiltration trenches and bioswales may be considered to distribute and supply roof water to the HDFs. Based on the testing and monitoring completed for this study, the soil, groundwater and infiltration conditions in the vicinity of each HDF has been summarized in Table 10 (following page) along with an overall assessment of the suitability of the area for the use of infiltration LID measures.

Table 10 HDF LID – Surficial Infiltration Potential

HDF I.D.	Surficial Soil Type	Depth to Groundwater (seasonal range, m)	Recommended Design Infiltration Rate (mm/hr)*	Comment on Opportunities and Constraints for Infiltration LIDs
HDFC13	silty sand	2 to 3	12 to 20	Surficial infiltration rate and depth to water table is suitable for use of surface and subsurface infiltration methods.
HDFC26	silty sand till	7 to 8 (west side), 3 to 6 (north side)	4.8 to 12	Surficial infiltration rate and depth to water table is suitable for use of surface and subsurface infiltration methods.
HDFC29	sandy silt till	>6	15 (N19-IF7)	Surficial infiltration rate and depth to water table is suitable for use of surface and subsurface infiltration methods.

*when an I-test was not completed at specific location, an infiltration range for the soil type (based on other infiltration tests completed in similar soils) was used.

4.4 Summary of LID Constraints and Opportunities

As discussed in the sections above, the MESPA (July 2013) provided feature-based target water volumes for LIDs to maintain the natural features within the Neighbourhood 19 area. These target volumes are summarized in Tables 3, 6 and 9 for the wetlands, woodlands and HDFs, respectively. Tables 4, 7 and 10 summarize the soil and groundwater conditions and estimated infiltration rates for each of the recommended LID areas.

As noted in these tables, in areas within Neighbourhood 19 not considered suitable for the use of subsurface infiltration techniques due to either low soil hydraulic conductivity and/or relatively high water table conditions, distribution of the surface water inputs to the features through the use of swales or other spreading techniques at surface is recommended.

Areas where the high water table is generally expected to be within about 1 m of existing grade have been hatched on the surficial geology map on Figure 10. The most favourable areas for the use of subsurface infiltration trenches, galleries, etc. within Neighbourhood 19 are those areas identified as having sandy soils (i.e., relatively high hydraulic conductivity) with the water table more than 1 m below grade, i.e., areas in the southern portion of the study area (Figure 10). It is noted that the areas of surficial till may also be suitable for subsurface infiltration facilities where there is sufficient depth to water table, as the weathered sandy till materials can have moderate infiltration capability due to secondary hydraulic conductivity (refer to Section 3.2). All areas are

considered suitable for general surface LID infiltration measures such as directing roof leaders to grass.

Details of the proposed stormwater management (SWM) and proposed LID strategies for Neighbourhood 19 are outlined in the NFSSR (Burnside, 2013).

5.0 Construction Considerations

5.1 Watercourse Crossings

There are several areas where services will cross watercourses within the Neighbourhood as shown on Figure 4. The crossings denoted by letters indicate Regional services and the crossings denoted by numbers represent local services. A summary of the crossings within Neighbourhood 19 is provided in Table 11, along with information on the groundwater and soil conditions at these locations. Designs for construction in these areas will need to evaluate the need for local dewatering and/or aquifer depressurization (refer to Section 5.2), and develop a water management plan for construction to address potential impacts to the watercourses.

Table 11 Servicing Crossing Construction Considerations

Crossing I.D.	Crossing Type	Reach	Water Conditions	Approximate Groundwater Elevation at Watercourse (masl)	Surficial Geology Mapped in Crossing Area
1	Type C Arterial Road at Ganatsekiagon Creek	GB6-1	ephemeral, no groundwater discharge	195	sandy silt/silty sand till
2	Type C Arterial Road at Ganatsekiagon Creek	GB7, GB8	ephemeral, no groundwater discharge	195	sandy silt/silty sand till
3	Type C Arterial Road at Ganatsekiagon Creek	G16, G16-1, G16-2	ephemeral, potential groundwater discharge area; however, volume is limited by low hydraulic conductivity soils	210	sandy silt/silty sand till

Crossing I.D.	Crossing Type	Reach	Water Conditions	Approximate Groundwater Elevation at Watercourse (masl)	Surficial Geology Mapped in Crossing Area
5	Whitevale Road at Ganatsekiagon Creek	G14, G15	perennial, potential groundwater discharge area; however, volume is limited by low hydraulic conductivity soils	197	sandy silt/silty sand till
12	Type C Arterial Road at Ganatsekiagon Creek	G13, G14, G14-1	perennial, potential groundwater discharge area; however, volume is limited by low hydraulic conductivity soils	185	sandy silt/silty sand till
21	Collector Road at Ganatsekiagon Creek	GB9	ephemeral, no groundwater discharge	205	sandy silt/silty sand till
22	Collector Road at Urfe Creek	UB3-1	ephemeral, no groundwater discharge	160	sandy silt/silty sand till
D	Conc. Rd. 5 at Urfe Creek	UB4, UB5	perennial, potential groundwater discharge area	157	sandy silt/silty sand till
E	Conc. Rd. 5 at Ganatsekiagon Creek	GB1-3, GB1-4	ephemeral, no groundwater discharge	172	sandy silt/silty sand till
F	Conc. Rd. 5 at Ganatsekiagon Creek	GB5, GB6	ephemeral, no groundwater discharge	175	sandy silt/silty sand till
G	Whitevale Bypass at Ganatsekiagon Creek	G14	perennial, potential groundwater discharge area; however, volume is limited by low hydraulic conductivity soils	192	sandy silt/silty sand till
L	Sideline 22 at Ganatsekiagon Creek	G10, G10-2, G11	perennial, groundwater discharge area	160	sand and gravel

Crossing I.D.	Crossing Type	Reach	Water Conditions	Approximate Groundwater Elevation at Watercourse (masl)	Surficial Geology Mapped in Crossing Area
M	Sideline 22 at Ganatsekiagon Creek	GB7	ephemeral, no groundwater discharge	185	sandy silt/silty sand till

masl – metres above sea level
Surficial geology shown on Figure 3, crossing locations shown on Figure 4

5.2 Dewatering/Depressurization Requirements

There are areas of high water table within the surficial till and local dewatering may be required where sewer trench grades and excavations encounter groundwater. The surficial till material has relatively low hydraulic conductivity and the geotechnical reports for the subject lands note that groundwater seepage, if encountered, within the till deposits should be manageable by gravity drainage or filtered sumps and pumps and is not anticipated to pose any difficulties for construction. Excavation below the water table in shallow sand deposits (such as those encountered at BH9-11-39, BH9-11-44 and BH9-11-53; refer to Figure 4 for borehole locations) may require a more positive approach to dewatering, such as well points.

Should the construction contractor need to pump water at rates exceeding 50,000 L/d, a temporary Permit to Take Water (PTTW) from the MOE will be required for construction dewatering. The PTTW must be obtained in accordance with the provincial regulations prior to dewatering activities.

5.3 Construction Below Water Table

The construction of buried services below the water table has the potential to capture and redirect groundwater flow through more permeable fill materials typically placed in the base of excavated trenches. Over the long term, these impacts can lower the local groundwater table. Particularly in the vicinity of local wetlands and woodlots, it is important to maintain the groundwater table levels within their natural elevation ranges in order to continue to support these natural features. In these areas, it is important that any services constructed below the water table be constructed using best management practices to reduce or prevent redirection of groundwater flow and overall lowering of the water table adjacent to features. This may involve the use of anti-seepage collars or clay plugs surrounding the pipes to provide barriers to flow and prevent groundwater flow along granular bedding material and erosion of the backfill materials.

5.4 Stormwater Management Pond Construction

Ten stormwater management facilities (SWMF) are proposed within Neighbourhood 19. The locations of the SWMF are shown on Figure 4. Well nests were installed in each of these locations during the geotechnical drilling investigations to determine the soil conditions and hydraulic gradients to direct the design of the SWMF. The borehole logs and geotechnical information are provided in Appendix E to the NFSSR. Based on the geotechnical findings and the groundwater monitoring data for each SWMF location, the soil and groundwater conditions that should be considered for the design of the SWMFs have been summarized in Table 12.

Typically, when SWMF are constructed in low hydraulic conductivity till soils, no liner is recommended. In most cases, this is independent of the elevation of the groundwater, because where the pond intersects the water table, the actual volume of groundwater flow into or out of the pond is limited. In areas where high artesian pressures are anticipated, however, lining and under draining of the SWMF may be recommended even in areas of tight soils to stabilize the pond bottom and prevent uplift. The use of engineering solutions such as under drains and perimeter drains without a liner also may be considered under some site conditions.

When SWMF are constructed in higher permeability sand and gravel deposits, lining is generally required to stabilize the pond bottom from erosion and sloughing and to help maintain the permanent pool in the pond. There may be an opportunity to design the facility as an “infiltration SWMF”, however, this is generally restricted to areas where the high water table is at least 1 m below the base elevation of the pond.

Table 12 Stormwater Management Pond Construction Considerations

SWMF I.D.	Monitoring Well Nest	Natural Hydraulic Gradient Condition	Soil Type	Groundwater Elevation – Average Condition (masl)	Bottom of SWMF Elevation (masl)	Normal Operating Water Level Elevation (masl)	Comments
24	MW9-11-12A/B	downward	silty sand – silty sand till – sand and gravel – silty sand till	178.0 to 181.0	172.5	174.0	Pond elevation will intersect the water table and the normal operating water level is expected to be below the average water table elevation. The pond will be constructed in low hydraulic conductivity till soils and lining has not been recommended (refer to geotechnical findings in Appendix E), however, inclusion of perimeter drains in the pond design should be considered to minimize the potential for groundwater seepage into the SWMF.
25	MW19-1s/d	N/A*	silty sand to sandy silt till – silty sand to sandy silt	154.0 to 155.0	154.8	156.3	Pond elevation will intersect the average water table elevation. The pond will be constructed in low hydraulic conductivity till soils so lining may not be necessary. The normal operating water level is above the water table and the resulting downward hydraulic gradient will promote recharge from the SWMF.
26	BH13-217 BH13-218s/d BH-2-11-6	downward	sandy silt to silty sand till	170.0 to 172.5	171.1	172.1	Pond elevation will intersect the water table and the normal operating water level is expected to be close to the average water table elevation. The pond will be constructed in low hydraulic conductivity till soils and lining has not been recommended (refer to geotechnical findings in Appendix E).
27	MW1-11-10s/d BH13-5 BH13-10	downward	silty sand/ sandy silt till	145.0 to 150.0	150.5	152.1	Pond elevation is above the water table, but the pond may intersect the perched water table. The pond will be constructed in sandy soil conditions and lining may be required to reduce leaking of the pond in order to maintain a permanent pool (refer to geotechnical findings in Appendix E).

SWMF I.D.	Monitoring Well Nest	Natural Hydraulic Gradient Condition	Soil Type	Groundwater Elevation – Average Condition (masl)	Bottom of SWMF Elevation (masl)	Normal Operating Water Level Elevation (masl)	Comments
29	MW19-5s/d	downward	silty sand/ sandy silt till	156.5 to 159.0	157.0	159.0	Pond elevation will intersect the water table and the normal operating water level is expected to be close to the average water table elevation. The pond will be constructed in low hydraulic conductivity till soils so lining may not be necessary. The downward hydraulic gradient will promote recharge from the SWMF.
38	MW-10-38A/B MW19-8s/d	none	sandy silt till	197.0 to 199.0	195.0	197.5	Pond elevation will intersect the water table and the normal operating water level is expected to be below the average water table elevation. The pond will be constructed in low hydraulic conductivity till soils and lining has not been recommended (refer to geotechnical findings in Appendix E), however, inclusion of perimeter drains in the pond design should be considered to minimize the potential for groundwater seepage into the SWMF.
40	MW9-11-17A/B	upward	sandy silt to silty sand till	188.5 to 190.0	188.5	190.5	Pond elevation is close to the average water table elevation. The pond will be constructed in low hydraulic conductivity till soils and lining has not been recommended (refer to geotechnical findings in Appendix E). The normal operating water level is slightly above the average water table and the downward hydraulic gradient will promote recharge from the SWMF.
41	MW2-11-23s/d	slightly upward	silty sand/ sandy silt till	187.5 to 189.0	188.1	189.1	Pond elevation is close to the average water table elevation and the normal operating water level is slightly above the average water table. The pond will be constructed in low hydraulic conductivity till soils and lining has not been recommended (refer to geotechnical findings in Appendix E).

SWMF I.D.	Monitoring Well Nest	Natural Hydraulic Gradient Condition	Soil Type	Groundwater Elevation – Average Condition (masl)	Bottom of SWMF Elevation (masl)	Normal Operating Water Level Elevation (masl)	Comments
43	MW-2-92-15s/d**	downward	sandy silt till	181.0 to 183.0	181.0	182.2	Pond elevation is close to the average water table elevation and the normal operating water level is close to the average water table elevation. The pond will be constructed in low hydraulic conductivity till soils and lining may not be necessary.
44	MW2-11-16s/d	downward	silty sand/ sandy silt till	179.0 to 180.5	179.0	180.0	Pond elevation will intersect the water table and the normal operating water level is expected to be close to the average water table elevation. The pond will be constructed in low hydraulic conductivity till soils and lining has not been recommended (refer to geotechnical findings in Appendix E).

*MW19d was damaged immediately after installation, so the vertical gradient at this location could not be determined.

** Closest well to proposed pond block area

N/A – only one well at this location so vertical gradients could not be determined.

5.5 Private Water Wells

The proposed development will be municipally serviced and therefore, in the long term, it is expected that any existing domestic water supply wells in the area will no longer be used. In the interim, however, it is important to ensure that construction does not adversely affect local groundwater supplies while the private water supply wells are still in use.

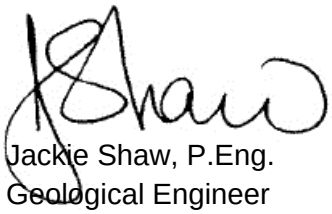
A survey of the static water level and water quality in all active water supply wells within 200 m of the planned construction area is recommended prior to construction. It will be necessary to complete a house-to-house survey to determine well locations and specific uses of local groundwater supply wells in the area. For any active and accessible water supply wells, the water levels will be measured at each well location during non-pumping conditions prior to the commencement of site construction activities, and a water sample will be collected at each well for analysis of background water quality. The water analysis will include general water quality indicator parameters including chloride, nitrate, turbidity and e-coli. At the end of the construction period, the static water level and a water sample will again be collected from the monitored supply wells to confirm the post development groundwater conditions.

5.6 Well Decommissioning

Prior to or during construction, it is necessary to ensure that all inactive wells within the development footprint have been located and properly decommissioned by a licensed water well contractor according to Ontario Regulation 903. This regulation applies to the groundwater observation wells installed for this study unless they are maintained throughout the construction for monitoring purposes.

Report Prepared By:

R.J. Burnside & Associates Limited



Jackie Shaw, P.Eng.
Geological Engineer
JT/JS:cl

Joanne Thompson, M.Sc., P.Geo.
Group Leader, Development Hydrogeology

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Project No. BRGE00360445A.

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Project No. BRGE00360435A.

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BURNSIDE

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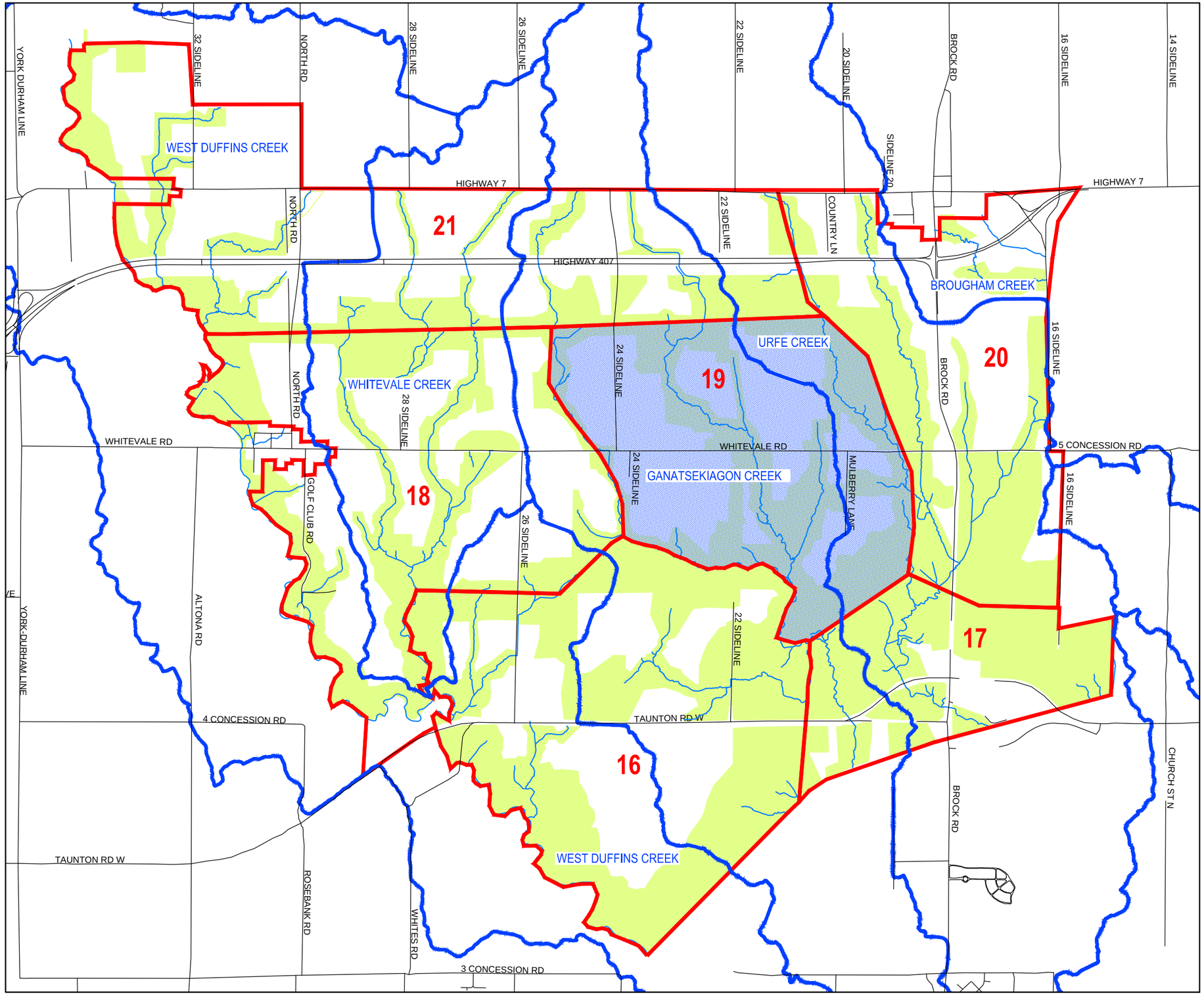
Figures

FIGURE 1

SEATON NEIGHBOURHOOD 19
REGION OF DURHAM
HYDROGEOLOGICAL STUDY

NEIGHBOURHOOD LOCATIONS



LEGEND

- NEIGHBOURHOOD BOUNDARIES
- WATERCOURSE
- ROADWAY
- SUBCATCHMENT BOUNDARY
- NATURAL HERITAGE SYSTEM
- AREA OF STUDY
- 19 NEIGHBOURHOOD NUMBER

N

0 0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0 2.2 2.4

Kilometres

1:30,000
August 2013
Project Number: PEB019877

Projection: UTM 17
Datum: NAD83

Prepared by: S. Ker

Verified by: J. Thompson

BURNSIDE

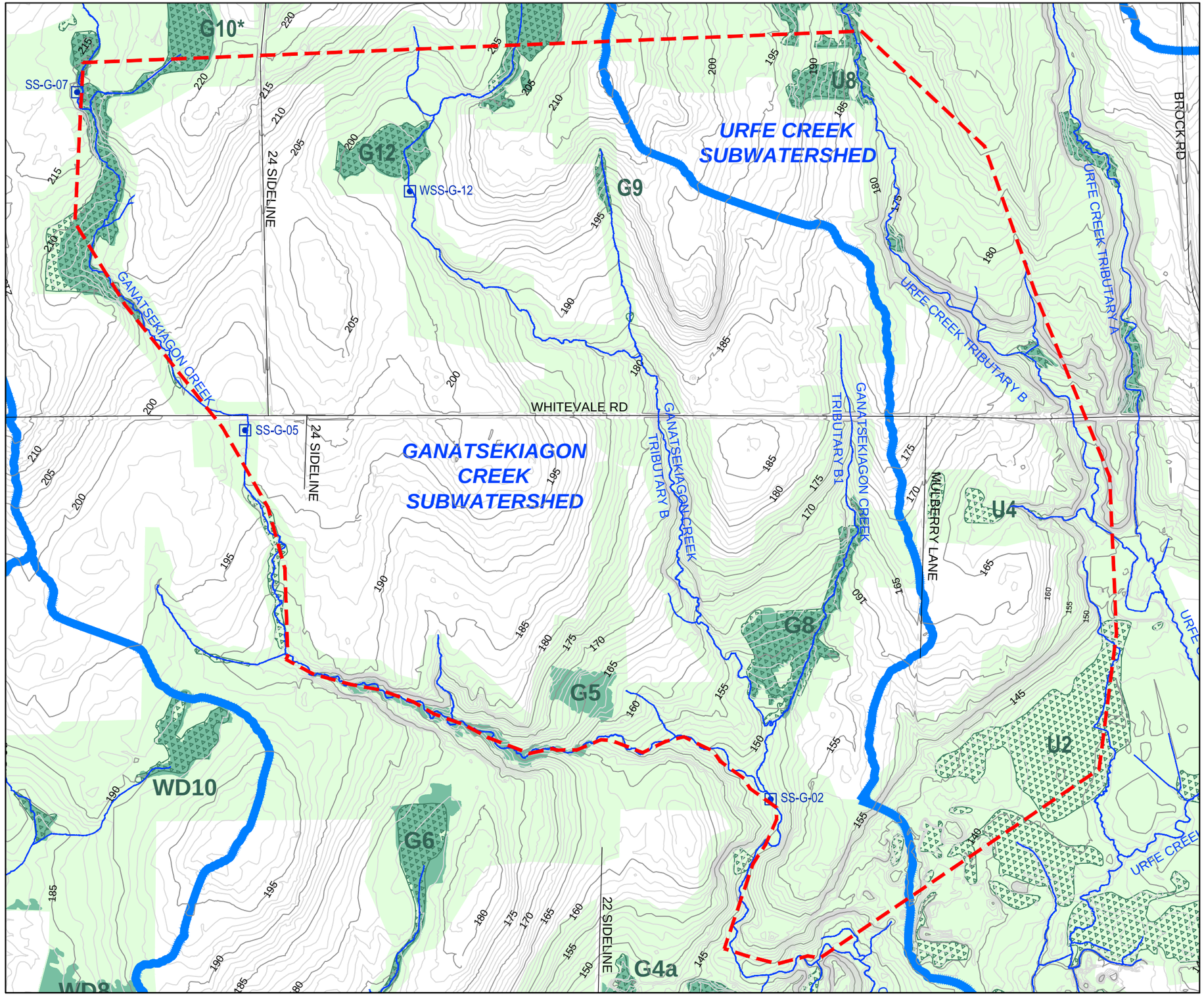
N16 TO N21 SITE LOCATIONS.dwg

Plot Time: Aug 22, 2013 - 4:44pm

FIGURE 2

SEATON NEIGHBOURHOOD 19
REGION OF DURHAM
HYDROGEOLOGICAL STUDY

TOPOGRAPHY AND DRAINAGE



LEGEND

- NEIGHBOURHOOD 19 BOUNDARY
- WATERCOURSE
- TOPOGRAPHICAL CONTOUR (masl - 5m intervals)
- ROADWAY
- NATURAL HERITAGE SYSTEM
- TRCA WETLANDS (WITHIN NHS)
- CPDP WETLANDS (WITHIN NHS)
- G4a — WETLANDS LABEL
- * — INDICATES SHARED IN NEIGBOURHOODS
- SUBWATERSHED BOUNDARY
- STAFF GAUGE: WSS = IN WETLAND SS = IN STREAM

N

0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8

Kilometres

August 2013
Project Number: PEB019877.0000

Projection: UTM 17N
Datum: NAD83

Prepared by: S. Ker

Verified by: J. Thompson

BURNSIDE

PEB019877 HG STUDY DRAWING SET.dwg

Plot Time: Aug 16, 2013–12:18pm

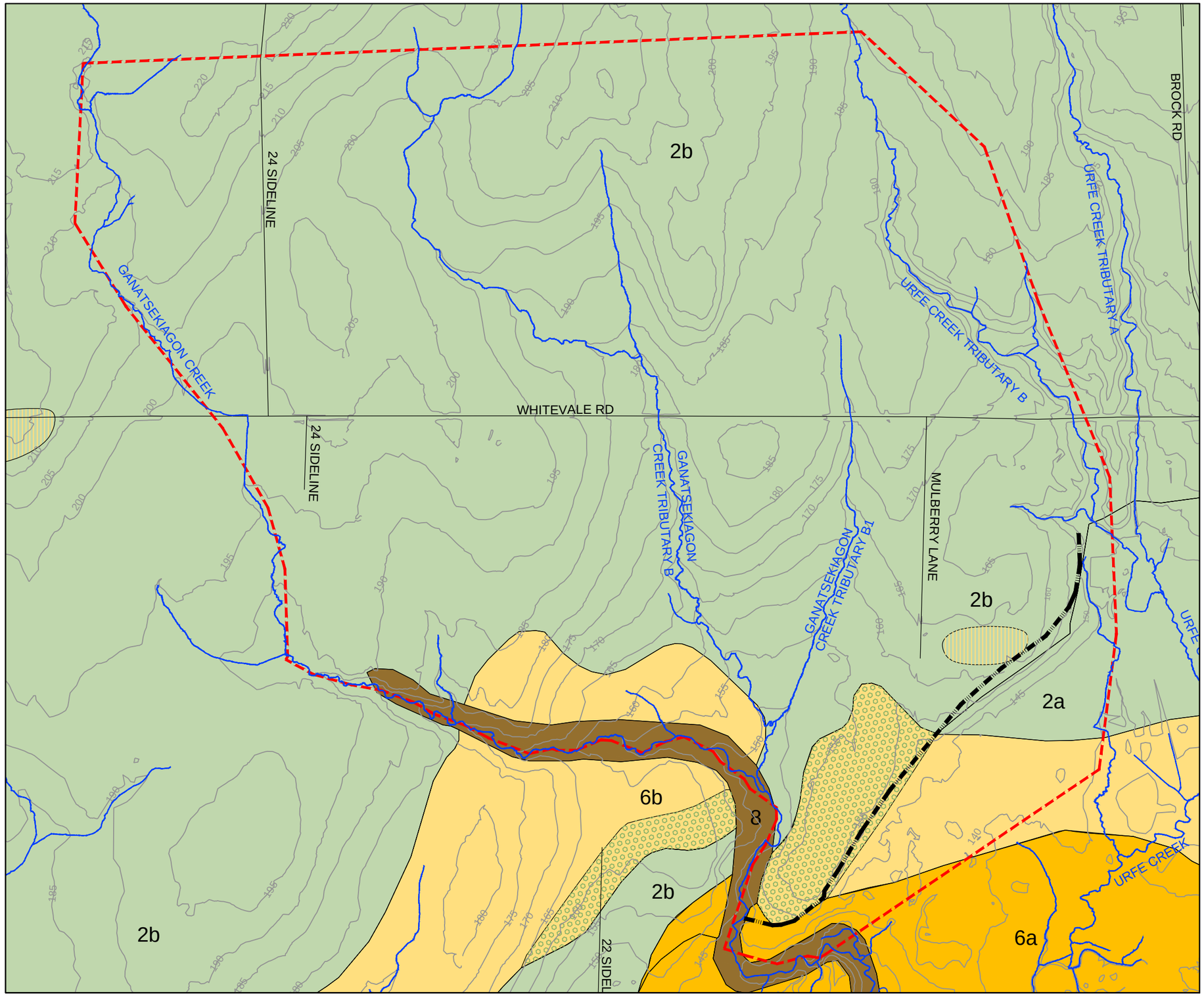


FIGURE 3

SEATON NEIGHBOURHOOD 19
REGION OF DURHAM
HYDROGEOLOGICAL STUDY

SURFICIAL GEOLOGY

LEGEND

- NEIGHBOURHOOD 19 BOUNDARY
- WATERCOURSE
- TOPOGRAPHICAL CONTOUR (masl - 5m intervals)
- ROADWAY
- IROQUOIS SHORELINE

SURFICIAL GEOLOGY

- 2a: Newmarket Till: sandy silt to silty sand till
- 2b: Halton Till: sandy silt facies
- 5: Silt, clay
- 6a: Gravel, gravelly sand
- 6b: Sand, silty sand
- 8: Modern alluvial - sand, gravel, silt
- 9: Organic deposits
- 10: Man-made deposits - landfill
- Re-interpreted area of till based on Borehole logs
- Re-interpreted area of sand (0.5 to 5.0m thick) based on Borehole logs

Data Reference: Ontario Geological Survey 2003. Surficial Geology of Southern Ontario; Miscellaneous Release - Data 128

N

0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8

Kilometres

August 2013
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Datum: NAD83

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Verified by: J. Thompson

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Plot Time: Aug 16, 2013 - 9:55am

FIGURE 4

SEATON NEIGHBOURHOOD 19
REGION OF DURHAM
HYDROGEOLOGICAL STUDY

BOREHOLE, WELL AND CROSS-SECTION LOCATIONS

LEGEND

- NEIGHBOURHOOD 19 BOUNDARY
- WATERCOURSE
- TOPOGRAPHICAL CONTOUR (masl - 5m intervals)
- TOPOGRAPHICAL CONTOUR (masl - 1m intervals)
- ROADWAY
- NATURAL HERITAGE SYSTEM
- TRCA WETLANDS (WITHIN NHS)
- CPDP WETLANDS (WITHIN NHS)
- BOREHOLE (TROW / EXP)
- BOREHOLE (AME)
- BOREHOLE (GOLDER)
- BOREHOLE (SOIL ENGINEERS)
- MOE WELL RECORD
- MONITORING WELL (AME)
- MONITORING WELL (V.A. WOODS)
- MONITORING WELL (DILLON)
- MONITORING WELL (TROW / EXP)
- MONITORING WELL (GOLDER)
- MONITORING WELL (SOIL ENGINEERS)
- PICKERING OBSERVATION WELL
- MONITORING WELL (SPL)
- BOREHOLE (SPL)
- 59 PROPOSED SWMF
- 14 PROPOSED SERVICING CROSSING
- A A' CROSS-SECTION LOCATION KEY

N

0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8
Kilometres

August 2013
Project Number: PEB019877.0000

Projection: UTM 17N
Datum: NAD83

Prepared by: S. Ker

Verified by: J. Thompson

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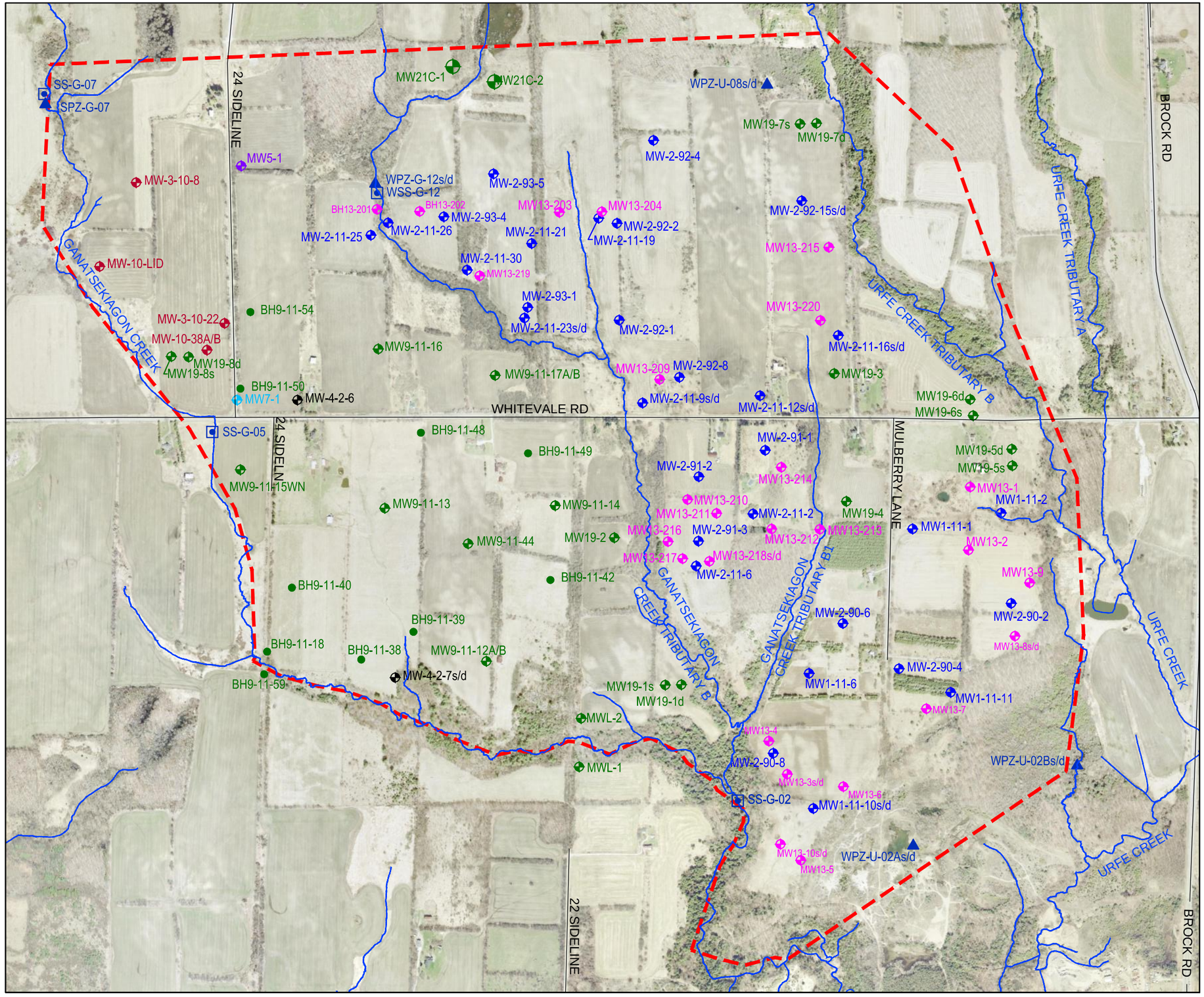
019877 HG STUDY DRAWING SET.dwg

Plot Time: Aug 22, 2013 - 1:49pm

FIGURE 5

SEATON NEIGHBOURHOOD 19
REGION OF DURHAM
HYDROGEOLOGICAL STUDY

MONITORING LOCATIONS



LEGEND

- NEIGHBOURHOOD 19 BOUNDARY
- WATERCOURSE
- ROADWAY
- MONITORING WELL (AME)
- MONITORING WELL (V.A. WOODS)
- MONITORING WELL (EXP / TROW)
- MONITORING WELL (GOLDER)
- MONITORING WELL (SOIL ENGINEERS)
- PICKERING OBSERVATION WELL
- BOREHOLE WITH STANDPIPE (GOLDER)
- MONITORING WELL (SPL)
- STAFF GAUGE: WSS = IN WETLAND SS = IN STREAM
- PIEZOMETER: WPZ = IN WETLAND SPZ = IN STREAM

N

0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8

Kilometres

August 2013
Project Number: PEB019877.0000

Projection: UTM 17N
Datum: NAD83

Prepared by: S. Ker

Verified by: J. Thompson

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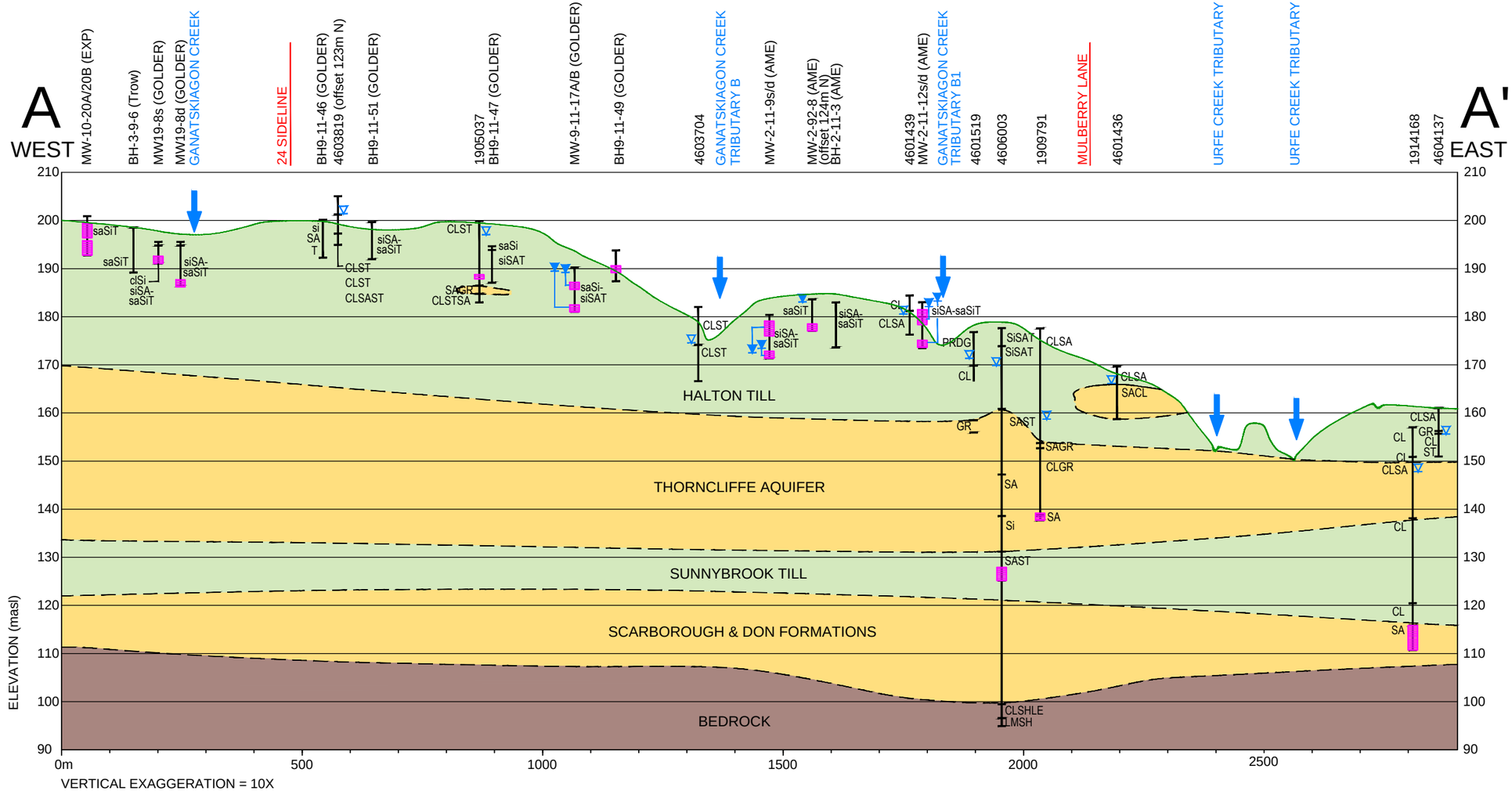


VERTICAL EXAGGERATION = 10X

NOTE: STRATIGRAPHY CONTACTS INFERRED FROM MESP MODEL SECTIONS

LEGEND

4901807 BH11-2 — BOREHOLE WELL NUMBER / MOE WELL RECORD NUMBER

WELL

CLGR — GEOLOGICAL STRATIGRAPHY

STATIC WATER LEVEL (REPORTED ON MOE WELL RECORD)

MEASURED WATER LEVEL (NOVEMBER 2011)

WELL SCREEN

CLAY / SILT / TILL

SAND / GRAVEL

BEDROCK (Source: Bedrock topography and overburden thickness mapping, southern Ontario: Ontario Geological Survey, Miscellaneous Release - Data 207.)

INTERPRETED GEOLOGICAL CONTACT

WATERCOURSE CROSSING

sa	sandy	SA	Sand
si	silty	CL	Clay
cl	clayey	Si	Silt
gr	gravelly	GR	Gravel
T	Till	STN	Stones
F	Fill	BLD	Boulder
PRDG	Predug	SHLE	Shale

August 2013
Project Number: PEB019877.000

Prepared by: S. Ker

Projection: UTM 17N
Datum: NAD83

Verified by: J. Shaw

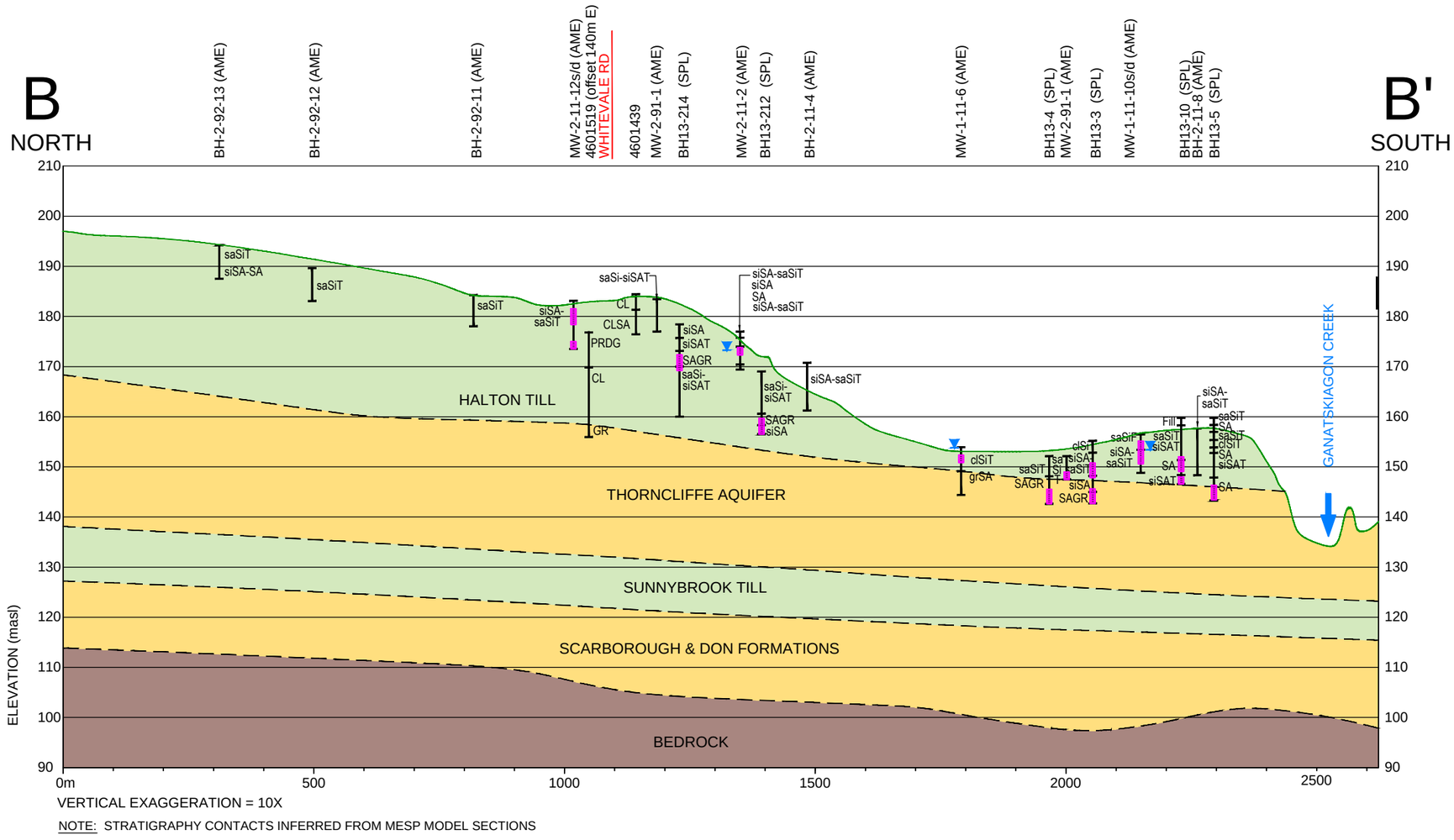
FIGURE 6

SEATON NEIGHBOURHOOD 19
REGION OF DURHAM
HYDROGEOLOGICAL STUDY

SCHEMATIC CROSS-SECTION A-A'

BURNSIDE

019877 HG STUDY DRAWING SET.dwg



NOTE: STRATIGRAPHY CONTACTS INFERRED FROM MESP MODEL SECTIONS

LEGEND

4901807 BH11-2 — BOREHOLE WELL NUMBER / MOE WELL RECORD NUMBER

WELL

CLGR — GEOLOGICAL STRATIGRAPHY

STATIC WATER LEVEL (REPORTED ON MOE WELL RECORD)

MEASURED WATER LEVEL (NOVEMBER 2011)

WELL SCREEN

- CLAY / SILT / TILL
- SAND / GRAVEL
- BEDROCK (Source: Bedrock topography and overburden thickness mapping, southern Ontario: Ontario Geological Survey, Miscellaneous Release - Data 207.)

INTERPRETED GEOLOGICAL CONTACT

WATERCOURSE CROSSING

sa	sandy	SA	Sand
si	silty	CL	Clay
cl	clayey	Si	Silt
gr	gravelly	GR	Gravel
T	Till	STN	Stones
F	Fill	BLD	Boulder
PRDG	Predug	SHLE	Shale

August 2013
Project Number: PEB019877.000

Prepared by: S. Ker

Projection: UTM 17N
Datum: NAD83

Verified by: J. Shaw

FIGURE 7

SEATON NEIGHBOURHOOD 19
REGION OF DURHAM
HYDROGEOLOGICAL STUDY

SCHEMATIC CROSS-SECTION B-B'

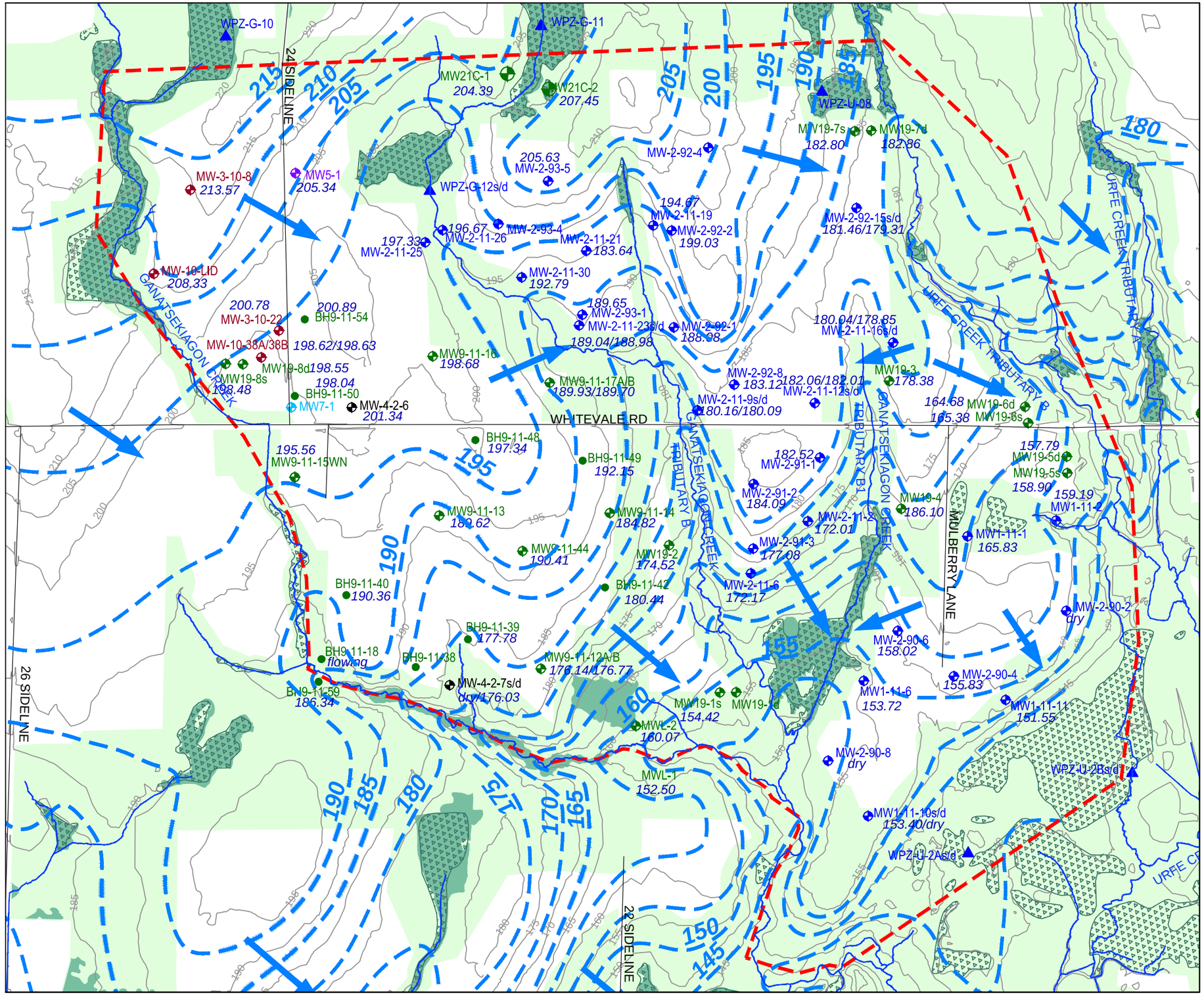
BURNSIDE

019877 HG STUDY DRAWING SET.dwg

FIGURE 8

SEATON NEIGHBOURHOOD 19
REGION OF DURHAM
HYDROGEOLOGICAL STUDY

INTERPRETED GROUNDWATER FLOW



LEGEND

- NEIGHBOURHOOD 19 BOUNDARY
- WATERCOURSE
- TOPOGRAPHICAL CONTOUR (masl - 5m intervals)
- ROADWAY
- NATURAL HERITAGE SYSTEM
- TRCA WETLANDS (WITHIN NHS)
- CPDP WETLANDS (WITHIN NHS)
- MONITORING WELL (AME)
- MONITORING WELL (V.A. WOODS)
- MONITORING WELL (EXP)
- MONITORING WELL (GOLDER)
- MONITORING WELL (SOIL ENGINEERS)
- PICKERING OBSERVATION WELL
- PIEZOMETER: WPZ = IN WETLAND SPZ = IN STREAM
- 160.00 MEASURED GROUNDWATER LEVEL (masl - November 2011)
- INTERPRETED GROUNDWATER CONTOUR
- INTERPRETED GROUNDWATER FLOW DIRECTION

N

0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8

Kilometres

August 2013
Project Number: PEB019877.0000

Projection: UTM 17N
Datum: NAD83

Prepared by: S. Ker

Verified by: J. Thompson

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019877 HG STUDY DRAWING SET.dwg

Plot Time: Aug 16, 2013–12:15pm

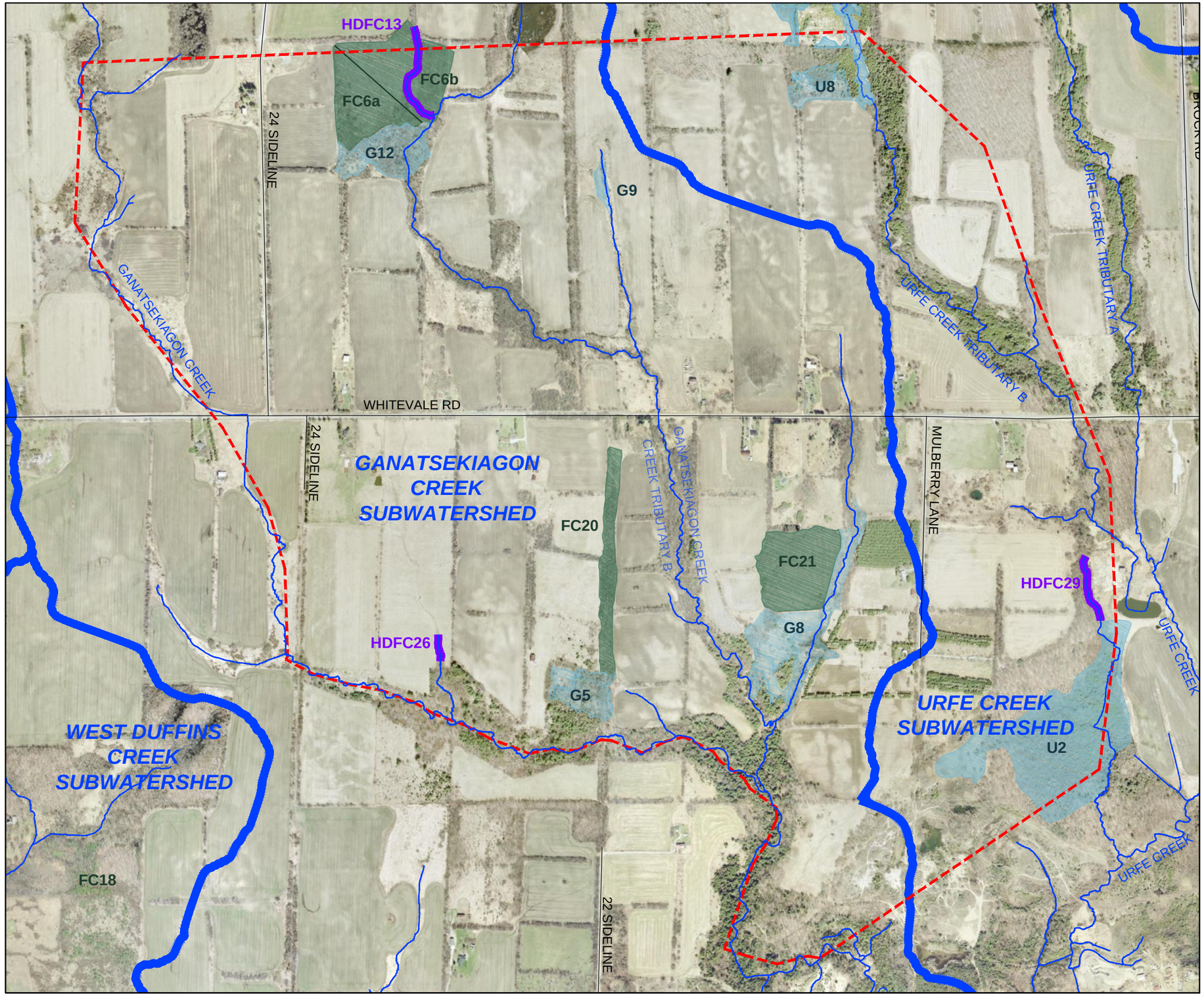

FIGURE 9

SEATON NEIGHBOURHOOD 19
REGION OF DURHAM
HYDROGEOLOGICAL STUDY

FEATURES REQUIRING WATER AUGMENTATION

LEGEND

- NEIGHBOURHOOD 19 BOUNDARY
- WATERCOURSE
- ROADWAY
- WOODLAND
- WETLAND
- SUBWATERSHED BOUNDARY
- HEADWATER DRAINAGE FEATURE

N

0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8

Kilometres

August 2013
Project Number: PEB019877.0000

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Datum: NAD83

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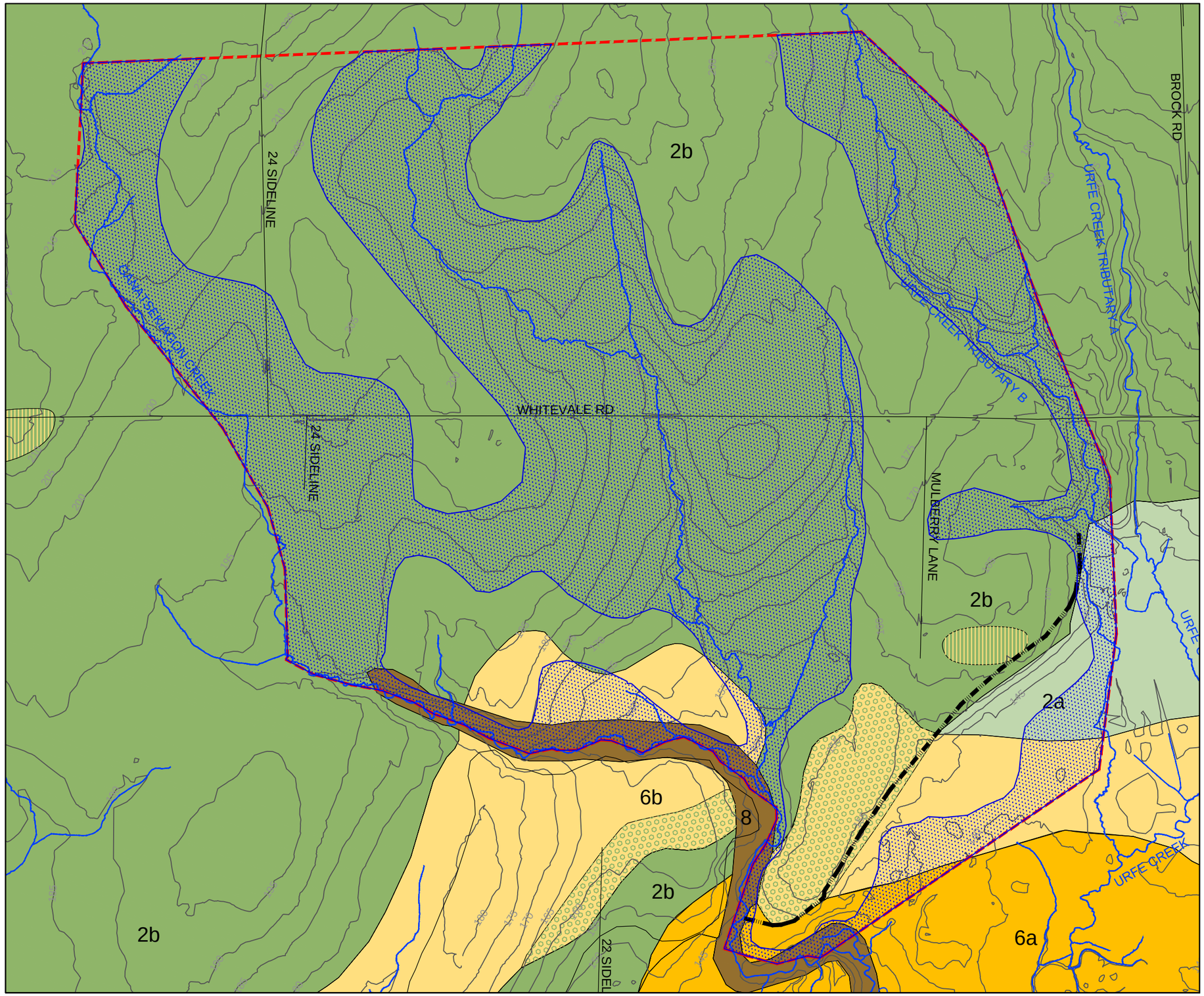
Plot Time: Aug 16, 2013 - 12:23pm

FIGURE 10

SEATON NEIGHBOURHOOD 19
REGION OF DURHAM
HYDROGEOLOGICAL STUDY

INTERPRETED AREAS OF HIGH WATER TABLE



LEGEND

- NEIGHBOURHOOD 19 BOUNDARY
- WATERCOURSE
- TOPOGRAPHICAL CONTOUR (masl - 5m intervals)
- ROADWAY
- IROQUOIS SHORELINE
- INTERPRETED AREAS OF HIGH WATER TABLE (<1.0m BELOW EXISTING GRADE; SEASONAL AND/OR ANNUAL)

SURFICIAL GEOLOGY

- 2a: Newmarket Till: sandy silt to silty sand till
- 2b: Halton Till: sandy silt facies
- 5: Silt, clay
- 6a: Gravel, gravelly sand
- 6b: Sand, silty sand
- 8: Modern alluvial - sand, gravel, silt
- 9: Organic deposits
- 10: Man-made deposits - landfill
- Re-interpreted area of till based on Borehole logs
- Re-interpreted area of sand (0.5 to 5.0m thick) based on Borehole logs

Data Reference: Ontario Geological Survey 2003. Surficial Geology of Southern Ontario; Miscellaneous Release - Data 128

N

0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8

Kilometres

August 2013
Project Number: PEN019877.0000

Projection: UTM 17N
Datum: NAD83

Prepared by: S. Ker

Verified by: J. Thompson

BURNSIDE

NFSSR - SEATON NEIGHBORHOODS HWT.dwg

Plot Time: Aug 22, 2013 – 2:36pm

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Appendix N19-A

MOE Well Records

TOWNSHIP CONCESSION (LOT)	UTM[1]	DATE[2] CNTR[3]	CASING DIA[4]	WATER[5,6] DETAIL	STAT LVL/PUMP LVL[7] RATE[8]/TIME HR:MIN	WATER USE[9]	SCREEN INFO[10]	WELL # (AUDIT#) WELL TAG # DEPTHS TO WHICH FORMATIONS EXTEND[5,11]
PICKERING TOWN CON 04(017)	17 653707 4861979[L]	2001/03 7118	06	FR 0075 FR 0085	008 / 019 010 / 2:30	DO	0080 04	1915049 (227259) BLCK LOAM SOFT 0002 BRWN FSND SOFT 0021 GREY SILT FSND SOFT 0070 GREY MSND FGVL HARD 0075 GREY FGVL MSND DNSE 0080 GREY CLAY GRVL HARD 0081 GREY GRVL FSND DNSE 0085
PICKERING TOWN CON 04(017)	17 653253 4861464[W]	1993/04 1673	06	FR 0066	020 / 061 005 / 2:0	DO	0063 03	1912396 (104031) LOAM 0001 SAND CLAY 0021 CLAY GRVL 0047 SILT CLAY 0061 SAND GRVL 0066
PICKERING TOWN CON 04(017)	17 653707 4861979[L]	2001/05 2662						1915281 (228797)
PICKERING TOWN CON 04(017)	17 653601 4862526[W]	1966/10 5412	30	FR 0026	008 / 002 / :0	DO		4601425 () LOAM 0001 BRWN CLAY 0010 BLUE CLAY 0026 BLUE CLAY MSND 0032
PICKERING TOWN CON 04(018)	17 653638 4860969[W]	1995/07 6874	30	FR	/ 025 005 / 1:0	DO		1912509 (160722) BRWN CLAY 0023 0025
PICKERING TOWN CON 04(018)	17 653317 4861847[L]	2002/03 6974	30			DO		1915756 (244607)
PICKERING TOWN CON 04(018)	17 653317 4861847[L]	2002/10 2662	06	UK 0117	-003 / 063 003 / 1:30	DO		1916326 (252340) BLCK LOAM 0001 BRWN SAND 0009 BRWN SAND GRVL 0018 BRWN CLAY SNDY GRVL 0020 GREY CLAY SNDY GRVL 0051 GREY SILT GRVL SAND 0067 RED GRNT SILT CLAY 0070 GREY CLAY 0082 GREY CLAY GRVL 0084 GREY CLAY 0114 GREY SAND WBRG 0115 BLCK SHLE 0118 BLCK SHLE 0168
PICKERING TOWN CON 04(018)	17 653317 4861847[L]	2001/08 1413	08 06	FR 0142	/ 040 050 / 1:0	DO	0137 05	1915358 (229806) BRWN CLAY HARD 0015 GREY CLAY HARD 0132 GREY FSND 0142
PICKERING TOWN CON 04(018)	17 653317 4861848[L]	2001/05 7118						1915155 (232621)
PICKERING TOWN CON 04(018)	17 653317 4861848[L]	2001/05 7118						1915157 (232638)
PICKERING TOWN CON 04(018)	17 653317 4861847[L]	2001/03 2662	06	FR 0050	023 / 024 007 / 1:30	DO		1915262 (228268) BLCK LOAM 0001 BRWN CLAY SNDY GRVL 0010 BRWN GRVL SAND 0030 GREY CLAY SNDY 0041 BRWN GRVL SAND 0050
PICKERING TOWN CON 04(018)	17 653317 4861847[L]	2001/02 2662	08 06 08	UK 0125	-002 / 035 / 1:0	DO	0122 03	1915271 (228244) BLCK LOAM 0001 BRWN CLAY SNDY LOOS 0015 GREY CLAY STNS HARD 0045 GREY CLAY 0123 GREY CLAY STNS 0125 GREY CSND 0126 GREY CLAY 0127

TOWNSHIP CONCESSION (LOT)	UTM[1]	DATE[2] CNTR[3]	CASING DIA[4]	WATER[5,6] DETAIL	STAT LVL/PUMP LVL[7] RATE[8]/TIME HR:MIN	WATER USE[9]	SCREEN INFO[10]	WELL # (AUDIT#) WELL TAG # DEPTHS TO WHICH FORMATIONS EXTEND[5,11]
PICKERING TOWN CON 04(018)	17 653317 4861847[L]	2001/02 2662	06 10	FR 0038	003 / 008 005 / 2:0	DO	0032 03	1915275 (228249) BLCK LOAM 0002 BRWN CLAY STNS 0009 GREY CLAY SLTY 0012 GREY SAND GRVL SLTY 0018 GREY CLAY SLTY 0027 GREY CLAY SOFT 0031 GREY SAND GRVL 0038 CLAY SLTY 0039
PICKERING TOWN CON 04(018)	17 653317 4861848[L]	2001/02 7118	06	FR 0090	016 / 081 010 / 2:0	DO		1914990 (227253) BRWN LOAM 0001 BRWN SAND FGVL 0009 GREY SAND FGVL 0025 GREY BLDR 0027 GREY SAND CLAY THIK 0032 GREY GRVL FSND 0090 GREY GRVL 0091
PICKERING TOWN CON 04(018)	17 653475 4860943[W]	1977/07 1845	06	FR 0079	013 / 021 012 / 1:0	DO		1905482 () PRDG 0009 BRWN SAND CLAY PCKD 0017 GREY CLAY SAND STNS 0065 GREY SAND CLAY PCKD 0078 GREY SHLE PCKD 0079
PICKERING TOWN CON 04(018)	17 653317 4861847[L]	2001/12 2662	06 06	UK 0078	010 / 037 012 / 1:45	DO	0074 04	1915589 (236666) BRWN LOAM 0001 BRWN SAND LOAM 0006 BRWN CLAY SNDY 0014 GREY CLAY SNDY 0031 GREY SAND SILT 0062 GREY CLAY STNS 0069 BRWN SAND GRVL WBRG 0078 GREY CLAY GRVL 0078
PICKERING TOWN CON 04(018)	17 653317 4861848[L]	2001/05 7118	06	FR 0070	013 / 064 010 / 2:0	DO		1915051 (215917) BRWN LOAM 0001 BRWN SAND CLAY 0012 GREY CLAY THIK 0021 GREY SAND FGVL 0070 GREY GRVL CSND 0074
PICKERING TOWN CON 04(018)	17 653317 4861847[L]	2002/01 3367	06	FR 0061	016 / 047 008 / 2:30	DO	0057 04	1915633 (241022) BRWN LOAM LOOS 0002 BRWN CLAY GRVL STNS 0010 GREY CLAY GRVL PCKD 0030 GREY SAND CLAY GRVL 0057 GREY SAND LOOS 0061
PICKERING TOWN CON 04(018)	17 653317 4861847[L]	2001/07 2662						1915280 (228354)
PICKERING TOWN CON 04(018)	17 653317 4861847[L]	2002/03 6974				DO		1915744 (244621)
PICKERING TOWN CON 04(018)	17 653317 4861847[L]	2002/03 6974	36			NU		1915755 (244609)
PICKERING TOWN CON 04(018)	17 653317 4861847[L]	2002/03 1413				DO		1915794 (241494)
PICKERING TOWN CON 04(018)	17 653681 4860836[W]	1963/09 5412		FR 0050		NU		4601429 () MSND STNS 0004 BRWN CLAY STNS 0014 BLUE CLAY STNS 0026 BLUE CLAY 0050 BLUE CLAY MSND 0051 BLUE CLAY 0065
PICKERING TOWN CON 04(018)	17 653570 4861053[W]	1960/10 5412	30	FR 0016	006 / 001 / :0	DO		4601427 () YLLW MSND 0004 GRVL 0005 BLUE CLAY 0016 GREY CLAY 0022

TOWNSHIP CONCESSION (LOT)	UTM[1]	DATE[2] CNTR[3]	CASING DIA[4]	WATER[5,6] DETAIL	STAT LVL/PUMP LVL[7] RATE[8]/TIME HR:MIN	WATER USE[9]	SCREEN INFO[10]	WELL # (AUDIT#) WELL TAG # DEPTHS TO WHICH FORMATIONS EXTEND[5,11]
PICKERING TOWN CON 04(018)	17 653055 4862843[W]	1971/09 1556	30	FR 0030	025 / 038 001 / 1:0	DO		4604845 () BLCK LOAM 0001 BRWN CLAY MSND BLDR 0010 BRWN MSND BLDR 0015 BRWN CLAY STNS 0024 BLUE CLAY BLDR 0030 BLUE CLAY GRVL 0034 BLUE CLAY BLDR 0039
PICKERING TOWN CON 04(018)	17 653317 4861847[L]	2001/12 3367						1915529 (241007)
PICKERING TOWN CON 04(018)	17 653317 4861848[L]	2001/02 7118	06	FR 0070	013 / 064 010 / 2:0	DO		1914991 (215228) BRWN LOAM 0001 BRWN FSND CLAY SOFT 0009 BRWN CSND GRVL HARD 0018 GREY CLAY GRVL HARD 0021 BRWN FSND FGVL HARD 0032 GREY FSND CLAY DNSE 0054 GREY FSND GRVL DNSE 0070 GREY GRVL 0074
PICKERING TOWN CON 04(018)	17 653317 4861847[L]	2001/12 3367	06	FR 0129	040 / 080 015 / 2:0	DO	0126 03	1915526 (241002) BRWN LOAM SOFT 0003 BRWN GRVL SAND CLAY 0035 GREY SAND CLAY SOFT 0080 GREY CLAY DNSE 0085 GREY CLAY GRVL PCKD 0126 BRWN CSND WBRG LOOS 0129
PICKERING TOWN CON 04(018)	17 653317 4861847[L]	2002/03 3367				DO		1915694 (241059)
PICKERING TOWN CON 04(018)	17 653317 4861847[L]	2002/03 3367						1915686 (241055)
PICKERING TOWN CON 04(018)	17 653737 4860897[W]	1995/11 6874	36	FR	003 / 012 010 / 1:30	DO		1912637 (158058)
PICKERING TOWN CON 04(018)	17 653317 4861847[L]	2002/04 3367				DO		1915922 (241083)
PICKERING TOWN CON 04(018)	17 653317 4861847[L]	2002/03 2662						1915911 (236740)
PICKERING TOWN CON 04(018)	17 653317 4861848[L]	2001/05 7118						1915156 (232637)
PICKERING TOWN CON 04(018)	17 653317 4861848[L]	2001/05 7118						1915154 (232639)
PICKERING TOWN CON 04(018)	17 653835 4860703[W]	1964/10 5412	30	FR 0018 FR 0015	010 / 001 / :0	DO		4601431 () LOAM 0001 FSND 0006 BLUE CLAY STNS 0018 FSND 0025
PICKERING TOWN CON 04(018)	17 653433 4860809[W]	1965/11 2610	30	FR 0017	012 / 002 / :0	PS		4601432 () BRWN CLAY GRVL 0009 GRVL 0019 CSND 0022
PICKERING TOWN CON 04(018)	17 653931 4860833[W]	1963/11 2306	06 06	FR 0105	015 / 109 / 2:0	DO		4601430 () PRDG 0045 MSND CLAY 0081 SHLE 0090 LMSN 0109

TOWNSHIP CONCESSION (LOT)	UTM[1]	DATE[2] CNTR[3]	CASING DIA[4]	WATER[5,6] DETAIL	STAT LVL/PUMP LVL[7] RATE[8]/TIME HR:MIN	WATER USE[9]	SCREEN INFO[10]	WELL # (AUDIT#) WELL TAG # DEPTHS TO WHICH FORMATIONS EXTEND[5,11]
PICKERING TOWN CON 04(018)	17 653619 4860977[W]	1961/02 5412	30	FR 0022	022 / 001 / :0	DO		4601428 () PRDG 0022 QSND 0031
PICKERING TOWN CON 04(018)	17 653553 4861060[W]	1960/10 5412	30	FR 0005 FR 0028	008 / 002 / :0	DO		4601426 () LOAM 0001 YLLW MSND 0005 GRVL 0006 BLUE CLAY 0028 GRVL 0030
PICKERING TOWN CON 04(018)	17 653317 4861847[L]	2001/05 2662				NU		1915294 (228290)
PICKERING TOWN CON 04(018)	17 653024 4862207[W]	1965/09 5412	30	FR 0005	005 / 003 / :0	DO		4601433 () BRWN CLAY 0005 CSND 0015
PICKERING TOWN CON 04(019)	17 652927 4861717[L]	2001/06 2662				NU		1915290 (228318)
PICKERING TOWN CON 04(019)	17 652927 4861717[L]	2002/02 2662				NU		1915897 (236745)
PICKERING TOWN CON 04(019)	17 652927 4861718[L]	2000/12 2662	06	FR 0078	011 / 037 006 / 3:0	DO	0075 03	1914967 (216682) BRWN SAND GRVL 0006 BRWN SAND WBRG 0014 GREY CLAY SLTY 0044 GREY CLAY SNDY GRVL 0075 GREY SAND WBRG 0079 GREY CLAY SNDY GRVL 0080
PICKERING TOWN CON 04(019)	17 652929 4861718[L]	1999/04 6874	30	FR 0016	016 / 023 025 / 2:30	DO		1913994 (199685) BRWN SAND 0023
PICKERING TOWN CON 04(019)	17 652775 4862712[W]	1996/04 6874	30	FR 0020	015 / 022 025 / 1:0	DO		1912809 (158041)
PICKERING TOWN CON 04(019)	17 653392 4860838[W]	1962/05 5420	34	FR 0008 FR 0015	010 / / :0	DO		4601434 () LOAM 0001 FSND 0008 BLUE CLAY 0028
PICKERING TOWN CON 04(019)	17 652715 4862713[W]	1969/08 2214	30	FR 0017	017 / 025 004 / 1:0	DO		4604137 () BLCK LOAM 0002 BRWN CLAY MSND 0015 GRVL 0017 BLUE CLAY STNS 0033
PICKERING TOWN CON 04(019)	17 652927 4861717[L]	2001/02 2662	06	FR 0118	027 / 027 006 / 1:45	DO		1915269 (228253) BLCK LOAM 0002 BRWN SAND STNS 0023 GREY CLAY SLTY 0050 GREY CLAY SNDY GRVL 0102 GREY SAND WBRG 0105 GREY GRVL WBRG 0118
PICKERING TOWN CON 04(019)	17 652927 4861717[L]	2001/09 2662						1915583 (228396)
PICKERING TOWN CON 04(019)	17 652927 4861717[L]	2001/07 2662	06	UK 0055	016 / 038 003 / 4:0	DO	0052 03	1915587 (228341) BLCK LOAM 0002 BRWN SAND GRVL 0005 BRWN CLAY SNDY GRVL 0011 GREY CLAY SNDY GRVL 0048 GREY SAND GRVL SILT 0055
PICKERING TOWN CON 04(019)	17 652927 4861717[L]	2002/03 3136						1915675 (242092)

TOWNSHIP CONCESSION (LOT)	UTM[1]	DATE[2] CNTR[3]	CASING DIA[4]	WATER[5,6] DETAIL	STAT LVL/PUMP LVL[7] RATE[8]/TIME HR:MIN	WATER USE[9]	SCREEN INFO[10]	WELL # (AUDIT#) WELL TAG # DEPTHS TO WHICH FORMATIONS EXTEND[5,11]
PICKERING TOWN CON 04(019)	17 652927 4861717[L]	2001/06 2662				NU		1915287 (228319)
PICKERING TOWN CON 04(020)	17 652689 4862658[W]	1999/06 5459	06 10					1914169 (195505)
PICKERING TOWN CON 04(020)	17 652687 4862658[W]	1999/06 5459	06	FR 0134	030 / 088 020 / 8:0		0135 15	1914168 (195506) BRWN CLAY 0020 GREY CLAY SOFT 0024 GREY CLAY SAND 0062 GREY CLAY HARD 0120 BLCK CLAY HARD 0134 GREY SAND 0152
PICKERING TOWN CON 04(020)	17 652534 4861583[L]	2002/02 2662	06 06	UK 0150	-004 / 003 015 / 1:20	DO	0147 03	1915892 (236748) BLCK LOAM 0001 BRWN CLAY STNS 0050 GREY CLAY STNS 0146 BRWN SAND GRVL WBRG 0150
PICKERING TOWN CON 04(020)	17 652534 4861583[L]	2002/03 6974				DO		1915754 (244611)
PICKERING TOWN CON 04(020)	17 652534 4861583[L]	2001/02 7118	06	FR 0028 FR 0160 FR 0086	002 / 007 010 / 2:0	DO	0159 04	1914993 (227255) BLCK LOAM 0001 BRWN FSND STNS LOOS 0028 BRWN CSND GRVL DNSE 0033 BRWN CSND DNSE 0057 GREY FSND SILT SOFT 0086 GREY FSND CLAY SILT 0125 GREY CLAY GRVL LYRD 0140 GREY CLAY FSND SILT 0157 GREY CLAY HARD 0160 GREY CSND GRVL SOFT 0164
PICKERING TOWN CON 04(020)	17 652688 4862658[W]	1999/06 5459	06					1914170 (195504)
PICKERING TOWN CON 04(020)	17 652904 4860580[W]	1996/08 6874	30	FR 0018	008 / 024 025 / 1:30	DO		1912925 (165204)
PICKERING TOWN CON 04(020)	17 652534 4861583[L]	2001/10 3136	06	FR 0040	026 / 035 008 / 1:0	DO	0042 05	1915381 (234021) BRWN SAND CLAY 0033 BRWN MSND 0047 GREY CLAY HARD 0047
PICKERING TOWN CON 04(020)	17 652975 4860394[W]	1995/09 6874	30	FR	012 / 022 010 / 1:0	DO		1912562 (160734)
PICKERING TOWN CON 04(021)	17 652139 4861444[L]	2002/03 2662						1915906 (236739)
PICKERING TOWN CON 04(021)	17 651955 4862403[W]	1989/03 4743	06	FR 0128	039 / 080 008 / 5:30	DO	0128 03	1909791 (54738) BRWN LOAM 0009 GREY CLAY SAND HARD 0078 BRWN SAND GRVL 0082 GREY CLAY GRVL HARD 0128 BLCK SAND LOOS 0131
PICKERING TOWN CON 04(021)	17 652139 4861444[L]	2001/08 4102						1915319 (233243)

TOWNSHIP CONCESSION (LOT)	UTM[1]	DATE[2] CNTR[3]	CASING DIA[4]	WATER[5,6] DETAIL	STAT LVL/PUMP LVL[7] RATE[8]/TIME HR:MIN	WATER USE[9]	SCREEN INFO[10]	WELL # (AUDIT#) WELL TAG # DEPTHS TO WHICH FORMATIONS EXTEND[5,11]
PICKERING TOWN CON 04(021)	17 652139 4861444[L]	2001/11 2662	06 06	UK 0147	046 / 068 005 / 1:50	DO	0143 04	1915588 (236657) BLCK LOAM 0001 BRWN CLAY GRVL 0019 GREY CLAY GRVL HARD 0062 BRWN SILT SAND 0068 GREY CLAY SILT 0076 GREY SILT 0143 GREY SAND 0147
PICKERING TOWN CON 04(021)	17 652139 4861444[L]	2002/03 3367						1915687 (241060)
PICKERING TOWN CON 04(021)	17 652139 4861444[L]	2001/05 2662						1915289 (228800)
PICKERING TOWN CON 04(021)	17 652072 4862199[W]	1966/08 2610						4601437 () GRVL 0011 CLAY STNS 0030
PICKERING TOWN CON 04(021)	17 652552 4860401[W]	1998/07 6874	30	FR 0030	018 / 030 035 / 2:0	DO		1914129 (199707) UNKN CMTD 0012 UNKN 0030
PICKERING TOWN CON 04(021)	17 652114 4862101[W]	1966/09 5420	34	FR 0030 FR 0045	018 / / :0	DO		4601438 () LOAM 0001 BRWN CLAY 0008 GRVL STNS 0015 BLUE CLAY 0028 MSND 0032 CLAY 0045 MSND 0046
PICKERING TOWN CON 04(021)	17 652118 4862405[W]	1962/06 5420	34	FR 0018	012 / / :0	ST DO		4601436 () LOAM 0001 YLLW CLAY 0012 BLUE MSND CLAY 0036
PICKERING TOWN CON 04(021)	17 652139 4861444[L]	2001/03 2662	06 06	FR 0145	/ 006 005 / 2:0	DO	0142 03	1915257 (228279) BRWN LOAM SOFT 0002 BRWN CLAY SAND STNS 0014 GREY CLAY PCKD 0085 BRWN SAND LOOS 0087 GREY CLAY DNSE 0130 GREY CLAY MSND PCKD 0141 BRWN SAND WBRG LOOS 0145
PICKERING TOWN CON 04(021)	17 652139 4861444[L]	2002/03 3367	06	FR 0073	/ 020 / 10:0	DO	0069 04	1915691 (241039) BRWN LOAM SOFT 0002 BRWN SAND PCKD 0020 BRWN GRVL SAND PCKD 0030 GREY CLAY GRVL PCKD 0069 BRWN CSND CGVL WBRG 0073
PICKERING TOWN CON 04(021)	17 652139 4861444[L]	2002/03 3367	06	FR 0102	005 / 005 020 / 2:0	DO	0099 03	1915923 (241068) BLCK LOAM 0002 BRWN SAND 0030 GREY CLAY GRVL 0070 GREY SAND GRVL 0099 GREY GRVL CSND 0102
PICKERING TOWN CON 04(021)	17 652139 4861444[L]	2002/03 3367						1915693 (241061)
PICKERING TOWN CON 04(021)	17 652381 4860425[W]	1999/05 6874	36	FR 0021	021 / 026 025 / 2:0	DO		1914019 (199693) BRWN SAND 0026
PICKERING TOWN CON 04(021)	17 651691 4862332[W]	1966/08 5412	30	FR 0013	012 / 002 / :0	DO		4601439 () LOAM 0001 BRWN CLAY 0010 BLUE CLAY MSND 0026

TOWNSHIP CONCESSION (LOT)	UTM[1]	DATE[2] CNTR[3]	CASING DIA[4]	WATER[5,6] DETAIL	STAT LVL/PUMP LVL[7] RATE[8]/TIME HR:MIN	WATER USE[9]	SCREEN INFO[10]	WELL # (AUDIT#) WELL TAG # DEPTHS TO WHICH FORMATIONS EXTEND[5,11]
PICKERING TOWN CON 04(022)	17 651741 4861299[L]	2001/02 2662	06 06	FR 0082	031 / 057 004 / 2:20	DO	0078 04	1915278 (228252) BLCK LOAM 0003 BRWN CLAY SNDY GRVL 0019 GREY CLAY SNDY GRVL 0060 GREY CLAY GRVL 0077 GREY SAND GRVL WBRG 0081 GREY SAND SLTY GRVL 0084
PICKERING TOWN CON 04(022)	17 651295 4862133[W]	1968/10 3102	30	FR 0025	025 / 003 / :0	ST	0049 01	4603704 () LOAM 0002 BRWN CLAY STNS 0025 GREY CLAY STNS 0050
PICKERING TOWN CON 04(022)	17 651741 4861299[L]	2001/05 2662				NU		1915305 (228285)
PICKERING TOWN CON 04(022)	17 651741 4861300[L]	2001/05 1413				DO		1915085 (229749)
PICKERING TOWN CON 04(022)	17 651741 4861299[L]	2003/02 6974				DO		1916366 (250284)
PICKERING TOWN CON 04(022)	17 651741 4861300[L]	2001/03 1413	06	FR 0137	040 / 100 010 / 1:0	DO	0134 03	1915022 (229724) BRWN CLAY HARD 0017 GREY CLAY SILT HARD 0060 GREY CLAY HARD 0130 BLCK FSND 0137
PICKERING TOWN CON 04(022)	17 651741 4861300[L]	2001/02 1413	06	FR 0081	058 / 075 010 / 1:0	DO	0078 03	1915010 (214847) BRWN CLAY BLDR HARD 0057 BRWN SAND PCKD 0074 BLCK CGVL 0081
PICKERING TOWN CON 04(022)	17 651741 4861300[L]	2001/05 1413				DO		1915087 (229748)
PICKERING TOWN CON 04(023)	17 651340 4861161[L]	2002/03 7099				DO		1915725 (231643)
PICKERING TOWN CON 04(023)	17 651340 4861161[L]	2002/03 7099				DO		1915727 (231644)
PICKERING TOWN CON 04(023)	17 651340 4861161[L]	2001/12 7099	06 06	FR 0137	083 / 126 004 / 2:0	DO	0137 04	1915524 (231654) BRWN LOAM 0002 BRWN CSND 0017 GREY SAND GRVL HARD 0044 GREY CLAY GRVL 0085 GREY GRVL CSND 0102 GREY CLAY THIK 0115 GREY CLAY GRVL 0137 GREY CSND 0141
PICKERING TOWN CON 04(023)	17 651312 4860706[W]	1963/03 2113	06	FR 0229	055 / 218 008 / 6:30	DO	0230 04	4601440 () LOAM 0001 BRWN MSND STNS 0033 GREY CLAY STNS 0187 BRWN MSND STNS 0227 GRVL FSND 0234
PICKERING TOWN CON 04(023)	17 651343 4861161[L]	1993/02 1508				NU		1912061 (144889)
PICKERING TOWN CON 04(023)	17 651340 4861161[L]	2002/05 6974				DO		1915851 (244623)

TOWNSHIP CONCESSION (LOT)	UTM[1]	DATE[2] CNTR[3]	CASING DIA[4]	WATER[5,6] DETAIL	STAT LVL/PUMP LVL[7] RATE[8]/TIME HR:MIN	WATER USE[9]	SCREEN INFO[10]	WELL # (AUDIT#) WELL TAG # DEPTHS TO WHICH FORMATIONS EXTEND[5,11]
PICKERING TOWN CON 04(023)	17 651800 4860243[W]	1992/01 4743	06	FR 0158	003 / 135 007 / 5:0	DO	0160 03	1911412 (110965) BRWN LOAM 0001 BRWN SAND BLDR HARD 0015 BRWN CLAY UNKN 0019 GREY CLAY GRVL 0158 BLCK SAND GRVL LOOS 0163
PICKERING TOWN CON 04(023)	17 651343 4861161[L]	1993/02 1508				NU		1912060 (144888)
PICKERING TOWN CON 04(024)	17 650957 4861029[L]	2002/01 3367	06	FR 0196	050 / 090 010 / 2:30	DO	0193 03	1915512 (241010) BLCK LOAM SOFT 0003 BRWN SAND CLAY SOFT 0020 GREY CLAY GRVL STNS 0080 GREY CLAY SOFT 0123 GREY SAND GRVL PCKD 0130 GREY FSND 0144 GREY SAND CLAY PCKD 0158 GREY CLAY SOFT 0193 GREY GRVL SAND LOOS 0196
PICKERING TOWN CON 04(024)	17 650957 4861029[L]	2002/03 3367						1915690 (241056)
PICKERING TOWN CON 04(024)	17 651187 4860076[W]	1995/11 6874	48	FR	012 / 030 025 / 1:45	NU		1912639 (158056)
PICKERING TOWN CON 04(025)	17 650563 4860896[L]	1994/02 1508				NU		1912053 (149050)
PICKERING TOWN CON 04(025)	17 650218 4861807[W]	1999/07 1413	06	FR 0224	065 / 200 040 / 1:0	DO	0219 05	1914145 (202759) BRWN CLAY SOFT 0017 GREY CLAY STNS BLDR 0137 GREY CLAY DNSE 0145 BLCK CGVL LOOS 0150 GREY CLAY DNSE 0210 GREY FSND CLN 0224
PICKERING TOWN CON 04(025)	17 650563 4860896[L]	1993/02 1508				NU		1912059 (144887)
PICKERING TOWN CON 04(025)	17 650560 4860895[L]	2002/03 6974	30			DO		1915757 (244606)
PICKERING TOWN CON 04(026)	17 650177 4860759[L]	2001/07 2662						1915297 (228355)
PICKERING TOWN CON 04(026)	17 647679 4859731[W]	1997/09 6874	30		/ 025 / 2:0	DO		1913433 (180951) BLUE CLAY 0016
PICKERING TOWN CON 04(026)	17 650177 4860759[L]	2002/04 7099				DO		1915726 (231647)
PICKERING TOWN CON 04(026)	17 650180 4860759[L]	1993/01 1508				NU		1912058 (144886)
PICKERING TOWN CON 04(026)	17 650180 4860759[L]	1993/01 1508				NU		1912057 (144885)
PICKERING TOWN CON 04(026)	17 650154 4860709[W]	1966/07 5420	34	FR 0038	010 / / :0	DO		4601441 () LOAM 0001 BRWN CLAY 0010 BLUE CLAY STNS 0038 MSND 0039 BLUE CLAY 0040

TOWNSHIP CONCESSION (LOT)	UTM[1]	DATE[2] CNTR[3]	CASING DIA[4]	WATER[5,6] DETAIL	STAT LVL/PUMP LVL[7] RATE[8]/TIME HR:MIN	WATER USE[9]	SCREEN INFO[10]	WELL # (AUDIT#) WELL TAG # DEPTHS TO WHICH FORMATIONS EXTEND[5,11]
PICKERING TOWN CON 04(026)	17 650165 4860198[W]	1971/12 5459	30	FR 0030	008 / / :0	DO		4605083 () LOAM 0001 BRWN CLAY 0010 BLUE CLAY 0022 BLUE CLAY SAND 0033
PICKERING TOWN CON 04(026)	17 650177 4860759[L]	2001/11 2576	06	FR 0236	070 / 001 / 2:0	DO	0230 06	1915467 (232220) LOAM 0001 BRWN CLAY GRVL 0019 GREY CLAY SLTY GRVL 0093 GREN CLAY SOFT SILT 0147 GREY CLAY 0175 GREY SILT 0203 GREY SAND 0235 BLUE SHLE 0236
PICKERING TOWN CON 04(026)	17 650177 4860759[L]	2001/11 2576	06	FR 0214	070 / 012 / 1:30	DO	0211 03	1915466 (232219) LOAM 0001 BRWN CLAY GRVL 0014 GREY CLAY SLTY GRVL 0105 GREY CLAY SOFT 0171 GREY SILT 0198 GREY SAND GRVL WBRG 0214
PICKERING TOWN CON 04(026)	17 650177 4860759[L]	2002/03 3136						1915677 (242096)
PICKERING TOWN CON 04(026)	17 650104 4860385[W]	1996/05 6874	30	FR 0015	015 / 030 025 / 1:30	DO		1912833 (158039)
PICKERING TOWN CON 04(026)	17 650177 4860759[L]	2003/07 6974				DO		1916667 (261359)
PICKERING TOWN CON 04(026)	17 650177 4860759[L]	2001/03 2662	06 06	FR 0177	107 / 121 005 / 2:0	DO	0173 04	1915268 (228264) BLCK LOAM 0005 BRWN SAND SLTY GRVL 0022 GREY CLAY SNDY GRVL 0030 GREY CLAY SNDY GRVL 0060 GREY CLAY GRVL 0155 GREY SAND SLTY WBRG 0165 GREY SAND WBRG 0177 GREY SAND SLTY 0178
PICKERING TOWN CON 04(026)	17 650177 4860759[L]	2002/02 2662	06 06	UK 0231	081 / 150 004 / 2:5	DO	0227 04	1915900 (236752) BLCK LOAM 0001 BRWN SAND SLTY 0003 BRWN CLAY SNDY GRVL 0015 GREY SAND SLTY GRVL 0065 GREY CLAY SNDY GRVL 0102 GREY SILT CLAY GRVL 0178 GREY CLAY SILT 0188 GREY CLAY GRVL 0217 GREY CLAY SILT SAND 0225 GREY SAND GRVL 0230 GREY SHLE 0231
PICKERING TOWN CON 04(027)	17 649665 4861523[W]	1968/09 5420	05	FR 0118	075 / 135 004 / 5:0	DO	0136 04	4603761 () BRWN CLAY 0018 BLUE CLAY BLDR 0085 BLUE CLAY 0118 MSND GRVL 0136 BLCK MSND 0140
PICKERING TOWN CON 04(027)	17 649777 4860624[L]	2002/03 3136						1915679 (242099)
PICKERING TOWN CON 04(027)	17 649777 4860624[L]	2002/03 3136						1915683 (242097)
PICKERING TOWN CON 04(027)	17 649777 4860624[L]	2001/11 3136	06	FR 0091	062 / 081 008 / 1:0	DO	0103 05	1915462 (234043) BRWN LOAM 0001 BRWN CLAY STNS HARD 0012 GREY CLAY SAND GRVL 0091 BRWN FSND 0109

TOWNSHIP CONCESSION (LOT)	UTM[1]	DATE[2] CNTR[3]	CASING DIA[4]	WATER[5,6] DETAIL	STAT LVL/PUMP LVL[7] RATE[8]/TIME HR:MIN	WATER USE[9]	SCREEN INFO[10]	WELL # (AUDIT#) WELL TAG # DEPTHS TO WHICH FORMATIONS EXTEND[5,11]
PICKERING TOWN CON 05(016)	17 653045 4864883[W]	1954/11 4823	06	FR 0023 FR 0085 FR 0006	001 / 060 / :0	NU		4601493 () LOAM 0003 GRVL MSND 0006 GRVL BLDR 0009 GRVL 0023 BLDR CLAY 0032 BLUE CLAY 0065 BLCK FSND 0085 SILT MSND CLAY 0100
PICKERING TOWN CON 05(016)	17 653515 4863123[W]	1968/12 2214	30	FR 0015	015 / 020 / :0	DO		4603801 () LOAM 0001 CLAY SILT 0015 GRVL 0020 BRWN CLAY 0035
PICKERING TOWN CON 05(016)	17 653559 4863360[W]	1965/03 2610	30	FR 0018	/ 020 004 / 1:0	CO		4601494 () GRVL 0012 GREY CLAY 0018 FSND 0020
PICKERING TOWN CON 05(017)	17 652949 4863875[L]	2001/02 2662	06 06	FR 0088	029 / 038 010 / 1:30	DO	0088 04	1915270 (228261) BRWN LOAM SOFT 0002 BRWN SAND CLAY STNS 0015 GREY CLAY SAND GRVL 0020 GREY CLAY GRVL HPAN 0088 BRWN CGVL CSND LOOS 0092
PICKERING TOWN CON 05(017)	17 652949 4863875[L]	2002/03 6974				ST		1915745 (244620)
PICKERING TOWN CON 05(017)	17 653162 4863366[W]	1995/11 6874	36	FR	005 / 016 010 / 1:30	DO		1912638 (158057) BRWN SAND GRVL 0016
PICKERING TOWN CON 05(017)	17 652165 4864543[W]	1970/05 4761	06	FR 0190	070 / 085 009 / 2:30	DO		4604403 () BRWN LOAM STNS 0002 GREY CLAY GRVL 0025 BLUE CLAY 0150 CLAY MSND 0175 BLUE CLAY 0190 FSND GRVL 0194
PICKERING TOWN CON 05(017)	17 652949 4863875[L]	2001/05 2662						1915282 (228796)
PICKERING TOWN CON 05(017)	17 652949 4863875[L]	2001/11 2662	06 06	UK 0074	-002 / 034 006 / 3:0	DO	0071 03	1915590 (236659) BLCK LOAM STNS 0001 BRWN CLAY GRVL 0016 GREY CLAY GRVL 0071 GREY SAND GRVL 0074
PICKERING TOWN CON 05(018)	17 652118 4864484[W]	1998/05 1413				DO		1913627 (188781)
PICKERING TOWN CON 05(018)	17 652557 4863728[L]	2002/02 2662	06 06 10	UK 0155 UK 0076	-002 / 012 012 / 1:0	DO	0151 04	1915899 (236755) BLCK LOAM 0001 BRWN CLAY SNDY GRVL 0011 GREY CLAY SNDY GRVL 0067 GREY SAND GRVL 0076 GREY CLAY SNDY GRVL 0113 GREY SILT CLAY 0121 GREY CLAY SNDY SILT 0149 GREY SAND GRVL 0157
PICKERING TOWN CON 05(018)	17 652557 4863728[L]	2001/05 7118						1915153 (227261)
PICKERING TOWN CON 05(018)	17 652184 4864168[W]	1993/02 1673	06	FR 0054	014 / 049 005 / 2:0	DO		1912397 (104018) LOAM 0001 SAND 0027 CLAY GRVL 0051 SAND GRVL 0054
PICKERING TOWN CON 05(018)	17 652081 4864572[W]	1997/11 1413	06	FR 0132	030 / 120 030 / 1:0	DO	0129 03	1913511 (188717) BRWN LOAM SOFT 0004 BRWN SAND GRVL LOOS 0050 GREY CLAY DNSE 0105 GREY FSND 0117 GREY SAND MGRD 0132

TOWNSHIP CONCESSION (LOT)	UTM[1]	DATE[2] CNTR[3]	CASING DIA[4]	WATER[5,6] DETAIL	STAT LVL/PUMP LVL[7] RATE[8]/TIME HR:MIN	WATER USE[9]	SCREEN INFO[10]	WELL # (AUDIT#) WELL TAG # DEPTHS TO WHICH FORMATIONS EXTEND[5,11]
PICKERING TOWN CON 05(018)	17 652138 4864622[W]	1965/12 5412	30	FR 0036	/ 011 005 / :0	DO		4601501 () LOAM 0001 BRWN CLAY 0020 FSND 0033 BRWN CLAY 0036 FSND 0045 GRVL 0047
PICKERING TOWN CON 05(018)	17 652056 4864494[W]	1964/03 5412	30	FR 0046	046 / 001 / :0	DO		4601499 () BRWN CLAY 0030 BRWN CLAY MSND 0037 BRWN FSND 0038 BRWN CLAY 0046 BLUE CLAY MSND 0048 BLUE CLAY STNS 0059
PICKERING TOWN CON 05(018)	17 652055 4864531[W]	1963/09 2204	02	FR 0040	018 / 051 004 / 2:0	DO		4601498 () PRDG 0030 MSND CLAY 0040 FSND 0057
PICKERING TOWN CON 05(018)	17 652091 4864582[W]	2000/03 7085				DO		1914462 (216451)
PICKERING TOWN CON 05(018)	17 652413 4863627[W]	2001/05 1413				DO		1915083 (229753)
PICKERING TOWN CON 05(018)	17 652090 4864582[W]	2000/03 7085				DO		1914461 (216449)
PICKERING TOWN CON 05(018)	17 652557 4863728[L]	2001/03 1413	06	FR 0119	040 / 100 015 / 1:0	DO	0116 03	1915020 (229726) BRWN CLAY HARD 0017 GREY CLAY HARD 0110 BRWN FSND 0119
PICKERING TOWN CON 05(018)	17 652076 4864469[W]	1964/10 5412	30	FR 0040	005 / 001 / :0	PS		4601500 () LOAM 0002 BRWN CLAY STNS 0023 FSND 0040 CSND 0042 BLUE CLAY 0044
PICKERING TOWN CON 05(018)	17 652044 4864601[W]	1963/06 5412	30	FR 0036	036 / 003 / :0	DO		4601497 () BRWN CLAY STNS 0025 YLLW MSND 0038 GREY MSND 0042
PICKERING TOWN CON 05(018)	17 652434 4863556[W]	1961/01 4813	05	FR 0112 FR 0131	035 / 070 008 / 3:0	DO	0131 05	4601495 () BRWN LOAM 0004 BRWN CLAY 0018 GREY CLAY 0032 BLCK CLAY 0068 GRVL 0092 GREY CLAY 0112 FSND 0136
PICKERING TOWN CON 05(018)	17 652089 4864582[W]	2000/03 7085				DO		1914448 (216450)
PICKERING TOWN CON 05(018)	17 652105 4864403[W]	1971/09 2610	05	FR 0067	013 / 082 001 / 4:10	DO	0078 04	4604888 () BRWN CLAY 0025 GRVL 0067 MSND 0083
PICKERING TOWN CON 05(018)	17 652057 4864516[W]	2000/03 7085				DO		1914442 (216530)
PICKERING TOWN CON 05(018)	17 652117 4864487[W]	1998/04 1413	06	FR 0119	038 / 110 015 / 1:0	DO	0116 03	1913630 (188760) BRWN CLAY STNS HARD 0017 BRWN SILT CLAY SAND 0057 GREY SILT CLAY SAND 0097 GREY CLAY BLDR HARD 0110 GREY FSND CLN 0119
PICKERING TOWN CON 05(019)	17 651849 4864343[W]	1961/12 5412	30	FR 0044	035 / / :0	DO		4601508 () BRWN CLAY STNS 0030 BRWN CLAY 0040 BLUE CLAY 0044 MSND 0050 BLUE CLAY 0051

TOWNSHIP CONCESSION (LOT)	UTM[1]	DATE[2] CNTR[3]	CASING DIA[4]	WATER[5,6] DETAIL	STAT LVL/PUMP LVL[7] RATE[8]/TIME HR:MIN	WATER USE[9]	SCREEN INFO[10]	WELL # (AUDIT#) WELL TAG # DEPTHS TO WHICH FORMATIONS EXTEND[5,11]
PICKERING TOWN CON 05(019)	17 651909 4864366[W]	1964/01 5412	30	FR 0043	043 / / :0	DO		4601510 () BRWN CLAY 0043 BRWN QSND 0046 BLUE QSND 0058
PICKERING TOWN CON 05(019)	17 651849 4864350[W]	1964/03 4713	06	FR 0150	030 / 080 030 / 3:0	DO	0142 08	4601512 () LOAM 0002 CLAY STNS 0027 BLUE CLAY 0080 CLAY MSND 0140 MSND SILT 0150
PICKERING TOWN CON 05(019)	17 651871 4864381[W]	1965/04 2306	06	FR 0091	036 / 071 006 / 3:0	DO		4601514 () PRDG 0040 MSND 0070 MSND GRVL 0090 GRVL CSND 0091
PICKERING TOWN CON 05(019)	17 651804 4864511[W]	1965/08 2306	06	FR 0075	030 / 030 005 / 3:0	DO		4601516 () CLAY 0040 MSND 0075 GRVL 0076
PICKERING TOWN CON 05(019)	17 651985 4864523[W]	1952/06 3421	06	FR 0070	030 / / :0	DO		4601502 () GREY CLAY 0070 GRVL 0073
PICKERING TOWN CON 05(019)	17 651873 4864381[W]	1959/05 4813	05	FR 0121	048 / 055 025 / 4:0	DO	0122 04	4601504 () BRWN CLAY 0008 BLUE CLAY 0028 CSND 0032 GRVL 0082 HPAN 0121 WHIT MSND 0128
PICKERING TOWN CON 05(019)	17 651888 4864545[W]	1961/02 5420	30	FR 0040	038 / 001 / :0	DO		4601506 () LOAM 0001 YLLW CLAY 0010 BLUE CLAY 0040 MSND 0045
PICKERING TOWN CON 05(019)	17 651743 4864309[W]	1962/08 2314	04	FR 0120	055 / 070 010 / 6:0	DO	0143 04	4601509 () LOAM 0003 CLAY GRVL BLDR 0035 BLUE CLAY GRVL 0086 MSND 0088 BLUE CLAY 0120 MSND 0147 CSND 0150
PICKERING TOWN CON 05(019)	17 651902 4864449[W]	1964/02 5420	05	FR 0122	048 / 058 018 / 5:0	DO	0122 04	4601511 () PRDG 0045 BRWN MSND 0075 BLUE FSND 0122 CSND 0126
PICKERING TOWN CON 05(019)	17 652039 4864458[W]	1964/07 5420	05	FR 0132	048 / 080 006 / 8:0	DO	0134 04	4601513 () PRDG 0040 BRWN MSND 0055 MSND CLAY GRVL 0080 BLUE FSND 0110 MSND 0122 BLUE CLAY 0132 FSND 0138
PICKERING TOWN CON 05(019)	17 651863 4864425[W]	1965/08 2306	06	FR 0225	055 / 180 010 / 8:0	DO	0117 08	4601515 () LOAM 0004 MSND GRVL CLAY 0050 MSND CLAY 0205 CSND 0225
PICKERING TOWN CON 05(019)	17 651907 4864471[W]	1967/07 2306	06	FR 0078	060 / 065 005 / 4:0	DO		4601517 () LOAM 0005 CLAY GRVL 0050 MSND GRVL 0075 GRVL 0078
PICKERING TOWN CON 05(019)	17 651835 4864353[W]	2005/12 4102			020 / / :0			1918021 (Z37085) 0029 0027 0010 0008
PICKERING TOWN CON 05(019)	17 652155 4863591[L]	2001/06 7118						1915152 (227264)
PICKERING TOWN CON 05(019)	17 652155 4863591[L]	2001/02 7118	06	FR 0148	-005 / 010 012 / 6:15	DO	0144 04	1915050 (227258) BLCK LOAM SOFT 0002 BRWN MSND BLDR PCKD 0023 BRWN FSND SOFT 0047 BRWN SILT FSND DNSE 0069 GREY MSND FGVL DNSE 0074 GREY CLAY HARD 0081 GREY CLAY FSND DNSE 0095 GREY CLAY SAND SILT 0148 BLCK MSND DNSE 0152

TOWNSHIP CONCESSION (LOT)	UTM[1]	DATE[2] CNTR[3]	CASING DIA[4]	WATER[5,6] DETAIL	STAT LVL/PUMP LVL[7] RATE[8]/TIME HR:MIN	WATER USE[9]	SCREEN INFO[10]	WELL # (AUDIT#) WELL TAG # DEPTHS TO WHICH FORMATIONS EXTEND[5,11]
PICKERING TOWN CON 05(019)	17 651928 4864407[W]	1961/07 5412	30	FR 0044	036 / 003 / :0	DO		4601507 () BRWN CLAY STNS 0042 BRWN MSND 0044 GREY MSND 0045 QSND 0046
PICKERING TOWN CON 05(019)	17 651925 4864407[W]	1960/06 2615	36	FR 0021 FR 0032	032 / / 12:0	CO		4601505 () LOAM CLAY 0002 BRWN CLAY 0021 MSND 0023 BRWN CLAY STNS 0032 MSND 0037
PICKERING TOWN CON 05(019)	17 651890 4864540[W]	1952/08 3421	06	FR 0092	027 / / :0	DO		4601503 () CLAY 0065 MSND 0091 GRVL 0092
PICKERING TOWN CON 05(019)	17 651902 4864345[W]	1999/06 5459	06	FR 0133	046 / 125 010 / 5:0	DO	0138 02	1914135 (195478) BLCK LOAM 0002 BRWN CLAY STNS BLDR 0017 GREY CLAY STNY 0068 GREY SAND SILT 0075 GREY CLAY SLTY 0118 GREY SAND SILT 0130 GREY CLAY SLTY 0133 GREY FSND 0144
PICKERING TOWN CON 05(019)	17 651735 4864303[W]	1985/10 4816	06		050 / 151 025 / 2:0	DO	0147 03	1907521 () LOAM 0001 BRWN STNS CLAY GRVL 0031 BRWN CLAY 0036 GREY CLAY 0045 FSND SILT 0060 GREY CLAY HARD 0119 BLCK FSND 0133 FSND SILT DRTY 0138 BRWN MSND 0157 GREY CLAY 0170
PICKERING TOWN CON 05(019)	17 651902 4864352[W]	2005/12 4102						1918023 (Z37081) 0141 0131 0123 0010 0007
PICKERING TOWN CON 05(019)	17 651923 4864432[W]	2005/12 4102			041 / / :0			1918022 (Z37083) 0120 0111 0102 0010 0007
PICKERING TOWN CON 05(019)	17 651764 4864307[W]	2005/12 4102			050 / / :0			1918020 (Z37084) 0150
PICKERING TOWN CON 05(019)	17 652155 4863591[L]	2001/01 2662	06 06	FR 0159	-005 / 017 020 / 1:0	DO	0156 03	1915260 (228241) BRWN LOAM 0001 BRWN CLAY SNDY 0021 GREY CLAY STNS 0030 GREY HPAN 0085 GREY CLAY GRVL SILT 0127 GREY HPAN 0158 GREY SAND GRVL WBRG 0159
PICKERING TOWN CON 05(019)	17 652155 4863591[L]	2001/05 1413				DO		1915089 (229746)
PICKERING TOWN CON 05(019)	17 652155 4863591[L]	2001/05 2662				NU		1915303 (228289)
PICKERING TOWN CON 05(019)	17 652155 4863591[L]	2002/02 5459	06	FR 0070	020 / 045 025 / 2:30	DO	0070 09	1915557 (238341) BRWN LOAM 0002 BRWN CLAY 0008 BRWN CLAY ROCK 0020 BRWN CLAY SNDY 0063 BRWN FSND 0080
PICKERING TOWN CON 05(019)	17 652155 4863591[L]	2001/02 1413	06	FR 0132	025 / 100 020 / 1:0	DO	0129 03	1915011 (229721) BRWN CLAY STNS HARD 0025 BRWN SAND SILT CLAY 0050 GREY CLAY STNS DNSE 0114 BLCK FSND 0132

TOWNSHIP CONCESSION (LOT)	UTM[1]	DATE[2] CNTR[3]	CASING DIA[4]	WATER[5,6] DETAIL	STAT LVL/PUMP LVL[7] RATE[8]/TIME HR:MIN	WATER USE[9]	SCREEN INFO[10]	WELL # (AUDIT#) WELL TAG # DEPTHS TO WHICH FORMATIONS EXTEND[5,11]
PICKERING TOWN CON 05(019)	17 652155 4863591[L]	2001/02 7118				NU		1914992 (227254) BLCK LOAM SOFT 0002 BRWN MSND BLDR PCKD 0023 BRWN FSND SOFT 0044 BRWN SILT FSND DNSE 0067 GREY MSND FGVL DNSE 0070 GREY CLAY HARD 0075 GREY SILT FSND DNSE 0080
PICKERING TOWN CON 05(019)	17 651957 4864356[W]	2003/05 7177						1916483 (261467)
PICKERING TOWN CON 05(019)	17 652155 4863591[L]	2002/01 2662	06 10 06	FR 0163	-002 / 003 012 / 6:40	DO	0155 08	1915907 (236684) BLCK LOAM 0001 BRWN CLAY SNDY 0006 GREY CLAY SNDY CLAY 0045 GREY CLAY 0118 GREY CLAY SILT 0133 GREY CLAY GRVL 0151 GREY SAND GRVL 0165
PICKERING TOWN CON 05(019)	17 652155 4863591[L]	2002/03 2662	06 06	UK 0136	025 / 031 010 / 1:0	DO	0133 03	1915901 (236737) BLCK LOAM 0002 BRWN CLAY SNDY 0010 BRWN CLAY SNDY GRVL 0023 GREY CLAY SNDY GRVL 0045 GREY CLAY GRVL 0100 GREY CLAY SILT 0114 GREY SAND 0136
PICKERING TOWN CON 05(019)	17 651904 4864352[W]	1999/06 5459						1914136 (195487)
PICKERING TOWN CON 05(019)	17 652095 4864323[W]	1985/09 4738	06	FR 0050	026 / 093 020 / 2:0	PS	0113 06	1907462 () BLCK MUCK SAND SOFT 0012 BRWN SAND CLAY LOOS 0050 BRWN FSND 0080 GREY FSND 0099 GREY SAND CLAY LOOS 0102 GREY MSND STNS 0120
PICKERING TOWN CON 05(019)	17 652273 4864039[W]	1963/05 2204	02	FR 0051	014 / 054 005 / 1:0	DO	0055 05	4601496 () PRDG 0040 CLAY GRVL 0051 FSND CLAY 0054 MSND 0060
PICKERING TOWN CON 05(020)	17 651766 4863453[L]	2002/03 6974				DO		1915753 (244612)
PICKERING TOWN CON 05(020)	17 651592 4864402[W]	1995/08 6874	36	FR	/ 043 / 1:0	DO		1912543 (158030) BRWN SAND 0043
PICKERING TOWN CON 05(020)	17 651905 4862563[W]	1970/07 2214	30	FR 0015	016 / 020 / :0	DO		4604460 () BLCK LOAM 0001 BRWN CLAY MSND 0015 BRWN MSND 0020 BLUE CLAY STNS 0022
PICKERING TOWN CON 05(020)	17 651755 4863043[W]	1971/05 2214	30	FR 0008	002 / 015 003 / 0:30	DO		4604748 () BLCK LOAM 0001 BRWN CLAY STNS 0008 GRVL MSND 0015
PICKERING TOWN CON 05(020)	17 651267 4864295[W]	1958/10 4813	07	FR 0090	032 / 080 012 / 2:0	DO	0086 04	4601518 () BRWN LOAM MSND 0008 YLLW CLAY MSND 0032 MSND SILT 0055 MSND 0090
PICKERING TOWN CON 05(020)	17 651766 4863453[L]	2001/10 3367	06	FR 0082	028 / 048 010 / 15:0	DO	0079 03	1915429 (228875) BRWN LOAM SOFT 0002 BRWN CLAY MGVL PCKD 0012 BRWN CLAY GRVL PCKD 0030 GREY GRVL STNS CLAY 0079 GREY CSND WBRG LOOS 0082

TOWNSHIP CONCESSION (LOT)	UTM[1]	DATE[2] CNTR[3]	CASING DIA[4]	WATER[5,6] DETAIL	STAT LVL/PUMP LVL[7] RATE[8]/TIME HR:MIN	WATER USE[9]	SCREEN INFO[10]	WELL # (AUDIT#) WELL TAG # DEPTHS TO WHICH FORMATIONS EXTEND[5,11]
PICKERING TOWN CON 05(020)	17 651766 4863453[L]	2001/11 3367						1915530 (241005)
PICKERING TOWN CON 05(020)	17 651766 4863453[L]	2001/11 3367	06	FR 0128	054 / 089 010 / 2:0	DO	0124 04	1915527 (228895) BLCK LOAM SOFT 0003 BRWN CLAY GRVL SAND 0030 GREY GRVL SAND CLAY 0042 GREY MSND PCKD 0050 GREY MSND GRVL PCKD 0076 GREY CLAY GRVL PCKD 0124 GREY SAND LOOS 0128
PICKERING TOWN CON 05(021)	17 651315 4864073[W]	1970/05 4761	06	FR 0070	025 / 040 009 / 3:30	DO		4604402 () PRDG 0040 GREY MSND 0060 BRWN MSND GRVL 0065 GRVL MSND 0071
PICKERING TOWN CON 05(021)	17 651382 4863317[L]	2001/12 3136	06	FR 0038	018 / 025 010 / 1:0	DO	0044 03	1915465 (234022) BRWN LOAM 0001 BRWN SAND CLAY 0027 BRWN CSND 0048 GREY FSND 0048
PICKERING TOWN CON 05(021)	17 651270 4864108[W]	1986/04 1847	30	FR 0036 FR 0018	006 / / :0	DO		1907667 () BLCK LOAM 0001 BRWN CLAY MGRD 0018 BRWN CLAY STNS MGRD 0036 BLUE CLAY STNS HARD 0044
PICKERING TOWN CON 05(021)	17 651382 4863317[L]	2003/02 6974				DO		1916367 (250280)
PICKERING TOWN CON 05(021)	17 651382 4863317[L]	2002/03 3136						1915681 (242091)
PICKERING TOWN CON 05(021)	17 651254 4864215[W]	1962/07 2204	02	FR 0050	012 / 022 003 / 1:0	DO	0050 05	4601522 () PRDG 0040 MSND 0055
PICKERING TOWN CON 05(021)	17 651254 4864193[W]	1958/08 2610	24	FR 0040	033 / 035 001 / 2:0	DO		4601520 () LOAM 0002 CLAY MSND 0025 MSND 0040
PICKERING TOWN CON 05(021)	17 651270 4864158[W]	1966/08 1326	05	FR 0079	050 / 082 008 / 2:0	DO	0079 04	4601523 () LOAM 0001 BLUE CLAY STNS 0035 BLUE CLAY 0079 BLUE MSND 0083
PICKERING TOWN CON 05(021)	17 651225 4864223[W]	1971/02 1413	05	UK 0090	036 / 040 010 / 2:0	DO		4604714 () BRWN CLAY STNS 0018 BLUE CLAY STNS 0068 BLUE SILT 0070 BLUE CLAY MSND STNS 0090
PICKERING TOWN CON 05(021)	17 651786 4862476[W]	1952/11 3421	04	FR 0060	018 / 018 006 / 1:0	ST DO		4601519 () PRDG 0023 GREY CLAY HPAN 0060 GRVL 0068
PICKERING TOWN CON 05(021)	17 651203 4864237[W]	1962/01 5420	34	FR 0016	016 / 003 / :0	DO		4601521 () LOAM 0001 YLLW CLAY MSND 0010 CSND 0023
PICKERING TOWN CON 05(022)	17 651165 4862573[W]	1968/03 5420	34	FR 0035	014 / / :0	DO		4603709 () LOAM 0001 BRWN CLAY 0012 BLUE CLAY 0035 CLAY GRVL 0038
PICKERING TOWN CON 05(022)	17 650988 4863185[L]	2001/09 2662	06 06	UK 0114	026 / 048 005 / 2:20	DO	0111 03	1915584 (228391) BLCK LOAM STNS 0001 BRWN CLAY STNS 0014 GREY CLAY STNS 0110 BRWN SAND 0115

TOWNSHIP CONCESSION (LOT)	UTM[1]	DATE[2] CNTR[3]	CASING DIA[4]	WATER[5,6] DETAIL	STAT LVL/PUMP LVL[7] RATE[8]/TIME HR:MIN	WATER USE[9]	SCREEN INFO[10]	WELL # (AUDIT#) WELL TAG # DEPTHS TO WHICH FORMATIONS EXTEND[5,11]
PICKERING TOWN CON 05(022)	17 650988 4863185[L]	2001/05 2662				NU		1915292 (228292)
PICKERING TOWN CON 05(022)	17 650988 4863185[L]	2001/02 2662	06	FR 0095	020 / 022 008 / 1:30	DO		1915276 (228258) BLCK LOAM 0004 BRWN CLAY SNDY 0007 BRWN CLAY SNDY GRVL 0027 BRWN SAND SILT WBRG 0041 GREY CLAY SNDY 0050 GREY GRVL SILT CLAY 0080 GREY CLAY SLTY GRVL 0089 UNKN WBRG 0095
PICKERING TOWN CON 05(023)	17 650591 4863054[L]	2001/12 2662	06 06	UK 0162	093 / 126 004 / 2:10	DO	0015 03	1915591 (236673) BLCK LOAM 0001 BRWN HPAN BLDR 0017 GREY HPAN STNS 0042 GREY CLAY GRVL 0120 GREY SILT GRVL 0132 BRWN SAND GRVL WBRG 0163 GREY CLAY 0163
PICKERING TOWN CON 05(023)	17 650493 4863872[W]	1987/11 5459	06	FR 0125	055 / 070 030 / 1:0	DO	0125 03	1908835 () LOAM 0002 BRWN CLAY SNDY STNS 0018 BRWN CLAY SNDY 0045 BRWN CLAY SNDY GRVL 0067 GREY CLAY STNS 0105 GREY CLAY SLTY 0119 GREY MSND 0125 GREY CSND 0128
PICKERING TOWN CON 05(023)	17 650815 4862123[W]	1978/01 2214	06 05	FR 0045	010 / 030 005 / 2:0	DO	0037 04	1905037 () BRWN CLAY STNS CMTD 0015 BLUE CLAY STNS CMTD 0045 BRWN SAND GRVL LOOS 0050 BLUE CLAY STNS SAND 0056
PICKERING TOWN CON 05(023)	17 651835 4862497[W]	1974/09 1413	05	FR 0152 FR 0100	025 / 027 013 / 24:0	NU	0163 09	4606003 () BRWN SILT SAND FILL 0012 GREY SILT SAND FILL 0055 GREY SAND STNS FILL 0100 GREY FSND 0128 GREY SILT FILL 0152 GREY MSND STNS 0256 GREY CLAY SHLE FILL 0266 LMSN SHLE 0271
PICKERING TOWN CON 05(023)	17 650591 4863054[L]	2002/03 2662						1915893 (243757)
PICKERING TOWN CON 05(024)	17 650200 4862925[L]	2003/02 6974				DO		1916380 (250290)
PICKERING TOWN CON 05(024)	17 650465 4862143[W]	1968/09 5420	34	FR 0028	012 / / :0	DO		4603819 () LOAM 0001 BRWN CLAY 0012 BLUE CLAY STNS 0025 BLUE CLAY MSND STNS 0033
PICKERING TOWN CON 05(024)	17 650200 4862925[L]	2003/05 6974				DO		1916539 (261345)
PICKERING TOWN CON 05(025)	17 649816 4862791[L]	2002/02 3367	06	FR 0183	102 / 111 010 / 2:30	DO	0180 03	1915632 (241030) BRWN LOAM SOFT 0002 BRWN CLAY GRVL STNS 0025 GREY CLAY GRVL PCKD 0150 GREY SAND CLAY PCKD 0160 BRWN SAND LOOS 0180 BRWN FSND LOOS 0183
PICKERING TOWN CON 05(025)	17 649816 4862791[L]	2002/03 3367						1915689 (241057)

TOWNSHIP CONCESSION (LOT)	UTM[1]	DATE[2] CNTR[3]	CASING DIA[4]	WATER[5,6] DETAIL	STAT LVL/PUMP LVL[7] RATE[8]/TIME HR:MIN	WATER USE[9]	SCREEN INFO[10]	WELL # (AUDIT#) WELL TAG # DEPTHS TO WHICH FORMATIONS EXTEND[5,11]
PICKERING TOWN CON 05(025)	17 649816 4862791[L]	2001/03 3136	06	FR 0265	064 / 067 008 / 7:0	DO	0272 03	1914973 (229220) BRWN LOAM 0001 BRWN CLAY STNS 0017 GREY CLAY SAND HARD 0190 GREY CLAY SOFT 0265 BRWN MSND 0275 BRWN SAND 0275
PICKERING TOWN CON 05(025)	17 650065 4862015[W]	2001/05 3136						1915138 (229201)
PICKERING TOWN CON 05(025)	17 650076 4862037[W]	2001/05 3136						1915137 (229200)
PICKERING TOWN CON 05(025)	17 650076 4862031[W]	1996/04 6874	30	FR 0015	/ 021 025 / 1:30	DO		1912834 (158040) BRWN CLAY 0021
PICKERING TOWN CON 05(025)	17 649816 4862791[L]	2002/03 3367						1915688 (241058)
PICKERING TOWN CON 05(025)	17 648277 4863247[W]	1993/02 1673	06	FR 0133	098 / 115 010 / 2:0	DO	0130 03	1912398 (104017) LOAM 0001 SAND CLAY 0047 CLAY GRVL 0063 GRVL 0071 SILT 0102 CLAY GRVL 0127 SAND GRVL 0133
PICKERING TOWN CON 05(026)	17 651725 4862441[W]	2001/05 3136						1915129 (229187)
PICKERING TOWN CON 05(026)	17 651725 4862441[W]	2001/05 3136						1915130 (229188)
PICKERING TOWN CON 05(026)	17 649415 4862657[L]	2001/03 2662	06 06	FR 0197	124 / 143 005 / 2:0	DO	0193 04	1915261 (228267) BLCK LOAM 0002 BRWN CLAY SLTY GRVL 0006 BRWN SAND GRVL 0038 GREY CLAY SNDY GRVL 0168 GREY SAND SLTY WBRG 0185 GREY SAND WBRG 0197 GREY SAND SLTY WBRG 0198
PICKERING TOWN CON 05(026)	17 649740 4861796[W]	1959/02 3715	30	FR 0042	042 / 005 / 10:0	DO		4601524 () LOAM 0001 MSND 0046
PICKERING TOWN CON 05(026)	17 649417 4862657[L]	1993/02 1508				NU		1912066 (144893)
PICKERING TOWN CON 05(026)	17 649415 4862657[L]	2002/03 6974				DO		1915751 (244614)
PICKERING TOWN CON 05(026)	17 649415 4862658[L]	2001/01 3136	06	FR 0058	031 / 048 015 / 2:0	DO	0063 03	1914942 (221376) BRWN LOAM 0001 BRWN CLAY STNS HARD 0025 GREY CLAY 0057 BRWN MSND 0066 BRWN CLAY 0066
PICKERING TOWN CON 05(026)	17 649415 4862657[L]	2002/03 6974				DO		1915752 (244613)
PICKERING TOWN CON 05(026)	17 651678 4862576[W]	2001/05 3136						1915131 (229190)

BURNSIDE

[THE DIFFERENCE IS OUR PEOPLE]

Appendix N19-B
Monitoring Well Logs

MW1-11-1

Log of Borehole 11-1

AME Materials Engineering

Project No.: 40840.290

Project Name: Seaton Lands- Mulberry Lane, South of Whitevale Road

Figure No. 2-1

Location: Pickering

Date Drilled: 3/24/11

Drill Type:

Datum: Geodetic

Split Spoon Sample
Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Shear Strength by Vane Test
Combustible Vapour Reading
Natural Moisture Content
Atterberg Limits
Undrained Triaxial at % Strain at Failure
Shear Strength by Penetrometer Test

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH
		TOPSOIL: ~300mm	166.05	0
		SILTY SAND/SANDY SILT TILL: greyish-brown, some clay and trace of gravel, wet, compact to very dense.	165.75	
		.....dry		2
		.....grey		4
			159.93	6
		End of borehole at 6.12 m		

Standard Penetration Test N Value: 20 40 60 80
Shear Strength kPa: 50 100 150 200
Total Organic Vapours (ppm): 25 50 75
Natural Moisture Content % Atterberg Limits (% Dry Weight): 10 20 30

SAMPLES

Natural Unit Weight kN/m³

3
25
35
53
50 for 100mm
35
50 for 30mm

LOG OF BOREHOLE OLD 40840.290- SITE 2.GPJ AME_ON.GDT 5/2/11

Notes:

Sheet No. 1 of 1

Date/Time	Water Level (m)	Depth to Cave (m)
03/24/2011	4.57	Open
03/25/2011	0.00	
03/29/2011	0.15	
04/01/2011	0.00	
04/09/2011	0.06	

MW1-11-2

Log of Borehole 11-2

AME Materials Engineering

Project No.: 40840.290

Project Name: Seaton Lands- Mulberry Lane, South of Whitevale Road

Figure No. 2-2

Location: Pickering

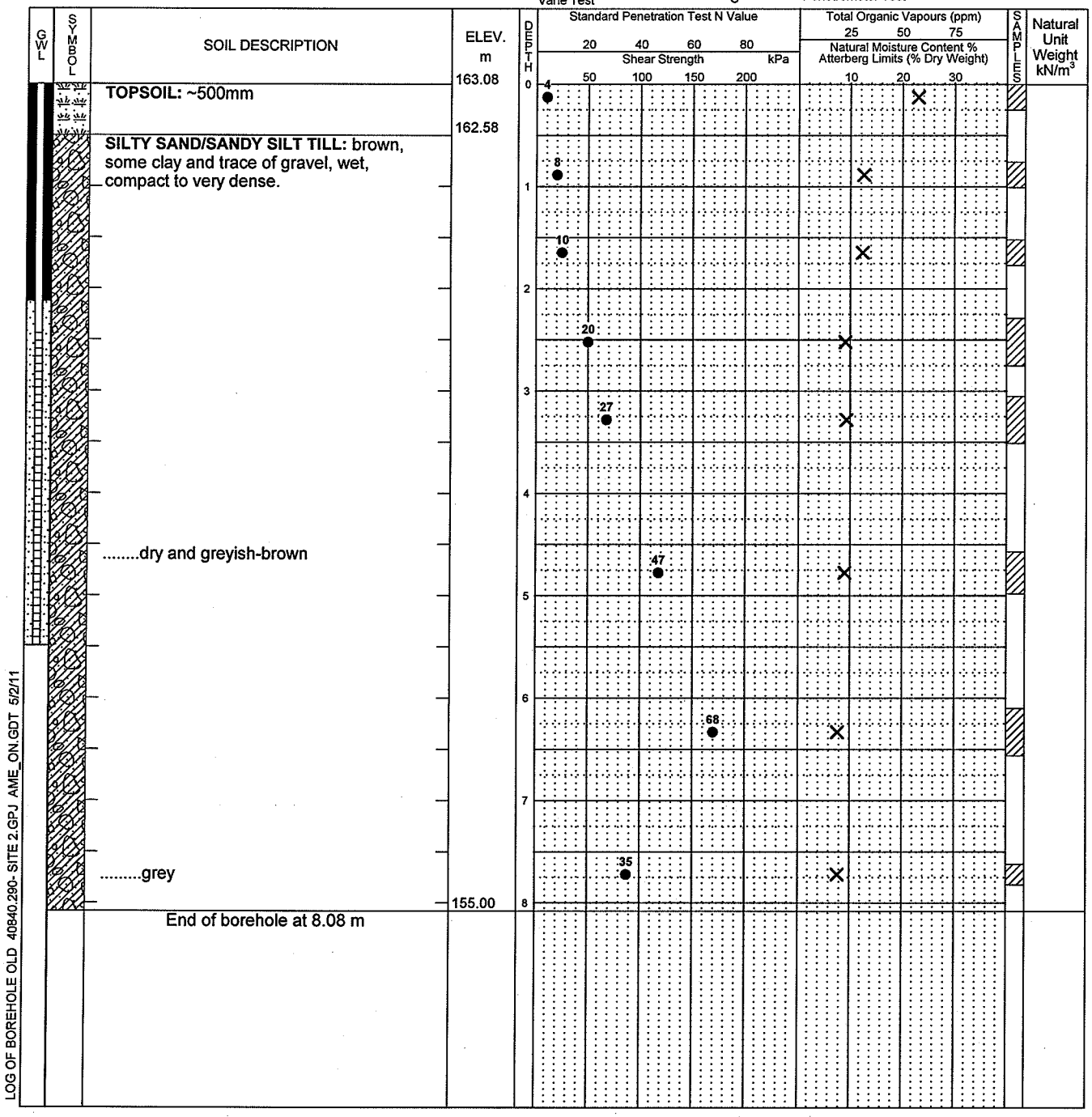
Date Drilled: 3/24/11

Drill Type:

Datum: Geodetic

Split Spoon Sample | Auger Sample | SPT (N) Value | Dynamic Cone Test | Shelby Tube | Shear Strength by Vane Test

Combustible Vapour Reading | Natural Moisture Content | Atterberg Limits | Undrained Triaxial at % Strain at Failure | Shear Strength by Penetrometer Test



LOG OF BOREHOLE OLD 40840.290- SITE 2.GPJ AME_ON.GDT 5/2/11

Notes:

Date/Time	Water Level (m)	Depth to Cave (m)
03/24/2011	6.71	Open
03/25/2011	1.90	
03/29/2011	2.30	
04/01/2011	2.45	
04/09/2011	2.46	

Sheet No. 1 of 1

BH1-11-3

Log of Borehole 11-3

AME Materials Engineering

Project No.: 40840.290

Project Name: Seaton Lands- Mulberry Lane, South of Whitevale Road

Figure No. 2-3

Location: Pickering

Date Drilled: 3/24/11

Drill Type:

Datum: Geodetic

Split Spoon Sample | Combustible Vapour Reading
Auger Sample | Natural Moisture Content
SPT (N) Value | Atterberg Limits
Dynamic Cone Test | Undrained Triaxial at % Strain at Failure
Shelby Tube
Shear Strength by Vane Test | Shear Strength by Penetrometer Test

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH
		TOPSOIL: ~300mm	165.00	0
		SILTY SAND/SANDY SILT TILL: brown, some clay and trace of gravel, wet to moist, compact to dense.	164.70	
		.....grey		6
		End of borehole at 6.55 m	158.45	

Standard Penetration Test N Value: 20 40 60 80
Shear Strength kPa: 50 100 150 200
Total Organic Vapours (ppm): 25 50 75
Natural Moisture Content % / Atterberg Limits (% Dry Weight): 10 20 30

SPT values: 3, 22, 25, 23, 25, 46, 25

SAMPLES | Natural Unit Weight kN/m³

LOG OF BOREHOLE OLD 40840.290- SITE 2.GPJ AME_ON.GDT 5/2/11

Notes:

Date/Time	Water Level (m)	Depth to Cave (m)
03/24/2011	4.42	Open

Sheet No. 1 of 1

BH1-11-4

Log of Borehole 11-4

AME Materials Engineering

Project No.: 40840.290

Project Name: Seaton Lands- Mulberry Lane, South of Whitevale Road

Figure No. 2-4

Location: Pickering

Date Drilled: 3/24/11

Drill Type:

Datum: Geodetic

Split Spoon Sample | Auger Sample | SPT (N) Value | Dynamic Cone Test | Shelby Tube | Shear Strength by Vane Test

Combustible Vapour Reading | Natural Moisture Content | Atterberg Limits | Undrained Triaxial at % Strain at Failure | Shear Strength by Penetrometer Test

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m
		TOPSOIL: ~350mm	159.56
		SANDY SILT FILL: brown, very moist, loose.	159.21
		SILTY SAND/SANDY SILT TILL: brown, some clay and trace of gravel, wet to moist, compact to very dense.	158.19
		.....grey	
		End of borehole at 6.55 m	153.01

DEPTH 0 1 2 3 4 5 6

Standard Penetration Test N Value: 20 40 60 80

Shear Strength kPa: 50 100 150 200

Total Organic Vapours (ppm): 25 50 75

Natural Moisture Content % / Atterberg Limits (% Dry Weight): 10 20 30

SAMPLES

Natural Unit Weight kN/m³

3 | 4 | 23 | 50 for 280mm | 25 | 50 for 300mm | 60

LOG OF BOREHOLE OLD 40840.290- SITE 2.GPJ AME_ON.GDT 5/2/11

Notes:

Date/Time	Water Level (m)	Depth to Cave (m)
03/24/2011	Dry	Open

Sheet No. 1 of 1

BH1-11-5

Log of Borehole 11-5

AME Materials Engineering

Project No.: 40840.290

Project Name: Seaton Lands- Mulberry Lane, South of Whitevale Road

Figure No. 2-5

Location: Pickering

Date Drilled: 3/24/11

Drill Type:

Datum: Geodetic

Split Spoon Sample | Auger Sample | SPT (N) Value | Dynamic Cone Test | Shelby Tube | Shear Strength by Vane Test

Combustible Vapour Reading | Natural Moisture Content | Atterberg Limits | Undrained Triaxial at % Strain at Failure | Shear Strength by Penetrometer Test

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH
		TOPSOIL: ~500mm	160.70	0
		SANDY SILT FILL: brown, some organics, very moist, very loose.	160.20	
		SILTY SAND/SANDY SILT TILL: brown, some clay and trace of gravel, wet, compact to dense.	158.50	1
				2
				3
				4
				5
				6
				7
		End of borehole at 7.75 m	152.95	

Standard Penetration Test N Value: 20 40 60 80

Shear Strength kPa: 50 100 150 200

Total Organic Vapours (ppm): 25 50 75

Natural Moisture Content % Atterberg Limits (% Dry Weight): 10 20 30

SAMPLES

Natural Unit Weight kN/m³

10 | 5 | 2 | 12 | 22 | 31 | 46 | 50 for 130mm

LOG OF BOREHOLE OLD 40840.290- SITE 2.GPJ AME_ON.GDT 5/2/11

Notes:

Date/Time	Water Level (m)	Depth to Cave (m)
03/24/2011	Dry	Open

Sheet No. 1 of 1

MW1-11-6

Log of Borehole 11-6

AME Materials Engineering

Project No.: 40840.290

Project Name: Seaton Lands- Mulberry Lane, South of Whitevale Road

Figure No. 2-6

Location: Pickering

Date Drilled: 3/24/11

Drill Type:

Datum: Geodetic

Split Spoon Sample
Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Shear Strength by Vane Test
Combustible Vapour Reading
Natural Moisture Content
Atterberg Limits
Undrained Triaxial at % Strain at Failure
Shear Strength by Penetrometer Test

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH
		TOPSOIL: ~300mm	154.14	0
		CLAYEY SILT TILL: greyish-brown, trace of sand and gravel, wet, stiff to very stiff.	153.84	
		.....grey		1
				2
				3
				4
		GRAVELLY SAND: grey, wet to saturated, very dense.	149.64	5
				6
		End of borehole at 6.38 m	147.76	

Standard Penetration Test N Value
Shear Strength kPa: 20, 40, 60, 80; 50, 100, 150, 200
Total Organic Vapours (ppm): 25, 50, 75
Natural Moisture Content % Atterberg Limits (% Dry Weight): 10, 20, 30
SAMPLES
Natural Unit Weight kN/m³

Plotted values: 2; 14; 15; 137.5; 137.5; 25; >225; 65; 50 for 280mm

LOG OF BOREHOLE OLD 40840.290- SITE 2.GPJ AME_ON.GDT 5/2/11

Notes:

Date/Time	Water Level (m)	Depth to Cave (m)
03/24/2011	1.07	4.11
03/29/2011	0.25	
03/30/2011	0.30	
04/09/2011	0.21	

Sheet No. 1 of 1

BH1-11-7

Log of Borehole 11-7

AME Materials Engineering

Project No.: 40840.290

Project Name: Seaton Lands- Mulberry Lane, South of Whitevale Road

Figure No. 2-7

Location: Pickering

Date Drilled: 3/24/11

Drill Type:

Datum: Geodetic

Split Spoon Sample | Auger Sample | SPT (N) Value | Dynamic Cone Test | Shelby Tube | Shear Strength by Vane Test

Combustible Vapour Reading | Natural Moisture Content | Atterberg Limits | Undrained Triaxial at % Strain at Failure | Shear Strength by Penetrometer Test

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH
		TOPSOIL: ~400mm	154.86	0
		SILTY SAND FILL: brown, wet, loose.	154.46	
		SILTY SAND/SANDY SILT TILL: brown, some clay and trace of gravel, wet, compact to very dense.	153.49	1
				2
				3
				4
			149.83	5
		End of borehole at 5.03 m		

Standard Penetration Test N Value: 20 40 60 80 — Shear Strength kPa: 50 100 150 200

Total Organic Vapours (ppm): 25 50 75 — Natural Moisture Content % Atterberg Limits (% Dry Weight): 10 20 30

SAMPLES | Natural Unit Weight kN/m³

2 | 4 | 6 | 37.5 | 29 | 50 for 300mm | 29

LOG OF BOREHOLE OLD 40840.290- SITE 2.GPJ AME_ON.GDT 5/2/11

Notes:

Date/Time	Water Level (m)	Depth to Cave (m)
03/24/2011	4.27	Open

Sheet No. 1 of 1

BH1-11-8

Log of Borehole 11-8

AME Materials Engineering

Project No.: 40840.290

Project Name: Seaton Lands- Mulberry Lane, South of Whitevale Road

Figure No. 2-8

Location: Pickering

Date Drilled: 3/28/11

Drill Type:

Datum: Geodetic

Split Spoon Sample	▨	Combustible Vapour Reading	□
Auger Sample	⊠	Natural Moisture Content	×
SPT (N) Value	●	Atterberg Limits	⊢○
Dynamic Cone Test	——	Undrained Triaxial at % Strain at Failure	⊕
Shelby Tube	■	Shear Strength by Penetrometer Test	▲
Shear Strength by Vane Test	✚ S		

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH
		TOPSOIL: 100mm	158.57 / 158.47	0
		SILTY SAND/SANDY SILT TILL: brown, some clay and trace of gravel, wet, loose to compact.		1
				2
		SILT: brown, wet, compact.	156.27	
		SILTY SAND/SANDY SILT TILL: brown, some clay and trace of gravel, wet to dry, compact to dense.	155.57	3
				4
				5
				6
				7
				8
				9
		End of borehole at 9.45 m	149.12	

Standard Penetration Test N Value — Shear Strength (20, 40, 60, 80 kPa; 50, 100, 150, 200)

Total Organic Vapours (ppm) (25, 50, 75)

Natural Moisture Content % Atterberg Limits (% Dry Weight) (10, 20, 30)

SAMPLES

Natural Unit Weight kN/m³

6 · 11 · 11 · 58 · 47 · 50 for 300mm · 70 · 49 · 50 for 460mm

LOG OF BOREHOLE OLD 40840.290- SITE 2.GPJ AME_ON.GDT 5/2/11

Notes:

Date/Time	Water Level (m)	Depth to Cave (m)
03/28/2011	Dry	Open

Sheet No. 1 of 1

BH1-11-9

Log of Borehole 11-9

AME Materials Engineering

Project No.: 40840.290

Project Name: Seaton Lands- Mulberry Lane, South of Whitevale Road

Figure No. 2-9

Location: Pickering

Date Drilled: 3/28/11

Drill Type:

Datum: Geodetic

Split Spoon Sample | Auger Sample | SPT (N) Value | Dynamic Cone Test | Shelby Tube | Shear Strength by Vane Test

Combustible Vapour Reading | Natural Moisture Content | Atterberg Limits | Undrained Triaxial at % Strain at Failure | Shear Strength by Penetrometer Test

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m
		TOPSOIL: ~300mm	156.59
		SANDY SILT FILL: brown, moist, compact.	156.29
		SILTY SAND/SANDY SILT TILL: brown, some clay and trace of gravel, very moist, compact to very dense.	155.22
		SILT: brown, moist, very dense.	148.06
		End of borehole at 9.45 m	147.14

DEPTH

Standard Penetration Test N Value
20 40 60 80
Shear Strength kPa
50 100 150 200

Total Organic Vapours (ppm)
25 50 75
Natural Moisture Content % Atterberg Limits (% Dry Weight)
10 20 30

SAMPLES

Natural Unit Weight kN/m³

0 1 2 3 4 5 6 7 8 9

6
20
30
65
77
50 for 230mm
50 for 150mm
50 for 430mm

LOG OF BOREHOLE OLD 40840.290- SITE 2.GPJ AME_ON.GDT 5/2/11

Notes:

Date/Time	Water Level (m)	Depth to Cave (m)
03/28/2011	Dry	Open

Sheet No. 1 of 1

MW1-11-10s

Log of Borehole 11-10A

AME Materials Engineering

Project No. 40840.290

Project: Seaton Lands- Mulberry Lane, South of Whitevale Road Drawing No. 2-10

Location: Pickering

Date Drilled: 3/28/11

Drill Type:

Datum: Geodetic

Split Spoon Sample | Auger Sample | SPT (N) Value | Dynamic Cone Test | Shelby Tube | Shear Strength by Vane Test (S)

Combustible Vapour Reading | Natural Moisture Content | Atterberg Limits | Undrained Triaxial at % Strain at Failure | Shear Strength by Penetrometer Test

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH
		TOPSOIL: ~500mm	156.48	0
		SANDY SILT FILL: brown, some organics, moist to wet, very loose.	155.98	
		SILTY SAND/SANDY SILT TILL: brown, some clay and trace of gracel, moist compact to very dense.	154.98	1
				2
			152.97	3
		End of borehole at 3.51 m		

Standard Penetration Test N Value: 20 40 60 80

Shear Strength kPa: 50 100 150 200

Total Organic Vapours (ppm): 250 500 750

Natural Moisture Content (%) Atterberg Limits (% Dry Weight): 10 20 30

SAMPLES

Natural Unit Weight kN/m³

SPT values: 1, 4, 27, 40, 53

LOG OF BOREHOLE 2 40840 290- SITE 2.GPJ AME_ON.GDT 5/4/11

Notes:

Date/Time	Water Level (m)	Depth to Cave (m)
03/28/2011	Dry	Open
03/29/2011	Dry	
03/30/2011	Dry	
04/01/2011	Dry	
04/09/2011	Dry	

Sheet No. 1 of 1

MW1-11-10d

Log of Borehole 11-10

AME Materials Engineering

Project No.: 40840.290

Project Name: Seaton Lands- Mulberry Lane, South of Whitevale Road

Figure No. 2-11

Location: Pickering

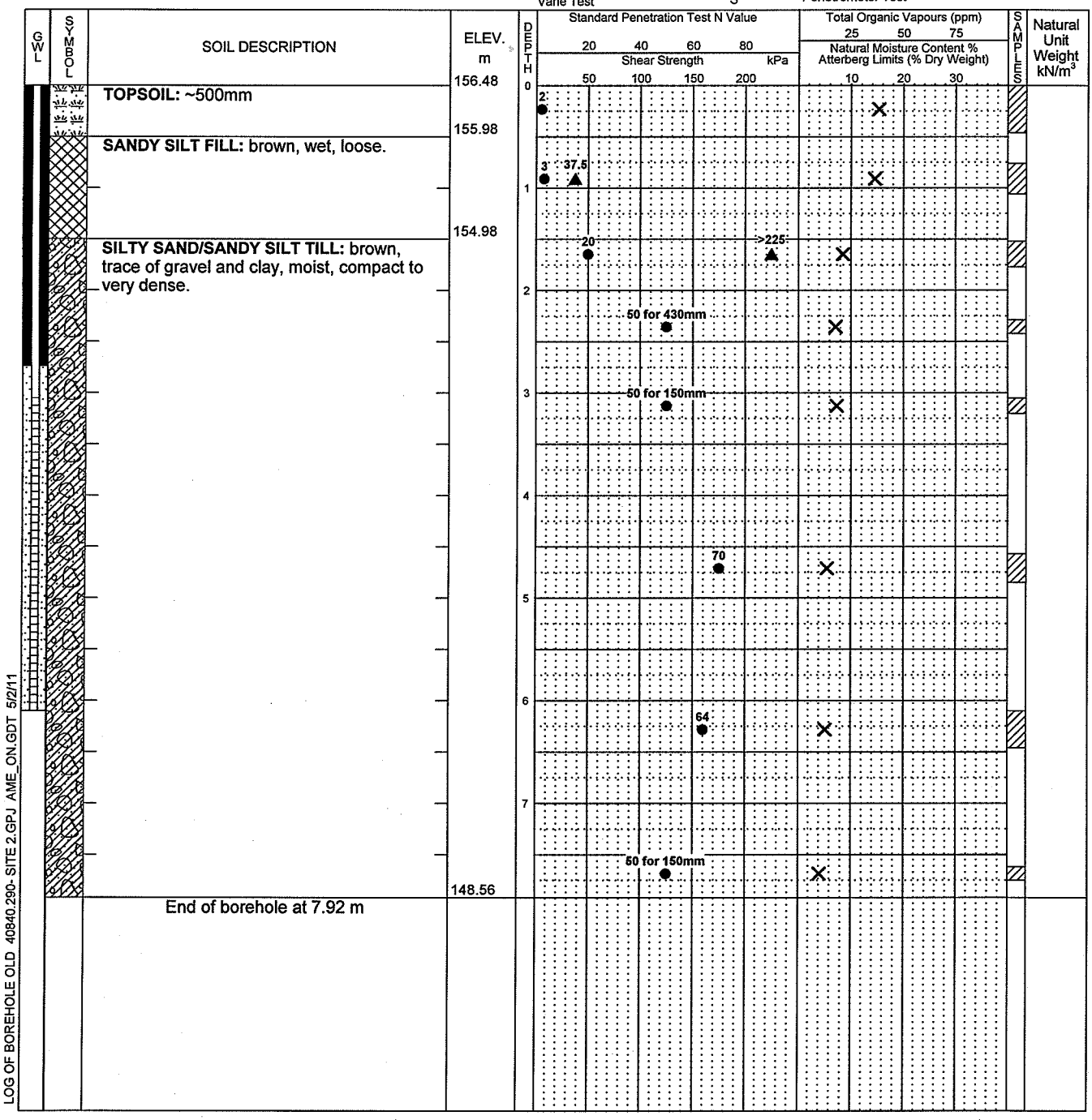
Date Drilled: 3/28/11

Drill Type:

Datum: Geodetic

Split Spoon Sample | Auger Sample | SPT (N) Value | Dynamic Cone Test | Shelby Tube | Shear Strength by Vane Test

Combustible Vapour Reading | Natural Moisture Content | Atterberg Limits | Undrained Triaxial at % Strain at Failure | Shear Strength by Penetrometer Test



LOG OF BOREHOLE OLD 40840.290- SITE 2.GPJ AME_ON.GDT 5/2/11

Notes:

Date/Time	Water Level (m)	Depth to Cave (m)
03/28/2011	Dry	Open
03/29/2011	Dry	
03/30/2011	Dry	
04/01/2011	Dry	
04/09/2011	Dry	

Sheet No. 1 of 1

MW1-11-11

Log of Borehole 11-11

AME Materials Engineering

Project No.: 40840.290

Project Name: Seaton Lands- Mulberry Lane, South of Whitevale Road

Figure No. 2-12

Location: Pickering

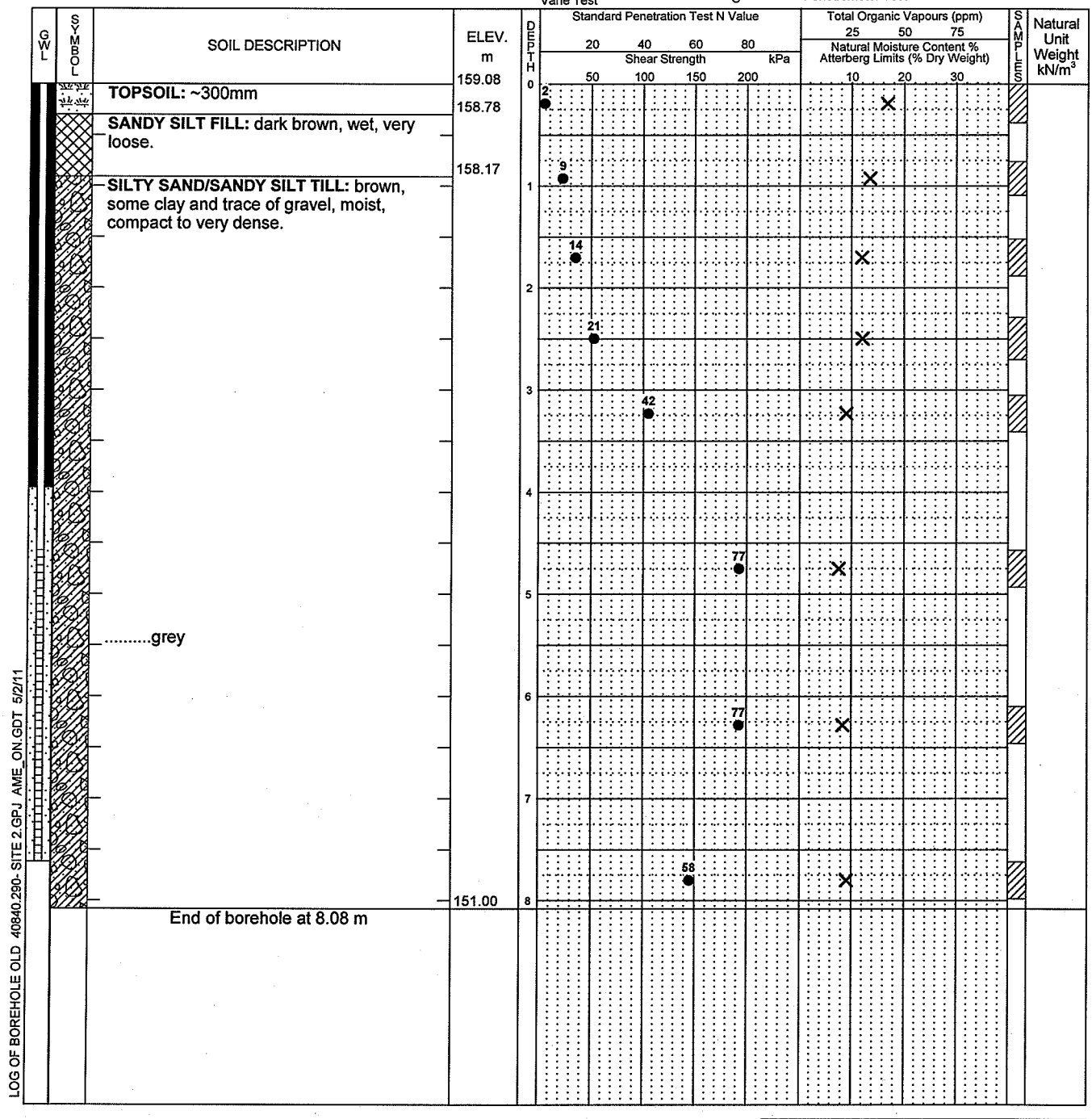
Date Drilled: 3/28/11

Drill Type:

Datum: Geodetic

Split Spoon Sample | Auger Sample | SPT (N) Value | Dynamic Cone Test | Shelby Tube | Shear Strength by Vane Test

Combustible Vapour Reading | Natural Moisture Content | Atterberg Limits | Undrained Triaxial at % Strain at Failure | Shear Strength by Penetrometer Test



LOG OF BOREHOLE OLD 40840.290- SITE 2.GPJ AME_ON.GDT 5/2/11

Notes:

Date/Time	Water Level (m)	Depth to Cave (m)
03/28/2011	6.40	Open
03/29/2011	2.05	
03/30/2011	2.15	
04/01/2011	2.15	
04/09/2011	2.27	

Sheet No. 1 of 1

BH1-11-12

Log of Borehole 11-12

AME Materials Engineering

Project No.: 40840.290

Project Name: Seaton Lands- Mulberry Lane, South of Whitevale Road

Figure No. 2-13

Location: Pickering

Date Drilled: 3/28/11

Drill Type:

Datum: Geodetic

Split Spoon Sample | Auger Sample | SPT (N) Value | Dynamic Cone Test | Shelby Tube | Shear Strength by Vane Test

Combustible Vapour Reading | Natural Moisture Content | Atterberg Limits | Undrained Triaxial at % Strain at Failure | Shear Strength by Penetrometer Test

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH
		TOPSOIL: ~500mm	157.79	0
		CLAYEY SILT TILL: brown, trace of sand and gravel, wet, very stiff.	157.29	
		.....grey		
		SILTY SAND/SANDY SILT TILL: grey, some clay and trace of gravel, moist, very dense.	152.46	
		End of borehole at 6.55 m	151.24	

Standard Penetration Test N Value; Shear Strength kPa (20, 40, 60, 80; 3, 50, 100, 150, 200)

Total Organic Vapours (ppm) (25, 50, 75)

Natural Moisture Content % Atterberg Limits (% Dry Weight) (10, 20, 30)

SAMPLES

Natural Unit Weight kN/m³

14, 175, 15, 150, 28, 225, 17, 150, 11, 70

LOG OF BOREHOLE OLD 40840.290- SITE 2.GPJ AME_ON.GDT 5/2/11

Notes:

Date/Time	Water Level (m)	Depth to Cave (m)
03/28/2011	4.27	Open

Sheet No. 1 of 1

BH2-11-1

Log of Borehole 11-1

AME Materials Engineering

Project No.: 40840.292

Project Name: Seaton Lands- Whitevale Road

Figure No. 2-1

Location: North and South Sides of Whitevale Road, Pickering

Date Drilled: 3/29/11

Drill Type:

Datum: Geodetic

Split Spoon Sample
Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Shear Strength by Vane Test
Combustible Vapour Reading
Natural Moisture Content
Atterberg Limits
Undrained Triaxial at % Strain at Failure
Shear Strength by Penetrometer Test

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH
		TOPSOIL: ~250mm	181.79	0
		SAND: brown, medium, wet, loose.	181.54	
		SILTY SAND/SANDY SILT TILL: brown, some clay and trace of gravel, wet to very moist, compact to very dense.	180.88	1
		End of borehole at 6.38 m	174.96	6

Standard Penetration Test N Value: 20 40 60 80
Shear Strength kPa: 50 100 150 200
Total Combustible Vapours (ppm): 25 50 75
Natural Moisture Content % / Atterberg Limits (% Dry Weight): 10 20 30

SPT values: 3, 11, 21, 29, 50 for 150mm, 50 for 150mm, 50 for 125mm

SAMPLES

Natural Unit Weight kN/m³

LOG OF BOREHOLE OLD 40840.292- SITE 1.GPJ AME_ON.GDT 5/6/11

Notes:

Date/Time	Water Level (m)	Depth to Cave (m)
03/29/2011	2.74	Open

Sheet No. 1 of 1

MW2-11-2

Log of Borehole 11-2

AME Materials Engineering

Project No.: 40840.292

Project Name: Seaton Lands- Whitevale Road

Figure No. 2-2

Location: North and South Sides of Whitevale Road, Pickering

Date Drilled: 3/29/11

Drill Type:

Datum: Geodetic

Split Spoon Sample
Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Shear Strength by Vane Test
Combustible Vapour Reading
Natural Moisture Content
Atterberg Limits
Undrained Triaxial at % Strain at Failure
Shear Strength by Penetrometer Test

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH	Standard Penetration Test N Value / Shear Strength kPa	Total Combustible Vapours (ppm) / Natural Moisture Content % / Atterberg Limits (% Dry Weight)	SAMPLES	Natural Unit Weight kN/m³
		TOPSOIL: ~300mm	177.14	0	2			
		SILTY SAND/SANDY SILT TILL: brown, some clay and trace of gravel, moist to wet, compact.	176.84	1	20			
		SILTY SAND: brown, moist, very dense.	175.64	2	50 for 280mm 50 for 150mm			
		SAND: brown, damp to moist, very dense.	174.24	3	53			
		GRAVELLY SAND: brown, moist to wet, very dense.	173.18	4	60			
				5				
				6	35			
		SILTY SAND/SANDY SILT TILL: brown, some clay and trace of gravel, moist, very dense.	170.43	7				
		End of borehole at 7.70 m	169.44		50 for 80mm			

Standard Penetration Test N Value: 20 40 60 80
Shear Strength: 50 100 150 200 kPa
Total Combustible Vapours (ppm): 25 50 75
Natural Moisture Content % / Atterberg Limits (% Dry Weight): 10 20 30

LOG OF BOREHOLE OLD 40840.292- SITE 1.GPJ AME_ON.GDT 5/6/11

Notes:

Date/Time	Water Level (m)	Depth to Cave (m)
03/29/2011	3.35	5.18
04/15/2011	4.10	

Sheet No. 1 of 1

BH2-11-3

Log of Borehole 11-3

AME Materials Engineering

Project No.: 40840.292

Project Name: Seaton Lands- Whitevale Road

Figure No. 2-3

Location: North and South Sides of Whitevale Road, Pickering

Date Drilled: 3/29/11

Drill Type:

Datum: Geodetic

Split Spoon Sample		Combustible Vapour Reading	□
Auger Sample		Natural Moisture Content	×
SPT (N) Value	●	Atterberg Limits	⊢—○
Dynamic Cone Test	——	Undrained Triaxial at % Strain at Failure	⊕
Shelby Tube		Shear Strength by Penetrometer Test	▲
Shear Strength by Vane Test	S		

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH
		TOPSOIL: ~250mm	185.15	0
		SILTY SAND/SANDY SILT TILL: brown, some clay and trace of gravel, wet to moist, compact to very dense.	184.90	
		.....grey		
		End of borehole at 6.50 m	178.65	6

Standard Penetration Test N Value: 20 40 60 80

Shear Strength: 50 100 150 200 kPa

Total Combustible Vapours (ppm): 25 50 75

Natural Moisture Content % / Atterberg Limits (% Dry Weight): 10 20 30

SAMPLES

Natural Unit Weight kN/m³

15 37 32 32 70 50 for 250mm

LOG OF BOREHOLE OLD 40840.292- SITE 1.GPJ AME_ON.GDT 5/6/11

Notes:

Date/Time	Water Level (m)	Depth to Cave (m)
03/29/2011	3.94	Open

Sheet No. 1 of 1

BH2-11-4

Log of Borehole 11-4

AME Materials Engineering

Project No.: 40840.292

Project Name: Seaton Lands- Whitevale Road

Figure No. 2-4

Location: North and South Sides of Whitevale Road, Pickering

Date Drilled: 3/30/11

Drill Type:

Datum: Geodetic

Split Spoon Sample	▨	Combustible Vapour Reading	□
Auger Sample	▨	Natural Moisture Content	×
SPT (N) Value	●	Atterberg Limits	⊢—○
Dynamic Cone Test	——	Undrained Triaxial at % Strain at Failure	⊕
Shelby Tube	▨	Shear Strength by Penetrometer Test	▲
Shear Strength by Vane Test	✚ S		

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH
		TOPSOIL: ~250mm	171.92	0
		SILTY SAND/SANDY SILT TILL: brown, some clay and trace of gravel, very moist to moist, loose to very dense.	171.67	
		End of borehole at 9.60 m	162.32	9

Standard Penetration Test N Value: 20 40 60 80

Shear Strength kPa: 50 100 150 200

Total Combustible Vapours (ppm): 25 50 75

Natural Moisture Content % Atterberg Limits (% Dry Weight): 10 20 30

SAMPLES

Natural Unit Weight kN/m³

SPT N values: 5, 9, 15, 28, 22, 75, 56, 35, 48

LOG OF BOREHOLE OLD 40840.292- SITE 1.GPJ AME_ON.GDT 5/6/11

Notes:

Date/Time	Water Level (m)	Depth to Cave (m)
03/30/2011	3.66	Open

Sheet No. 1 of 1

BH2-11-5

Log of Borehole 11-5

AME Materials Engineering

Project No.: 40840.292

Project Name: Seaton Lands- Whitevale Road

Figure No. 2-5

Location: North and South Sides of Whitevale Road, Pickering

Date Drilled: 3/30/11

Drill Type:

Datum: Geodetic

Split Spoon Sample	▨	Combustible Vapour Reading	□
Auger Sample	▨	Natural Moisture Content	×
SPT (N) Value	●	Atterberg Limits	⊢—○
Dynamic Cone Test	——	Undrained Triaxial at % Strain at Failure	⊕
Shelby Tube	▨	Shear Strength by Penetrometer Test	▲
Shear Strength by Vane Test	S		

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH
		TOPSOIL: ~300mm	171.32	0
		SILTY SAND/SANDY SILT TILL: brown, some clay and trace of gravel, wet to moist, compact to very dense.	171.02	
		.....grey		
		End of borehole at 9.60 m	161.72	

Standard Penetration Test N Value: 20 40 60 80

Shear Strength kPa: 50 100 150 200

Total Combustible Vapours (ppm): 25 50 75

Natural Moisture Content % Atterberg Limits (% Dry Weight): 10 20 30

SAMPLES

Natural Unit Weight kN/m³

2 ●

17 ●

40 ●

77 ●

50 for 300mm ●

50 for 130mm ●

50 for 280mm ●

50 for 300mm ●

50 ●

LOG OF BOREHOLE OLD 40840.292- SITE 1.GPJ AME_ON.GDT 5/6/11

Notes:

Date/Time	Water Level (m)	Depth to Cave (m)
03/30/2011	Dry	Open

Sheet No. 1 of 1

MW2-11-6

Log of Borehole 11-6

AME Materials Engineering

Project No.: 40840.292

Project Name: Seaton Lands- Whitevale Road

Figure No. 2-6

Location: North and South Sides of Whitevale Road, Pickering

Date Drilled: 3/30/11

Drill Type:

Datum: Geodetic

Split Spoon Sample	▨	Combustible Vapour Reading	□
Auger Sample	▨	Natural Moisture Content	×
SPT (N) Value	●	Atterberg Limits	⊢—⊖
Dynamic Cone Test	——	Undrained Triaxial at % Strain at Failure	⊕
Shelby Tube	▨	Shear Strength by Penetrometer Test	▲
Shear Strength by Vane Test	S		

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH
		TOPSOIL: ~300mm	172.77	0
		SILTY SAND/SANDY SILT TILL: brown, some clay and trace of gravel, very moist to moist, compact to very dense.	172.47	
		.....grey		8
		End of borehole at 8.99 m	163.17	

Standard Penetration Test N Value: 20 40 60 80

Shear Strength kPa: 50 100 150 200

Total Combustible Vapours (ppm): 25 50 75

Natural Moisture Content % Atterberg Limits (% Dry Weight): 10 20 30

SAMPLES

Natural Unit Weight kN/m³

SPT N values: 4, 20, 33, 40, 38, 36, 37, 64, 57

LOG OF BOREHOLE OLD 40840.292- SITE 1.GPJ AME_ON.GDT 5/6/11

Notes:

Date/Time	Water Level (m)	Depth to Cave (m)
03/30/2011	Dry	Open
04/15/2011	0.72	
04/15/2011	0.72	

Sheet No. 1 of 1

BH2-11-7

Log of Borehole 11-7

AME Materials Engineering

Project No.: 40840.292

Project Name: Seaton Lands- Whitevale Road

Figure No. 2-7

Location: North and South Sides of Whitevale Road, Pickering

Date Drilled: 3/30/11

Drill Type:

Datum: Geodetic

Split Spoon Sample		Combustible Vapour Reading	□
Auger Sample		Natural Moisture Content	×
SPT (N) Value	●	Atterberg Limits	
Dynamic Cone Test		Undrained Triaxial at % Strain at Failure	⊕
Shelby Tube		Shear Strength by Penetrometer Test	▲
Shear Strength by Vane Test	S		

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH	Standard Penetration Test N Value / Shear Strength kPa	Total Combustible Vapours (ppm) / Natural Moisture Content % / Atterberg Limits (% Dry Weight)	SAMPLES	Natural Unit Weight kN/m³
		TOPSOIL: ~300mm	182.24	0	2			
		SILTY SAND/SANDY SILT TILL: brown, some clay and trace of gravel, damp to moist, compact to very dense.	181.94	1	20 ● >225 ▲			
				2	35 ● >225 ▲			
				3	50 for 200mm ●			
				4	50 for 230mm ●			
		.....grey		5	50 for 150mm ●			
				6	50 for 300mm ●			
				7	50 for 150mm ●			
				8				
				9	50 for 230mm ●			
		End of borehole at 9.37 m	172.87					

LOG OF BOREHOLE OLD 40840.292- SITE 1.GPJ AME_ON.GDT 5/6/11

Notes:

Date/Time	Water Level (m)	Depth to Cave (m)
03/30/2011	Dry	Open

Sheet No. 1 of 1

BH2-11-8

Log of Borehole 11-8

AME Materials Engineering

Project No.: 40840.292

Project Name: Seaton Lands- Whitevale Road

Figure No. 2-8

Location: North and South Sides of Whitevale Road, Pickering

Date Drilled: 3/30/11

Drill Type:

Datum: Geodetic

Legend	Symbol	Legend	Symbol
Split Spoon Sample	▨	Combustible Vapour Reading	□
Auger Sample	▩	Natural Moisture Content	×
SPT (N) Value	●	Atterberg Limits	⊢—○
Dynamic Cone Test	—	Undrained Triaxial at % Strain at Failure	⊕
Shelby Tube	▨	Shear Strength by Penetrometer Test	▲
Shear Strength by Vane Test	✚ S		

Depth (m)	Soil Description	Elev. (m)	SPT N Value	Natural Moisture Content (%) (approx.)
0	**TOPSOIL:** ~350mm	183.49	3	~15
0.35	**SILTY SAND/SANDY SILT TILL:** brown, some clay and trace of gravel, damp to very moist, compact to very dense.	183.14		
~0.9			12	~14
~1.8			90	~8
~2.5			86	~8
~3.1			50 for 280mm	~7
~4.6			50 for 150mm	~7
~6.1			50 for 130mm	~7
~6.9	.........grey			
~7.6			50 for 150mm	~7
~9.2			50 for 280mm	~6
9.42	End of borehole at 9.42 m	174.07		

Chart headers: Standard Penetration Test N Value (20, 40, 60, 80); Shear Strength kPa (50, 100, 150, 200); Total Combustible Vapours (ppm) (25, 50, 75); Natural Moisture Content %, Atterberg Limits (% Dry Weight) (10, 20, 30); Samples; Natural Unit Weight kN/m^3. Columns: GWL, Symbol, Soil Description, Elev. m, Depth.

Notes:

Date/Time	Water Level (m)	Depth to Cave (m)
03/30/2011	4.00	4.60

Sheet No. 1 of 1

MW2-11-9s

Log of Borehole 11-9A

AME Materials Engineering

Project No.: 40840.292

Project Name: Seaton Lands- Whitevale Road

Figure No. 2-10

Location: North and South Sides of Whitevale Road, Pickering

Date Drilled: 3/30/11

Drill Type:

Datum: Geodetic

Split Spoon Sample
Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Shear Strength by Vane Test (S)
Combustible Vapour Reading
Natural Moisture Content
Atterberg Limits
Undrained Triaxial at % Strain at Failure
Shear Strength by Penetrometer Test

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH	Standard Penetration Test N Value / Shear Strength kPa (20 40 60 80 / 50 100 150 200)	Total Combustible Vapours (ppm) (25 50 75) / Natural Moisture Content % Atterberg Limits (% Dry Weight) (10 20 30)	SAMPLES	Natural Unit Weight kN/m³
		TOPSOIL: ~400mm	180.62	0	3			
		SILTY SAND/SANDY SILT TILL: brown, some clay and trace of gravel, very moist to moist, compact to very dense.	180.22	1	17			
				2	40			
				3	50 for 280mm			
				4	50 for 280mm			
		.....grey		5	53			
			175.59					
		End of borehole at 5.03 m						

LOG OF BOREHOLE OLD 40840.292- SITE 1.GPJ AME_ON.GDT 5/6/11

Notes:

Date/Time	Water Level (m)	Depth to Cave (m)
03/31/2011	Dry	4.27
04/15/2011	0.60	
04/15/2011	0.60	

Sheet No. 1 of 1

MW2-11-9d

Log of Borehole 11-9

AME Materials Engineering

Project No.: 40840.292

Project Name: Seaton Lands- Whitevale Road

Figure No. 2-9

Location: North and South Sides of Whitevale Road, Pickering

Date Drilled: 3/31/11

Drill Type:

Datum: Geodetic

Split Spoon Sample
Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Shear Strength by Vane Test (S)
Combustible Vapour Reading
Natural Moisture Content
Atterberg Limits
Undrained Triaxial at % Strain at Failure
Shear Strength by Penetrometer Test

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH
		TOPSOIL: ~450mm	180.62	0
		SILTY SAND/SANDY SILT TILL: brown, some clay and trace of gravel, dampt to moist, very dense.	180.17	
		.....grey		
		End of borehole at 9.27 m	171.35	

Standard Penetration Test N Value: 20 40 60 80
Shear Strength kPa: 50 100 150 200
Total Combustible Vapours (ppm): 25 50 75
Natural Moisture Content % / Atterberg Limits (% Dry Weight): 10 20 30

3
50 for 280mm
50 for 230mm
50 for 230mm
50 for 280mm
50 for 230mm
50 for 150mm
50 for 130mm
50 for 130mm

SAMPLES | Natural Unit Weight kN/m³

LOG OF BOREHOLE OLD 40840.292- SITE 1.GPJ AME_ON.GDT 5/6/11

Notes:

Date/Time	Water Level (m)	Depth to Cave (m)
03/31/2011	Dry	8.00
04/15/2011	7.00	

Sheet No. 1 of 1

BH2-11-10

Log of Borehole 11-10

AME Materials Engineering

Project No.: 40840.292

Project Name: Seaton Lands- Whitevale Road

Figure No. 2-11

Location: North and South Sides of Whitevale Road, Pickering

Date Drilled: 3/31/11

Drill Type:

Datum: Geodetic

Split Spoon Sample		Combustible Vapour Reading	□
Auger Sample		Natural Moisture Content	×
SPT (N) Value	●	Atterberg Limits	
Dynamic Cone Test		Undrained Triaxial at % Strain at Failure	⊕
Shelby Tube		Shear Strength by Penetrometer Test	▲
Shear Strength by Vane Test	S		

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH
		TOPSOIL: ~400mm	184.98	0
		SILTY SAND/SANDY SILT TILL: brown, some clay and trace of gravel, wet to moist, compact to very dense.	184.58	
		.....grey		4
		End of borehole at 4.65 m	180.33	

Standard Penetration Test N Value: 20 40 60 80

Shear Strength kPa: 50 100 150 200

Total Combustible Vapours (ppm): 25 50 75

Natural Moisture Content % Atterberg Limits (% Dry Weight): 10 20 30

SAMPLES

Natural Unit Weight kN/m³

4 ● 18 ● 32 ● 40 ● 50 for 250mm ● 50 for 80mm

LOG OF BOREHOLE OLD 40840.292- SITE 1.GPJ AME_ON.GDT 5/6/11

Notes:

Date/Time	Water Level (m)	Depth to Cave (m)
03/31/2011	1.50	1.60

Sheet No. 1 of 1

BH2-11-11

Log of Borehole 11-11

AME Materials Engineering

Project No.: 40840.292

Project Name: Seaton Lands- Whitevale Road

Figure No. 2-12

Location: North and South Sides of Whitevale Road, Pickering

Date Drilled: 3/31/11

Drill Type:

Datum: Geodetic

Split Spoon Sample		Combustible Vapour Reading	□
Auger Sample		Natural Moisture Content	×
SPT (N) Value	●	Atterberg Limits	
Dynamic Cone Test		Undrained Triaxial at % Strain at Failure	⊕
Shelby Tube		Shear Strength by Penetrometer Test	▲
Shear Strength by Vane Test	S		

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH
		TOPSOIL: ~300mm	182.96	0
		SILTY SAND/SANDY SILT TILL: brown, some clay and trace of gravel, wet to dry, very dense.	182.66	
		.....grey		
		End of borehole at 9.30 m	173.66	9

Standard Penetration Test N Value: 20 40 60 80

Shear Strength kPa: 50 100 150 200

Total Combustible Vapours (ppm): 25 50 75

Natural Moisture Content % Atterberg Limits (% Dry Weight): 10 20 30

SAMPLES

Natural Unit Weight kN/m³

4 ●

50 ●

50 for 150mm ●

50 for 280mm ●

50 for 280mm ●

50 for 250mm ●

50 for 300mm ●

50 for 150mm ●

50 for 150mm ●

LOG OF BOREHOLE OLD 40840.292- SITE 1.GPJ AME_ON.GDT 5/6/11

Notes:

Date/Time	Water Level (m)	Depth to Cave (m)
03/31/2011	6.10	1.40

Sheet No. 1 of 1

MW2-11-12s

Log of Borehole 11-12A

AME Materials Engineering

Project No.: 40840.292

Project Name: Seaton Lands- Whitevale Road

Figure No. 2-14

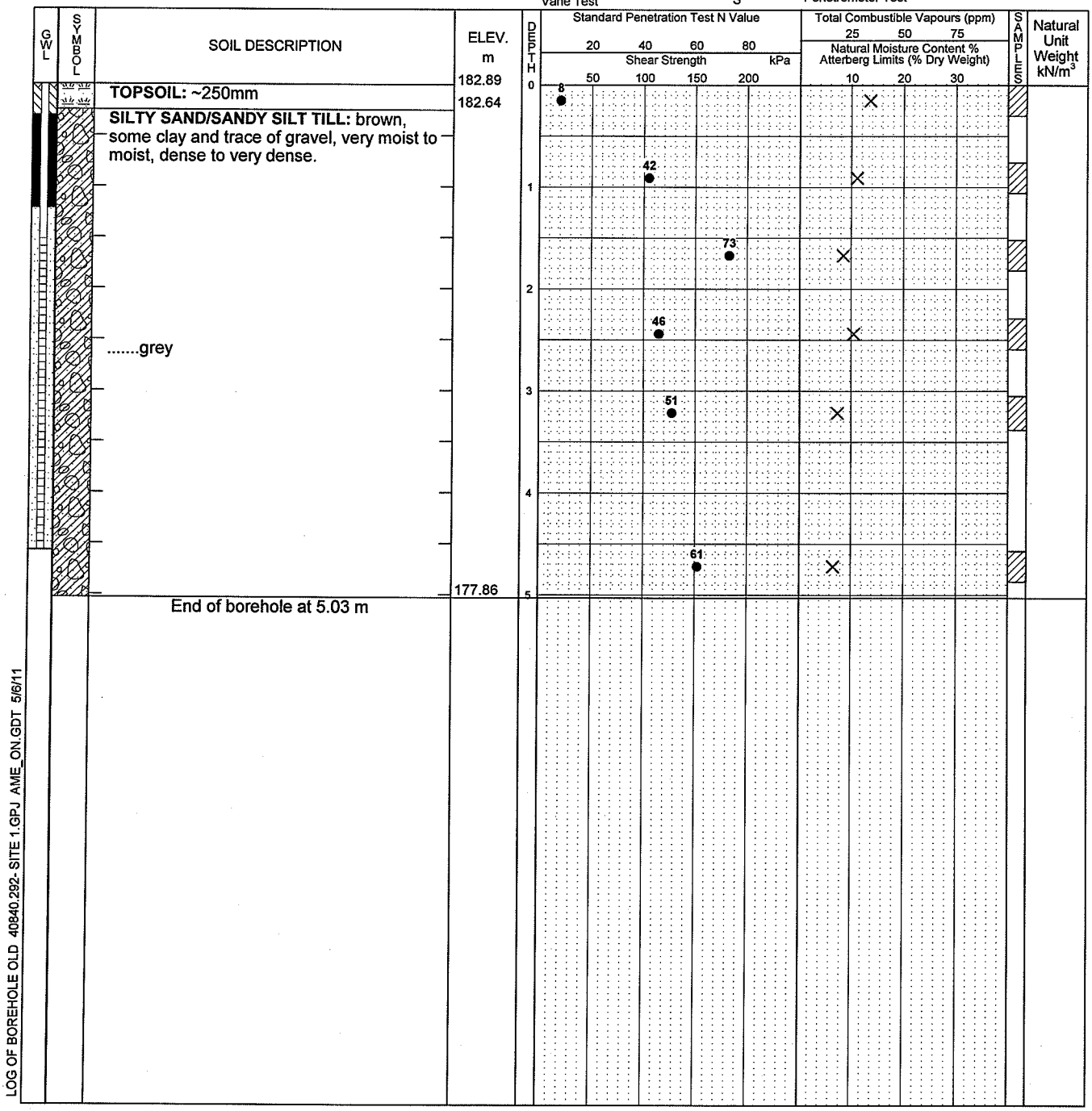
Location: North and South Sides of Whitevale Road, Pickering

Date Drilled: 3/31/11

Drill Type:

Datum: Geodetic

Split Spoon Sample
Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Shear Strength by Vane Test
Combustible Vapour Reading
Natural Moisture Content
Atterberg Limits
Undrained Triaxial at % Strain at Failure
Shear Strength by Penetrometer Test



LOG OF BOREHOLE OLD 40840.292- SITE 1.GPJ AME_ON.GDT 5/6/11

Notes:

Date/Time	Water Level (m)	Depth to Cave (m)
03/31/2011	3.96	Open
04/15/2011	0.70	

Sheet No. 1 of 1

MW2-11-12d

Log of Borehole 11-12

AME Materials Engineering

Project No.: 40840.292

Project Name: Seaton Lands- Whitevale Road

Figure No. 2-13

Location: North and South Sides of Whitevale Road, Pickering

Date Drilled: 3/31/11

Drill Type:

Datum: Geodetic

Split Spoon Sample	▨	Combustible Vapour Reading	□
Auger Sample	▨	Natural Moisture Content	×
SPT (N) Value	●	Atterberg Limits	⊢○
Dynamic Cone Test	——	Undrained Triaxial at % Strain at Failure	⊕
Shelby Tube	▨	Shear Strength by Penetrometer Test	▲
Shear Strength by Vane Test	S		

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH
		TOPSOIL: ~300mm	182.89	0
		SILTY SAND/SANDY SILT TILL: brown, some clay and trace of gravel, moist, compact to very dense.	182.59	
		.....grey		1
				2
				3
				4
				5
				6
				7
				8
				9
		End of borehole at 9.58 m	173.31	

Standard Penetration Test N Value: 20 40 60 80

Shear Strength kPa: 50 100 150 200

Total Combustible Vapours (ppm): 25 50 75

Natural Moisture Content % / Atterberg Limits (% Dry Weight): 10 20 30

SAMPLES

Natural Unit Weight kN/m³

5 22 67 89 92 68 87 70 50 for 430mm

LOG OF BOREHOLE OLD 40840.292- SITE 1.GPJ AME_ON.GDT 5/6/11

Notes:

Date/Time	Water Level (m)	Depth to Cave (m)
03/31/2011	6.71	Open
04/15/2011	0.60	

Sheet No. 1 of 1

BH2-11-13

Log of Borehole 11-13

AME Materials Engineering

Project No.: 40840.292

Project Name: Seaton Lands- Whitevale Road

Figure No. 2-15

Location: North and South Sides of Whitevale Road, Pickering

Date Drilled: 3/31/11

Drill Type:

Datum: Geodetic

Split Spoon Sample	▨	Combustible Vapour Reading	□
Auger Sample	▨	Natural Moisture Content	×
SPT (N) Value	●	Atterberg Limits	⊢—○
Dynamic Cone Test	——	Undrained Triaxial at % Strain at Failure	⊕
Shelby Tube	▨	Shear Strength by Penetrometer Test	▲
Shear Strength by Vane Test	S		

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH
		TOPSOIL: ~300mm	183.02	0
		SILTY SAND/SANDY SILT TILL: brown, some clay and trace of gravel, moist, compact to very dense.	182.72	
		.....grey		
		End of borehole at 9.40 m	173.62	9

Standard Penetration Test N Value: 20 40 60 80
Shear Strength kPa: 50 100 150 200
Total Combustible Vapours (ppm): 25 50 75
Natural Moisture Content % / Atterberg Limits (% Dry Weight): 10 20 30

SPT values: 10, 36, 46, 40, 55, 44, 50 for 230mm, 50 for 280mm, 50 for 250mm

SAMPLES | Natural Unit Weight kN/m³

LOG OF BOREHOLE OLD 40840.292- SITE 1.GPJ AME_ON.GDT 5/6/11

Notes:

Date/Time	Water Level (m)	Depth to Cave (m)
03/31/2011	4.27	7.32

Sheet No. 1 of 1

BH2-11-14

Log of Borehole 11-14

AME Materials Engineering

Project No.: 40840.292

Project Name: Seaton Lands- Whitevale Road

Figure No. 2-16

Location: North and South Sides of Whitevale Road, Pickering

Date Drilled: 3/31/11

Drill Type:

Datum: Geodetic

Split Spoon Sample		Combustible Vapour Reading	□
Auger Sample	▨	Natural Moisture Content	×
SPT (N) Value	●	Atterberg Limits	⊢—○
Dynamic Cone Test	——	Undrained Triaxial at % Strain at Failure	⊕
Shelby Tube	▨	Shear Strength by Penetrometer Test	▲
Shear Strength by Vane Test	S		

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH
		TOPSOIL: ~250mm	178.91	0
		SILTY SAND/SANDY SILT TILL: brown, some clay and trace of gravel, very moist to moist, very dense.	178.66	
		End of borehole at 9.27 m	169.64	9

Standard Penetration Test N Value: 20 40 60 80

Shear Strength kPa: 50 100 150 200

Total Combustible Vapours (ppm): 25 50 75

Natural Moisture Content % Atterberg Limits (% Dry Weight): 10 20 30

SAMPLES

Natural Unit Weight kN/m³

7 · 59 · 50 for 200mm · 90 · 50 for 300mm · 50 for 430mm · 50 for 430mm · 68 · 50 for 130mm

LOG OF BOREHOLE OLD 40840.292- SITE 1.GPJ AME_ON.GDT 5/6/11

Notes:

Date/Time	Water Level (m)	Depth to Cave (m)
03/31/2011	5.79	8.23

Sheet No. 1 of 1

BH2-11-15

Log of Borehole 11-15

AME Materials Engineering

Project No.: 40840.292

Project Name: Seaton Lands- Whitevale Road

Figure No. 2-17

Location: North and South Sides of Whitevale Road, Pickering

Date Drilled: 4/1/11

Drill Type:

Datum: Geodetic

Split Spoon Sample	▨	Combustible Vapour Reading	□
Auger Sample	▨	Natural Moisture Content	×
SPT (N) Value	●	Atterberg Limits	⊢—○
Dynamic Cone Test	——	Undrained Triaxial at % Strain at Failure	⊕
Shelby Tube	▨	Shear Strength by Penetrometer Test	▲
Shear Strength by Vane Test	S		

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH
		TOPSOIL: ~400mm	180.29	0
		SILTY FINE SAND: brown, saturated, loose.	179.89	
		SILTY SAND/SANDY SILT TILL: brown, some clay and trace of gravel, very moist, compact.	179.09	1
		.....grey		2
				3
		CLAYEY SILT TILL: grey, trace of gravel, wet to very moist, very stiff.	176.29	4
				5
				6
				7
				8
				9
		End of borehole at 9.60 m	170.69	

Standard Penetration Test N Value: 20 40 60 80

Shear Strength: 50 100 150 200 kPa

Total Combustible Vapours (ppm): 25 50 75

Natural Moisture Content % Atterberg Limits (% Dry Weight): 10 20 30

SAMPLES

Natural Unit Weight kN/m³

SPT N values: 2, 6, 16, 29, 25, 20, 21, 26, 25

LOG OF BOREHOLE OLD 40840.292- SITE 1.GPJ AME_ON.GDT 5/6/11

Notes:

Date/Time	Water Level (m)	Depth to Cave (m)
03/31/2011	0.61	1.52

Sheet No. 1 of 1

MW2-11-16s

Log of Borehole 11-16A

AME Materials Engineering

Project No.: 40840.292

Project Name: Seaton Lands- Whitevale Road

Figure No. 2-19

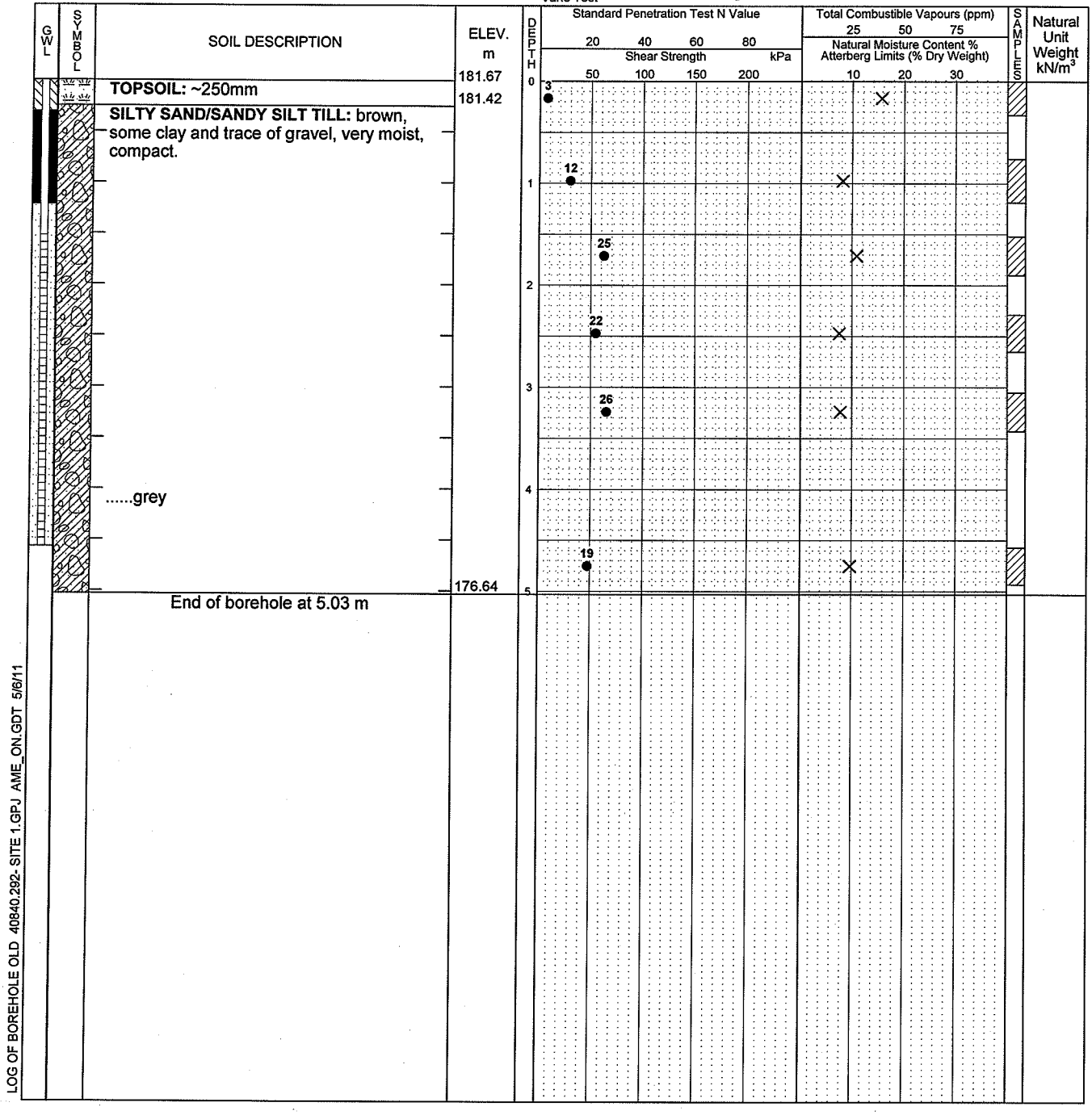
Location: North and South Sides of Whitevale Road, Pickering

Date Drilled: 4/1/11

Drill Type:

Datum: Geodetic

Split Spoon Sample
Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Shear Strength by Vane Test
Combustible Vapour Reading
Natural Moisture Content
Atterberg Limits
Undrained Triaxial at % Strain at Failure
Shear Strength by Penetrometer Test



LOG OF BOREHOLE OLD 40840.292- SITE 1.GPJ AME_ON.GDT 5/6/11

Notes:

Date/Time	Water Level (m)	Depth to Cave (m)
04/01/2011	Dry	Open
04/15/2011	1.40	

Sheet No. 1 of 1

MW2-11-16d

Log of Borehole 11-16

AME Materials Engineering

Project No.: 40840.292

Project Name: Seaton Lands- Whitevale Road

Figure No. 2-18

Location: North and South Sides of Whitevale Road, Pickering

Date Drilled: 4/1/11

Drill Type:

Datum: Geodetic

Split Spoon Sample	▨	Combustible Vapour Reading	□
Auger Sample	▨	Natural Moisture Content	×
SPT (N) Value	●	Atterberg Limits	⊢—○
Dynamic Cone Test	——	Undrained Triaxial at % Strain at Failure	⊕
Shelby Tube	▨	Shear Strength by Penetrometer Test	▲
Shear Strength by Vane Test	S		

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH
		TOPSOIL: ~300mm	181.67	0
		SILTY SAND/SANDY SILT TILL: brown, some clay and trace of gravel, damp to very moist, compact to very dense.	181.37	
		.....grey		
		.....increasing clay content		
		End of borehole at 9.60 m	172.07	9

Standard Penetration Test N Value: 3, 20, 30, 35, 35, 46, 20, 22, 64

Shear Strength kPa: 20 40 60 80 / 50 100 150 200

Total Combustible Vapours (ppm): 25 50 75

Natural Moisture Content % / Atterberg Limits (% Dry Weight): 10 20 30

SAMPLES

Natural Unit Weight kN/m³

LOG OF BOREHOLE OLD 40840.292- SITE 1.GPJ AME_ON.GDT 5/6/11

Notes:

Date/Time	Water Level (m)	Depth to Cave (m)
04/01/2011	7.35	7.01
04/15/2011	2.85	

Sheet No. 1 of 1

BH2-11-17

Log of Borehole 11-17

AME Materials Engineering

Project No.: 40840.292

Project Name: Seaton Lands- Whitevale Road

Figure No. 2-20

Location: North and South Sides of Whitevale Road, Pickering

Date Drilled: 4/1/11

Drill Type:

Datum: Geodetic

Split Spoon Sample
Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Shear Strength by Vane Test
Combustible Vapour Reading
Natural Moisture Content
Atterberg Limits
Undrained Triaxial at % Strain at Failure
Shear Strength by Penetrometer Test

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH
		TOPSOIL: ~300mm	181.72	0
		SILTY SAND/SANDY SILT TILL: brown, some clay and trace of gravel, wet to moist, compact to dense.	181.42	
		End of borehole at 3.51 m	178.21	3

Standard Penetration Test N Value: 20 40 60 80
Shear Strength kPa: 50 100 150 200
Total Combustible Vapours (ppm): 25 50 75
Natural Moisture Content % Atterberg Limits (% Dry Weight): 10 20 30
SAMPLES
Natural Unit Weight kN/m³

SPT N values: 2, 16, 19, 31, 34

LOG OF BOREHOLE OLD 40840.292- SITE 1.GPJ AME_ON.GDT 5/6/11

Notes:

Date/Time	Water Level (m)	Depth to Cave (m)
04/01/2011	Dry	Open

Sheet No. 1 of 1

BH2-11-18

Log of Borehole 11-18

AME Materials Engineering

Project No.: 40840.292

Project Name: Seaton Lands- Whitevale Road

Figure No. 2-21

Location: North and South Sides of Whitevale Road, Pickering

Date Drilled: 4/1/11

Drill Type:

Datum: Geodetic

Split Spoon Sample	▨	Combustible Vapour Reading	□
Auger Sample	▨	Natural Moisture Content	×
SPT (N) Value	●	Atterberg Limits	⊢—○
Dynamic Cone Test	——	Undrained Triaxial at % Strain at Failure	⊕
Shelby Tube	▨	Shear Strength by Penetrometer Test	▲
Shear Strength by Vane Test	S		

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH
		TOPSOIL: ~300mm	195.97	0
		SILTY SAND/SANDY SILT TILL: brown, some clay and trace of gravel, damp to moist, compact to very dense.	195.67	
		.....grey		1
				2
				3
				4
				5
				6
		End of borehole at 6.40 m	189.57	

Standard Penetration Test N Value: 20 40 60 80

Shear Strength kPa: 50 100 150 200

Total Combustible Vapours (ppm): 25 50 75

Natural Moisture Content % / Atterberg Limits (% Dry Weight): 10 20 30

SAMPLES

Natural Unit Weight kN/m³

3

17

28

50 for 300mm

50 for 280mm

50 for 150mm

50 for 300mm

LOG OF BOREHOLE OLD 40840.292- SITE 1.GPJ AME_ON.GDT 5/6/11

Notes:

Date/Time	Water Level (m)	Depth to Cave (m)
04/01/2011	Dry	Open

Sheet No. 1 of 1

MW2-11-19

Log of Borehole 11-19

AME Materials Engineering

Project No.: 40840.292

Project Name: Seaton Lands- Whitevale Road

Figure No. 2-22

Location: North and South Sides of Whitevale Road, Pickering

Date Drilled: 4/1/11

Drill Type:

Datum: Geodetic

Split Spoon Sample
Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Shear Strength by Vane Test
Combustible Vapour Reading
Natural Moisture Content
Atterberg Limits
Undrained Triaxial at % Strain at Failure
Shear Strength by Penetrometer Test

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH
		TOPSOIL: ~300mm	194.70	0
		SILTY SAND/SANDY SILT TILL: brown, some clay and trace of gravel, damp to very moist, compact to very dense.	194.40	
		.....grey		4
		End of borehole at 4.72 m	189.98	

Standard Penetration Test N Value: 20 40 60 80
Shear Strength kPa: 50 100 150 200
Total Organic Vapours (ppm): 25 50 75
Natural Moisture Content % / Atterberg Limits (% Dry Weight): 10 20 30

SPT values: 3; 18; 50 for 300mm; 50 for 300mm; 90 for 380mm; 50 for 150mm

SAMPLES

Natural Unit Weight kN/m³

LOG OF BOREHOLE OLD 40840.292- SITE 1.GPJ AME_ON.GDT 5/10/11

Notes:

Date/Time	Water Level (m)	Depth to Cave (m)
04/01/2011	Dry	3.66
04/15/2011	0.50	
04/15/2011	Dry	

Sheet No. 1 of 1

BH2-11-20

Log of Borehole 11-20

AME Materials Engineering

Project No.: 40840.292

Project Name: Seaton Lands- Whitevale Road

Figure No. 2-23

Location: North and South Sides of Whitevale Road, Pickering

Date Drilled: 4/1/11

Drill Type:

Datum: Geodetic

Split Spoon Sample | Auger Sample | SPT (N) Value | Dynamic Cone Test | Shelby Tube | Shear Strength by Vane Test

Combustible Vapour Reading | Natural Moisture Content | Atterberg Limits | Undrained Triaxial at % Strain at Failure | Shear Strength by Penetrometer Test

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH
		TOPSOIL: ~250mm	195.26	0
		SILTY SAND/SANDY SILT TILL: brown, some clay and trace of gravel, damp to moist, compact to very dense.	195.01	1
		.....grey		2
				3
				4
		End of borehole at 4.85 m	190.41	

Standard Penetration Test N Value: 20 40 60 80 — Shear Strength: 50 100 150 200 kPa

Total Combustible Vapours (ppm): 25 50 75 — Natural Moisture Content % Atterberg Limits (% Dry Weight): 10 20 30

SAMPLES | Natural Unit Weight kN/m³

1 — 25 — 30 — 50 — 54 — 50 for 280mm

LOG OF BOREHOLE OLD 40840.292- SITE 1.GPJ AME_ON.GDT 5/6/11

Notes:

Date/Time	Water Level (m)	Depth to Cave (m)
04/01/2011	Dry	4.27

Sheet No. 1 of 1

MW2-11-21

Log of Borehole 11-21

AME Materials Engineering

Project No.: 40840.292

Project Name: Seaton Lands- Whitevale Road

Figure No. 2-24

Location: North and South Sides of Whitevale Road, Pickering

Date Drilled: 4/4/11

Drill Type:

Datum: Geodetic

Split Spoon Sample
Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Shear Strength by Vane Test
Combustible Vapour Reading
Natural Moisture Content
Atterberg Limits
Undrained Triaxial at % Strain at Failure
Shear Strength by Penetrometer Test

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH	Standard Penetration Test N Value (20 40 60 80) / Shear Strength kPa (50 100 150 200)	Total Combustible Vapours (ppm) (25 50 75) / Natural Moisture Content % Atterberg Limits (% Dry Weight) (10 20 30)	SAMPLES	Natural Unit Weight kN/m³
		TOPSOIL: ~300mm	184.85	0				
			184.55					
		SILTY SAND/SANDY SILT TILL: brown, some clay and trace of gravel, moist, compact to very dense.		1	16			
				2	18, 22			
				3	28			
				4				
				5	35			
				6	40			
				7				
				8	31			
		.....grey		9	50 for 80mm			
			175.63					
		End of borehole at 9.22 m						

LOG OF BOREHOLE OLD 40840.292- SITE 1.GPJ AME_ON.GDT 5/6/11

Notes:

Date/Time	Water Level (m)	Depth to Cave (m)
04/04/2011	1.52	Open
04/15/2011	1.05	

Sheet No. 1 of 1

BH2-11-22

Log of Borehole 11-22

AME Materials Engineering

Project No.: 40840.292

Project Name: Seaton Lands- Whitevale Road

Figure No. 2-25

Location: North and South Sides of Whitevale Road, Pickering

Date Drilled: 4/7/11

Drill Type:

Datum: Geodetic

Split Spoon Sample	▨	Combustible Vapour Reading	□
Auger Sample	▨	Natural Moisture Content	×
SPT (N) Value	●	Atterberg Limits	⊢—○
Dynamic Cone Test	——	Undrained Triaxial at % Strain at Failure	⊕
Shelby Tube	▨	Shear Strength by Penetrometer Test	▲
Shear Strength by Vane Test	S		

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH
		TOPSOIL: ~350mm	189.30	0
			188.95	
		SILTY SAND/SANDY SILT TILL: brown, some clay and trace of gravel, wet to moist, compact to very dense.		1
				2
				3
				4
		.....grey		5
				6
				7
				8
				9
		End of borehole at 9.60 m	179.70	

Standard Penetration Test N Value: 20 40 60 80

Shear Strength kPa: 50 100 150 200

Total Combustible Vapours (ppm): 25 50 75

Natural Moisture Content % Atterberg Limits (% Dry Weight): 10 20 30

SAMPLES

Natural Unit Weight kN/m³

5 22 28 23 36 31 74 50 for 280mm 45

LOG OF BOREHOLE OLD 40840.292- SITE 1.GPJ AME_ON.GDT 5/6/11

Notes:

Date/Time	Water Level (m)	Depth to Cave (m)
04/07/2011	Dry	Open

Sheet No. 1 of 1

MW2-11-23s

Log of Borehole 11-23A

AME Materials Engineering

Project No.: 40840.292

Project Name: Seaton Lands- Whitevale Road

Figure No. 2-27

Location: North and South Sides of Whitevale Road, Pickering

Date Drilled: 4/7/11

Drill Type:

Datum: Geodetic

Split Spoon Sample
Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Shear Strength by Vane Test
Combustible Vapour Reading
Natural Moisture Content
Atterberg Limits
Undrained Triaxial at % Strain at Failure
Shear Strength by Penetrometer Test

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH	Standard Penetration Test N Value / Shear Strength kPa	Total Combustible Vapours (ppm) / Natural Moisture Content % / Atterberg Limits (% Dry Weight)	SAMPLES	Natural Unit Weight kN/m³
		TOPSOIL: ~350mm	189.51	0	4			
		SANDY SILT: brown, very moist to moist, compact to dense.	189.16		15			
		.....clayey silt		1	15			
				2	33			
				3	45			
		.....grey		4	40			
			184.48	5				
		End of borehole at 5.03 m						

Standard Penetration Test N Value: 20 40 60 80
Shear Strength kPa: 50 100 150 200
Total Combustible Vapours (ppm): 25 50 75
Natural Moisture Content % / Atterberg Limits (% Dry Weight): 10 20 30

LOG OF BOREHOLE OLD 40840.292- SITE 1.GPJ AME_ON.GDT 5/6/11

Notes:

Date/Time	Water Level (m)	Depth to Cave (m)
04/07/2011	Dry	Open
04/15/2011	0.65	

Sheet No. 1 of 1

MW2-11-23d

Log of Borehole 11-23

AME Materials Engineering

Project No.: 40840.292

Project Name: Seaton Lands- Whitevale Road

Figure No. 2-26

Location: North and South Sides of Whitevale Road, Pickering

Date Drilled: 4/7/11

Drill Type:

Datum: Geodetic

Split Spoon Sample	▨	Combustible Vapour Reading	□
Auger Sample	▨	Natural Moisture Content	×
SPT (N) Value	●	Atterberg Limits	⊢—○
Dynamic Cone Test	——	Undrained Triaxial at % Strain at Failure	⊕
Shelby Tube	▨		
Shear Strength by Vane Test	✚ S	Shear Strength by Penetrometer Test	▲

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH
		TOPSOIL: ~300mm	189.51	0
		SILTY SAND/SANDY SILT TILL: brown, some clay and trace of gravel, wet to moist, compact to very dense.	189.21	
		.....clayey silt		1
				2
				3
				4
				5
		.....grey, dry		6
				7
				8
				9
		End of borehole at 9.60 m	179.91	

Standard Penetration Test N Value: 20 40 60 80

Shear Strength kPa: 50 100 150 200

Total Combustible Vapours (ppm): 25 50 75

Natural Moisture Content % Atterberg Limits (% Dry Weight): 10 20 30

SAMPLES

Natural Unit Weight kN/m³

SPT N values: 3, 19, 18, 29, 38, 66, 55, 37, 47

LOG OF BOREHOLE OLD 40840.292- SITE 1.GPJ AME_ON.GDT 5/6/11

Notes:

Date/Time	Water Level (m)	Depth to Cave (m)
04/07/2011	8.23	Open
04/15/2011	0.73	

Sheet No. 1 of 1

BH2-11-24

Log of Borehole 11-24

AME Materials Engineering

Project No.: 40840.292

Project Name: Seaton Lands- Whitevale Road

Figure No. 2-28

Location: North and South Sides of Whitevale Road, Pickering

Date Drilled: 4/7/11

Drill Type:

Datum: Geodetic

Split Spoon Sample | Auger Sample | SPT (N) Value | Dynamic Cone Test | Shelby Tube | Shear Strength by Vane Test (S)

Combustible Vapour Reading | Natural Moisture Content | Atterberg Limits | Undrained Triaxial at % Strain at Failure | Shear Strength by Penetrometer Test

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH
		TOPSOIL: ~350mm	190.60	0
		SILTY SAND/SANDY SILT TILL: brown, some clay and trace of gravel, very moist to moist, compact to very dense.	190.25	
		.....grey		
		End of borehole at 9.60 m	181.00	9

Standard Penetration Test N Value — Shear Strength kPa (20 40 60 80 / 50 100 150 200)

Total Combustible Vapours (ppm) (25 50 75) — Natural Moisture Content % Atterberg Limits (% Dry Weight) (10 20 30)

SAMPLES

Natural Unit Weight kN/m³

3 | 23 | 52 | 70 for 430mm | 50 for 300mm | 50 for 130mm | 74 for 430mm | 69 | 50

LOG OF BOREHOLE OLD 40840.292- SITE 1.GPJ AME_ON.GDT 5/6/11

Notes:

Date/Time	Water Level (m)	Depth to Cave (m)
04/07/2011	Dry	Open

Sheet No. 1 of 1

MW2-11-25

Log of Borehole 11-25

AME Materials Engineering

Project No.: 40840.292

Project Name: Seaton Lands- Whitevale Road

Figure No. 2-29

Location: North and South Sides of Whitevale Road, Pickering

Date Drilled: 4/7/11

Drill Type:

Datum: Geodetic

Split Spoon Sample	▨	Combustible Vapour Reading	□
Auger Sample	▨	Natural Moisture Content	×
SPT (N) Value	●	Atterberg Limits	⊢—○
Dynamic Cone Test	——	Undrained Triaxial at % Strain at Failure	⊕
Shelby Tube	▨	Shear Strength by Penetrometer Test	▲
Shear Strength by Vane Test	S		

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH
		TOPSOIL: ~350mm	197.60	0
		SILTY SAND/SANDY SILT TILL: brown, some clay and trace of gravel, very moist to moist, compact to dense.	197.25	
		.....grey		3
		End of borehole at 6.55 m	191.05	6

Standard Penetration Test N Value: 20 40 60 80

Shear Strength kPa: 50 100 150 200

Total Combustible Vapours (ppm): 25 50 75

Natural Moisture Content % / Atterberg Limits (% Dry Weight): 10 20 30

SAMPLES

Natural Unit Weight kN/m³

4 22 50 for 250mm 45 33 24 45

LOG OF BOREHOLE OLD 40840.292- SITE 1.GPJ AME_ON.GDT 5/6/11

Notes:

Date/Time	Water Level (m)	Depth to Cave (m)
04/07/2011	5.49	Open
04/15/2011	0.55	

Sheet No. 1 of 1

MW2-11-26

Log of Borehole 11-26

AME Materials Engineering

Project No.: 40840.292

Project Name: Seaton Lands- Whitevale Road

Figure No. 2-30

Location: North and South Sides of Whitevale Road, Pickering

Date Drilled: 4/7/11

Drill Type:

Datum: Geodetic

Split Spoon Sample
Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Shear Strength by Vane Test
Combustible Vapour Reading
Natural Moisture Content
Atterberg Limits
Undrained Triaxial at % Strain at Failure
Shear Strength by Penetrometer Test

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH
		TOPSOIL: ~350mm	197.33	0
		SILTY SAND/SANDY SILT TILL: brown, some clay and trace of gravel, very moist, compact to very dense.	196.98	
		.....grey		1
				2
				3
				4
				5
				6
		End of borehole at 6.55 m	190.78	

Standard Penetration Test N Value: 20 40 60 80
Shear Strength kPa: 50 100 150 200
Total Organic Vapours (ppm): 25 50 75
Natural Moisture Content % / Atterberg Limits (% Dry Weight): 10 20 30

SPT values: 4, 29, 50 for 300mm, 62, 50 for 150mm, 51, 36

SAMPLES

Natural Unit Weight kN/m³

LOG OF BOREHOLE OLD 40840.292- SITE 1.GPJ AME_ON.GDT 5/10/11

Notes:

Date/Time	Water Level (m)	Depth to Cave (m)
04/07/2011	2.74	Open
04/15/2011	1.50	

Sheet No. 1 of 1

BH2-11-27

Log of Borehole 11-27

AME Materials Engineering

Project No.: 40840.292

Project Name: Seaton Lands- Whitevale Road

Figure No. 2-31

Location: North and South Sides of Whitevale Road, Pickering

Date Drilled: 4/8/11

Drill Type:

Datum: Geodetic

Split Spoon Sample		Combustible Vapour Reading	□
Auger Sample		Natural Moisture Content	×
SPT (N) Value	●	Atterberg Limits	
Dynamic Cone Test		Undrained Triaxial at % Strain at Failure	⊕
Shelby Tube		Shear Strength by Penetrometer Test	▲
Shear Strength by Vane Test	S		

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH
		TOPSOIL: ~250mm	200.25	0
		SILT: brown, moist to wet, compact.	200.00	
				1
				2
		SILTY SAND/SANDY SILT TILL: brown, some clay and trace of gravel, damp to moist, compact to very dense.	198.12	
				3
		.....grey		4
			195.42	
		End of borehole at 4.83 m		

Standard Penetration Test N Value: 20 40 60 80

Shear Strength: 6 50 100 150 200 kPa

Total Combustible Vapours (ppm): 25 50 75

Natural Moisture Content % Atterberg Limits (% Dry Weight): 10 20 30

SAMPLES

Natural Unit Weight kN/m³

19 22 42 43 50 for 250mm

LOG OF BOREHOLE OLD 40840.292- SITE 1.GPJ AME_ON.GDT 5/6/11

Notes:

Date/Time	Water Level (m)	Depth to Cave (m)
04/08/2011	Dry	Open

Sheet No. 1 of 1

BH2-11-28

Log of Borehole 11-28

AME Materials Engineering

Project No.: 40840.292

Project Name: Seaton Lands- Whitevale Road

Figure No. 2-32

Location: North and South Sides of Whitevale Road, Pickering

Date Drilled: 4/8/11

Drill Type:

Datum: Geodetic

Split Spoon Sample	▨	Combustible Vapour Reading	□
Auger Sample	⊠	Natural Moisture Content	×
SPT (N) Value	●	Atterberg Limits	⊢○
Dynamic Cone Test	——	Undrained Triaxial at % Strain at Failure	⊕
Shelby Tube	■	Shear Strength by Penetrometer Test	▲
Shear Strength by Vane Test	S		

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m
		TOPSOIL: ~400mm	207.69
		SILTY SAND/SANDY SILT TILL: brown, some clay and trace of gravel, moist to wet, compact to dense.	207.29
		SILTY SAND: brown, wet, dense.	204.79
		SILTY SAND/SANDY SILT TILL: brown, some clay and trace of gravel, moist to wet, very dense.	203.58
		End of borehole at 7.87 m	199.82

Standard Penetration Test N Value: 20 40 60 80

Shear Strength kPa: 50 100 150 200

Total Organic Vapours (ppm): 25 50 75

Natural Moisture Content % Atterberg Limits (% Dry Weight): 10 20 30

DEPTH 0 1 2 3 4 5 6 7

SAMPLES

Natural Unit Weight kN/m³

3 19 35 17 32 85 50 for 230mm 50 for 250mm

LOG OF BOREHOLE OLD 40840.292- SITE 1.GPJ AME_ON.GDT 5/10/11

Notes:

Date/Time	Water Level (m)	Depth to Cave (m)
04/08/2011	2.44	7.57

Sheet No. 1 of 1

BH2-11-29

Log of Borehole 11-29

AME Materials Engineering

Project No.: 40840.292

Project Name: Seaton Lands- Whitevale Road

Figure No. 2-33

Location: North and South Sides of Whitevale Road, Pickering

Date Drilled: 4/8/11

Drill Type:

Datum: Geodetic

Split Spoon Sample
Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Shear Strength by Vane Test (S)
Combustible Vapour Reading
Natural Moisture Content
Atterberg Limits
Undrained Triaxial at % Strain at Failure
Shear Strength by Penetrometer Test

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH
		TOPSOIL: ~300mm	202.18	0
		SILTY SAND/SANDY SILT TILL: brown, some clay and trace of gravel, damp to very moist, compact to very dense.	201.88	
		End of borehole at 7.72 m	194.46	7

Standard Penetration Test N Value: 18, 52, 62, 75, 50 for 100mm, 50 for 100mm, 50 for 100mm

Shear Strength kPa: 20 40 60 80; 2 50 100 150 200

Total Combustible Vapours (ppm): 25 50 75

Natural Moisture Content % / Atterberg Limits (% Dry Weight): 10 20 30

SAMPLES

Natural Unit Weight kN/m³

LOG OF BOREHOLE OLD 40840.292- SITE 1.GPJ AME_ON.GDT 5/6/11

Notes:

Date/Time	Water Level (m)	Depth to Cave (m)
04/08/2011	Dry	Open

Sheet No. 1 of 1

MW2-11-30

Log of Borehole 11-30

AME Materials Engineering

Project No.: 40840.292

Project Name: Seaton Lands- Whitevale Road

Figure No. 2-34

Location: North and South Sides of Whitevale Road, Pickering

Date Drilled: 4/8/11

Drill Type:

Datum: Geodetic

Split Spoon Sample | Auger Sample | SPT (N) Value | Dynamic Cone Test | Shelby Tube | Shear Strength by Vane Test (S)

Combustible Vapour Reading | Natural Moisture Content | Atterberg Limits | Undrained Triaxial at % Strain at Failure | Shear Strength by Penetrometer Test

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH	Standard Penetration Test N Value / Shear Strength kPa (20 40 60 80 / 50 100 150 200)	Total Combustible Vapours (ppm) (25 50 75) / Natural Moisture Content % Atterberg Limits (% Dry Weight) (10 20 30)	SAMPLES	Natural Unit Weight kN/m³
		TOPSOIL: ~200mm	193.71	0	3			
		SILTY SAND/SANDY SILT TILL: brown, some clay and trace of gravel, damp to very moist, compact to very dense.	193.51	1	10			
				2	23			
					46			
		.....grey		3	53			
				4				
				5	50 for 300mm			
				6	50 for 280mm			
				7				
				8	38			
				9				
					50			
		End of borehole at 9.60 m	184.11					

LOG OF BOREHOLE OLD 40840.292- SITE 1.GPJ AME_ON.GDT 5/6/11

Notes:

Date/Time	Water Level (m)	Depth to Cave (m)
04/08/2011	Dry	Open
04/15/2011	0.60	

Sheet No. 1 of 1

BH2-90-1

Log of Borehole 90-1

Project No.: 40840.90

Project Name: Seaton Parcel 3

Figure No. 2

Location: Pickering, Ontario

Date Drilled: 04/20/06

Drill Type: Solid Stem Auger

Datum: Geodetic

Split Spoon Sample
Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Shear Strength by Vane Test (S)
Combustible Vapour Reading
Natural Moisture Content
Atterberg Limits
Undrained Triaxial at % Strain at Failure
Shear Strength by Penetrometer Test

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH m	Standard Penetration Test N Value / Shear Strength kPa (20, 40, 60, 80 / 50, 100, 150, 200)	Total Combustible Vapours (ppm) (25, 50, 75) / Natural Moisture Content % Atterberg Limits (% Dry Weight) (10, 20, 30)	SAMPLES	Natural Unit Weight kN/m³
		~ 200 mm TOPSOIL over	165.10	0				
		SANDY SILT TILL: brown, moist, trace gravel, compact to very dense	164.90	1				
				2				
				3				
				4				
				5				
		SAND: brown, fine to medium grained, slightly moist to moist, very dense	159.52	6	50/100mm			
		End of borehole at 6.22 m	158.88					

LOG OF BOREHOLE 40840.90 SEATON PARCEL 3.GPJ AME_ON.GDT 06/09/06

Notes:

Date/Time	Water Level (m)	Depth to Cave (m)
Upon Completion	Dry	None

Sheet No. 1 of 1

MW2-90-2

Log of Borehole 90-2

Project No.: 40840.90

Project Name: Seaton Parcel 3

Figure No. 3

Location: Pickering, Ontario

Date Drilled: 04/20/06

Drill Type: Solid Stem Auger

Datum: Geodetic

Split Spoon Sample	▨	Combustible Vapour Reading	□
Auger Sample	⊠	Natural Moisture Content	×
SPT (N) Value	●	Atterberg Limits	⊢○
Dynamic Cone Test	——	Undrained Triaxial at % Strain at Failure	⊕
Shelby Tube	■		
Shear Strength by Vane Test	✚ S	Shear Strength by Penetrometer Test	▲

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH	Standard Penetration Test N Value / Shear Strength kPa	Total Combustible Vapours (ppm) / Natural Moisture Content % / Atterberg Limits (% Dry Weight)	SAMPLE	Natural Unit Weight kN/m³
		~ 200 mm TOPSOIL over	161.02	0	20 40 60 80 / 50 100 150 200	25 50 75 / 10 20 30		
		SANDY SILT TILL: brown to grey, moist to very moist, trace gravel, very dense increased sand near surface	160.82					
		becoming grey		1				
				2				
				3				
				4				
				5				
		SAND: medium grained, brownish grey, moist to wet, very dense	155.52	6	50/130mm			
		End of borehole at 6.22 m	154.80					

LOG OF BOREHOLE 40840.90 SEATON PARCEL 3.GPJ AME_ON.GDT 06/09/06

Notes:

Date/Time	Water Level (m)	Depth to Cave (m)
Upon Completion	Dry	None
April 21, 2006	Dry	
May 2, 2006	Dry	

Sheet No. 1 of 1

BH2-90-3

Log of Borehole 90-3

Project No.: 40840.90

Project Name: Seaton Parcel 3

Figure No. 4

Location: Pickering, Ontario

Date Drilled: 04/20/06

Drill Type: Solid Stem Auger

Datum: Geodetic

Split Spoon Sample	▨	Combustible Vapour Reading	□
Auger Sample	⊠	Natural Moisture Content	×
SPT (N) Value	●	Atterberg Limits	⊢○
Dynamic Cone Test	——	Undrained Triaxial at % Strain at Failure	⊕
Shelby Tube	▮	Shear Strength by Penetrometer Test	▲
Shear Strength by Vane Test	✚ S		

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH
		~150 mm TOPSOIL over	163.21	0
		SAND: brown to grey, fine to medium grained, moist to wet, compact to very dense	163.06	
▼		becoming grey	161.11	2
		SANDY SILT TILL: grey, moist, trace gravel, very dense	159.21	4
		End of borehole at 6.20 m	157.01	6

Standard Penetration Test N Value: 20 40 60 80

Shear Strength kPa: 50 100 150 200

Total Combustible Vapours (ppm): 25 50 75

Natural Moisture Content % Atterberg Limits (% Dry Weight): 10 20 30

SAMPLE NUMBER

Natural Unit Weight kN/m³

50/100mm

LOG OF BOREHOLE 40840.90 SEATON PARCEL 3.GPJ AME_ON.GDT 06/09/06

Notes:

Date/Time	Water Level (m)	Depth to Cave (m)
Upon Completion	2.10	2.20

Sheet No. 1 of 1

MW2-90-4

Log of Borehole 90-4

Project No.: 40840.90

Project Name: Seaton Parcel 3

Figure No. 5

Location: Pickering, Ontario

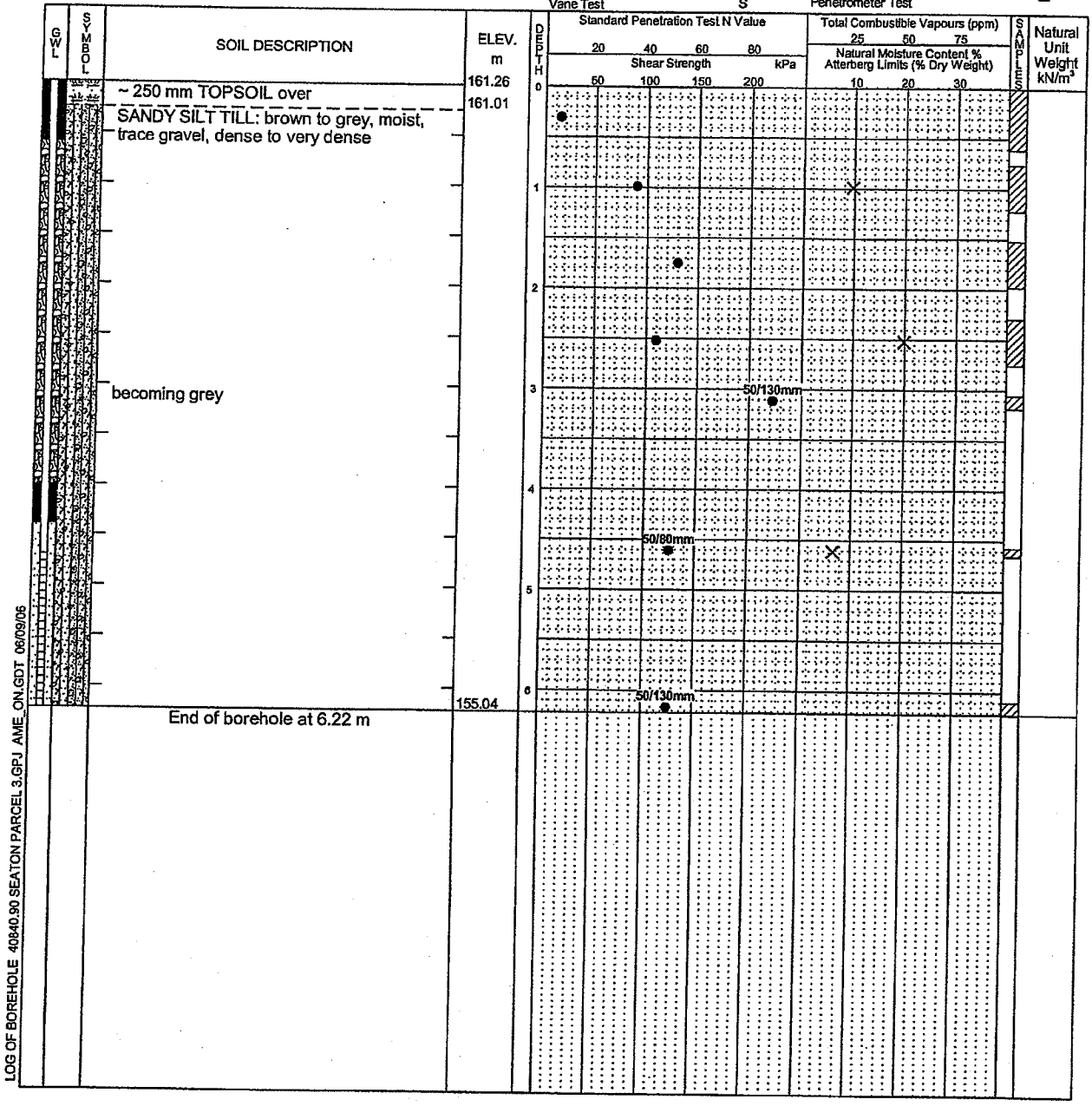
Date Drilled: 04/20/06

Drill Type: Solid Stem Auger

Datum: Geodetic

Split Spoon Sample | Auger Sample | SPT (N) Value | Dynamic Cone Test | Shelby Tube | Shear Strength by Vane Test

Combustible Vapour Reading | Natural Moisture Content | Atterberg Limits | Undrained Triaxial at % Strain at Failure | Shear Strength by Penetrometer Test



LOG OF BOREHOLE 40840.90 SEATON PARCEL 3.GPJ AME_ON.GDT 06/09/06

Notes:

Date/Time	Water Level (m)	Depth to Cave (m)
Upon Completion	Dry	None
April 21, 2006	Dry	
May 2, 2006	Dry	

Sheet No. 1 of 1

BH2-90-5

Log of Borehole 90-5

Project No.: 40840.90

Project Name: Seaton Parcel 3

Figure No. 6

Location: Pickering, Ontario

Date Drilled: 04/20/06

Drill Type: Solid Stem Auger

Datum: Geodetic

Split Spoon Sample	▨	Combustible Vapour Reading	□
Auger Sample	⊠	Natural Moisture Content	×
SPT (N) Value	●	Atterberg Limits	⊢—⊖
Dynamic Cone Test	——	Undrained Triaxial at % Strain at Failure	⊕
Shelby Tube	▣	Shear Strength by Penetrometer Test	▲
Shear Strength by Vane Test	✚ S		

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH
		~ 230 mm TOPSOIL over	157.51	0
		SANDY SILT TILL: brown to grey, moist, trace gravel, dense to very dense	157.28	
		becoming grey		
▼		SAND: brownish grey, fine grained, wet, very dense	151.91	
			151.71	
		End of borehole at 6.53 m	150.98	

Standard Penetration Test N Value: 20 40 60 80

Shear Strength kPa: 50 100 150 200

Total Combustible Vapours (ppm): 25 50 75

Natural Moisture Content % Atterberg Limits (% Dry Weight): 10 20 30

SAMPLES

Natural Unit Weight kN/m³

50/130mm

50/130mm

50/130mm

LOG OF BOREHOLE 40840.90 SEATON PARCEL 3.GPJ AME_ON.GDT 06/09/06

Notes:

Date/Time	Water Level (m)	Depth to Cave (m)
Upon Completion	5.80	None

Sheet No. 1 of 1

MW2-90-6

Log of Borehole 90-6

Project No.: 40840.90

Project Name: Seaton Parcel 3

Figure No. 7

Location: Pickering, Ontario

Date Drilled: 04/20/06

Drill Type: Solid Stem Auger

Datum: Geodetic

Split Spoon Sample	▨	Combustible Vapour Reading	□
Auger Sample	⊠	Natural Moisture Content	×
SPT (N) Value	●	Atterberg Limits	⊢○
Dynamic Cone Test	——	Undrained Triaxial at % Strain at Failure	⊕
Shelby Tube	■	Shear Strength by Penetrometer Test	▲
Shear Strength by Vane Test	S		

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH	Standard Penetration Test N Value (20 40 60 80) / Shear Strength kPa (50 100 150 200)	Total Combustible Vapours (ppm) (25 50 75) / Natural Moisture Content % Atterberg Limits (% Dry Weight) (10 20 30)	SAMPLE	Natural Unit Weight kN/m³
		~ 200 mm TOPSOIL over	160.14	0				
		SANDY SILT TILL: brown to grey, moist to very moist, trace gravel, compact to very dense	159.94					
			158.84	1				
				2				
				3				
				4				
				5				
		becoming grey		6				
			153.59					
		End of borehole at 6.55 m						

LOG OF BOREHOLE 40840.90 SEATON PARCEL 3.GPJ AME_ON.GDT 06/09/06

Notes:

Date/Time	Water Level (m)	Depth to Cave (m)
Upon Completion	6.10	None
April 21, 2006	5.10	
May 2, 2006	1.30	

Sheet No. 1 of 1

BH2-90-7

Log of Borehole 90-7

Project No.: 40840.90

Project Name: Seaton Parcel 3

Figure No. 8

Location: Pickering, Ontario

Date Drilled: 06/27/06

Drill Type: Solid Stem Auger

Datum: Geodetic

Split Spoon Sample | Auger Sample | SPT (N) Value | Dynamic Cone Test | Shelby Tube | Shear Strength by Vane Test

Combustible Vapour Reading | Natural Moisture Content | Atterberg Limits | Undrained Triaxial at % Strain at Failure | Shear Strength by Penetrometer Test

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH	Standard Penetration Test N Value (20 40 60 80) / Shear Strength kPa (50 100 150 200)	Total Combustible Vapours (ppm) (25 50 75) / Natural Moisture Content % Atterberg Limits (% Dry Weight) (10 20 30)	SAMPLES	Natural Unit Weight kN/m³
		~ 200 mm TOPSOIL over SANDY SILT TILL: brown, moist to very moist, trace gravel, trace clay, trace rootlets near surface, loose to very dense, occasional coarse gravel	158.38 158.18	0 1 2 3 4	50/76mm			
		End of borehole at 4.80 m	153.58					

LOG OF BOREHOLE 40840.90 SEATON PARCEL 3.GPJ AME_ON.GDT 07/21/06

Notes:

Date/Time	Water Level (m)	Depth to Cave (m)
Upon Completion	Dry	None

Sheet No. 1 of 1

MW2-90-8

Log of Borehole 90-8

Project No.: 40840.90

Project Name: Seaton Parcel 3

Figure No. 9

Location: Pickering, Ontario

Date Drilled: 06/27/06

Drill Type: Solid Stem Auger

Datum: Geodetic

Split Spoon Sample	▨	Combustible Vapour Reading	□
Auger Sample	⊠	Natural Moisture Content	×
SPT (N) Value	●	Atterberg Limits	⊢—○
Dynamic Cone Test	——	Undrained Triaxial at % Strain at Failure	⊕
Shelby Tube	■	Shear Strength by Penetrometer Test	▲
Shear Strength by Vane Test	S		

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH	Standard Penetration Test N Value (20 40 60 80) / Shear Strength kPa (50 100 150 200)	Total Combustible Vapours (ppm) (25 50 75) / Natural Moisture Content % Atterberg Limits (% Dry Weight) (10 20 30)	SAMPLES	Natural Unit Weight kN/m³
		~ 150 mm TOPSOIL over	152.20	0				
		SANDY SILT TILL: brown, moist to very moist, trace gravel, loose to very dense, occasional coarse gravel	152.05					
		increased clay content from 2.3 m to end of borehole		1				
				2				
				3				
				4				
			147.60		50/25mm			
		End of borehole at 4.60 m						
		Borehole terminated on boulder						

LOG OF BOREHOLE 40840.90 SEATON PARCEL 3.GPJ AME_ON.GDT 07/21/06

Notes:

Date/Time	Water Level (m)	Depth to Cave (m)
Upon Completion	Dry	None
June 28, 2006	Dry	
July 4, 2006	Dry	

Sheet No. 1 of 1

MW2-91-1

Log of Borehole 91-1

AME Materials Engineering

Project No.: 40840.91

Project Name: Seaton Parcel 4

Figure No. 2

Location: Whitevale Road and Mulberry Lane, Pickering, Ontario

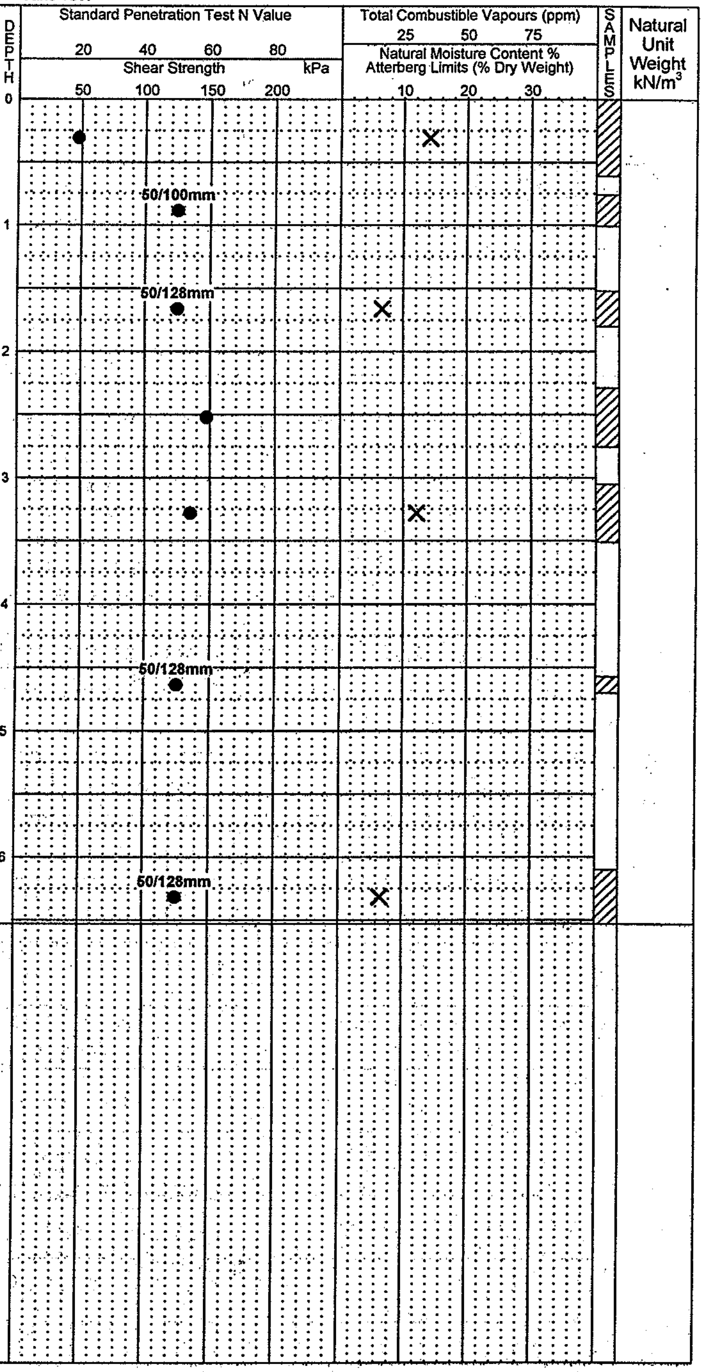
Date Drilled: 4/21/06

Drill Type: Solid Stem Auger

Datum: Geodetic

Legend		Legend	
Split Spoon Sample	▨	Combustible Vapour Reading	□
Auger Sample	⊠	Natural Moisture Content	✕
SPT (N) Value	●	Atterberg Limits	⊢—○
Dynamic Cone Test	——	Undrained Triaxial at % Strain at Failure	⊕
Shelby Tube	■		
Shear Strength by Vane Test	S	Shear Strength by Penetrometer Test	▲

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH
		~ 200 mm TOPSOIL over	183.35	0
		SANDY SILT TO SILTY SAND TILL: light brown to grey, moist, very dense, trace gravel, trace clay, reworked below topsoil	183.15	
			182.85	
		changes to grey		
			176.82	
		End of borehole at 6.53 m		



Notes:

Sheet No. 1 of 1

Date/Time	Water Level (m)	Depth to Cave (m)
Upon Completion	Dry	No Cave
April 22, 2006	5.80	
May 2, 2006	0.50	

LOG OF BOREHOLE OLD 40840.91 SEATON PARCEL 4.GPJ AME_ON.GDT 9/25/09

MW2-91-2

Log of Borehole 91-2

AME Materials Engineering

Project No.: 40840.91

Project Name: Seaton Parcel 4

Figure No. 3

Location: Whitevale Road and Mulberry Lane, Pickering, Ontario

Date Drilled: 4/21/06

Drill Type: Solid Stem Auger

Datum: Geodetic

Split Spoon Sample	▨	Combustible Vapour Reading	□
Auger Sample	⊠	Natural Moisture Content	×
SPT (N) Value	●	Atterberg Limits	⊢○
Dynamic Cone Test	—	Undrained Triaxial at % Strain at Failure	⊕
Shelby Tube	■	Shear Strength by Penetrometer Test	▲
Shear Strength by Vane Test	S		

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH	Standard Penetration Test N Value / Shear Strength kPa	Total Combustible Vapours (ppm) / Natural Moisture Content % / Atterberg Limits (% Dry Weight)	SAMPLES	Natural Unit Weight kN/m³
		~ 200 mm TOPSOIL over	185.04	0	20 40 60 80 / 50 100 150 200	25 50 75 / 10 20 30		
		SANDY SILT TO SILTY SAND TILL: light brown to brown grey, moist to wet, very dense, trace gravel, trace clay, reworked below topsoil	184.84					
			184.14	1				
				2				
				3	50/128mm			
				4				
				5				
			178.89	6	50/50mm			
		End of borehole at 6.15 m						

LOG OF BOREHOLE OLD 40840.91 SEATON PARCEL 4.GPJ AME_ON.GDT 9/25/09

Notes:

Date/Time	Water Level (m)	Depth to Cave (m)
Upon Completion	5.50	No Cave
April 22, 2006	4.80	
May 2, 2006	0.90	

Sheet No. 1 of 1

MW2-91-3

Log of Borehole 91-3

AME Materials Engineering

Project No.: 40840.91

Project Name: Seaton Parcel 4

Figure No. 4

Location: Whitevale Road and Mulberry Lane, Pickering, Ontario

Date Drilled: 4/21/06

Drill Type: Solid Stem Auger

Datum: Geodetic

Split Spoon Sample	▨	Combustible Vapour Reading	□
Auger Sample	⊠	Natural Moisture Content	×
SPT (N) Value	●	Atterberg Limits	⊢○
Dynamic Cone Test	——	Undrained Triaxial at % Strain at Failure	⊕
Shelby Tube	■	Shear Strength by Penetrometer Test	▲
Shear Strength by Vane Test	S		

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH
		~ 230 mm TOPSOIL over	177.29	0
		SANDY SILT TO SILTY SAND TILL: light brown to grey, moist, very dense, trace gravel, trace clay, reworked below topsoil	177.09	
		changes to grey		6
		End of borehole at 6.20 m	171.09	

Standard Penetration Test N Value: 20 40 60 80

Shear Strength kPa: 50 100 150 200

Total Combustible Vapours (ppm): 25 50 75

Natural Moisture Content % Atterberg Limits (% Dry Weight): 10 20 30

SAMPLES

Natural Unit Weight kN/m³

50/100mm

50/100mm

50/100mm

LOG OF BOREHOLE OLD 40840.91 SEATON PARCEL 4.GPJ AME_ON.GDT 9/25/09

Notes:

Date/Time	Water Level (m)	Depth to Cave (m)
Upon Completion	5.20	No Cave
April 22, 2006	4.70	
May 2, 2006	0.20	

Sheet No. 1 of 1

MW2-92-1

Log of Borehole 92-1

AME Materials Engineering

Project No.: 40840.92

Project Name: Seaton Parcel 5

Figure No. 2

Location: Pickering, Ontario

Date Drilled: 4/24/06

Drill Type: Solid Stem Auger

Datum: Geodetic

Split Spoon Sample
Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Shear Strength by Vane Test
Combustible Vapour Reading
Natural Moisture Content
Atterberg Limits
Undrained Triaxial at % Strain at Failure
Shear Strength by Penetrometer Test

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH
		~ 200 mm TOPSOIL over	187.64	0
		SANDY SILT TILL: brown to grey, moist, dense to very dense, trace gravel, trace clay, reworked below topsoil	187.54	
		becoming grey		3
			181.42	6
		End of borehole at 6.22 m		

Standard Penetration Test N Value: 20 40 60 80
Shear Strength kPa: 50 100 150 200
Total Combustible Vapours (ppm): 25 50 75
Natural Moisture Content % Atterberg Limits (% Dry Weight): 10 20 30

50/130mm
50/130mm
50/130mm

SAMPLES

Natural Unit Weight kN/m³

LOG OF BOREHOLE OLD 40840.92 SEATON PARCEL 5.GPJ AME_ON.GDT 9/25/09

Notes:

Date/Time	Water Level (m)	Depth to Cave (m)
Upon Completion	5.80	No Cave
April 25, 2006	5.10	
May 2, 2006	0.10	

Sheet No. 1 of 1

MW2-92-2

Log of Borehole 92-2

AME Materials Engineering

Project No.: 40840.92

Project Name: Seaton Parcel 5

Figure No. 3

Location: Pickering, Ontario

Date Drilled: 4/24/06

Drill Type: Solid Stem Auger

Datum: Geodetic

Split Spoon Sample	▨	Combustible Vapour Reading	□
Auger Sample	⊠	Natural Moisture Content	×
SPT (N) Value	●	Atterberg Limits	⊢—○
Dynamic Cone Test	——	Undrained Triaxial at % Strain at Failure	⊕
Shelby Tube	■	Shear Strength by Penetrometer Test	▲
Shear Strength by Vane Test	✚ S		

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH
		~ 230 mm TOPSOIL over	200.45	0
		SANDY SILT TILL: brown to grey, moist, very dense, trace gravel, trace clay, reworked below topsoil	200.22	
			199.15	1
				2
		becoming grey		3
				4
				5
			194.25	6
		End of borehole at 6.20 m		

Standard Penetration Test N Value: 20 40 60 80

Shear Strength kPa: 50 100 150 200

Total Combustible Vapours (ppm): 25 50 75

Natural Moisture Content % Atterberg Limits (% Dry Weight): 10 20 30

SAMPLES

Natural Unit Weight kN/m³

50/130mm

50/130mm

50/100mm

50/100mm

LOG OF BOREHOLE OLD 40840.92 SEATON PARCEL 5.GPJ AME_ON.GDT 9/25/09

Notes:

Date/Time	Water Level (m)	Depth to Cave (m)
Upon Completion	5.80	No Cave
April 25, 2006	5.00	
May 2, 2006	1.30	

Sheet No. 1 of 1

BH2-92-3

Log of Borehole 92-3

Project No.: 40840.92

Project Name: Seaton Parcel 5

Figure No. 4

Location: Pickering, Ontario

Date Drilled: 05/01/06

Drill Type: Solid Stem Auger

Datum: Geodetic

Split Spoon Sample	▨	Combustible Vapour Reading	□
Auger Sample	⊠	Natural Moisture Content	×
SPT (N) Value	●	Atterberg Limits	⊢⊖
Dynamic Cone Test	——	Undrained Triaxial at % Strain at Failure	⊕
Shelby Tube	■	Shear Strength by Penetrometer Test	▲
Shear Strength by Vane Test	S		

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH
		~ 200 mm TOPSOIL over	215.40	0
		SANDY SILT TILL: brown, moist, compact, trace gravel, trace clay, reworked below topsoil	215.20	
		SILTY SAND TO SAND: brown, moist to wet, compact to very dense	212.50	3
▼			208.70	7
		End of borehole at 9.60 m	205.80	9

Standard Penetration Test N Value: 20 40 60 80

Shear Strength: 50 100 150 200 kPa

Total Combustible Vapours (ppm): 25 50 75

Natural Moisture Content % Atterberg Limits (% Dry Weight): 10 20 30

SAMPLES

Natural Unit Weight kN/m³

50/130mm

50/130mm

50/130mm

LOG OF BOREHOLE 40840.92 SEATON PARCEL 5.GPJ AME_ON.GDT 06/09/06

Notes:

Date/Time	Water Level (m)	Depth to Cave (m)
Upon Completion	6.70	No Cave

Sheet No. 1 of 1

MW2-92-4

Log of Borehole 92-4

Project No.: 40840.92

Project Name: Seaton Parcel 5

Figure No. 5

Location: Pickering, Ontario

Date Drilled: 04/24/06

Drill Type: Solid Stem Auger

Datum: Geodetic

Split Spoon Sample | Combustible Vapour Reading
Auger Sample | Natural Moisture Content
SPT (N) Value | Atterberg Limits
Dynamic Cone Test | Undrained Triaxial at % Strain at Failure
Shelby Tube
Shear Strength by Vane Test | Shear Strength by Penetrometer Test

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH
		~ 200 mm TOPSOIL over	201.32	0
		SILTY SAND TO SAND: brown, moist, compact to very dense	201.12	
		SANDY SILT TILL: brown, moist, very dense, trace gravel, trace clay	195.72	6
		End of borehole at 6.22 m	195.10	

Standard Penetration Test N Value
Shear Strength kPa: 20 40 60 80 / 50 100 150 200
Total Combustible Vapours (ppm): 25 50 75
Natural Moisture Content % Atterberg Limits (% Dry Weight): 10 20 30
SAMPLES
Natural Unit Weight kN/m³

50/130mm

LOG OF BOREHOLE 40840.92 SEATON PARCEL 5.GPJ AME_ON.GDT 06/09/06

Notes:

Date/Time	Water Level (m)	Depth to Cave (m)
Upon Completion	Dry	No Cave
April 25, 2006	Dry	
May 2, 2006	Dry	

Sheet No. 1 of 1

BH2-92-5

Log of Borehole 92-5

AME Materials Engineering

Project No.: 40840.92

Project Name: Seaton Parcel 5

Figure No. 6

Location: Pickering, Ontario

Date Drilled: 4/21/06

Drill Type: Solid Stem Auger

Datum: Geodetic

Split Spoon Sample	▨	Combustible Vapour Reading	□
Auger Sample	▩	Natural Moisture Content	×
SPT (N) Value	●	Atterberg Limits	⊢—○
Dynamic Cone Test	——	Undrained Triaxial at % Strain at Failure	⊕
Shelby Tube	■	Shear Strength by Penetrometer Test	▲
Shear Strength by Vane Test	✤ S		

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH
		~ 130 mm TOPSOIL over SANDY SILT TILL: brown, moist, compact to dense, trace gravel, trace clay, reworked below topsoil	200.94 200.81	0
				1
				2
		SILTY SAND TO SAND: brown, moist to wet, very dense	198.84	
▼			197.84	3
				4
				5
				6
		End of borehole at 6.38 m	194.56	

Standard Penetration Test N Value: 20 40 60 80

Shear Strength kPa: 50 100 150 200

Total Combustible Vapours (ppm): 25 50 75

Natural Moisture Content % / Atterberg Limits (% Dry Weight): 10 20 30

SAMPLES

Natural Unit Weight kN/m³

50/130mm

50/130mm

50/130mm

LOG OF BOREHOLE OLD 40840.92 SEATON PARCEL 5.GPJ AME_ON.GDT 9/25/09

Notes:

Date/Time	Water Level (m)	Depth to Cave (m)
Upon Completion	3.10	No Cave

Sheet No. 1 of 1

BH2-92-6

Log of Borehole 92-6

AME Materials Engineering

Project No.: 40840.92

Project Name: Seaton Parcel 5

Figure No. 7

Location: Pickering, Ontario

Date Drilled: 4/21/06

Drill Type: Solid Stem Auger

Datum: Geodetic

Split Spoon Sample	▨	Combustible Vapour Reading	□
Auger Sample	⊠	Natural Moisture Content	×
SPT (N) Value	●	Atterberg Limits	⊢—○
Dynamic Cone Test	——	Undrained Triaxial at % Strain at Failure	⊕
Shelby Tube	■	Shear Strength by Penetrometer Test	▲
Shear Strength by Vane Test	S		

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH
		~ 100 mm TOPSOIL over	201.05	0
		SANDY SILT TILL: brown to grey, moist, dense to very dense, trace gravel, trace clay, reworked below topsoil	200.95	
		becoming grey		
			194.85	6
		End of borehole at 6.20 m		

Standard Penetration Test N Value: 20 40 60 80

Shear Strength kPa: 50 100 150 200

Total Combustible Vapours (ppm): 25 50 75

Natural Moisture Content % / Atterberg Limits (% Dry Weight): 10 20 30

50/80mm

50/100mm

SAMPLES

Natural Unit Weight kN/m³

LOG OF BOREHOLE OLD 40840.92 SEATON PARCEL 5.GPJ AME_ON.GDT 9/25/09

Notes:

Date/Time	Water Level (m)	Depth to Cave (m)
Upon Completion	Dry	No Cave

Sheet No. 1 of 1

BH2-92-7

Log of Borehole 92-7

AME Materials Engineering

Project No.: 40840.92

Project Name: Seaton Parcel 5

Figure No. 8

Location: Pickering, Ontario

Date Drilled: 4/21/06

Drill Type: Solid Stem Auger

Datum: Geodetic

Split Spoon Sample	▨	Combustible Vapour Reading	□
Auger Sample	⊠	Natural Moisture Content	×
SPT (N) Value	●	Atterberg Limits	⊢—○
Dynamic Cone Test	——	Undrained Triaxial at % Strain at Failure	⊕
Shelby Tube	■	Shear Strength by Penetrometer Test	▲
Shear Strength by Vane Test	✚ S		

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH
		~ 230 mm TOPSOIL over	199.81	0
		SANDY SILT TILL: brown, moist, very dense, trace gravel, trace clay, reworked below topsoil	199.58	
				1
				2
				3
				4
				5
			193.64	6
		End of borehole at 6.17 m		

Standard Penetration Test N Value: 20 40 60 80
Shear Strength kPa: 50 100 150 200

Total Combustible Vapours (ppm): 25 50 75
Natural Moisture Content % / Atterberg Limits (% Dry Weight): 10 20 30

50/130mm

50/80mm

SAMPLES

Natural Unit Weight kN/m³

LOG OF BOREHOLE OLD 40840.92 SEATON PARCEL 5.GPJ AME_ON.GDT 9/25/09

Notes:

Date/Time	Water Level (m)	Depth to Cave (m)
Upon Completion	Dry	No Cave

Sheet No. 1 of 1

MW2-92-8

Log of Borehole 92-8

AME Materials Engineering

Project No.: 40840.92

Project Name: Seaton Parcel 5

Figure No. 9

Location: Pickering, Ontario

Date Drilled: 4/24/06

Drill Type: Solid Stem Auger

Datum: Geodetic

Split Spoon Sample	▨	Combustible Vapour Reading	□
Auger Sample	⊠	Natural Moisture Content	×
SPT (N) Value	●	Atterberg Limits	⊢○
Dynamic Cone Test	——	Undrained Triaxial at % Strain at Failure	⊕
Shelby Tube	■	Shear Strength by Penetrometer Test	▲
Shear Strength by Vane Test	✤ S		

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH
		~ 250 mm TOPSOIL over	183.48	0
		SANDY SILT TILL: brown to grey, moist, compact to very dense, trace gravel, trace clay, reworked below topsoil	183.23	
			182.98	
		becoming grey		3
			176.93	6
		End of borehole at 6.55 m		

Standard Penetration Test N Value: 20 40 60 80

Shear Strength kPa: 50 100 150 200

Total Combustible Vapours (ppm): 25 50 75

Natural Moisture Content % / Atterberg Limits (% Dry Weight): 10 20 30

50/100mm

50/130mm

50/130mm

50/130mm

SAMPLES

Natural Unit Weight kN/m³

LOG OF BOREHOLE OLD 40840.92 SEATON PARCEL 5.GPJ AME_ON.GDT 9/25/09

Notes:

Date/Time	Water Level (m)	Depth to Cave (m)
Upon Completion	1.80	No Cave
April 25, 2006	1.30	
May 2, 2006	0.50	

Sheet No. 1 of 1

BH2-92-9

Log of Borehole 92-9

AME Materials Engineering

Project No.: 40840.92

Project Name: Seaton Parcel 5

Figure No. 10

Location: Pickering, Ontario

Date Drilled: 4/27/06

Drill Type: Solid Stem Auger

Datum: Geodetic

Split Spoon Sample | Combustible Vapour Reading
Auger Sample | Natural Moisture Content
SPT (N) Value | Atterberg Limits
Dynamic Cone Test | Undrained Triaxial at % Strain at Failure
Shelby Tube | Shear Strength by Penetrometer Test
Shear Strength by Vane Test

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH
		~ 200 mm TOPSOIL over	182.04	0
		SANDY SILT TILL: brown to grey, moist to very moist, compact to very dense, trace gravel, trace clay, reworked below topsoil	181.84	
		becoming grey		1
		grey clayey silt pocket from 1.5 m to 3.0 m below existing grade		2
				3
				4
				5
				6
		End of borehole at 6.33 m	175.71	

Standard Penetration Test N Value: 20 40 60 80
Shear Strength kPa: 50 100 150 200
Total Combustible Vapours (ppm): 25 50 75
Natural Moisture Content % / Atterberg Limits (% Dry Weight): 10 20 30

50/130mm

50/80mm

SAMPLES

Natural Unit Weight kN/m³

LOG OF BOREHOLE OLD 40840.92 SEATON PARCEL 5.GPJ AME_ON.GDT 9/25/09

Notes:

Date/Time	Water Level (m)	Depth to Cave (m)
Upon Completion	Dry	No Cave
April 28, 2006	Dry	
May 2, 2006	Dry	

Sheet No. 1 of 1

BH2-92-10

Log of Borehole 92-10

AME Materials Engineering

Project No.: 40840.92

Project Name: Seaton Parcel 5

Figure No. 11

Location: Pickering, Ontario

Date Drilled: 4/27/06

Drill Type: Solid Stem Auger

Datum: Geodetic

Split Spoon Sample | Auger Sample | SPT (N) Value | Dynamic Cone Test | Shelby Tube | Shear Strength by Vane Test (S)

Combustible Vapour Reading | Natural Moisture Content | Atterberg Limits | Undrained Triaxial at % Strain at Failure | Shear Strength by Penetrometer Test

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH
		~ 410 mm TOPSOIL over	184.24	0
		SANDY SILT to SILTY SAND TILL: brown to grey, moist, compact to very dense, trace gravel, trace clay, reworked below topsoil	183.83	
		becoming grey		
		End of borehole at 6.20 m	178.04	6

Standard Penetration Test N Value: 20 40 60 80 — Shear Strength kPa: 50 100 150 200

Total Combustible Vapours (ppm): 25 50 75 — Natural Moisture Content % / Atterberg Limits (% Dry Weight): 10 20 30

SAMPLES | Natural Unit Weight kN/m³

50/130mm

50/100mm

50/130mm

50/130mm

50/100mm

LOG OF BOREHOLE OLD 40840.92 SEATON PARCEL 5.GPJ AME_ON.GDT 9/25/09

Notes:

Date/Time	Water Level (m)	Depth to Cave (m)
Upon Completion	Dry	No Cave

Sheet No. 1 of 1

BH2-92-11

Log of Borehole 92-11

AME Materials Engineering

Project No.: 40840.92

Project Name: Seaton Parcel 5

Figure No. 12

Location: Pickering, Ontario

Date Drilled: 4/28/06

Drill Type: Solid Stem Auger

Datum: Geodetic

Split Spoon Sample | Auger Sample | SPT (N) Value | Dynamic Cone Test | Shelby Tube | Shear Strength by Vane Test (S)

Combustible Vapour Reading | Natural Moisture Content | Atterberg Limits | Undrained Triaxial at % Strain at Failure | Shear Strength by Penetrometer Test

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH
		~ 250 mm TOPSOIL over	185.04	0
		SANDY SILT TILL: brown to grey, moist, compact to very dense, trace gravel, trace clay, reworked below topsoil	184.79	
			184.34	1
				2
		becoming grey		3
				4
				5
				6
		End of borehole at 6.55 m	178.49	

Standard Penetration Test N Value: 20 40 60 80

Shear Strength kPa: 50 100 150 200

Total Combustible Vapours (ppm): 25 50 75

Natural Moisture Content % Atterberg Limits (% Dry Weight): 10 20 30

50/130mm

50/100mm

SAMPLES

Natural Unit Weight kN/m³

LOG OF BOREHOLE OLD 40840.92 SEATON PARCEL 5.GPJ AME_ON.GDT 9/25/09

Notes:

Date/Time	Water Level (m)	Depth to Cave (m)
Upon Completion	5.20	No Cave
April 29, 2006	4.30	
May 2, 2006	0.70	

Sheet No. 1 of 1

BH2-92-12

Log of Borehole 92-12

AME Materials Engineering

Project No.: 40840.92

Project Name: Seaton Parcel 5

Figure No. 13

Location: Pickering, Ontario

Date Drilled: 4/28/06

Drill Type: Solid Stem Auger

Datum: Geodetic

Split Spoon Sample	▨	Combustible Vapour Reading	□
Auger Sample	⊠	Natural Moisture Content	×
SPT (N) Value	●	Atterberg Limits	⊢—○
Dynamic Cone Test	——	Undrained Triaxial at % Strain at Failure	⊕
Shelby Tube	■	Shear Strength by Penetrometer Test	▲
Shear Strength by Vane Test	✚ S		

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH	Standard Penetration Test N Value / Shear Strength kPa	Total Combustible Vapours (ppm) / Natural Moisture Content % / Atterberg Limits (% Dry Weight)	SAMPLES	Natural Unit Weight kN/m³
		~ 100 mm TOPSOIL over SANDY SILT TILL: brown to grey, moist, very dense, trace gravel, trace clay, reworked below topsoil	191.18 / 191.08	0	20 40 60 80 / 50 100 150 200	25 50 75 / 10 20 30		
				1				
					50/130mm			
				2				
					50/130mm			
				3	50/130mm			
		becoming grey		4				
					50/100mm			
				5				
				6	50/130mm			
			184.80					
		End of borehole at 6.38 m						

LOG OF BOREHOLE OLD 40840.92 SEATON PARCEL 5.GPJ AME_ON.GDT 9/25/09

Notes:

Date/Time	Water Level (m)	Depth to Cave (m)
Upon Completion	Dry	No Cave

Sheet No. 1 of 1

BH2-92-15 (original)

Log of Borehole 92-15

AME Materials Engineering

Project No.: 40840.92

Project Name: Seaton Parcel 5

Figure No. 16

Location: Pickering, Ontario

Date Drilled: 4/28/06

Drill Type: Solid Stem Auger

Datum: Geodetic

Split Spoon Sample	▨	Combustible Vapour Reading	□
Auger Sample	⊠	Natural Moisture Content	×
SPT (N) Value	●	Atterberg Limits	⊢—○
Dynamic Cone Test	——	Undrained Triaxial at % Strain at Failure	⊕
Shelby Tube	■	Shear Strength by Penetrometer Test	▲
Shear Strength by Vane Test	S		

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH
		~ 300 mm TOPSOIL over	184.14	0
▼		SANDY SILT TILL: brown, moist, compact to very dense, trace gravel, trace clay, reworked below topsoil	183.84	
			181.74	2
		SILTY SAND TO SAND: brown, moist to wet, very dense, coarse grained	178.64	5
		End of borehole at 6.38 m	177.61	6

Standard Penetration Test N Value: 20, 40, 60, 80

Shear Strength kPa: 50, 100, 150, 200

Total Combustible Vapours (ppm): 25, 50, 75

Natural Moisture Content % Atterberg Limits (% Dry Weight): 10, 20, 30

SAMPLES

Natural Unit Weight kN/m³

60/130mm

LOG OF BOREHOLE OLD 40840.92 SEATON PARCEL 5.GPJ AME_ON.GDT 9/25/09

Notes:

Date/Time	Water Level (m)	Depth to Cave (m)
Upon Completion	2.40	No Cave

Sheet No. 1 of 1

MW2-92-15s

Log of Borehole MW-101

AME Materials Engineering

Project No.: 40840.92

Project Name: Monitoring Well Installation, Seaton Lands - Parcel 5 Figure No. 3

Location: Whitevale Road & Sideline 20, Pickering, Ontario

Date Drilled: 5/29/09

Drill Type: Hollow Stem Auger

Datum: Assumed "Zero" at Existing Surface

Split Spoon Sample
Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Shear Strength by Vane Test
Combustible Vapour Reading
Natural Moisture Content
Atterberg Limits
Undrained Triaxial at % Strain at Failure
Shear Strength by Penetrometer Test

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH
		~300 mm **Topsoil**	0.00	0
		FILL:Clayey silt, traces of sand and gravel, trace of rootlet, brown, mottled, very moist.	-0.30	
		SANDY SILT TILL: brown, trace of gravel, occasionally coarse, oxidised along the surface, compact to very dense, moist to very moist.	-0.60	1
				2
▼			-2.85	
		End of borehole at 3.11 m	-3.11	3

Standard Penetration Test N Value: 20 40 60 80
Shear Strength kPa: 50 100 150 200
Total Organic Vapours (ppm): 25 50 75
Natural Moisture Content % Atterberg Limits (% Dry Weight): 10 20 30
SAMPLES
Natural Unit Weight kN/m³

LOG OF BOREHOLE OLD 40840.92 - PARCEL 5 (MATTAMY'S) MONITORING WELL - MAY 29, 2009.GPJ AME_ON.GDT 6/6/11

Notes:

Date/Time	Water Level (m)	Depth to Cave (m)
May 29, 2009	2.85	Open

Sheet No. 1 of 1

MW2-92-15d

Log of Borehole MW-100

AME Materials Engineering

Project No.: 40840.92

Project Name: Monitoring Well Installation, Seaton Lands - Parcel 5 Figure No. 2

Location: Whitevale Road & Sideline 20, Pickering, Ontario

Date Drilled: 5/29/09

Drill Type: Hollow Stem Auger

Datum: Assumed "Zero" at Existing Surface

Split Spoon Sample | Auger Sample | SPT (N) Value | Dynamic Cone Test | Shelby Tube | Shear Strength by Vane Test

Combustible Vapour Reading | Natural Moisture Content | Atterberg Limits | Undrained Triaxial at % Strain at Failure | Shear Strength by Penetrometer Test

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH
		~300 mm **Topsoil**	0.00	0
		FILL:Clayey silt, traces of sand and gravel, trace of rootlet, brown, mottled, very moist.	-0.30 / -0.60	
		SANDY SILT TILL: brown, trace of gravel, oxidised along the surface, compact to very dense, moist to very moist.		1
				2
			-2.30	
				3
				4
		SILTY SAND to SAND: grey, wet, very dense.	-4.11	
				5
			-5.59	
		SILTY SAND TILL: grey to dark grey, trace to some gravel, trace of clay, occasional decomposed limestone gravel, very moist, very dense.		6
			-6.86	0
		End of borehole at 6.86 m		

Standard Penetration Test N Value: 20 40 60 80 — Shear Strength kPa: 50 100 150 200

Total Organic Vapours (ppm): 25 50 75 — Natural Moisture Content % / Atterberg Limits (% Dry Weight): 10 20 30

SAMPLES | Natural Unit Weight kN/m³

26 | 25 | 50/150mm | 62 | 50/150mm | 50/100mm | 50/100mm | 50/100mm

LOG OF BOREHOLE OLD 40840.92 - PARCEL 5 (MATTAMY'S) MONITORING WELL - MAY 29, 2009.GPJ AME_ON.GDT 6/6/11

Notes:

Date/Time	Water Level (m)	Depth to Cave (m)
May 29, 2009	2.30	5.18

Sheet No. 1 of 1

BH2-92-16

Log of Borehole 92-16

AME Materials Engineering

Project No.: 40840.92

Project Name: Seaton Parcel 5

Figure No. 17

Location: Pickering, Ontario

Date Drilled: 4/28/06

Drill Type: Solid Stem Auger

Datum: Geodetic

Split Spoon Sample	▨	Combustible Vapour Reading	□
Auger Sample	⊠	Natural Moisture Content	×
SPT (N) Value	●	Atterberg Limits	⊢○
Dynamic Cone Test	——	Undrained Triaxial at % Strain at Failure	⊕
Shelby Tube	■	Shear Strength by Penetrometer Test	▲
Shear Strength by Vane Test	✚ S		

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH
		~ 250 mm TOPSOIL over	181.56	0
		SANDY SILT TILL: brown, moist, compact to very dense, trace gravel, trace clay, reworked below topsoil	181.31	
▼		SILTY SAND TO SAND: brown, moist to wet, very dense	177.46	4
			177.26	
		End of borehole at 6.22 m	175.34	6

Standard Penetration Test N Value: 20 40 60 80

Shear Strength kPa: 50 100 150 200

Total Combustible Vapours (ppm): 25 50 75

Natural Moisture Content % / Atterberg Limits (% Dry Weight): 10 20 30

50/130mm

50/130mm

SAMPLES

Natural Unit Weight kN/m³

LOG OF BOREHOLE OLD 40840.92 SEATON PARCEL 5.GPJ AME_ON.GDT 9/25/09

Notes:

Date/Time	Water Level (m)	Depth to Cave (m)
Upon Completion	4.30	No Cave

Sheet No. 1 of 1

BH2-92-17

Log of Borehole 92-17

AME Materials Engineering

Project No.: 40840.92

Project Name: Seaton Parcel 5

Figure No. 18

Location: Pickering, Ontario

Date Drilled: 4/28/06

Drill Type: Solid Stem Auger

Datum: Geodetic

Split Spoon Sample | Auger Sample | SPT (N) Value | Dynamic Cone Test | Shelby Tube | Shear Strength by Vane Test (S)

Combustible Vapour Reading | Natural Moisture Content | Atterberg Limits | Undrained Triaxial at % Strain at Failure | Shear Strength by Penetrometer Test

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH
		~250 mm TOPSOIL over	179.91	0
		SANDY SILT TILL: brown to grey, moist, compact to very dense, trace gravel, trace clay, reworked below topsoil	179.66	
		becoming grey		
		increased clay content at 4.6 m below existing grade	175.21	5
		End of borehole at 6.38 m	173.53	6

Standard Penetration Test N Value; Shear Strength kPa: 20, 40, 60, 80; 50, 100, 150, 200

Total Combustible Vapours (ppm): 25, 50, 75

Natural Moisture Content % Atterberg Limits (% Dry Weight): 10, 20, 30

SAMPLES

Natural Unit Weight kN/m³

60/130mm

LOG OF BOREHOLE OLD 40840.92 SEATON PARCEL 5.GPJ AME_ON.GDT 9/25/09

Notes:

Date/Time	Water Level (m)	Depth to Cave (m)
Upon Completion	Dry	No Cave
April 29, 2006	5.00	
May 2, 2006	4.70	

Sheet No. 1 of 1

MW2-93-1

Log of Borehole 93-1

AME Materials Engineering

Project No.: 40840.93

Project Name: Seaton Parcel 6

Figure No. 2

Location: Pickering, Ontario

Date Drilled: 5/1/06

Drill Type: Solid Stem Auger

Datum: Geodetic

Split Spoon Sample | Combustible Vapour Reading
Auger Sample | Natural Moisture Content
SPT (N) Value | Atterberg Limits
Dynamic Cone Test | Undrained Triaxial at % Strain at Failure
Shelby Tube | Shear Strength by Penetrometer Test
Shear Strength by Vane Test

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH
		~ 250 mm TOPSOIL over	190.01	0
		SANDY SILT TO SILTY SAND TILL: brown to grey, moist, trace gravel, compact to very dense	189.76	
			189.01	1
				2
				3
		becoming grey		4
				5
				6
		End of borehole at 6.53 m	183.48	

Standard Penetration Test N Value: 20 40 60 80
Shear Strength kPa: 50 100 150 200
Total Combustible Vapours (ppm): 25 50 75
Natural Moisture Content % Atterberg Limits (% Dry Weight): 10 20 30
SAMPLES
Natural Unit Weight kN/m³

50/130 mm

LOG OF BOREHOLE OLD 40840.93 SEATON PARCEL 6.GPJ AME_ON.GDT 9/25/09

Notes:

Date/Time	Water Level (m)	Depth to Cave (m)
Upon Completion May 2, 2006	Dry 1.00	No Cave

Sheet No. 1 of 1

BH2-93-2

Log of Borehole 93-2

AME Materials Engineering

Project No.: 40840.93

Project Name: Seaton Parcel 6

Figure No. 3

Location: Pickering, Ontario

Date Drilled: 5/1/06

Drill Type: Solid Stem Auger

Datum: Geodetic

Split Spoon Sample	▨	Combustible Vapour Reading	□
Auger Sample	⊠	Natural Moisture Content	×
SPT (N) Value	●	Atterberg Limits	⊢○
Dynamic Cone Test	——	Undrained Triaxial at % Strain at Failure	⊕
Shelby Tube	■		
Shear Strength by Vane Test	S	Shear Strength by Penetrometer Test	▲

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH
		~ 150 mm TOPSOIL over	192.62	0
		SANDY SILT TO SILTY SAND TILL: brown to grey, moist, trace gravel, compact to very dense	192.47	
			191.52	1
				2
				3
		becoming grey		4
				5
			186.42	6
		End of borehole at 6.20 m		

Standard Penetration Test N Value: 20 40 60 80

Shear Strength kPa: 50 100 150 200

Total Combustible Vapours (ppm): 25 50 75

Natural Moisture Content % Atterberg Limits (% Dry Weight): 10 20 30

SAMPLES

Natural Unit Weight kN/m³

50/130 mm

50/130 mm

50/100 mm

LOG OF BOREHOLE OLD 40840.93 SEATON PARCEL 6.GPJ AME_ON.GDT 9/25/09

Notes:

Date/Time	Water Level (m)	Depth to Cave (m)
Upon Completion	2.20	No Cave
May 2, 2006	1.10	

Sheet No. 1 of 1

BH2-93-3

Log of Borehole 93-3

AME Materials Engineering

Project No.: 40840.93

Project Name: Seaton Parcel 6

Figure No. 4

Location: Pickering, Ontario

Date Drilled: 5/1/06

Drill Type: Solid Stem Auger

Datum: Geodetic

Split Spoon Sample
Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Shear Strength by Vane Test
Combustible Vapour Reading
Natural Moisture Content
Atterberg Limits
Undrained Triaxial at % Strain at Failure
Shear Strength by Penetrometer Test

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH
		~ 300 mm TOPSOIL over	199.21	0
		SANDY SILT TO SILTY SAND TILL: brown to grey, moist, trace gravel, compact to very dense	198.91	
		becoming grey		3
				4
				5
				6
		End of borehole at 6.38 m	192.83	

Standard Penetration Test N Value: 20 40 60 80
Shear Strength kPa: 50 100 150 200
Total Combustible Vapours (ppm): 25 50 75
Natural Moisture Content % Atterberg Limits (% Dry Weight): 10 20 30

50/130 mm
50/80 mm
50/130 mm

SAMPLES

Natural Unit Weight kN/m³

LOG OF BOREHOLE OLD 40840.93 SEATON PARCEL 6.GPJ AME_ON.GDT 9/25/09

Notes:

Date/Time	Water Level (m)	Depth to Cave (m)
Upon Completion	1.50	No Cave

Sheet No. 1 of 1

MW2-93-4

Log of Borehole 93-4

AME Materials Engineering

Project No.: 40840.93

Project Name: Seaton Parcel 6

Figure No. 5

Location: Pickering, Ontario

Date Drilled: 5/1/06

Drill Type: Solid Stem Auger

Datum: Geodetic

Split Spoon Sample	▨	Combustible Vapour Reading	□
Auger Sample	⊠	Natural Moisture Content	×
SPT (N) Value	●	Atterberg Limits	⊢○
Dynamic Cone Test	——	Undrained Triaxial at % Strain at Failure	⊕
Shelby Tube	■	Shear Strength by Penetrometer Test	▲
Shear Strength by Vane Test	S		

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH
		~ 200 mm TOPSOIL over	201.25	0
		SANDY SILT TO SILTY SAND TILL: brown to grey, moist, trace gravel, compact to very dense	201.05	
				1
				2
			198.65	
				3
		becoming grey		4
				5
			195.03	6
		End of borehole at 6.22 m		

Standard Penetration Test N Value: 20 40 60 80

Shear Strength kPa: 50 100 150 200

Total Combustible Vapours (ppm): 25 50 75

Natural Moisture Content % Atterberg Limits (% Dry Weight): 10 20 30

SAMPLES

Natural Unit Weight kN/m³

50/130 mm

50/130 mm

50/130 mm

LOG OF BOREHOLE OLD 40840.93 SEATON PARCEL 6.GPJ AME_ON.GDT 9/25/09

Notes:

Date/Time	Water Level (m)	Depth to Cave (m)
Upon Completion	2.40	No Cave
May 2, 2006	2.60	

Sheet No. 1 of 1

MW2-93-5

Log of Borehole 93-5

AME Materials Engineering

Project No.: 40840.93

Project Name: Seaton Parcel 6

Figure No. 6

Location: Pickering, Ontario

Date Drilled: 5/1/06

Drill Type: Solid Stem Auger

Datum: Geodetic

Split Spoon Sample | Auger Sample | SPT (N) Value | Dynamic Cone Test | Shelby Tube | Shear Strength by Vane Test (S)

Combustible Vapour Reading | Natural Moisture Content | Atterberg Limits | Undrained Triaxial at % Strain at Failure | Shear Strength by Penetrometer Test

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH
		~ 230 mm TOPSOIL over	208.50	0
		SANDY SILT TO SILTY SAND TILL: brown to grey, moist, trace gravel, compact to very dense	208.27	
			207.70	1
				2
				3
				4
		becoming grey		5
			202.30	6
		End of borehole at 6.20 m		

Standard Penetration Test N Value: 20 40 60 80

Shear Strength: 50 100 150 200 kPa

Total Combustible Vapours (ppm): 25 50 75

Natural Moisture Content % / Atterberg Limits (% Dry Weight): 10 20 30

SAMPLES

Natural Unit Weight kN/m³

50/130 mm

50/130 mm

50/130 mm

50/100 mm

LOG OF BOREHOLE OLD 40840.93 SEATON PARCEL 6.GPJ AME_ON.GDT 9/25/09

Notes:

Date/Time	Water Level (m)	Depth to Cave (m)
Upon Completion May 2, 2006	Dry 0.80	No Cave

Sheet No. 1 of 1

Log of Borehole 1

BH3-10-1

Project No. BRGE00360447A

Project: Geotechnical Investigation - Proposed Residential Development

Location: Part of Lot 25, Concession 5, Pickering, Ontario

Drawing No. 2

Sheet No. 1 of 1

Date Drilled: May 13, 2009

Drill Type: CME 75 Drill

Datum: Geodetic

Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Field Vane Test

Combustible Vapour Reading
Natural Moisture
Plastic and Liquid Limit
Undrained Triaxial at % Strain at Failure
Penetrometer

GWL	SYMBOL	Soil Description	ELEV. m	DEPTH
		TOPSOIL - silt with rootlets; dark brown, very moist	220.31	0
		SANDY SILT TILL - wet sand seams and layers, scattered gravel and cobbles, topsoil remains in upper level; brown, saturated to ~3m, moist below, loose to ~0.75m, compact to very dense below	220.0	
		SILT - trace of sand and gravel; brown changing to grey at ~4.5m, moist, very dense	216.3	
		SANDY SILT TILL - scattered gravel and cobbles; grey, moist with wet sand seams, very dense	214.8	
		END OF BOREHOLE	211.1	

N Value: 20 40 60 80
Shear Strength: 0.1 0.2 MPa
Combustible Vapour Reading (ppm): 250 500 750
Natural Moisture Content % Atterberg Limits (% Dry Weight): 10 20 30

/250mm
/250mm
/150mm
/100mm

SAMPLES

Natural Unit Weight kN/m³

NOTES:
1. Gas reading in open borehole: 0% (using MSA Model 60)

Time	Water Level (m)	Depth to Cave (m)
On completion	1.22	1.63

Trow

Log of Borehole 2

BH3-10-2

Project No. BRGE00360447A

Drawing No. 3

Project: Geotechnical Investigation - Proposed Residential Development

Sheet No. 1 of 1

Location: Part of Lot 25, Concession 5, Pickering, Ontario

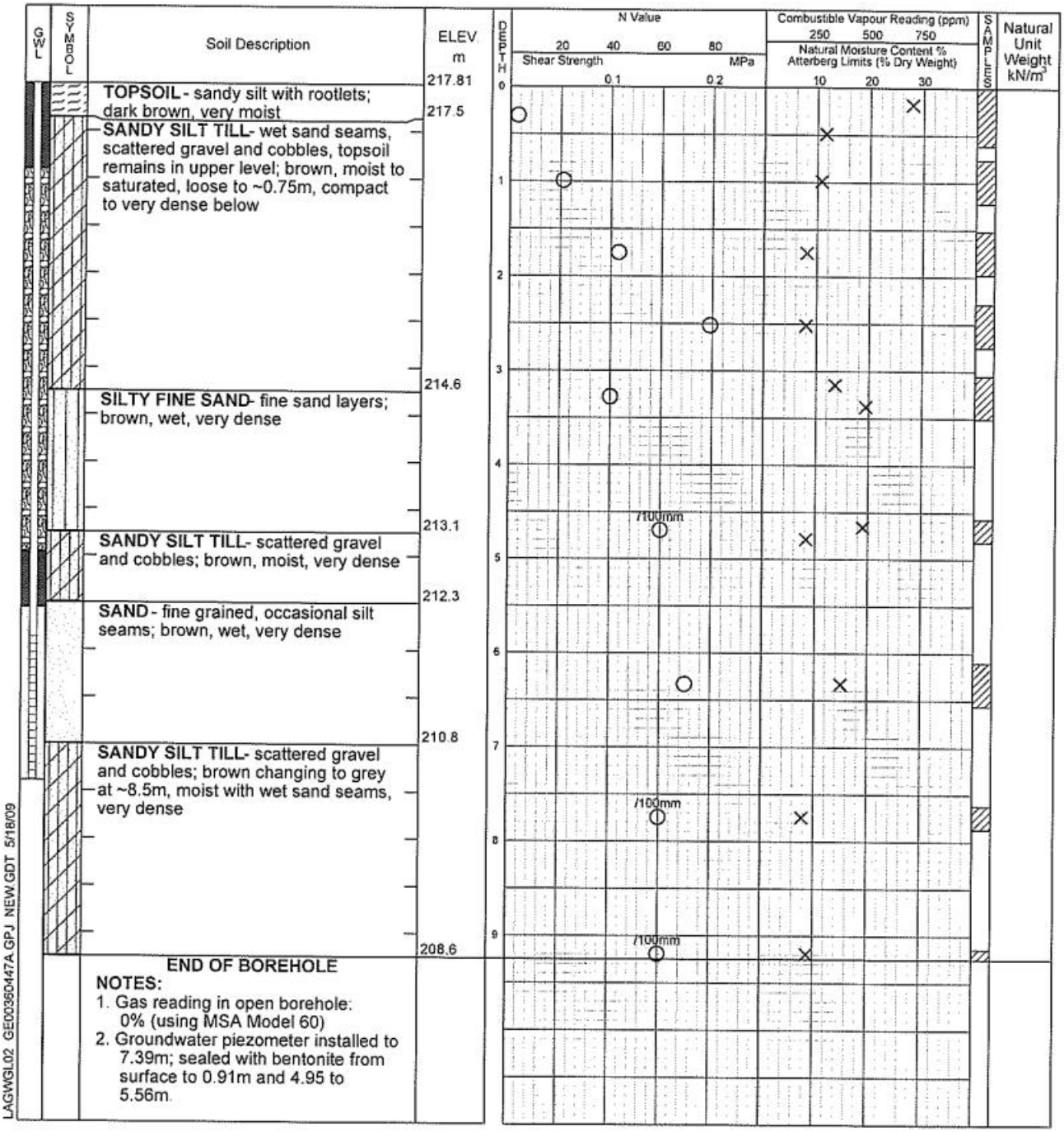
Date Drilled: May 8 and 13, 2009

Drill Type: CME 75 Drill

Datum: Geodetic

Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Field Vane Test

Combustible Vapour Reading
Natural Moisture
Plastic and Liquid Limit
Undrained Triaxial at % Strain at Failure
Penetrometer



NOTES:
1. Gas reading in open borehole: 0% (using MSA Model 60)
2. Groundwater piezometer installed to 7.39m; sealed with bentonite from surface to 0.91m and 4.95 to 5.56m.

LAGWGL02 GE00360447A.GPJ NEW.GDT 5/18/09

Trow

Time	Water Level (m)	Depth to Cave (m)
On completion	1.14	
After 3 days	0.60	

Log of Borehole 3

BH3-10-3

Project No: BRGE00360447A
Drawing No: 4
Project: Geotechnical Investigation - Proposed Residential Development
Sheet No: 1 of 1
Location: Part of Lot 25, Concession 5, Pickering, Ontario

Date Drilled: May 6, 2009
Drill Type: CME 75 Drill
Datum: Geodetic

Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Field Vane Test

Combustible Vapour Reading
Natural Moisture
Plastic and Liquid Limit
Undrained Triaxial at % Strain at Failure
Penetrometer

GWL	SYMBOL	Soil Description	ELEV. m
		TOPSOIL- sandy silt with rootlets; dark brown, very moist	216.69
		SANDY SILT- topsoil remains in upper level; brown, saturated, loose	216.4
		SANDY SILT TILL- some gravel; brown, saturated to ~1.75m, moist below, compact	215.9
		SILT - wet silty fine sand seams; brown, saturated, dense	214.6
		SANDY SILT TILL- scattered gravel and cobbles; grey, moist, very dense	213.8
		END OF BOREHOLE	212.0

NOTES:
1. Gas reading in open borehole: 0% (using MSA Model 60)

DEPTH (m): 0, 1, 2, 3, 4

N Value: 20, 40, 60, 80
Shear Strength: 0.1, 0.2 MPa

Combustible Vapour Reading (ppm): 250, 500, 750
Natural Moisture Content % Atterberg Limits (% Dry Weight): 10, 20, 30

/250mm
/125mm

SAMPLES

Natural Unit Weight kN/m³

LAGWGL02 GE00360447A.GPJ NEW.GDT 5/18/09

Trow

Time	Water Level (m)	Depth to Cave (m)
On completion	2.77	3.02

Log of Borehole 4

BH3-10-4

Project No. BRGE00360447A

Project: Geotechnical Investigation - Proposed Residential Development

Location: Part of Lot 25, Concession 5, Pickering, Ontario

Drawing No. 5

Sheet No. 1 of 1

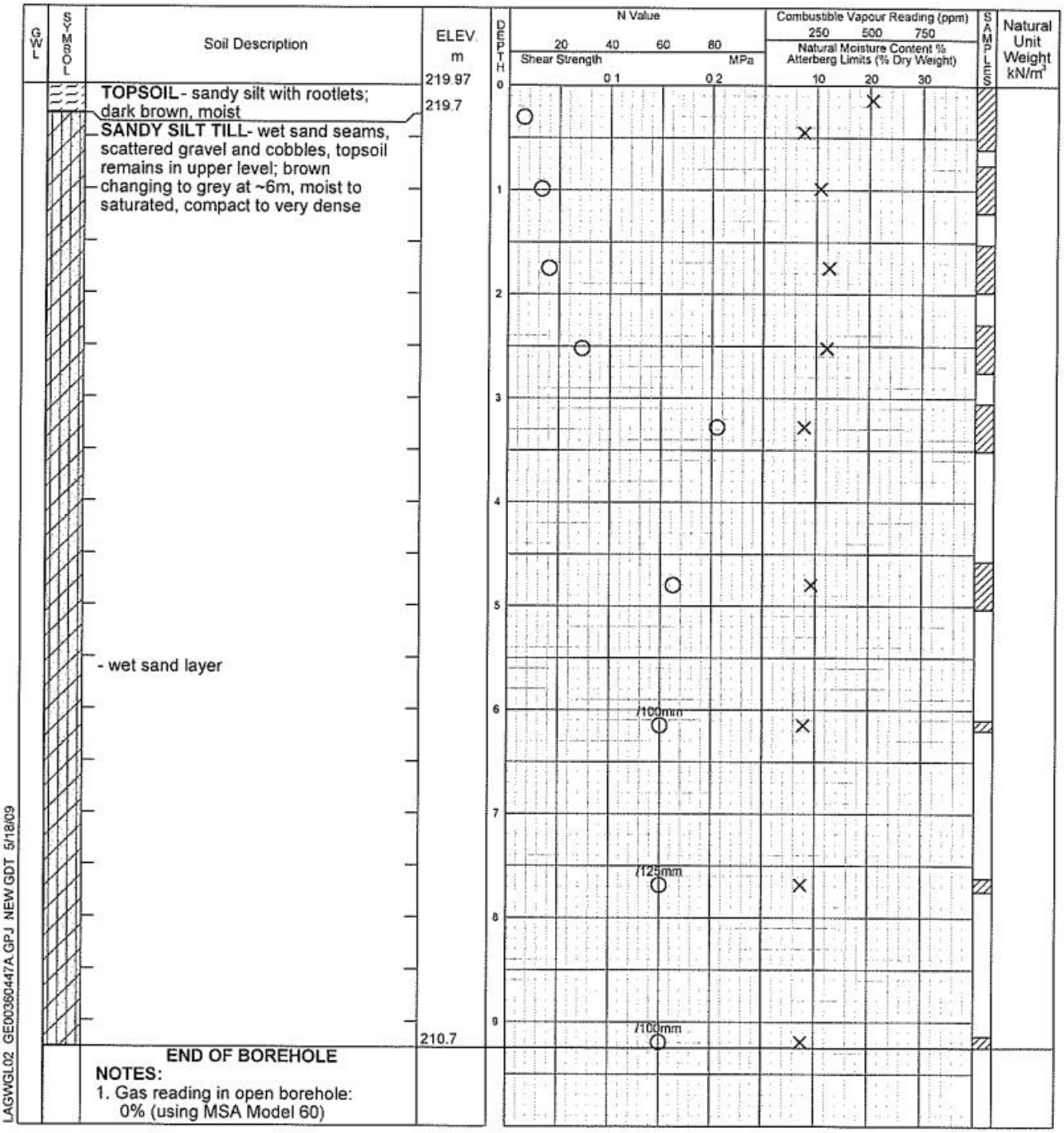
Date Drilled: May 13, 2009

Drill Type: CME 75 Drill

Datum: Geodetic

Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Field Vane Test

Combustible Vapour Reading
Natural Moisture
Plastic and Liquid Limit
Undrained Triaxial at % Strain at Failure
Penetrometer



Trow

Time	Water Level (m)	Depth to Cave (m)
On completion	2.39	4.39

Log of Borehole 5

BH3-10-5

Project No. BRGE00360447A

Drawing No. 6

Project: Geotechnical Investigation - Proposed Residential Development

Sheet No. 1 of 1

Location: Part of Lot 25, Concession 5, Pickering, Ontario

Date Drilled: May 12, 2009

Drill Type: CME 75 Drill

Datum: Geodetic

Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Field Vane Test

Combustible Vapour Reading
Natural Moisture
Plastic and Liquid Limit
Undrained Triaxial at % Strain at Failure
Penetrometer

GWL	SYMBOL	Soil Description	ELEV. m	DEPTH	N Value / Shear Strength (MPa)	Combustible Vapour Reading (ppm) / Natural Moisture Content % / Atterberg Limits (% Dry Weight)	SAMPLES	Natural Unit Weight kN/m³
		TOPSOIL - silt with rootlets; dark brown, very moist	211.62	0	20 40 60 80 / 0.1 0.2	250 500 750 / 10 20 30		
		SANDY SILT TILL - wet sand seams, scattered gravel and cobbles, topsoil remains in upper level; brown changing to grey at ~2m, saturated and loose to ~0.75m, moist and compact to very dense below	211.2	1				
				2				
				3	/125mm			
				4				
				5	/125mm			
				6	/150mm			
				7				
				8	/100mm			
				9	/100mm			
		END OF BOREHOLE	202.4					

NOTES:

1. Gas reading in open borehole: 0% (using MSA Model 60)
2. Groundwater piezometer installed to 9.14m; sealed with bentonite from surface to 0.91m and 6.71 to 7.31m.

LAGWGL02 GE00360447A.GPJ NEW GDT 5/18/09

Trow

Time	Water Level (m)	Depth to Cave (m)
On completion	3.96	
After 4 days	4.00	

Log of Borehole 6

BH3-10-6

Project No. BRGE00360447A

Drawing No 7

Project: Geotechnical Investigation - Proposed Residential Development

Sheet No. 1 of 1

Location: Part of Lot 25, Concession 5, Pickering, Ontario

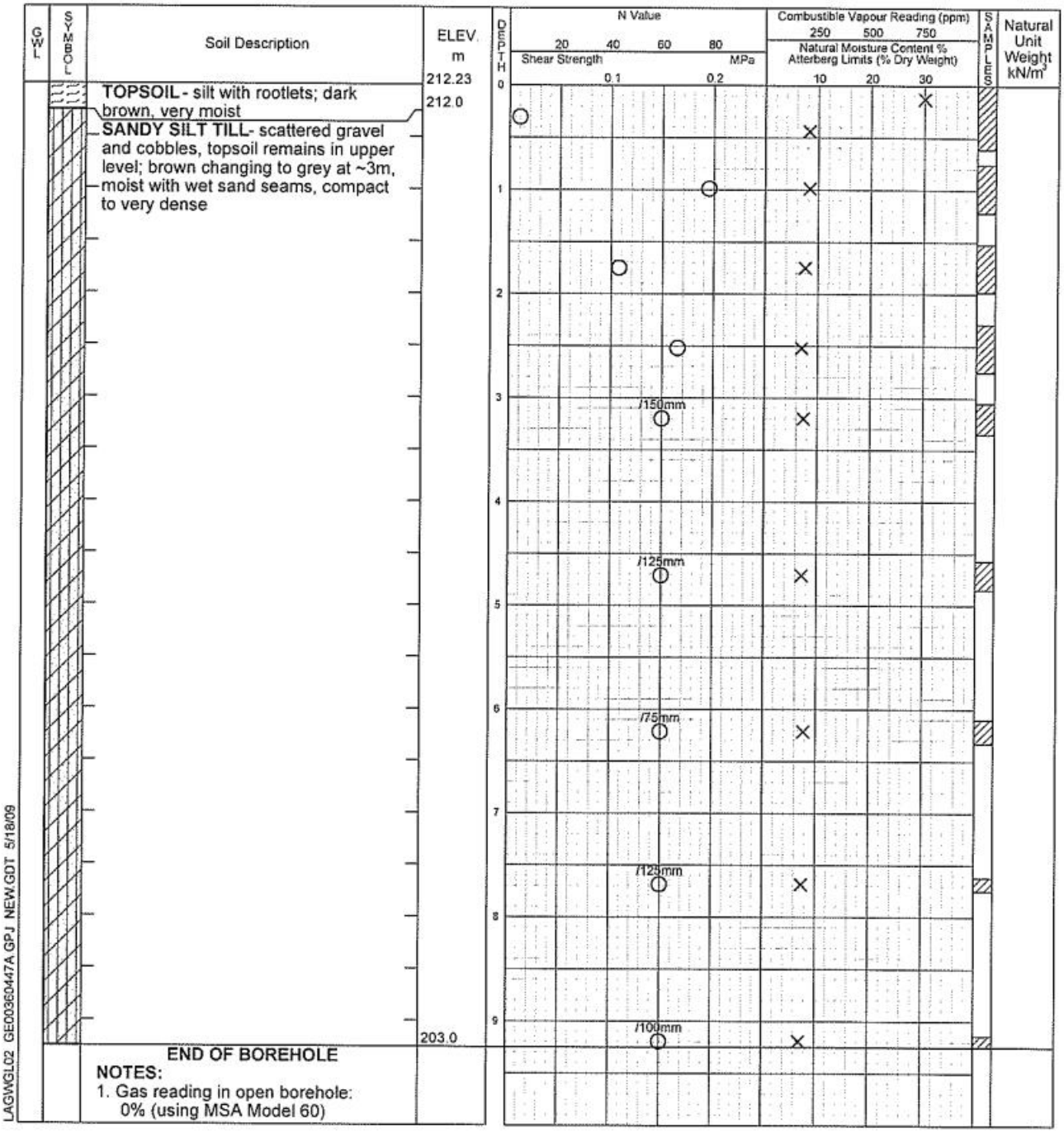
Date Drilled: May 12, 2009

Drill Type: CME 75 Drill

Datum: Geodetic

Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Field Vane Test

Combustible Vapour Reading
Natural Moisture
Plastic and Liquid Limit
Undrained Triaxial at % Strain at Failure
Penetrometer



Time	Water Level (m)	Depth to Cave (m)
On completion	Dry	8.79

Trow

Log of Borehole 7

BH3-10-7

Project No. BRGE00360447A

Drawing No. 8

Project: Geotechnical Investigation - Proposed Residential Development

Sheet No. 1 of 1

Location: Part of Lot 25, Concession 5, Pickering, Ontario

Date Drilled: May 6, 2009

Drill Type: CME 75 Drill

Datum: Geodetic

Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Field Vane Test

Combustible Vapour Reading
Natural Moisture
Plastic and Liquid Limit
Undrained Triaxial at % Strain at Failure
Penetrometer

GWL	SYMBOL	Soil Description	ELEV. m
		TOPSOIL - sandy silt with rootlets; dark brown, very moist	213.02
		SANDY SILT TILL - wet sand seams and layers, some gravel, topsoil remains in upper level; brown, saturated, loose to ~1m, compact below	212.7
		SILT - some sand, trace of gravel; brown, saturated, compact	210.2
		SANDY SILT TILL - scattered gravel and cobbles; brown changing to grey at ~5.5m, moist, very dense	209.0
		END OF BOREHOLE	203.8

NOTES:
1. Gas reading in open borehole: 0% (using MSA Model 60)

DEPTH (m): 0, 1, 2, 3, 4, 5, 6, 7, 8, 9

N Value: 20, 40, 60, 80

Shear Strength: 0.1, 0.2 MPa

Combustible Vapour Reading (ppm): 250, 500, 750

Natural Moisture Content % Atterberg Limits (% Dry Weight): 10, 20, 30

SAMPLES

Natural Unit Weight kN/m³

/50mm

/125mm

/100mm

/100mm

LAGWGL02 GE00360447A.GPJ NEW.GDT 5/18/09

Trow

Time	Water Level (m)	Depth to Cave (m)
On completion	2.13	2.34

Log of Borehole 8

MW3-10-8

Project No. BRGE00360447A

Drawing No. 9

Project: Geotechnical Investigation - Proposed Residential Development

Sheet No. 1 of 1

Location: Part of Lot 25, Concession 5, Pickering, Ontario

Date Drilled: May 8 and June 9, 2009

Drill Type: CME 75 Drill

Datum: Geodetic

Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Field Vane Test (S)

Combustible Vapour Reading
Natural Moisture
Plastic and Liquid Limit
Undrained Triaxial at % Strain at Failure
Penetrometer

GWL	SYMBOL	Soil Description	ELEV. m
			214.37
		TOPSOIL - sandy silt with rootlets; dark brown, very moist	214.1
		SAND - silt inclusions, trace of gravel, topsoil remains in upper level; brown, moist, compact	213.6
		SANDY SILT TILL - some gravel; brown, moist, compact	213.0
		SANDY SILT - seams of wet silty fine sand and silt; brown changing to grey at ~4m, saturated, dense to very dense	
		SANDY SILT TILL - scattered gravel and cobbles; grey, moist, very dense	208.9
		END OF BOREHOLE	205.1

NOTES:
1. Gas reading in open borehole: 0% (using MSA Model 60)
2. Groundwater monitoring well installed to 5.11m on June 9, 2009; sealed with bentonite from surface to 3.28m.

DEPTH 0 1 2 3 4 5 6 7 8 9

N Value: 20 40 60 80
Shear Strength: 0.1 0.2 MPa

Combustible Vapour Reading (ppm): 250 500 750
Natural Moisture Content %
Atterberg Limits (% Dry Weight): 10 20 30

SAMPLES

Natural Unit Weight kN/m³

/100mm
/100mm
/100mm

LAGWGL02 GE00360447A.GPJ NEW.GDT 6/2/11

Time	Water Level (m)	Depth to Cave (m)
On completion (open hole)	2.03	2.41
On completion (well)	3.96	
After 23 days (well)	0.21	

Log of Borehole 9

BH3-10-9

Project No. BRGE00360447A

Drawing No. 10

Project: Geotechnical Investigation - Proposed Residential Development

Sheet No. 1 of 1

Location: Part of Lot 25, Concession 5, Pickering, Ontario

Date Drilled: May 8, 2009

Drill Type: CME 75 Drill

Datum: Geodetic

Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Field Vane Test

Combustible Vapour Reading
Natural Moisture
Plastic and Liquid Limit
Undrained Triaxial at % Strain at Failure
Penetrometer

GWL	SYMBOL	Soil Description	ELEV. m	DEPTH	N Value / Shear Strength (MPa)	Combustible Vapour Reading (ppm) / Natural Moisture Content % / Atterberg Limits (% Dry Weight)	SAMPLES	Natural Unit Weight kN/m³
		TOPSOIL- sandy silt with rootlets; dark brown, very moist	210.03	0	20 40 60 80	250 500 750		
		SANDY SILT TILL- some gravel, topsoil remains in upper level; brown, saturated, loose to ~0.75m, compact below	209.7		Shear Strength 0.1 0.2 MPa	Natural Moisture Content % Atterberg Limits (% Dry Weight) 10 20 30		
		SANDY SILT- brown, saturated, compact	208.3	1				
		SANDY SILT TILL- wet sand seams, scattered gravel and cobbles; brown changing to grey at ~4m, saturated to ~3m, moist below, dense to very dense	207.8	2				
				3	/250mm			
				4				
				5				
				6	/100mm			
				7				
				8	/125mm			
				9	/100mm			
		END OF BOREHOLE	200.8					

NOTES:
1. Gas reading in open borehole: 0% (using MSA Model 60)

LAGWGL02 GE00360447A.GPJ NEW GDT 5/18/09

Trow

Time	Water Level (m)	Depth to Cave (m)
On completion	2.41	8.53

Log of Borehole 10

BH3-10-10

Project No. BRGE00360447A

Drawing No. 11

Project: Geotechnical Investigation - Proposed Residential Development

Sheet No. 1 of 1

Location: Part of Lot 25, Concession 5, Pickering, Ontario

Date Drilled: May 5, 2009

Drill Type: CME 75 Drill

Datum: Geodetic

Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Field Vane Test

Combustible Vapour Reading
Natural Moisture
Plastic and Liquid Limit
Undrained Triaxial at % Strain at Failure
Penetrometer

GWL	SYMBOL	Soil Description	ELEV. m
		TOPSOIL - silt with rootlets; dark brown, very moist	214.68
		SANDY SILT TILL - wet sand seams, scattered gravel and cobbles, topsoil remains in upper level; brown changing to grey at ~4m, saturated to ~2m, moist below, loose to ~0.75m, compact to very dense below	214.4
		END OF BOREHOLE	205.4

NOTES:
1. Gas reading in open borehole: 0% (using MSA Model 60)

DEPTH

N Value: 20 40 60 80

Shear Strength: 0.1 0.2 MPa

Combustible Vapour Reading (ppm): 250 500 750

Natural Moisture Content % Atterberg Limits (% Dry Weight): 10 20 30

SAMPLE No.

Natural Unit Weight kN/m³

/125mm

/75mm

/75mm

/100mm

/100mm

LAGWGL02 GE00360447A.GPJ NEW GDT 5/18/09

Trow

Time	Water Level (m)	Depth to Cave (m)
On completion	6.17	8.53

Log of Borehole 11

BH3-10-11

Project No. BRGE00360447A

Drawing No. 12

Project: Geotechnical Investigation - Proposed Residential Development

Sheet No. 1 of 1

Location: Part of Lot 25, Concession 5, Pickering, Ontario

Date Drilled: May 12, 2009

Drill Type: CME 75 Drill

Datum: Geodetic

Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Field Vane Test

Combustible Vapour Reading
Natural Moisture
Plastic and Liquid Limit
Undrained Triaxial at % Strain at Failure
Penetrometer

GWL	SYMBOL	Soil Description	ELEV. m	DEPTH	N Value / Shear Strength (MPa)	Combustible Vapour Reading (ppm) / Natural Moisture Content % / Atterberg Limits (% Dry Weight)	SAMPLES	Natural Unit Weight kN/m³
		TOPSOIL- sandy silt with rootlets; dark brown, very moist	206.20	0				
		SANDY SILT- trace of gravel, topsoil remains in upper level; brown, saturated, loose	205.9					
		SANDY SILT TILL- scattered gravel and cobbles; brown changing to grey at ~3m, moist with wet sand seams, dense to very dense	205.5	1	/150mm			
				2	/100mm			
				3	/100mm			
				4	/150mm			
				5				
				6	/100mm			
				7				
				8	/125mm			
				9	/150mm			
		END OF BOREHOLE	196.9					

N Value: 20 40 60 80; Shear Strength: 0.1 0.2 MPa

Combustible Vapour Reading (ppm): 250 500 750; Natural Moisture Content % / Atterberg Limits (% Dry Weight): 10 20 30

NOTES:

1. Gas reading in open borehole: 0% (using MSA Model 60)
2. Groundwater piezometer installed to 9.14m; sealed with bentonite from surface to 0.91m and 6.71 to 7.31m.

Time	Water Level (m)	Depth to Cave (m)
On completion	Dry	
After 4 days	7.96	

Trow

LAGWGL02 GE00360447A.GPJ NEW GDT 5/18/09

Log of Borehole 12

BH3-10-12

Project No. BRGE00360447A

Drawing No. 13

Project: Geotechnical Investigation - Proposed Residential Development

Sheet No. 1 of 1

Location: Part of Lot 25, Concession 5, Pickering, Ontario

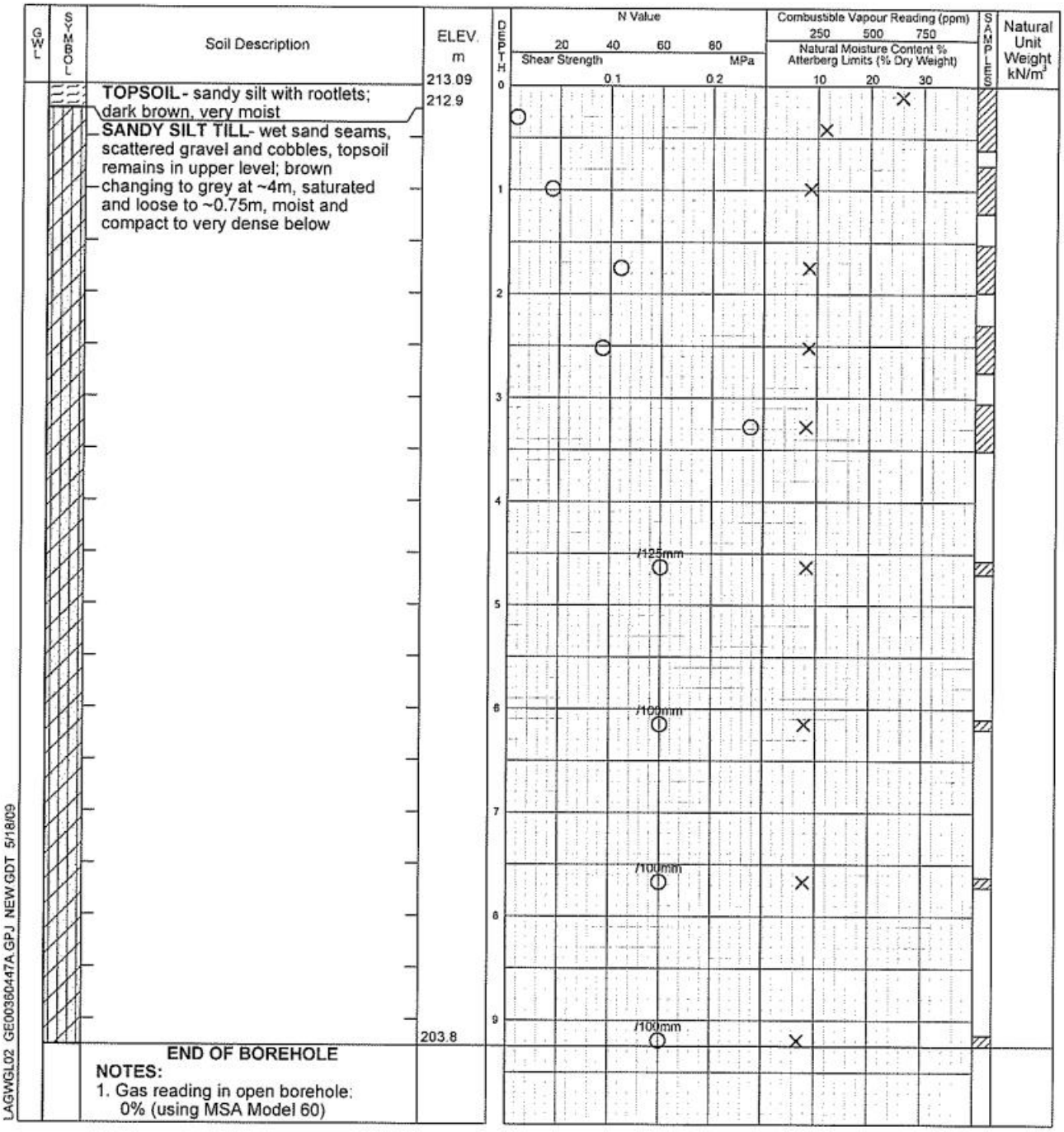
Date Drilled: May 6, 2009

Drill Type: CME 75 Drill

Datum: Geodetic

Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Field Vane Test

Combustible Vapour Reading
Natural Moisture
Plastic and Liquid Limit
Undrained Triaxial at % Strain at Failure
Penetrometer



LAGWGL02 GE00360447A.GPJ NEW GDT 5/18/09

Trow

Time	Water Level (m)	Depth to Cave (m)
On completion	8.71	8.79

Log of Borehole 13

BH3-10-13

Project No. BRGE00360447A

Drawing No. 14

Project: Geotechnical Investigation - Proposed Residential Development

Sheet No. 1 of 1

Location: Part of Lot 25, Concession 5, Pickering, Ontario

Date Drilled: May 7, 2009

Drill Type: CME 75 Drill

Datum: Geodetic

Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Field Vane Test

Combustible Vapour Reading
Natural Moisture
Plastic and Liquid Limit
Undrained Triaxial at % Strain at Failure
Penetrometer

GWL	SYMBOL	Soil Description	ELEV. m	DEPTH
		TOPSOIL- silt with rootlets; dark brown, very moist	209.61	0
		SANDY SILT TILL- scattered gravel and cobbles, topsoil remains in upper level; brown changing to grey at ~4m, saturated and loose to ~0.75m, moist and compact to very dense below	209.4	
		END OF BOREHOLE	204.8	4

NOTES:
1. Gas reading in open borehole: 0% (using MSA Model 60)

N Value: 20 40 60 80
Shear Strength: 0.1 0.2 MPa
Combustible Vapour Reading (ppm): 250 500 750
Natural Moisture Content % Atterberg Limits (% Dry Weight): 10 20 30
SAMPLES
Natural Unit Weight kN/m³

/225mm
/125mm

LAGWGL02 GE00360447A.GPJ NEW GDT 5/18/09

Trow

Time	Water Level (m)	Depth to Cave (m)
On completion	Dry	4.34

Log of Borehole 14

BH3-10-14

Project No. BRGE00360447A

Drawing No. 15

Project: Geotechnical Investigation - Proposed Residential Development

Sheet No. 1 of 1

Location: Part of Lot 25, Concession 5, Pickering, Ontario

Date Drilled: May 12, 2009

Drill Type: CME 75 Drill

Datum: Geodetic

Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Field Vane Test

Combustible Vapour Reading
Natural Moisture
Plastic and Liquid Limit
Undrained Triaxial at % Strain at Failure
Penetrometer

GWL	SYMBOL	Soil Description	ELEV. m	DEPTH	N Value / Shear Strength (MPa)	Combustible Vapour Reading (ppm) / Natural Moisture Content % / Atterberg Limits (% Dry Weight)	SAMPLES	Natural Unit Weight kN/m³
		TOPSOIL - sandy silt with rootlets; dark brown, very moist	206.06	0				
			205.4					
		SANDY SILT TILL - scattered gravel and cobbles, topsoil remains in upper level; brown changing to grey at ~4m, saturated to ~1m, moist below, compact to very dense		1				
					/150mm			
				2				
					/125mm			
				3				
					/75mm			
				4				
					/75mm			
			201.3					
		END OF BOREHOLE						

NOTES:
1. Gas reading in open borehole: 0% (using MSA Model 60)

LAGWGL02 GE00360447A.GPJ NEW.GDT 5/19/09

Trow

Time	Water Level (m)	Depth to Cave (m)
On completion	Dry	3.99

Log of Borehole 15

BH3-10-15

Project No. BRGE00360447A

Drawing No. 16

Project: Geotechnical Investigation - Proposed Residential Development

Sheet No. 1 of 1

Location: Part of Lot 25, Concession 5, Pickering, Ontario

Date Drilled: May 6, 2009

Drill Type: CME 75 Drill

Datum: Geodetic

Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Field Vane Test

Combustible Vapour Reading
Natural Moisture
Plastic and Liquid Limit
Undrained Triaxial at % Strain at Failure
Penetrometer

GWL	SYMBOL	Soil Description	ELEV. m	DEPTH
		TOPSOIL - sandy silt with rootlets; dark brown, very moist	210.91	0
		SANDY SILT - trace of gravel, topsoil remains in upper level; brown, saturated, loose	210.7	
		SANDY SILT TILL - wet sand seams, scattered gravel and cobbles; brown, moist to saturated, compact to very dense	210.2	1
		- wet sandy silt layers		2
				3
		SILT - some sand; brown, saturated, very dense	206.9	4
				5
		SANDY SILT TILL - scattered gravel and cobbles; grey, moist with wet sand seams, very dense	205.4	6
		SANDY SILT - wet silty fine sand layers; grey, saturated, dense	203.9	7
				8
		SANDY SILT TILL - scattered gravel and cobbles; grey, moist, very dense	202.4	9
		END OF BOREHOLE	201.7	

N Value: 20 40 60 80
Shear Strength: 0.1 0.2 MPa
/150mm
/150mm
/100mm

Combustible Vapour Reading (ppm): 250 500 750
Natural Moisture Content % Atterberg Limits (% Dry Weight): 10 20 30

SAMPLES

Natural Unit Weight kN/m³

NOTES:
1. Gas reading in open borehole: 0% (using MSA Model 60)

Time	Water Level (m)	Depth to Cave (m)
On completion	2.44	3.25

Trow

LAGWGL02 GE00360447A.GPJ NEW.GDT 5/19/09

Log of Borehole 16

BH3-10-16

Project No. BRGE00360447A

Drawing No. 17

Project: Geotechnical Investigation - Proposed Residential Development

Sheet No. 1 of 1

Location: Part of Lot 25, Concession 5, Pickering, Ontario

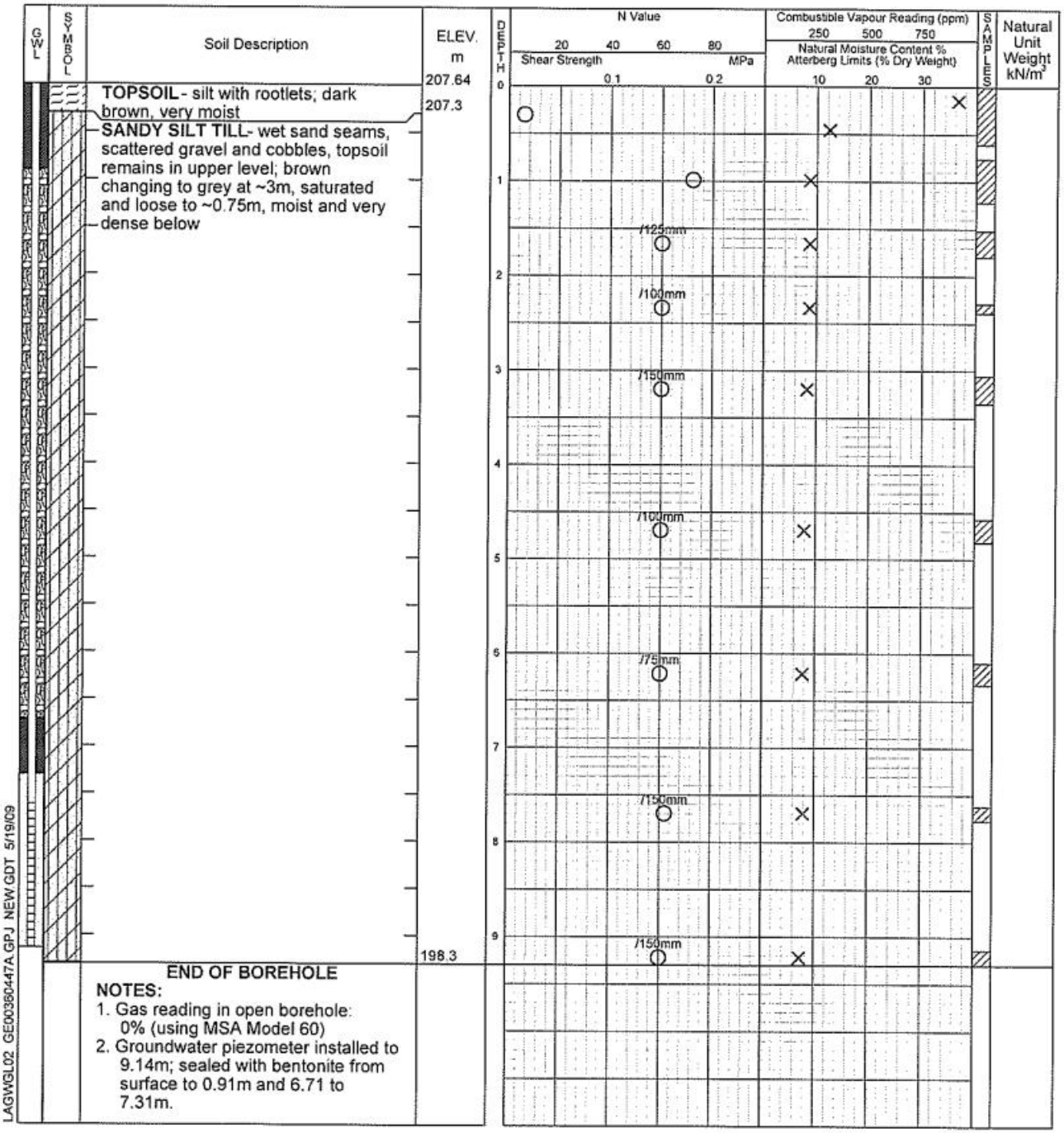
Date Drilled: May 7, 2009

Drill Type: CME 75 Drill

Datum: Geodetic

Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Field Vane Test

Combustible Vapour Reading
Natural Moisture
Plastic and Liquid Limit
Undrained Triaxial at % Strain at Failure
Penetrometer



NOTES:

1. Gas reading in open borehole: 0% (using MSA Model 60)
2. Groundwater piezometer installed to 9.14m; sealed with bentonite from surface to 0.91m and 6.71 to 7.31m.

LAGWGL02_GE00360447A.GPJ_NEW.GDT_5/19/09

Trow

Time	Water Level (m)	Depth to Cave (m)
On completion	Dry	
After 9 days	at surface	

Log of Borehole 17

BH3-10-17

Project No. BRGE00360447A

Drawing No. 18

Project: Geotechnical Investigation - Proposed Residential Development

Sheet No. 1 of 1

Location: Part of Lot 25, Concession 5, Pickering, Ontario

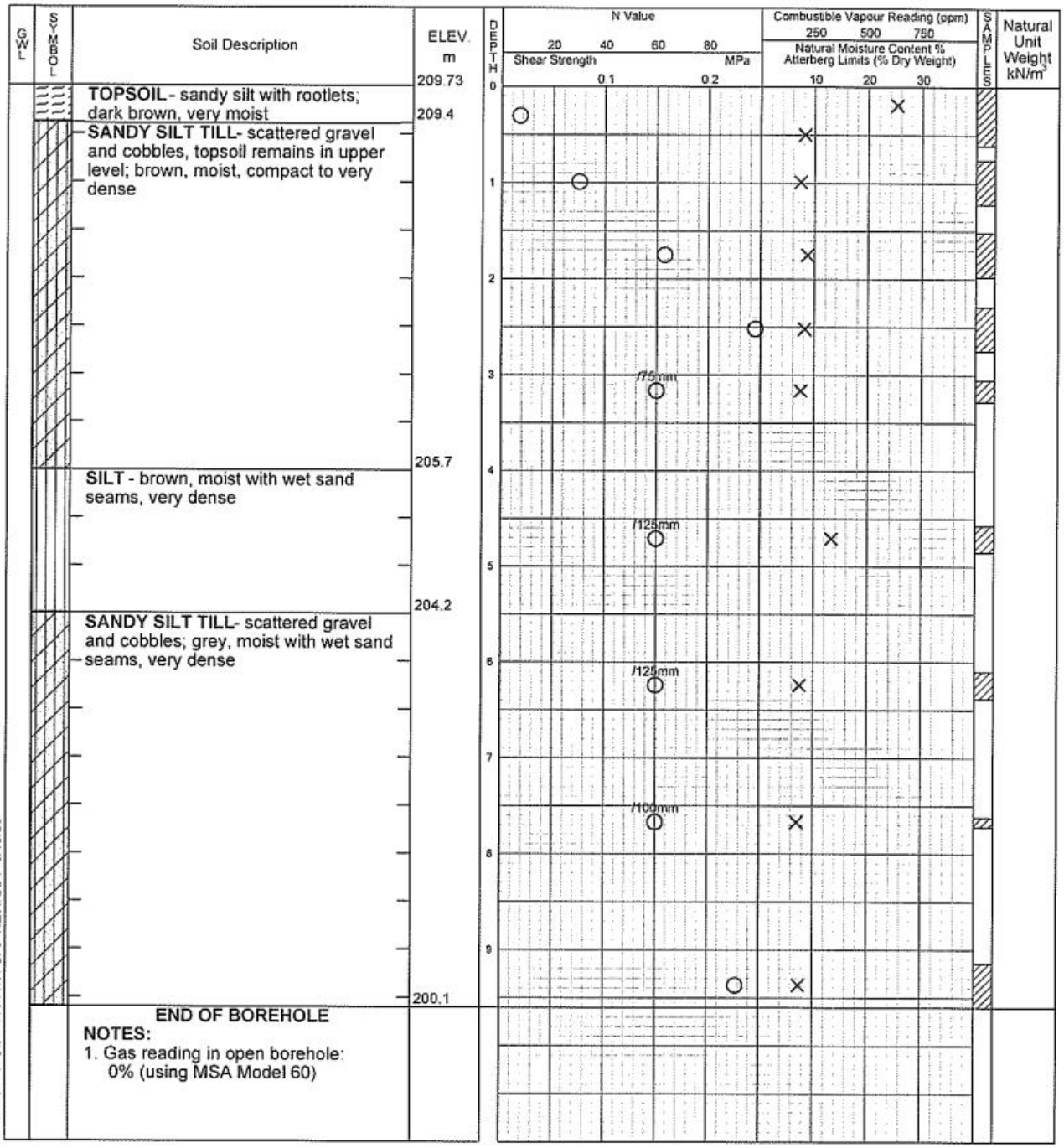
Date Drilled: May 6, 2009

Drill Type: CME 75 Drill

Datum: Geodetic

Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Field Vane Test

Combustible Vapour Reading
Natural Moisture
Plastic and Liquid Limit
Undrained Triaxial at % Strain at Failure
Penetrometer



LAGWGL02 GE00360447A.GPJ NEW.GDT 5/19/09

Trow

Time	Water Level (m)	Depth to Cave (m)
On completion	6.81	8.03

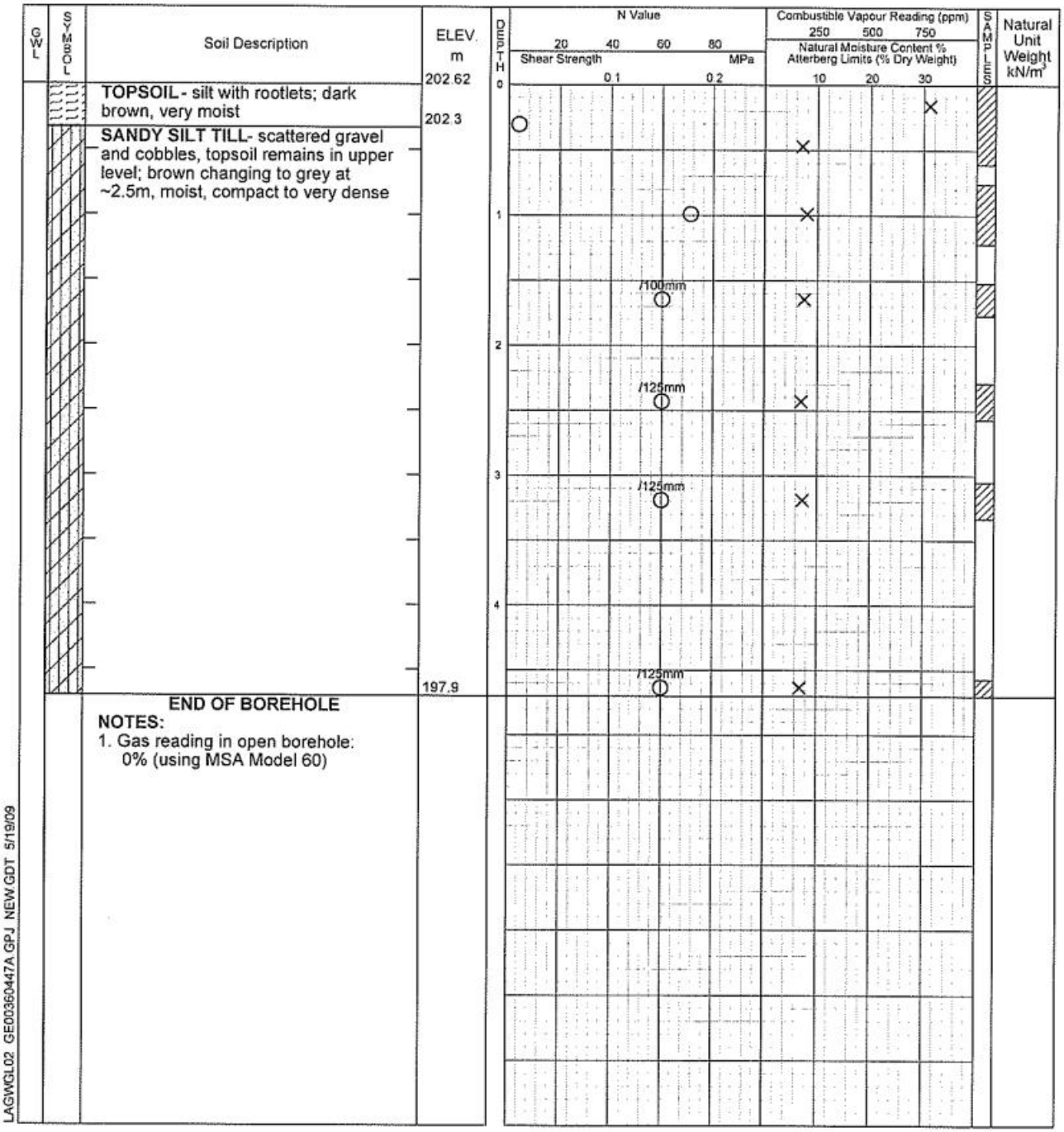
Log of Borehole 18

BH3-10-18

Project No. BRGE00360447A
Drawing No. 19
Project: Geotechnical Investigation - Proposed Residential Development
Sheet No. 1 of 1
Location: Part of Lot 25, Concession 5, Pickering, Ontario

Date Drilled: May 12, 2009
Drill Type: CME 75 Drill
Datum: Geodetic

Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Field Vane Test
Combustible Vapour Reading
Natural Moisture
Plastic and Liquid Limit
Undrained Triaxial at % Strain at Failure
Penetrometer



LAGWGL02 GE00360447A GPJ NEW GDT 5/19/09

Trow

Time	Water Level (m)	Depth to Cave (m)
On completion	Dry	4.29

Log of Borehole 19

BH3-10-19

Project No. BRGE00360447A

Drawing No. 20

Project: Geotechnical Investigation - Proposed Residential Development

Sheet No. 1 of 1

Location: Part of Lot 25, Concession 5, Pickering, Ontario

Date Drilled: May 5, 2009

Drill Type: CME 75 Drill

Datum: Geodetic

Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Field Vane Test

Combustible Vapour Reading
Natural Moisture
Plastic and Liquid Limit
Undrained Triaxial at % Strain at Failure
Penetrometer

GWL	SYMBOL	Soil Description	ELEV. m
		TOPSOIL- sandy silt with rootlets; dark brown, very moist	205.62
		SANDY SILT TILL- scattered gravel and cobbles, topsoil remains in upper level; brown changing to grey at ~4m, saturated and loose to ~0.75m, moist and compact to very dense below	205.4
		END OF BOREHOLE	196.2

NOTES:
1. Gas reading in open borehole: 0% (using MSA Model 60)

DEPTH

N Value: 20 40 60 80
Shear Strength: 0.1 0.2 MPa

Combustible Vapour Reading (ppm): 250 500 750
Natural Moisture Content % Atterberg Limits (% Dry Weight): 10 20 30

SAMPLES

Natural Unit Weight kN/m³

/125mm
/125mm
/75mm
/100mm

Time	Water Level (m)	Depth to Cave (m)
On completion	Dry	8.48

Trow

LAGWGL02 GE00360447A.GPJ NEW.GDT 5/19/09

Log of Borehole 20

BH3-10-20

Project No. BRGE00360447A

Drawing No. 21

Project: Geotechnical Investigation - Proposed Residential Development

Sheet No. 1 of 1

Location: Part of Lot 25, Concession 5, Pickering, Ontario

Date Drilled: May 7, 2009

Drill Type: CME 75 Drill

Datum: Geodetic

Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Field Vane Test

Combustible Vapour Reading
Natural Moisture
Plastic and Liquid Limit
Undrained Triaxial at % Strain at Failure
Penetrometer

GWL	SYMBOL	Soil Description	ELEV. m	DEPTH	N Value / Shear Strength (MPa)	Combustible Vapour Reading (ppm) / Natural Moisture Content % / Atterberg Limits (% Dry Weight)	SAMPLES	Natural Unit Weight kN/m³
		TOPSOIL- silt with rootlets; dark brown, very moist	201.61	0				
		SANDY SILT TILL- scattered gravel and cobbles, topsoil remains in upper level; brown changing to grey at ~2.5m, saturated and loose to ~0.75m, moist and very dense below	201.4		/250mm			
				1				
					/100mm			
				2				
					/125mm			
				3				
					/125mm			
				4				
					/125mm			
				5				
					/100mm			
				6				
					/75mm			
				7				
					/100mm			
				8				
				9				
			192.4					
		END OF BOREHOLE						

NOTES:
1. Gas reading in open borehole: 0% (using MSA Model 60)

LAGWGL02 GE00360447A.GPJ NEW.GDT 5/19/09

Trow

Time	Water Level (m)	Depth to Cave (m)
On completion	Dry	8.58

Log of Borehole 21

BH3-10-21

Project No. BRGE00360447A

Drawing No. 22

Project: Geotechnical Investigation - Proposed Residential Development

Sheet No. 1 of 1

Location: Part of Lot 25, Concession 5, Pickering, Ontario

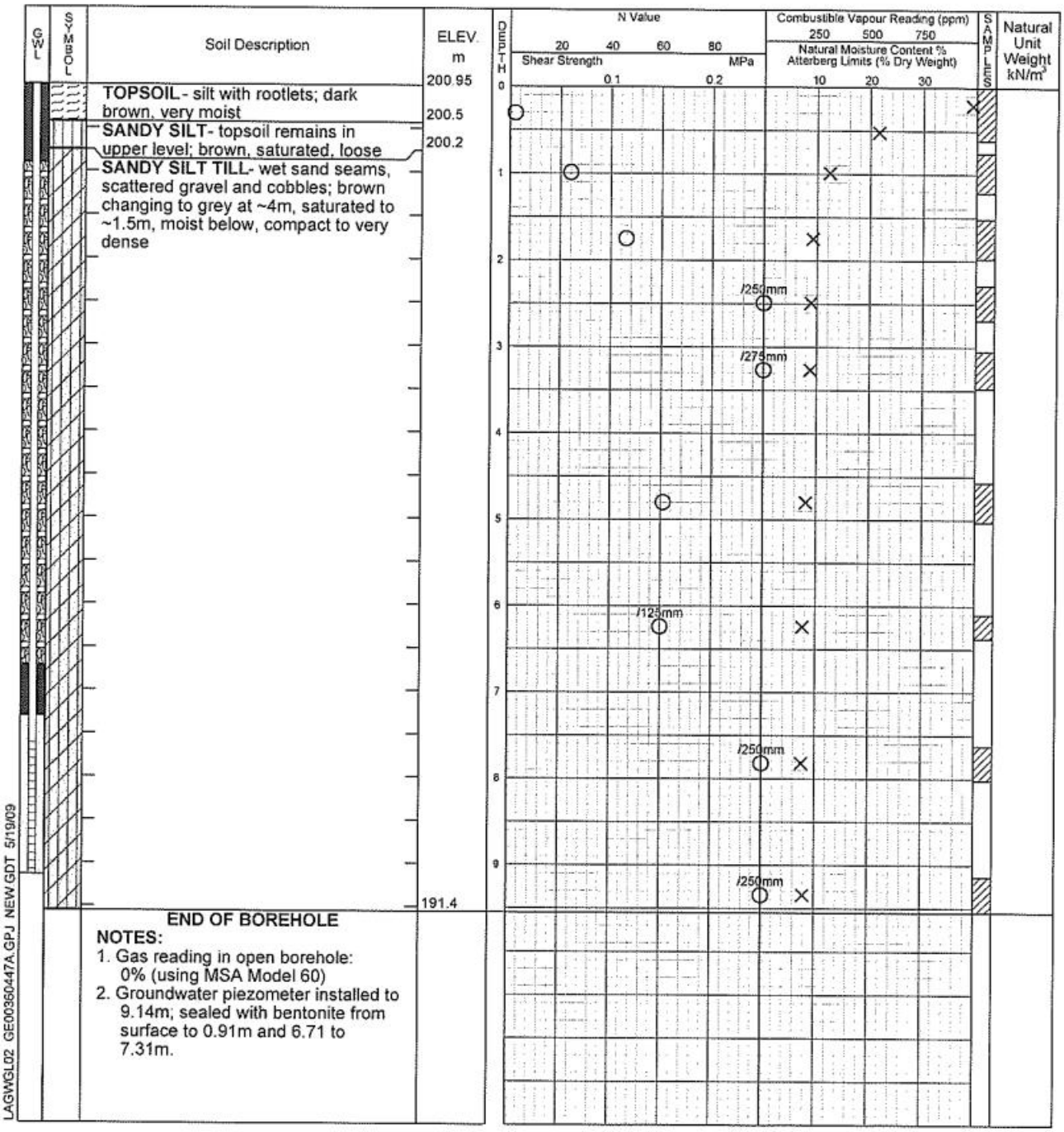
Date Drilled: May 7, 2009

Drill Type: CME 75 Drill

Datum: Geodetic

Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Field Vane Test

Combustible Vapour Reading
Natural Moisture
Plastic and Liquid Limit
Undrained Triaxial at % Strain at Failure
Penetrometer



Time	Water Level (m)	Depth to Cave (m)
On completion	8.23	
After 9 days	0.39	

Trow

Log of Borehole 22

MW3-10-22

Project No. BRGE00360447A

Drawing No. 23

Project: Geotechnical Investigation - Proposed Residential Development

Sheet No. 1 of 1

Location: Part of Lot 25, Concession 5, Pickering, Ontario

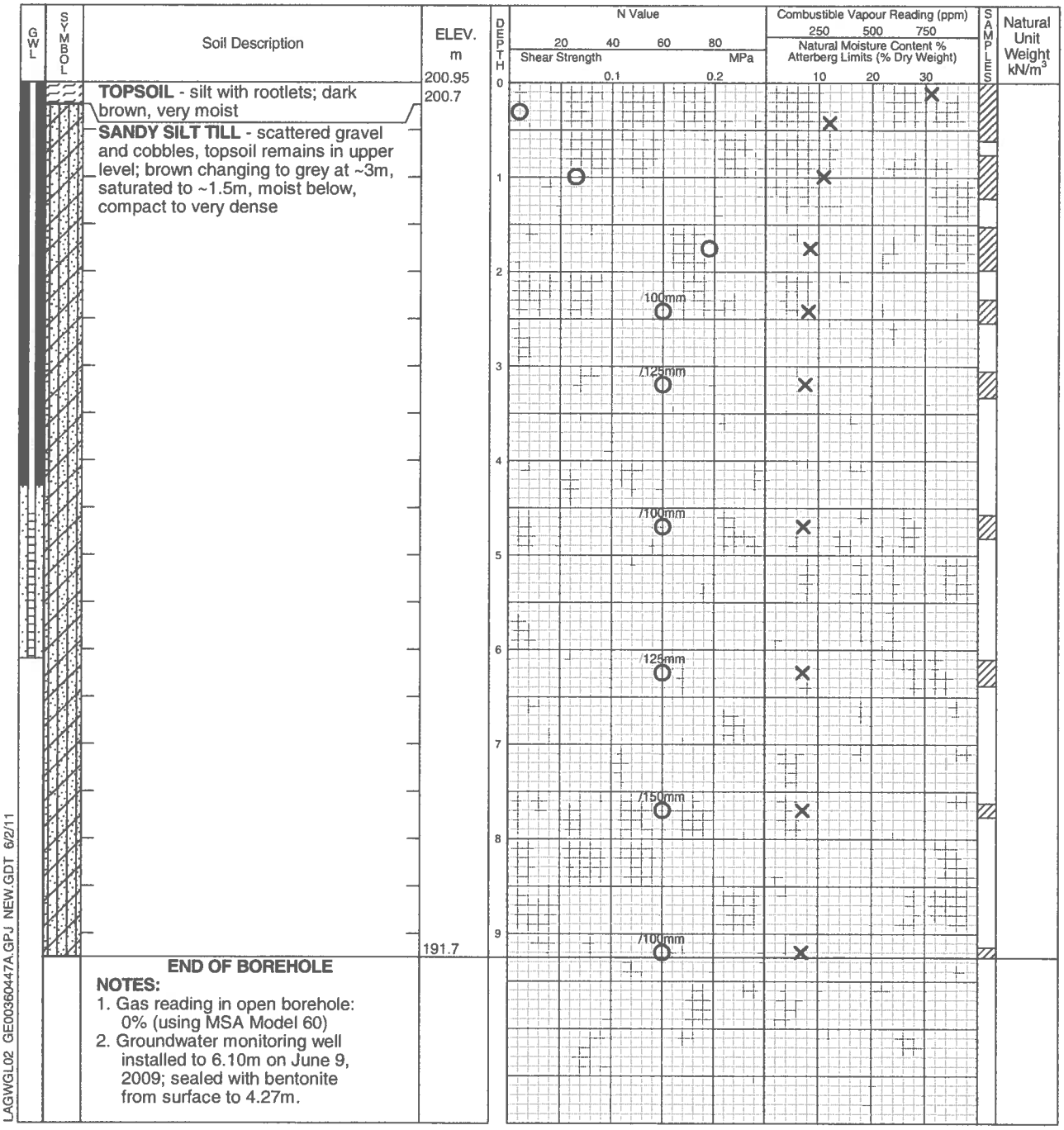
Date Drilled: May 7 and June 9, 2009

Drill Type: CME 75 Drill

Datum: Geodetic

Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Field Vane Test

Combustible Vapour Reading
Natural Moisture
Plastic and Liquid Limit
Undrained Triaxial at % Strain at Failure
Penetrometer



NOTES:

1. Gas reading in open borehole: 0% (using MSA Model 60)
2. Groundwater monitoring well installed to 6.10m on June 9, 2009; sealed with bentonite from surface to 4.27m.

Time	Water Level (m)	Depth to Cave (m)
On completion (open hole)	Dry	8.08
On completion (well)	Dry	
After 23 days (well)	0.18	

LAGWGL02 GE00360447A.GPJ NEW.GDT 6/2/11

Log of Borehole 1

BH3-14-1

Project No. BRGE00360445A

Drawing No. 2

Project: Geotechnical Investigation - Proposed Residential Development

Sheet No. 1 of 1

Location: Part of Lot 24, Concession 5, Pickering, Ontario

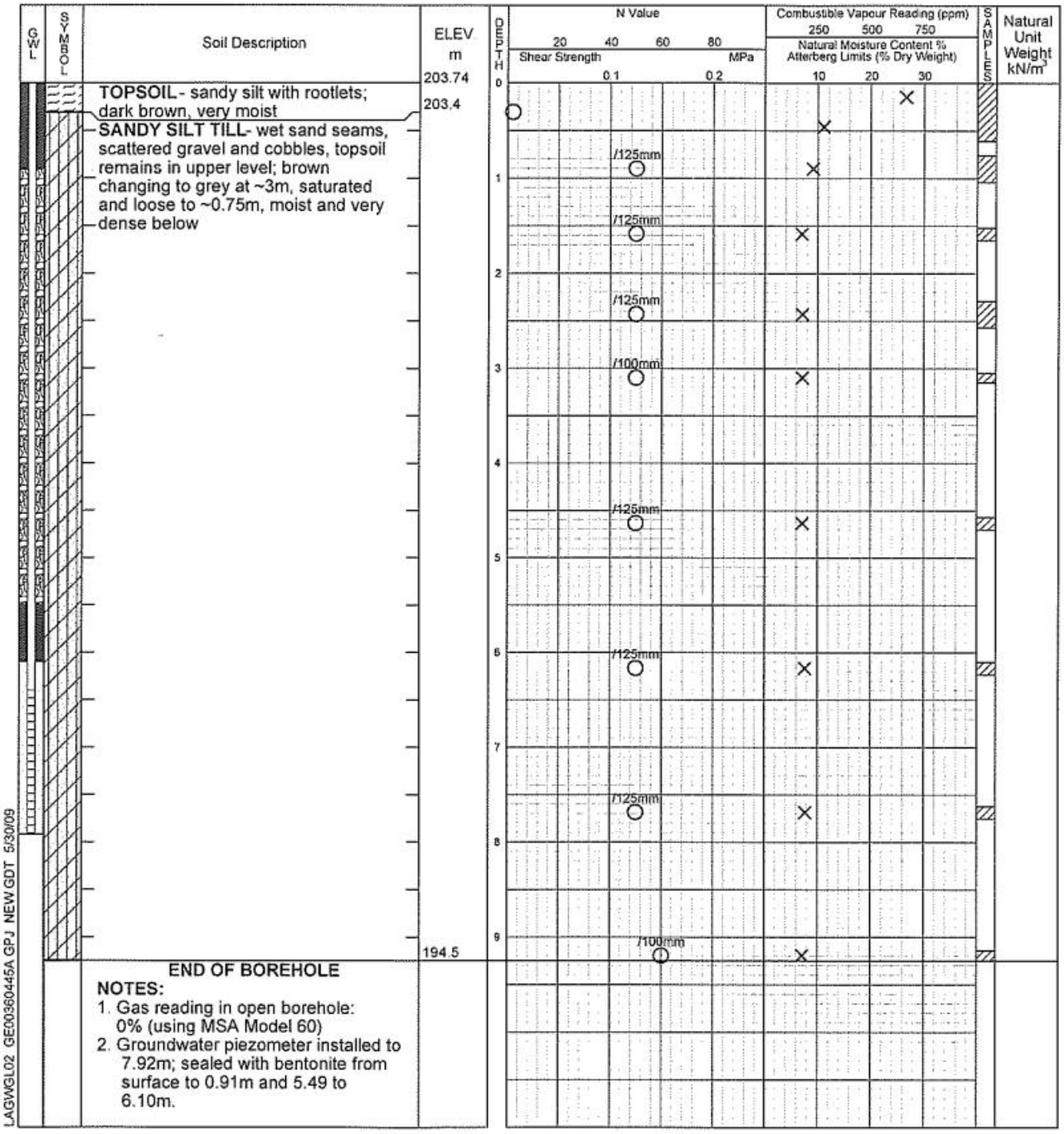
Date Drilled: May 5, 2009

Drill Type: CME 75

Datum: Geodetic

Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Field Vane Test

Combustible Vapour Reading
Natural Moisture
Plastic and Liquid Limit
Undrained Triaxial at % Strain at Failure
Penetrometer



NOTES:
1. Gas reading in open borehole: 0% (using MSA Model 60)
2. Groundwater piezometer installed to 7.92m; sealed with bentonite from surface to 0.91m and 5.49 to 6.10m.

LAGWGL02 GE00360445A GPJ NEW GDT 5/30/09

Trow

Time	Water Level (m)	Depth to Cave (m)
On completion	Dry	
After 11 days	0.63	

Log of Borehole 2

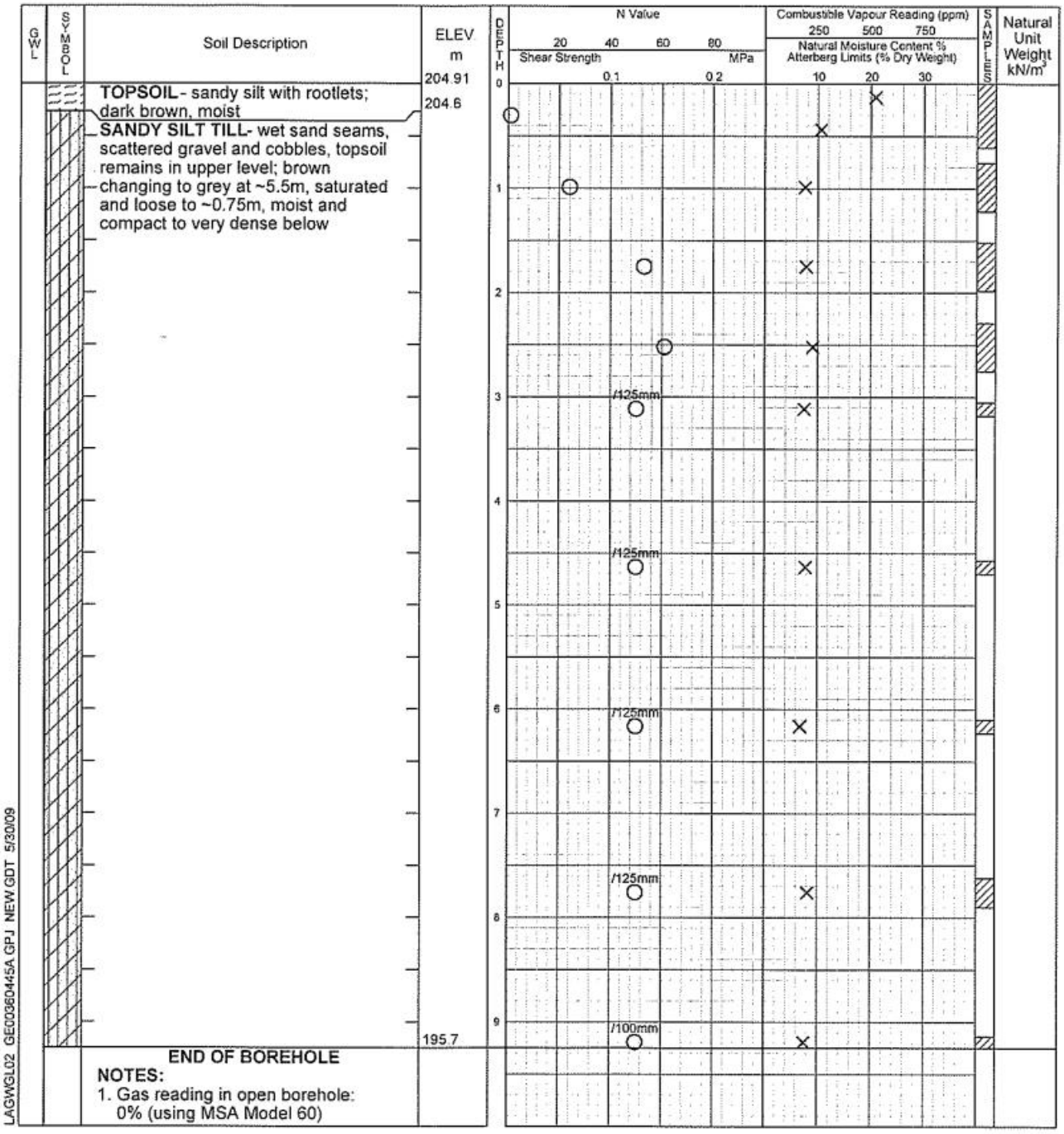
BH3-14-2

Project No: BRGE00360445A
Drawing No: 3
Project: Geotechnical Investigation - Proposed Residential Development
Sheet No: 1 of 1
Location: Part of Lot 24, Concession 5, Pickering, Ontario

Date Drilled: May 5, 2009
Drill Type: CME 75
Datum: Geodetic

Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Field Vane Test

Combustible Vapour Reading
Natural Moisture
Plastic and Liquid Limit
Undrained Triaxial at % Strain at Failure
Penetrometer



LAGWGL02 GE00360445A GPJ NEW GDT 5/30/09

Time	Water Level (m)	Depth to Cave (m)
On completion	0.97	8.69

Trow

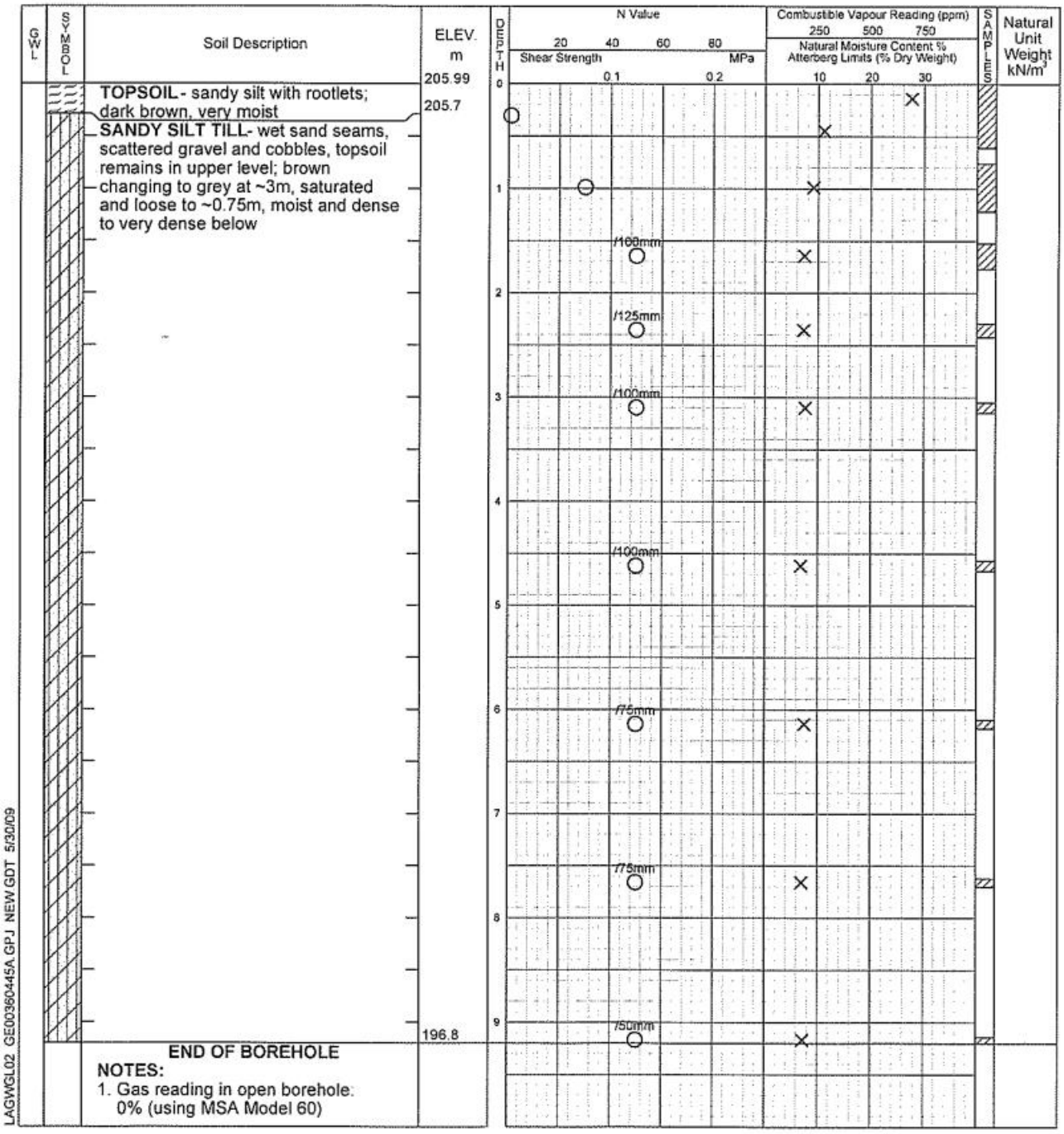
Log of Borehole 3

BH3-14-3

Project No: BRGE00360445A
Drawing No: 4
Project: Geotechnical Investigation - Proposed Residential Development
Sheet No: 1 of 1
Location: Part of Lot 24, Concession 5, Pickering, Ontario

Date Drilled: May 5, 2009
Drill Type: CME 75
Datum: Geodetic

Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Field Vane Test
Combustible Vapour Reading
Natural Moisture
Plastic and Liquid Limit
Undrained Triaxial at % Strain at Failure
Penetrometer



LAGWGL02 GE00360445A.GPJ NEW GDT 5/30/09

Trow

Time	Water Level (m)	Depth to Cave (m)
On completion	8.38	8.43

Log of Borehole 4

BH3-14-4

Project No. BRGE00360445A

Drawing No. 5

Project: Geotechnical Investigation - Proposed Residential Development

Sheet No. 1 of 1

Location: Part of Lot 24, Concession 5, Pickering, Ontario

Date Drilled: May 5, 2009

Drill Type: CME 75

Datum: Geodetic

Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Field Vane Test

Combustible Vapour Reading
Natural Moisture
Plastic and Liquid Limit
Undrained Triaxial at % Strain at Failure
Penetrometer

GWL	SYMBOL	Soil Description	ELEV. m	DEPTH	N Value / Shear Strength (MPa)	Combustible Vapour Reading (ppm) / Natural Moisture Content % / Atterberg Limits (% Dry Weight)	SAMPLES	Natural Unit Weight kN/m³
		TOPSOIL - sandy silt with rootlets; dark brown, very moist	203.60	0				
		SANDY SILT - topsoil remains in upper level; brown, saturated, loose	203.3					
		SANDY SILT TILL - scattered gravel and cobbles, topsoil remains in upper level; brown changing to grey at ~3.5m, moist, very dense	202.9	1	/125mm			
				2	/125mm			
				3	/125mm			
				4				
				5	/125mm			
				6	/125mm			
				7				
				8	/75mm			
				9	/100mm			
			194.4					
		END OF BOREHOLE						

NOTES:
1. Gas reading in open borehole: 0% (using MSA Model 60)

LAGWGL02 GE00360445A GPJ NEW GDT 5/30/09

Trow

Time	Water Level (m)	Depth to Cave (m)
On completion	Dry	8.64

Log of Borehole 5

BH3-14-5

Project No. BRGE00360445A
Drawing No. 6
Project: Geotechnical Investigation - Proposed Residential Development
Sheet No. 1 of 1
Location: Part of Lot 24, Concession 5, Pickering, Ontario

Date Drilled: May 5, 2009
Drill Type: CME 75
Datum: Geodetic

Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Field Vane Test

Combustible Vapour Reading
Natural Moisture
Plastic and Liquid Limit
Undrained Triaxial at % Strain at Failure
Penetrometer

GWL	SYMBOL	Soil Description	ELEV. m	DEPTH
		TOPSOIL- sandy silt with rootlets; dark brown, very moist	205.73	0
		SANDY SILT- trace of gravel, topsoil remains in upper level; brown, saturated, loose	205.4	
		SANDY SILT TILL- wet sand seams and layers, scattered gravel and cobbles; brown changing to grey at ~4m, moist to saturated, dense to very dense	205.0	1
				2
				3
				4
				5
				6
				7
				8
				9
		SILTY FINE SAND- brown, saturated, very dense	200.2	
		SANDY SILT TILL- scattered gravel and cobbles; grey, moist, very dense	198.7	
		END OF BOREHOLE	196.5	

N Value: 20 40 60 80
Shear Strength: 0.1 0.2 MPa
Combustible Vapour Reading (ppm): 250 500 750
Natural Moisture Content % Atterberg Limits (% Dry Weight): 10 20 30
SAMPLES
Natural Unit Weight kN/m³

/125mm
/125mm
/100mm
/100mm

NOTES:
1. Gas reading in open borehole: 0% (using MSA Model 60)
2. Groundwater piezometer installed to 9.14m; sealed with bentonite from surface to 0.91m and 6.71 to 7.31m.

Time	Water Level (m)	Depth to Cave (m)
On completion	1.25	
After 11 days	1.38	

Trow

LAGWGL02 GE00360445A GPJ NEW GDT 5/30/09

Log of Borehole 1

BH3-15-1

Project No. BRGE00360435A

Drawing No. 2

Project: Geotechnical Investigation - Proposed Residential Development

Sheet No. 1 of 1

Location: Part of Lot 24, Concession 5, Pickering, Ontario

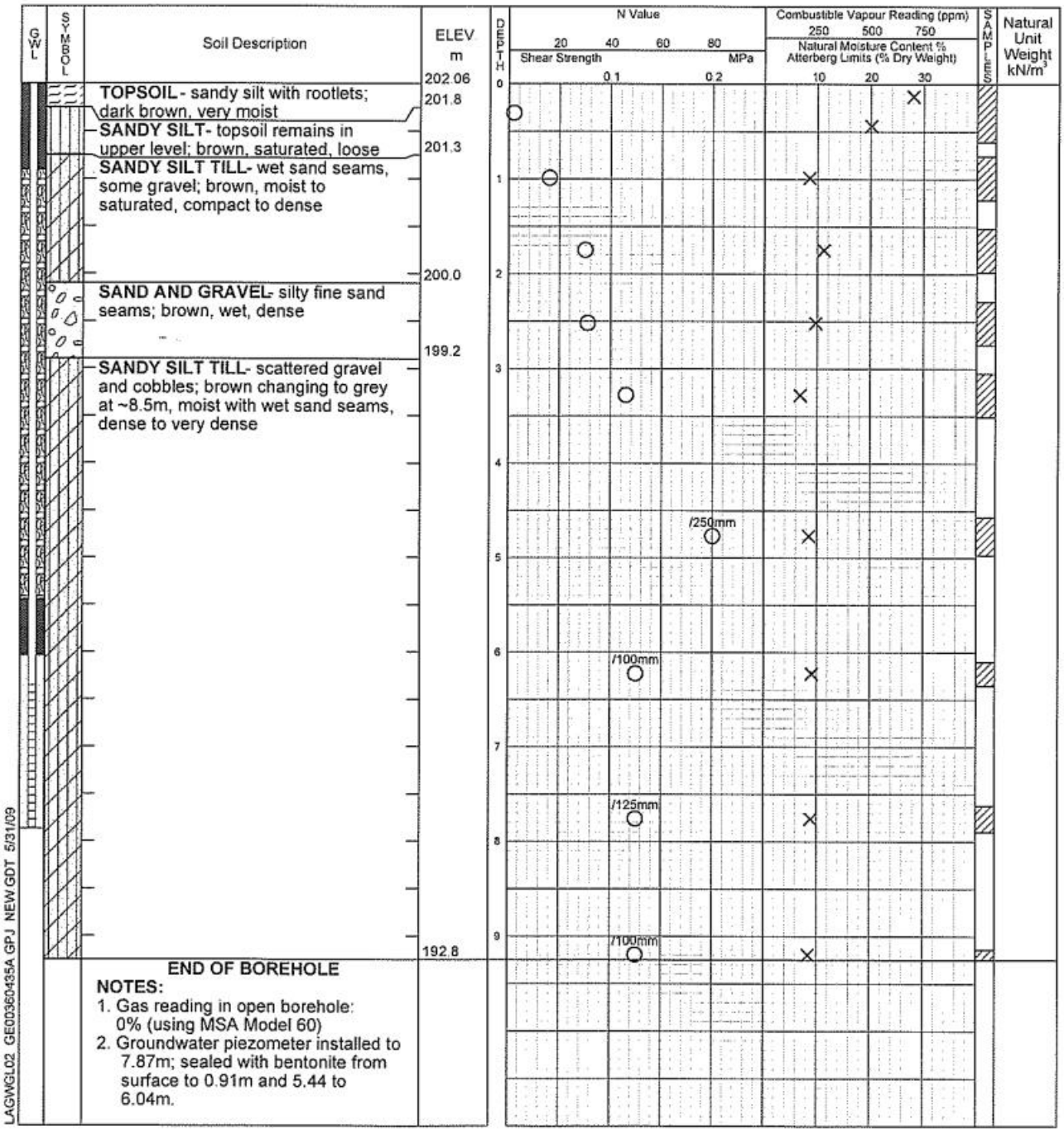
Date Drilled: May 6, 2009

Drill Type: CME 75

Datum: Geodetic

Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Field Vane Test

Combustible Vapour Reading
Natural Moisture
Plastic and Liquid Limit
Undrained Triaxial at % Strain at Failure
Penetrometer



NOTES:
1. Gas reading in open borehole: 0% (using MSA Model 60)
2. Groundwater piezometer installed to 7.87m; sealed with bentonite from surface to 0.91m and 5.44 to 6.04m.

LAGWGL02 GE00360435A.GPJ NEW.GDT 5/31/09

Trow

Time	Water Level (m)	Depth to Cave (m)
On completion	1.42	
After 10 days	0.80	

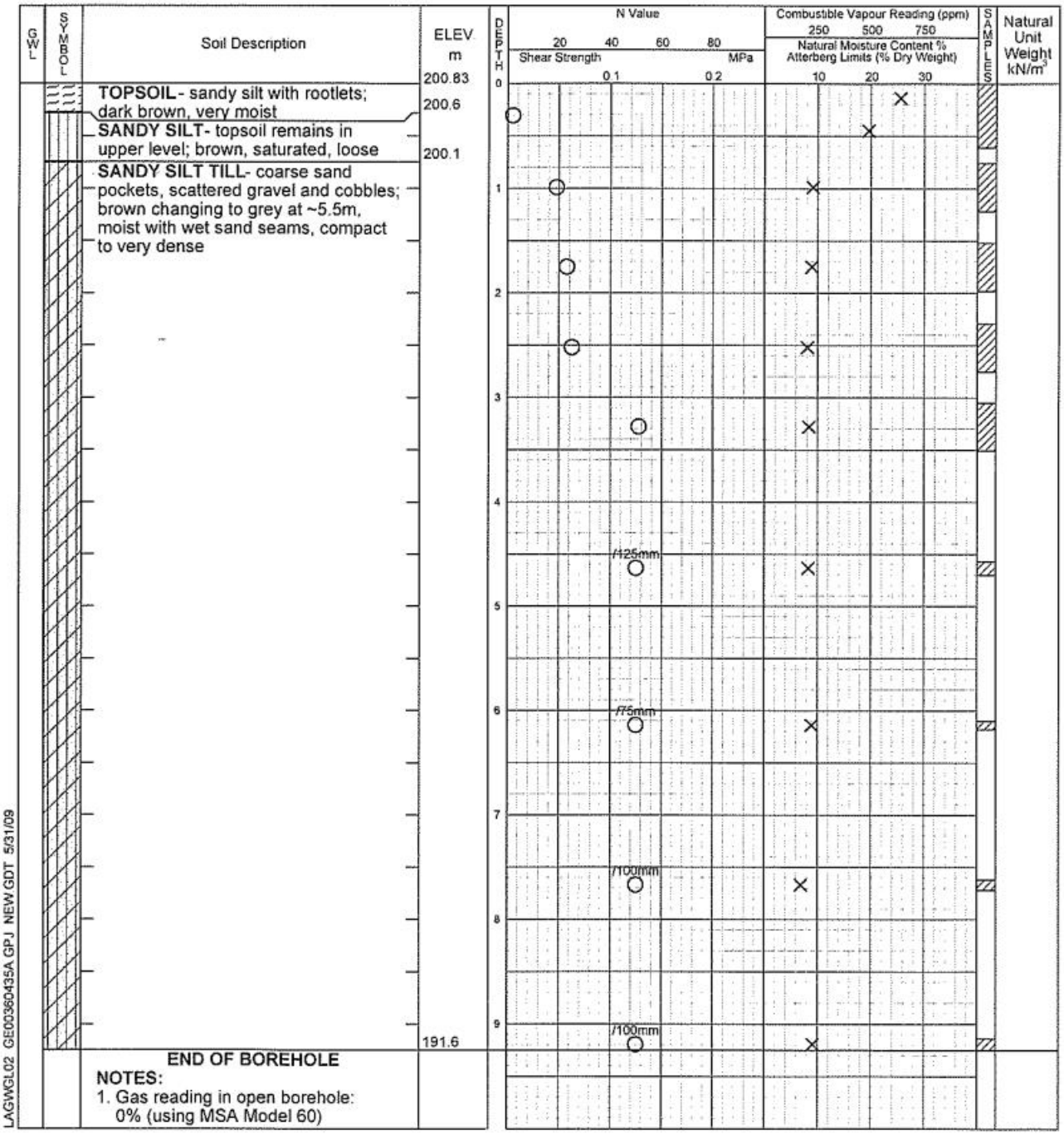
Log of Borehole 2

BH3-15-2

Project No: BRGE00360435A
Drawing No: 3
Project: Geotechnical Investigation - Proposed Residential Development
Sheet No: 1 of 1
Location: Part of Lot 24, Concession 5, Pickering, Ontario

Date Drilled: May 6, 2009
Drill Type: CME 75
Datum: Geodetic

Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Field Vane Test
Combustible Vapour Reading
Natural Moisture
Plastic and Liquid Limit
Undrained Triaxial at % Strain at Failure
Penetrometer



Time	Water Level (m)	Depth to Cave (m)
On completion	2.64	8.58

Trow

Log of Borehole 3

BH3-15-3

Project No. BRGE00360435A

Drawing No. 4

Project: Geotechnical Investigation - Proposed Residential Development

Sheet No. 1 of 1

Location: Part of Lot 24, Concession 5, Pickering, Ontario

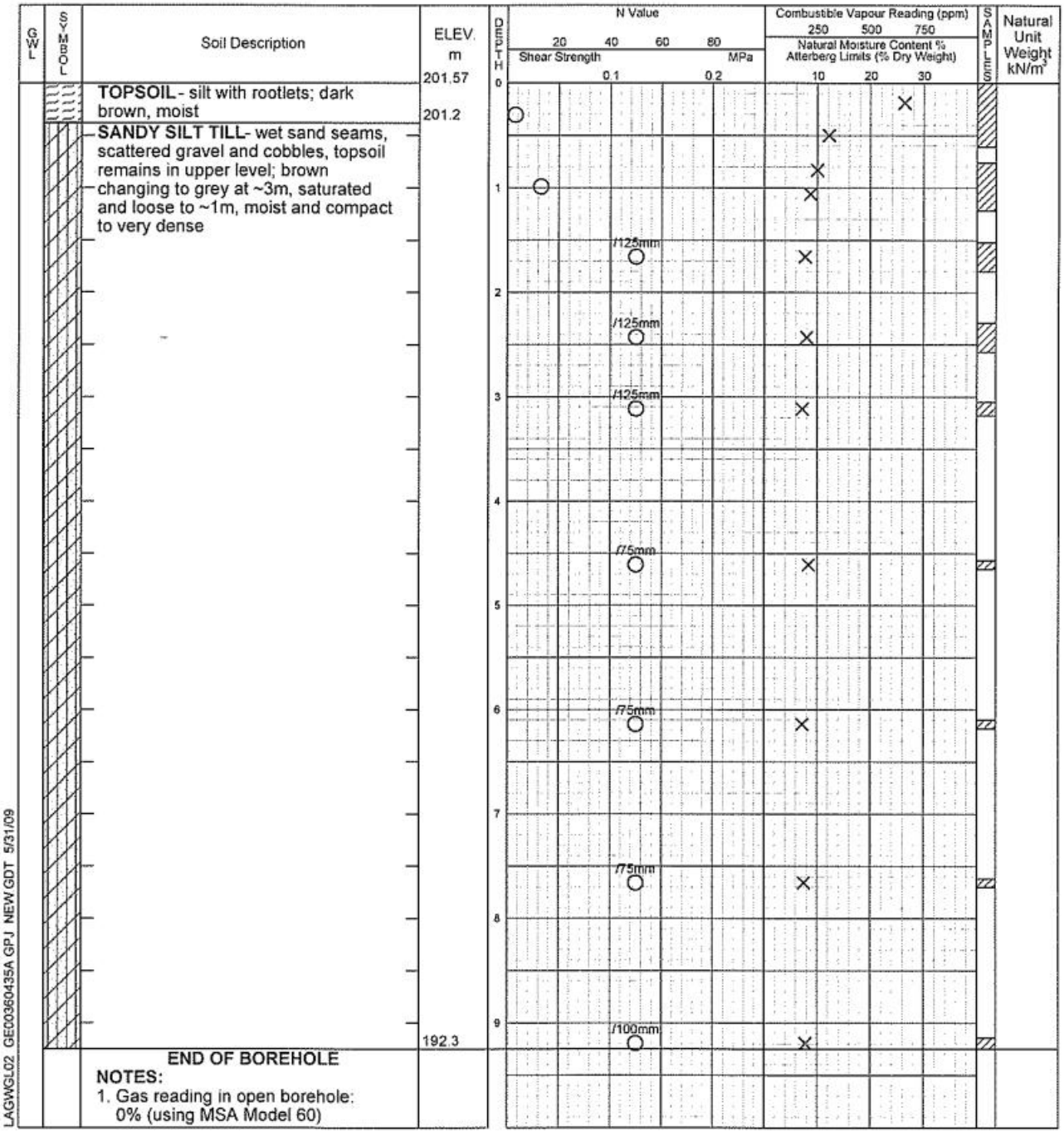
Date Drilled: May 6, 2009

Drill Type: CME 75

Datum: Geodetic

Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Field Vane Test

Combustible Vapour Reading
Natural Moisture
Plastic and Liquid Limit
Undrained Triaxial at % Strain at Failure
Penetrometer



LAGWGL02 GE00360435A GPJ NEW GDT 5/31/09

Trow

Time	Water Level (m)	Depth to Cave (m)
On completion	1.78	8.94

Log of Borehole 4

BH3-15-4

Project No. BRGE00360435A

Drawing No. 5

Project: Geotechnical Investigation - Proposed Residential Development

Sheet No. 1 of 1

Location: Part of Lot 24, Concession 5, Pickering, Ontario

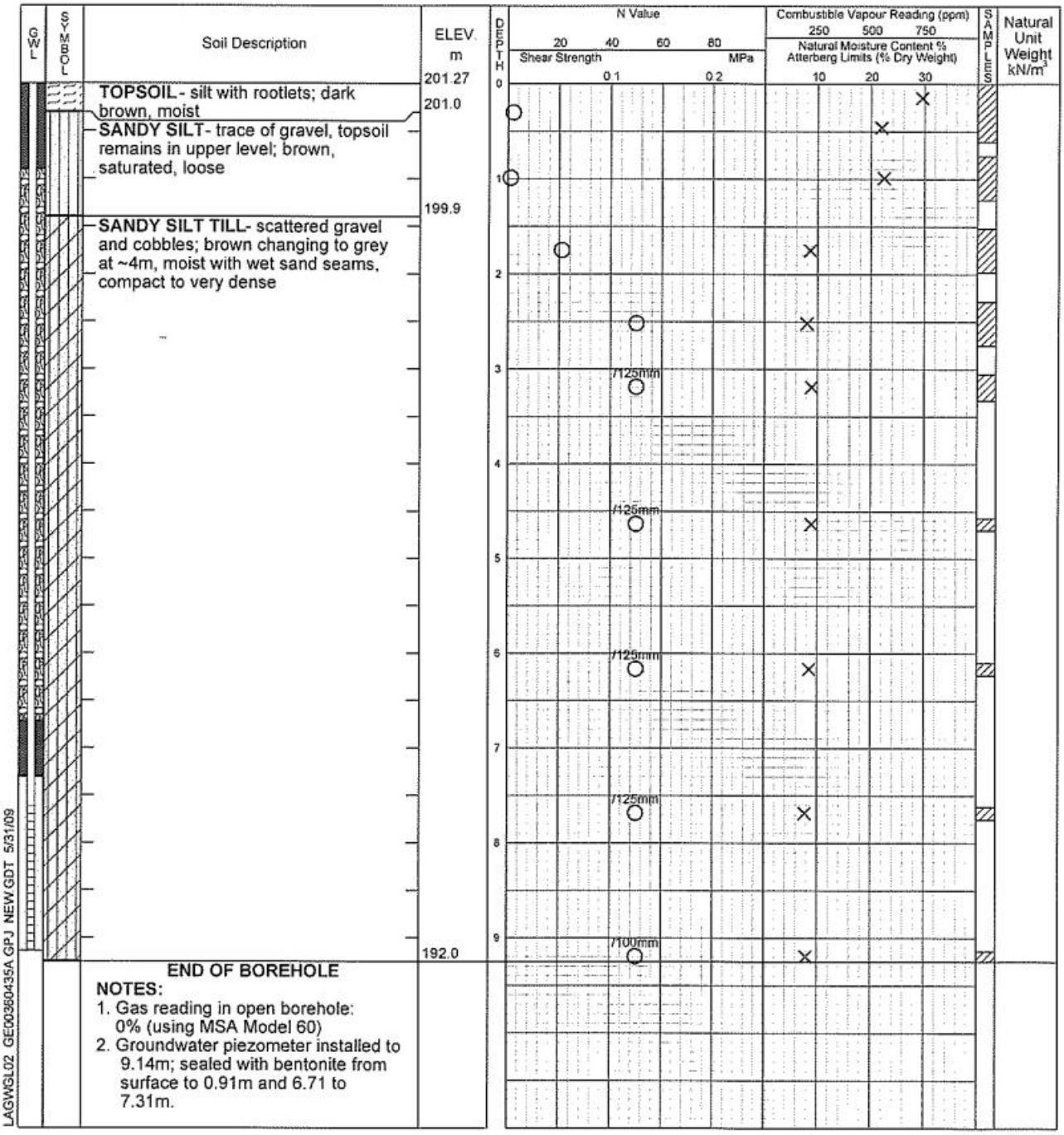
Date Drilled: May 6, 2009

Drill Type: CME 75

Datum: Geodetic

Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Field Vane Test

Combustible Vapour Reading
Natural Moisture
Plastic and Liquid Limit
Undrained Triaxial at % Strain at Failure
Penetrometer



LAGWGL02 GE00360435A.GPJ NEW.GDT 5/31/09

Trow

Time	Water Level (m)	Depth to Cave (m)
On completion	2.91	
After 10 days	2.74	

MW4-2-5

Project No: 5473-9-4

Project: Water Balance-Proposed Subdivision

Client: Lebovic c/o Sernas Group Inc.

Location: Bock Rd/Taunton Rd, Pickering, ON

Borehole #: TW5

Enclosure: 6

Engineer:

Depth	Symbol	Description	Depth/Elev.	Sample Number	Sample Type	Blows/ft	Recovery	Standard Penetration Test blows/ft (1, 20, 40, 60, 80)	Well Data	Remarks
0		Ground Surface	0							
		Topsoil 250 mm SILTY CLAY Soft, brown, wet	0 0.6	1	SS	4				
			-0.6							
1				2	SS	39				
				3	SS	100+				
2										
		SILTY SAND TILL Dense then very dense, trace fine to medium gravel, brown then grey, moist		4	SS	100+				
3				5	SS	100+				
		brown								
4		grey								
				6	SS	100+				
5										
6			6.3	7	SS	100+				
		End of Borehole	-6.3							
7										

Drilled By: Eastern Soil

Drill Method: Auger

Drill Date: June 2, 2009

V A Wood Associates Ltd
1080 Tapscott Rd, Unit 24
Scarborough, ON
M1X 1E7

Hole Size: 110 mm

Datum:

Sheet: 1 of 1

MW4-2-6

Project No: 5473-9-4

Project: Water balance-Proposed Subdivision

Client: Lebovic c/o Sernas Group Inc.

Location: Borck Rd/Taunto Rd, Pickering, ON

Borehole #: TW6

Enclosure: 7

Engineer:

Depth	Symbol	Description	Depth/Elev.	Number	Type	Blows/ft	Recovery	Standard Penetration Test blows/ft (1, 20, 40, 60, 80)	Well Data	Remarks
		Ground Surface	0							
0		Topsoil 300 mm CLAYEY SAND Loose, organics, brown, wet	0 0.6	1	SS	7				50 mm diameter PVC pipe
1		*SILTY SAND TILL* Very dense, trace fine to medium gravel, brown then grey, moist	-0.6	2	SS	53				
2				3	SS	100+				
3				4	SS	100+				
4		brown grey		5	SS	100+				
5				6	SS	100+				
6			6.3	7	SS	100+				
7		End of Borehole	-6.3							

Drilled By: Eastern Soil

Drill Method: Auger

Drill Date: June 1, 2009

V A Wood Associates Ltd
1080 Tapscott Rd, Unit 24
Scarborough, ON
M1X 1E7

Hole Size: 110 mm

Datum:

Sheet: 1 of 1

MW4-2-7s/d

Project No: 5473-9-4

Project: Water Balance-Proposed Subdivision

Client: Lebovic c/o Sernas Group Inc.

Location: Brock Rd/Taunton Rd, Pickering, ON

Borehole #: TW7

Enclosure: 8

Engineer:

SUBSURFACE PROFILE				SAMPLE				Standard Penetration Test blows/ft (1: 20 40 60 80)			
Depth	Symbol	Description	Depth/Elev.	Number	Type	Blows/ft	Recovery		Well Data	Remarks
0		Ground Surface	0							
		Topsoil 300 mm	0	1	SS	3				Two 50 mm diam PVC pipes
		CLAYEY SAND Very loose, brown, wet	0.6							
			-0.6	2	SS	25				
1		*SILTY SAND TILL*		3	SS	58				
2		Compact then very dense, trace fine to medium gravel, brown, moist		4	SS	100+				
3				5	SS	100+				
4				6	SS	100+				
5										
6			6.3	7	SS	100+				
			-6.3							
7		no sampling, likely to be very dense silty sand till								
8										
			9							
9		End of Borehole	-9							
10										

Drilled By: Eastern Soil

Drill Method: Auger

Drill Date: May 29, 2009

V A Wood Associates Ltd
1080 Tapscott Rd, Unit 24
Scarborough, ON
M1X 1E7

Hole Size: 110 mm

Datum:

Sheet: 1 of 1

MW5-1

JOB NO: 0903-S015

LOG OF BOREHOLE NO: 1

FIGURE NO: 1

JOB DESCRIPTION: Monitoring Well Installation

JOB LOCATION: Various Locations along Whitevale Road, City of Pickering

METHOD OF BORING: Flight-Auger

DATE: April 21, 2009

Depth Elev. (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value
0.0 / 207.5	Ground Surface **41 cm TOPSOIL**	1	DO	5
	Hard	2	DO	100+
		3	DO	100+
		4	DO	100+
		5	DO	100+
	SILTY CLAY, Till brown / grey	6	DO	100+
	sandy, a trace of gravel occ. wet sand and silt seams and layers, cobbles and boulders	7	AS	100+
		8	AS	100+
8.2 / 199.3	**END OF BOREHOLE** Refusal to augering, inferred boulder or bedrock Installed 50 mm Ø standpipe to 7.6 m. Sand backfill from 5.8 to 7.6 m. Bentonite seal from 0.3 to 5.8 m. Concrete from 0.0 to 0.3 m, mounted with a steel protective casing.	9	AS	100+

Depth Scale (m): 0 1 2 3 4 5 6 7 8 9 10 11

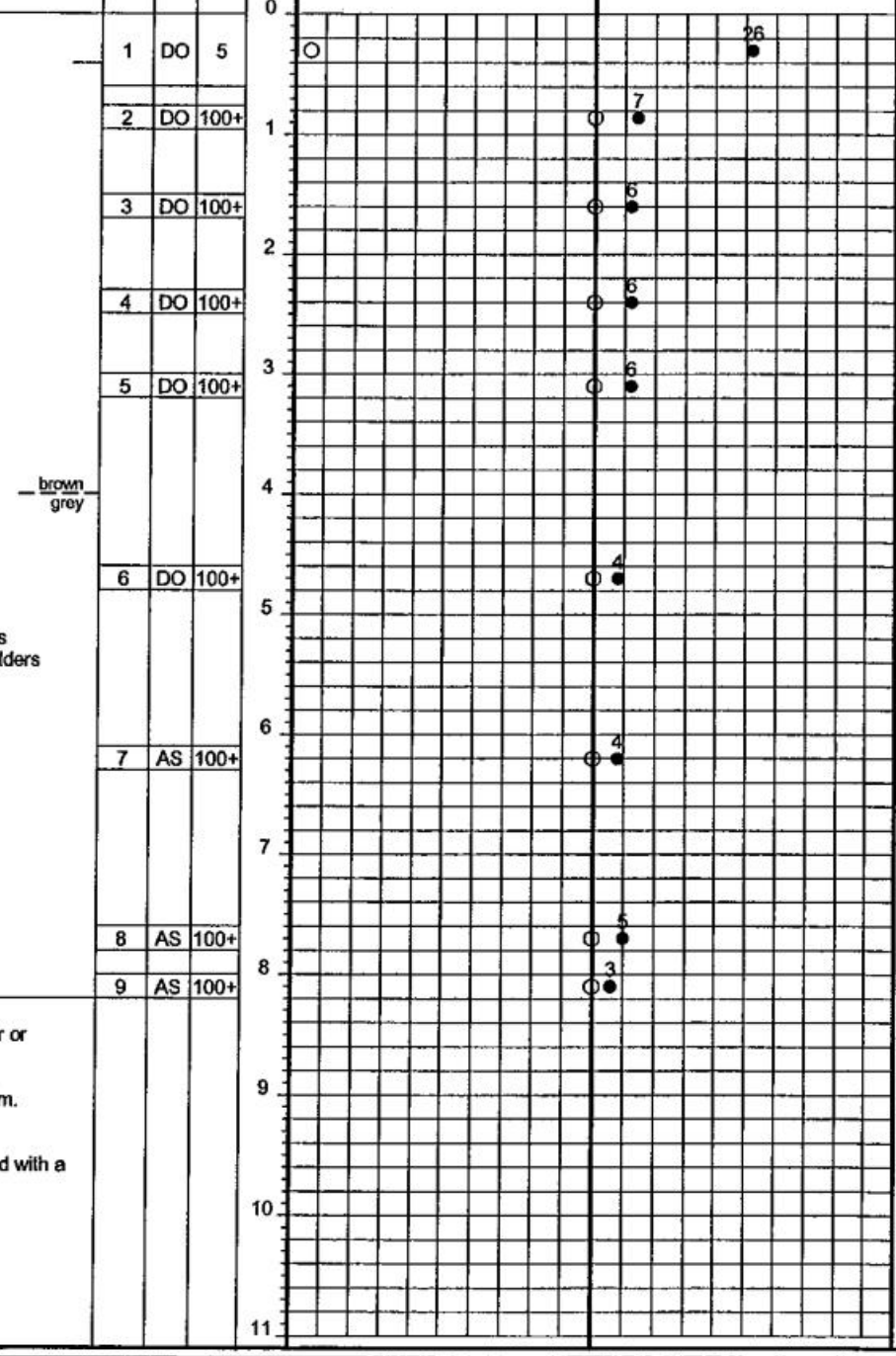
× Shear Strength (kN/m2): 50 100 150 200

○ Penetration Resistance (blows/0.3m): 10 30 50 70 90

Atterberg Limits: PL — LL

● Moisture Content (%): 10 20 30 40

WATER LEVEL: Dry on completion



Soil Engineers Ltd.

PROJECT: 11-1111-0052

RECORD OF MONITORING WELL MW 11-12

SHEET 1 OF 1

LOCATION: SEE FIGURE 2

BORING DATE: April 21, 2011

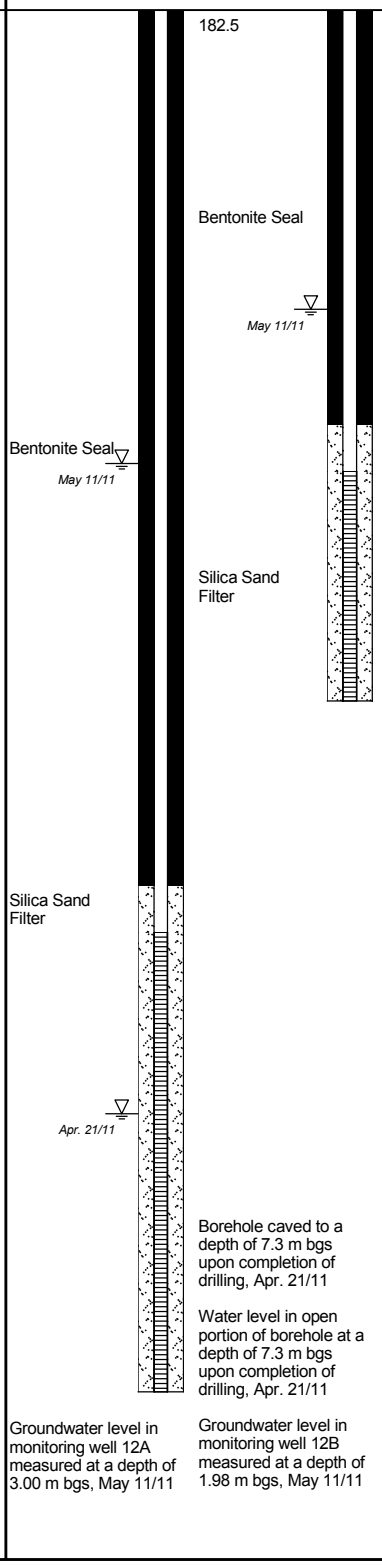
DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	HYDRAULIC CONDUCTIVITY, k, cm/s; WATER CONTENT PERCENT (Wp, W, Wl)	ADDITIONAL LAB. TESTING
0		GROUND SURFACE		182.50						
		TOPSOIL		0.00 / 182.30						
		Light brown to dark brown SILTY SAND, trace gravel		0.20 / 181.74	1	AS	-	182		
1		Dense brown SILTY SAND, some gravel, trace clay (TILL)		0.76 / 181.13	2	50 DO	34			
		Very dense light brown SAND and GRAVEL, some silt		1.37 / 180.55	3	50 DO	50/ .10	181		
2		Very dense light brown SILTY SAND, trace clay, some gravel, contains cobbles and boulders, oxidation staining (TILL)		1.95	4	50 DO	88/ .23	180		
3					5	50 DO	52			
4	TRACK-MOUNTED CME-55 POWER AUGER 150 mm Dia. Solid Stem Augers							179		
5					6	50 DO	50/ .15	178		
6					7	50 DO	50/ .13	177		
7								176		
8					8	50 DO	50/ .13	175		
9				173.25	9	50 DO	50/ .10	174		
		END OF BOREHOLE		9.25						
10										

INSTALLATION AND GROUNDWATER OBSERVATIONS



DEPTH SCALE

1 : 50

Golder Associates

LOGGED: KF

CHECKED: OS

PROJECT: 11-1111-0052

RECORD OF MONITORING WELL MW 11-13

SHEET 1 OF 1

LOCATION: SEE FIGURE 2

BORING DATE: April 25, 2011

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES	ELEVATION
0		GROUND SURFACE		190.88				
	TRACK-MOUNTED CME-55 POWER AUGER 150 mm Dia. Solid Stem Augers	TOPSOIL		0.00	1A	AS	-	190
				190.55				
		Brown SANDY SILT, some clay, trace gravel		0.33	2B			
				190.12				
1		Dense to very dense brown to grey SANDY SILT to SILTY SAND, trace clay, some gravel, contains cobbles and boulders (TILL)		0.76	2	50 DO	35	
					3	50 DO	50/.13	189
2					4	50 DO	50/.10	
								188
3					5	50 DO	50/.08	
		Becoming grey below approximately 3.8 m depth						187
4					6	50 DO	50/.08	
								186
5								
								185
6					7	50 DO	50/.10	
								184
7								
		END OF BOREHOLE		183.16 / 7.72	8	50 DO	50/.10	
8								
9								
10								

DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m: 20 40 60 80

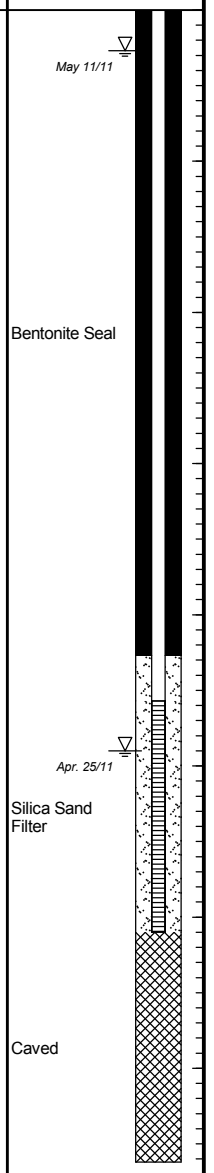
SHEAR STRENGTH Cu, kPa: nat V. + Q - ●; rem V. ⊕ U - ○; 20 40 60 80

HYDRAULIC CONDUCTIVITY, k, cm/s: 10^{-6} 10^{-5} 10^{-4} 10^{-3}

WATER CONTENT PERCENT: Wp W WI; 10 20 30 40

ADDITIONAL LAB. TESTING

INSTALLATION AND GROUNDWATER OBSERVATIONS



Borehole caved to a depth of 6.2 m bgs below ground surface upon completion of drilling, Apr. 25/11

Water level in monitoring well at a depth of 4.9 m bgs upon completion of drilling, Apr. 25/11

Groundwater level in monitoring well measured at a depth of 0.27 m bgs, May 11/11

DEPTH SCALE
1 : 50

Golder Associates

LOGGED: CR
CHECKED: OS

LDN_BHS 11-1111-0052 WHITEVALE SITE.GPJ GLDR_LDN.GDT 6/8/11 DATA INPUT: JT 2011/05 SB 2011/04

PROJECT: 11-1111-0052

RECORD OF MONITORING WELL MW 11-14

SHEET 1 OF 1

LOCATION: SEE FIGURE 2

BORING DATE: April 21, 2011

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOWS/0.3m	ELEVATION
0		GROUND SURFACE		186.52				
	TRACK-MOUNTED CME-55 POWER AUGER 150 mm Dia. Solid Stem Augers	TOPSOIL		0.00 / 186.29				
		Light brown SANDY SILT, trace clay, trace gravel		0.23 / 185.76	1	AS	-	186
1		Dense to very dense brown to grey SILTY SAND to SANDY SILT, trace to some clay, trace gravel, oxidation staining (TILL)		0.76	2	50 DO	61	185
					3	50 DO	44	
2					4	50 DO	90/ .28	184
		Becoming grey below approximately 2.7 m depth			5	50 DO	50/ .13	
3								183
4								
								182
5					6	50 DO	64	
								181
6					7	50 DO	86/ .23	
								180
7								
				178.75	8	50 DO	50/ .15	179
		END OF BOREHOLE		7.77				
8								
9								
10								

DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m: 20 40 60 80

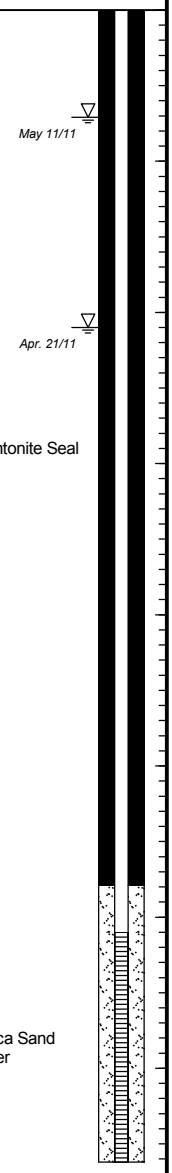
SHEAR STRENGTH Cu, kPa: 20 40 60 80 — nat V. + Q - ● — rem V. ⊕ U - ○

HYDRAULIC CONDUCTIVITY, k, cm/s: 10^{-6} 10^{-5} 10^{-4} 10^{-3}

WATER CONTENT PERCENT: Wp W WI — 10 20 30 40

ADDITIONAL LAB. TESTING

INSTALLATION AND GROUNDWATER OBSERVATIONS



Water level in open borehole at a depth of 2.1 m bgs upon completion of drilling, Apr. 21/11

Groundwater level in monitoring well measured at a depth of 0.71 m bgs, May 11/11

LDN_BHS 11-1111-0052 WHITEVALE SITE.GPJ GLDR_LDN.GDT 6/8/11 DATA INPUT: JT 2011/05 SB 2011/04

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: KF

CHECKED: OS

MW-9-11-15-WN

PROJECT: 11-1111-0052

RECORD OF MONITORING WELL MW 11-15

SHEET 1 OF 1

LOCATION: SEE FIGURE 2

BORING DATE: April 21, 2011

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl; 10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0		GROUND SURFACE		196.14								
	TRACK-MOUNTED POWER AUGER 150 mm Dia. Solid Stem Augers	TOPSOIL		0.00 / 195.89				196				
		Brown SANDY SILT, some clay, trace gravel		0.25 / 195.38	1	AS	-					
1		Dense to very dense brown SANDY SILT to SILTY SAND, some to trace clay, trace to some gravel, contains cobbles and boulders (TILL)		0.76	2	50 DO	35	195				May 11/11
2					3	50 DO	88/ .25	194				
					4	50 DO	50/ .15					Bentonite Seal
3					5	50 DO	50/ .15	193				
4								192				
					6	50 DO	50/ .13					
5		Becoming grey below approximately 5.3 m depth						191				Apr. 21/11
6					7	50 DO	50/ .15	190				
7								189				Silica Sand Filter
				188.37	8	AS	50/ .15					
		END OF BOREHOLE		7.77								Water level in open borehole at a depth of 5.2 m bgs upon completion of drilling, Apr. 21/11
8												Groundwater level in monitoring well measured at a depth of 0.82 m bgs, May 11/11
9												
10												

LDN_BHS 11-1111-0052 WHITEVALE SITE.GPJ GLDR_LDN.GDT 6/8/11 DATA INPUT: JT 2011/05 SB 2011/04

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: AM

CHECKED: OS

PROJECT: 11-1111-0052

RECORD OF MONITORING WELL MW 11-16

SHEET 1 OF 1

LOCATION: SEE FIGURE 2

BORING DATE: April 18, 2011

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOWS/0.3m	ELEVATION
0	TRACK-MOUNTED POWER AUGER 150 mm Dia. Solid Stem Augers	GROUND SURFACE		200.23				200
		TOPSOIL		0.00				
				199.95	1	AS	-	
1		Compact to very dense brown to grey SANDY SILT to SILTY SAND, trace to some clay, trace to some gravel, contains cobbles, boulders and zones of oxidation staining (TILL)		0.28	2	50 DO	24	199
2					3	50 DO	50/ .15	198
					4	50 DO	50/ .08	
3					5	50 DO	50/ .13	197
4								196
5					6	50 DO	50/ .13	
6								195
					7	50 DO	50/ .13	194
7								193
				192.54	8	50 DO	50/ .08	
		END OF BOREHOLE		7.70				
8								
9								
10								

DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m: 20 40 60 80

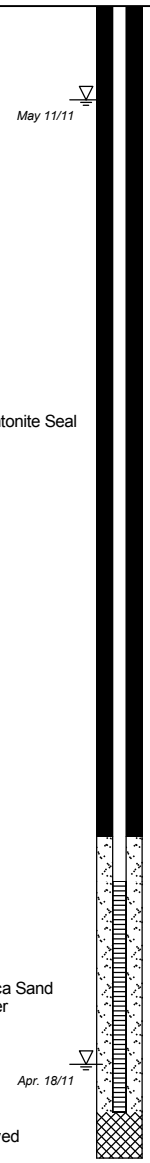
SHEAR STRENGTH Cu, kPa: 20 40 60 80 — nat V. + Q - ● — rem V. ⊕ U - ○

HYDRAULIC CONDUCTIVITY, k, cm/s: 10^{-6} 10^{-5} 10^{-4} 10^{-3}

WATER CONTENT PERCENT: Wp — W — Wl; 10 20 30 40

ADDITIONAL LAB. TESTING

INSTALLATION AND GROUNDWATER OBSERVATIONS



Borehole caved to a depth of 7.3 m bgs upon completion of drilling, Apr. 18/11

Water level in open portion of borehole at a depth of 7 m bgs upon completion of drilling, Apr. 18/11

Groundwater level in monitoring well measured at a depth of 0.62 m bgs, May 11/11

LDN_BHS 11-1111-0052 WHITEVALE SITE.GPJ GLDR_LDN.GDT 6/8/11 DATA INPUT: JT 2011/05 SB 2011/04

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: AM

CHECKED: OS

PROJECT: 11-1111-0052

RECORD OF MONITORING WELL MW 11-17

SHEET 1 OF 1

LOCATION: SEE FIGURE 2

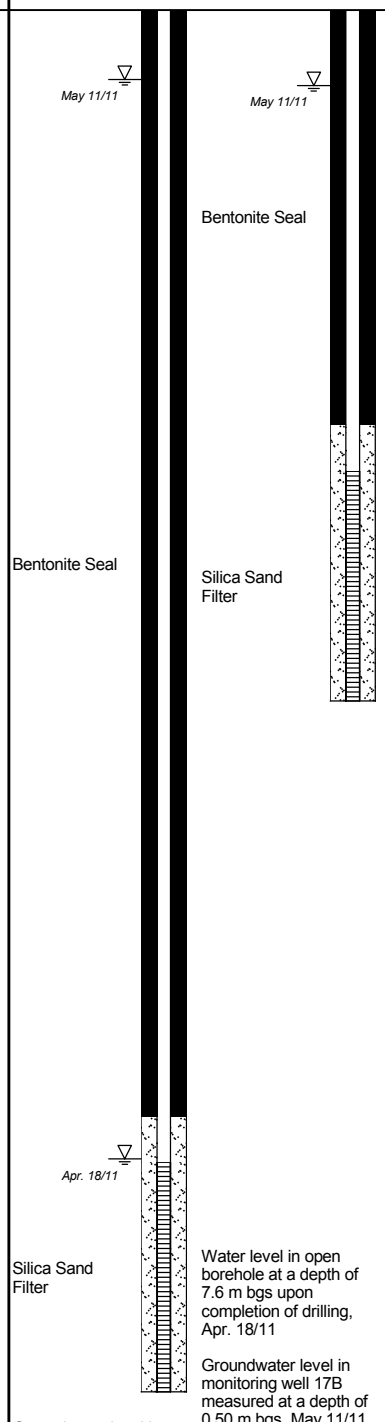
BORING DATE: April 18, 2011

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	HYDRAULIC CONDUCTIVITY, k, cm/s; WATER CONTENT PERCENT	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0		GROUND SURFACE		190.96							17A El. 190.96 / 17B El. 191.05
		TOPSOIL		0.00							
				190.66							
		Compact to very dense brown to grey SANDY SILT to SILTY SAND, trace to some clay, trace to some gravel, contains cobbles and boulders (TILL)		0.30	1	AS	-				
1					2	50 DO	25	190			
					3	50 DO	50/ .15				
2					4	50 DO	50/ .13	189			
		Becoming grey below approximately 2.7 m depth									
3					5	50 DO	50/ .08	188			
4	TRACK-MOUNTED POWER AUGER 150 mm Dia. Solid Stem Augers							187			
					6	50 DO	50/ .13				
5								186			
6					7	50 DO	50/ .08	185			
7								184			
					8	50 DO	50/ .10				
8								183			
9								182			
				181.66	9	50 DO	70/ .13				
		END OF BOREHOLE		9.30							
10											



DEPTH SCALE

1 : 50

Golder Associates

LOGGED: AM

CHECKED: OS

MW-9-11-18

PROJECT: 11-1111-0052

RECORD OF BOREHOLE BH 11-18

SHEET 1 OF 1

LOCATION: SEE FIGURE 2

BORING DATE: April 21, 2011

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80)	SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕; Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3})	WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0		GROUND SURFACE		187.62										
		TOPSOIL		0.08										
		Very dense brown to grey SILTY SAND to SANDY SILT, trace clay, trace to some gravel, contains cobbles, boulders and zones of sand and gravel (TILL)			1	AS	-	187						
1					2	50 DO	80/ .28							
					3	50 DO	50/ .15	186						
2				185.63										
		Very dense brown SILTY FINE SAND, trace gravel, trace clay		1.99	4	50 DO	70/ .10	185					MH	
3	TRACK-MOUNTED CME-55 POWER AUGER 150 mm Dia. Solid Stem Augers				5	50 DO	60/ .05							Bentonite Seal
								184						
4				183.78										
		Very dense grey SILTY SAND, some gravel (TILL)		3.84	6	50 DO	60/ .15	183						
5														Apr. 21/11
								182						
6					7	50 DO	100/ .15							
								181						Silica Sand Filter
7														Caved
				179.92	8	50 DO	50/ .13	180						
		END OF BOREHOLE		7.70										
8														Borehole caved to a depth of 7.3 m bgs upon completion of drilling, April 21/11
9														Water level in open portion of borehole at a depth of 5.2 m bgs upon completion of drilling, April 21/11
10														Groundwater level in monitoring well measured at a depth of 0.10 m bgs, May 11/11

LDN_BHS 11-1111-0052 WHITEVALE SITE.GPJ GLDR_LDN.GDT 6/8/11 DATA INPUT: JT 2011/05 SB 2011/04

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: AM

CHECKED: OS

PROJECT: 11-1111-0052

RECORD OF BOREHOLE BH 11-38

SHEET 1 OF 1

LOCATION: SEE FIGURE 2

BORING DATE: April 25, 2011

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES:	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp W WI; 10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0		GROUND SURFACE		187.41								
	TRACK-MOUNTED CME-55 POWER AUGER 150 mm Dia. Solid Stem Augers	TOPSOIL		0.00 / 187.05	1A			187		○		
		Brown CLAYEY SILT, some gravel, some sand		0.36 / 186.65	1B	AS	-			○		
1		Dense brown SILTY SAND and GRAVEL		0.76 / 186.04	2	50 DO	38			○		Apr. 25/11
		Very dense brown to grey SILTY SAND to SANDY SILT, trace clay, trace to some gravel, contains cobbles and boulders (TILL)		1.37	3	50 DO	50/ .05	186				
2					4	50 DO	85	185		○	MH	
3					5	50 DO	78			○		
4								184				
					6	50 DO	72	183				
5												
								182				
6					7	50 DO	85/ .05			○		
		Becoming grey at approximately 6.8 m depth						181				
7												
								180				
8				179.33	8	50 DO	90			○		
		END OF BOREHOLE		8.08								Borehole caved to a depth of 4 m bgs upon completion of drilling, Apr. 25/11 Water level in open portion of borehole at a depth of 0.9 m bgs upon completion of drilling, Apr. 25/11
9												
10												

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: CR

CHECKED: OS

MW-9-11-39

PROJECT: 11-1111-0052

RECORD OF BOREHOLE BH 11-39

SHEET 1 OF 1

LOCATION: SEE FIGURE 2

BORING DATE: April 25, 2011

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE		ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕; Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, WI) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0	TRACK-MOUNTED CME-55 POWER AUGER 150 mm Dia. Solid Stem Augers	GROUND SURFACE		184.66								
		TOPSOIL		0.00	1A	AS	-	184				
				184.30								
		Brown CLAYEY SILT, some sand		0.36	1B							
				183.90								
1		Compact to very dense brown SILTY SAND, trace clay, some gravel, contains cobbles and boulders (TILL)		0.76	2	50 DO	16					
								183				
2					3	50 DO	52					Bentonite Seal
					4	50 DO	36	182				
3												May 11/11
					5	50 DO	80					
4								181				Apr. 25/11
					6	50 DO	50/ .10	180				
5												Silica Sand Filter
				179.20								
		Very dense brown SILTY FINE SAND, trace clay		5.46				179				
6					7	50 DO	94				MH	
								178				Caved
7												
				176.89	8	50 DO	60/ .13	177				
		END OF BOREHOLE		7.77								
8												Borehole caved to a depth of 6.1 m bgs upon completion of drilling, Apr. 25/11
9												Water level in open portion of borehole at a depth of 4 m bgs upon completion of drilling, Apr. 25/11
10												Groundwater level in monitoring well measured at a depth of 3.12 m bgs, May 11/11

LDN_BHS 11-1111-0052 WHITEVALE SITE.GPJ GLDR_LDN.GDT 6/8/11 DATA INPUT: JT 2011/05 SB 2011/04

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: CR

CHECKED: OS

MW-9-11-40

PROJECT: 11-1111-0052

RECORD OF BOREHOLE BH 11-40

SHEET 1 OF 1

LOCATION: SEE FIGURE 2

BORING DATE: April 21, 2011

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕; Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0		GROUND SURFACE		191.25								
	TRACK-MOUNTED CME-55 POWER AUGER 150 mm Dia. Solid Stem Augers	TOPSOIL		0.00								
				190.97	1	AS	-	191				
		Brown SILTY SAND, trace to some gravel		0.28								
				190.49								
1		Very dense brown to grey SANDY SILT to SILTY SAND, trace to some clay, trace to some gravel, contains cobbles, boulders and zones of sand (TILL)		0.76	2	50 DO	76					May 11/11
					3	50 DO	50/ .13	190				Bentonite Seal
2					4	50 DO	50/ .13	189				
3					5	50 DO	70/ .08					
								188				
4		Becoming grey at approximately 3.9 m depth										
								187				
					6	50 DO	70/ .13					
5												
								186				Silica Sand Filter
6				185.03	7	50 DO	60/ .13					
		END OF BOREHOLE		6.22								
7												Borehole caved to a depth of 0.9 m bgs upon completion of drilling, Apr. 21/11
												Groundwater level in monitoring well measured at a depth of 0.76 m bgs, May 11/11
8												
9												
10												

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: AM

CHECKED: OS

LDN_BHS 11-1111-0052 WHITEVALE SITE.GPJ GLDR_LDN.GDT 6/8/11 DATA INPUT: JT 2011/05 SB 2011/04

PROJECT: 11-1111-0052

RECORD OF BOREHOLE BH 11-41

SHEET 1 OF 1

LOCATION: SEE FIGURE 2

BORING DATE: April 21, 2011

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80)	SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕; Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3})	WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0		GROUND SURFACE		187.69										
	TRACK-MOUNTED CME-55 POWER AUGER 150 mm Dia. Solid Stem Augers	TOPSOIL		0.00										
				187.39	1	AS	-							
		Brown to dark brown SILTY SAND, trace clay, trace gravel		0.30										
				186.93				187						
1		Very dense brown to grey SILTY SAND to SANDY SILT, trace to some clay, trace to some gravel, contains cobbles and boulders (TILL)		0.76	2	50 DO	71							
					3	50 DO	66	186						
2					4	50 DO	50/ .15							
								185						
3					5	50 DO	50/ .13							
								184						
4		Becoming grey below approximately 3.8 m depth												
					6	50 DO	60/ .10	183						
5														
								182						
6					7	50 DO	60/ .05							
								181						
7														
				180.00	8	50 DO	50/ .08							
		END OF BOREHOLE		7.69										
8														Borehole caved to a depth of 0.9 m bgs upon completion of drilling, Apr. 21/11
														Water level in open portion of borehole at a depth of 0.6 m bgs upon completion of drilling, Apr. 21/11
9														
10														

Apr. 21/11

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: AM

CHECKED: OS

LDN_BHS 11-1111-0052 WHITEVALE SITE.GPJ GLDR_LDN.GDT 6/8/11 DATA INPUT: JT 2011/05 SB 2011/04

MW-9-11-42

PROJECT: 11-1111-0052

RECORD OF BOREHOLE BH 11-42

SHEET 1 OF 1

LOCATION: SEE FIGURE 2

BORING DATE: April 21, 2011

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕; Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0	TRACK-MOUNTED CME-55 POWER AUGER 150 mm Dia. Solid Stem Augers	GROUND SURFACE		182.64								
		TOPSOIL		0.00 / 182.41								
		Light brown SILTY SAND, trace gravel		0.23 / 181.88	1	AS	-	182				
1		Dense to very dense, light brown SANDY SILT to SILTY SAND, trace to some clay, trace to some gravel, contains cobbles and boulders (TILL)		0.76	2	50 DO	46					Apr. 21/11
					3	50 DO	68	181				May 11/11
2					4	50 DO	40	180				
3					5	50 DO	57					Bentonite Seal
4								179				
					6	50 DO	50/ .13	178				
5												
								177				
6					7	50 DO	70					
								176				Silica Sand Filter
7				174.87	8	50 DO	50/ .15	175				
		END OF BOREHOLE		7.77								
8												Borehole caved to a depth of 7.6 m bgs upon completion of drilling, Apr. 21/11
9												Water level in open portion of borehole at a depth of 0.9 m bgs upon completion of drilling, Apr. 21/11
10												Groundwater level in monitoring well measured at a depth of 1.87 m bgs, May 11/11

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: KF

CHECKED: OS

LDN_BHS 11-1111-0052 WHITEVALE SITE.GPJ GLDR_LDN.GDT 6/8/11 DATA INPUT: JT 2011/05 SB 2011/04

PROJECT: 11-1111-0052

RECORD OF BOREHOLE BH 11-43

SHEET 1 OF 1

LOCATION: SEE FIGURE 2

BORING DATE: April 21, 2011

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕; Q - ●, U - ○)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl; 10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0	TRACK-MOUNTED CME-55 POWER AUGER 150 mm Dia. Solid Stem Augers	GROUND SURFACE		189.58								
		TOPSOIL		0.00								
				189.25	1	AS	-	189				
		Very dense brown SILTY SAND, trace gravel		0.33	2	50 DO	60/ .05					
1				188.41								
		Very dense brown to grey SILTY SAND to SANDY SILT, trace to some clay, trace to some gravel, contains cobbles and boulders (TILL)		1.17	3	50 DO	60/ .13	188				
2					4	50 DO	60/ .13					
								187				
3					5	50 DO	60/ .13					
								186				
4		Becoming grey below approximately 3.8 m depth										
					6	50 DO	60/ .10	185				Apr. 21/11
5												
								184				
6				183.33	7	50 DO	60/ .15					
		END OF BOREHOLE		6.25								Water level in open borehole at a depth of 4.6 m bgs upon completion of drilling, Apr. 21/11
7												
8												
9												
10												

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: AM

CHECKED: OS

LDN_BHS 11-1111-0052 WHITEVALE SITE.GPJ GLDR_LDN.GDT 6/8/11 DATA INPUT: JT 2011/05 SB 2011/04

MW-9-11-44

PROJECT: 11-1111-0052

RECORD OF BOREHOLE BH 11-44

SHEET 1 OF 1

LOCATION: SEE FIGURE 2

BORING DATE: April 21, 2011

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕; Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
		GROUND SURFACE		191.93								
0	TRACK-MOUNTED CME-55 POWER AUGER 150 mm Dia. Solid Stem Augers	TOPSOIL		0.00 / 191.67								
		Compact light brown SILTY SAND to SILTY FINE SAND, trace gravel		0.25	1	AS	-					
1					2	50 DO	20	191				Apr. 21/11 May 11/11
				190.56								
		Compact to very dense light brown to grey SILTY SAND to SANDY SILT, trace to some gravel, trace to some clay (TILL)		1.37	3	50 DO	25	190			MH	
2					4	50 DO	50/ .13					
3					5	50 DO	50/ .08	189				Bentonite Seal
4		Becoming grey below approximately 3.8 m depth						188				
					6	50 DO	50/ .08					
5								187				
6					7	50 DO	50/ .03	186				
7								185				Silica Sand Filter
				184.29	8	AS	50/ .03					
		END OF BOREHOLE		7.64								
8												Water level in open borehole at a depth of 0.9 m bgs upon completion of drilling, Apr. 21/11
												Groundwater level in monitoring well measured at a depth of 0.91 m bgs, May 11/11
9												
10												

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: KF

CHECKED: OS

LDN_BHS 11-1111-0052 WHITEVALE SITE.GPJ GLDR_LDN.GDT 6/8/11 DATA INPUT: JT 2011/05 SB 2011/04

RECORD OF BOREHOLE BH 11-45

PROJECT: 11-1111-0052

LOCATION: SEE FIGURE 2

SAMPLER HAMMER, 63.5kg; DROP, 760mm

BORING DATE: April 21, 2011

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

SHEET 1 OF 1

DATUM: GEODETIC

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES:	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕; Q - ●, U - ○)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl; 10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0		GROUND SURFACE		195.04								
		TOPSOIL		0.00	1A	AS	-	195				
				194.68								
		Brown SANDY SILTY, some clay, trace gravel		0.36	1B							
				194.28								
1		Compact to very dense brown to grey SILTY SAND, trace clay, trace to some gravel, contains cobbles and boulders (TILL)		0.76	2	50 DO	26	194				
					3	50 DO	50					
2								193				Apr. 21/11
					4	50 DO	90					
3								192				
					5	50 DO	64					
4								191				
					6	50 DO	50/ .05					
5								190				
		Becoming grey below approximately 5.4 m depth										
6				188.87	7	50 DO	50/ .08	189				
		END OF BOREHOLE		6.17								
7												Borehole caved to a depth of 2.4 m bgs upon completion of drilling, Apr. 21/11
8												Water level in open portion of borehole at a depth of 1.8 m bgs upon completion of drilling, Apr. 21/11
9												
10												

TRACK-MOUNTED CME-55 POWER AUGER
150 mm Dia. Solid Stem Augers

DEPTH SCALE
1 : 50

Golder Associates

LOGGED: CR
CHECKED: OS

LDN_BHS 11-1111-0052 WHITEVALE SITE.GPJ GLDR_LDN.GDT 6/8/11 DATA INPUT: JT 2011/05 SB 2011/04

PROJECT: 11-1111-0052

RECORD OF BOREHOLE BH 11-46

SHEET 1 OF 1

LOCATION: SEE FIGURE 2

BORING DATE: April 25, 2011

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE		ELEVATION
0		GROUND SURFACE		200.02				
	TRACK-MOUNTED CME-55 POWER AUGER 150 mm Dia. Solid Stem Augers	TOPSOIL		0.00	1A	AS	-	200
				199.66				
		Brown SILTY SAND to SANDY SILT, trace gravel		0.36	1B			
				199.26				
1		Dense to very dense brown to grey SILTY SAND, trace clay, some gravel, contains cobbles and boulders (TILL)		0.76	2	50 DO	48	199
					3	50 DO	50/ .15	
2								198
					4	50 DO	50/ .10	
3					5	50 DO	50/ .08	197
4		Becoming grey below 3.8 m depth						196
					6	50 DO	50/ .15	
5								195
6								194
					7	50 DO	50/ .15	
7								193
				192.35	8	50 DO	50/ .05	
		END OF BOREHOLE		7.67				
8								
9								
10								

DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m: 20 40 60 80

SHEAR STRENGTH Cu, kPa: nat V. + Q - ● rem V. ⊕ U - ○ (20 40 60 80)

HYDRAULIC CONDUCTIVITY, k, cm/s: 10^{-6} 10^{-5} 10^{-4} 10^{-3}

WATER CONTENT PERCENT: Wp W WI (10 20 30 40)

ADDITIONAL LAB. TESTING

INSTALLATION AND GROUNDWATER OBSERVATIONS

Apr. 25/11

Borehole caved to a depth of 6.1 m bgs upon completion of drilling, Apr. 25/11

Water level in open portion of borehole at a depth of 5.2 m bgs upon completion of drilling, Apr. 25/11

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: CR

CHECKED: OS

LDN_BHS 11-1111-0052 WHITEVALE SITE.GPJ GLDR_LDN.GDT 6/8/11 DATA INPUT: JT 2011/05 SB 2011/04

RECORD OF BOREHOLE BH 11-47

PROJECT: 11-1111-0052

LOCATION: SEE FIGURE 2

SAMPLER HAMMER, 63.5kg; DROP, 760mm

BORING DATE: April 25, 2011

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

SHEET 1 OF 1

DATUM: GEODETIC

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES:	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl; 10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0		GROUND SURFACE		194.68								
	TRACK-MOUNTED CME-55 POWER AUGER 150 mm Dia. Solid Stem Augers	TOPSOIL		0.00 / 194.32	1A	AS	-	194				
		Brown SANDY SILT, trace clay, trace gravel		0.36 / 193.92	1B							
1		Dense to very dense brown to grey SILTY SAND, trace clay, some gravel, contains cobbles and boulders (TILL)		0.76	2	50 DO	42					
					3	50 DO	50/ .15	193				
2					4	50 DO	50/ .08					
								192				
3		Becoming grey below approximately 2.8 m depth			5	50 DO	50/ .08					
								191				
4												
					6	50 DO	50/ .10	190				
5												
								189				
6					7	50 DO	50/ .15					
								188				
7												
				186.98	8	50 DO	50/ .08	187				
		END OF BOREHOLE		7.70								Borehole caved to a depth of 6.1 m bgs upon completion of drilling, Apr. 25/11
8												
9												
10												

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: CR

CHECKED: OS

LDN_BHS 11-1111-0052 WHITEVALE SITE.GPJ GLDR_LDN.GDT 6/8/11 DATA INPUT: JT 2011/05 SB 2011/04

MW-9-11-48

PROJECT: 11-1111-0052

RECORD OF BOREHOLE BH 11-48

SHEET 1 OF 1

LOCATION: SEE FIGURE 2

BORING DATE: April 25, 2011

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES:	ELEVATION
0		GROUND SURFACE		199.92				
	TRACK-MOUNTED CME-55 POWER AUGER 150 mm Dia. Solid Stem Augers	TOPSOIL		0.00	1A	AS	-	
				199.44				
		Brown SANDY SILT, trace clay, some gravel		0.48	1B			
				199.16				
1		Dense to very dense brown to grey SILTY SAND to SANDY SILT, trace clay, some gravel, contains cobbles and boulders (TILL)		0.76	2	50 DO	37	199
					3	50 DO	50/ .15	
2								198
					4	50 DO	50/ .13	
3					5	50 DO	50/. 13	197
4		Becoming grey below approximately 3.8 m depth						196
					6	50 DO	50/ .13	
5								195
6								194
					7	50 DO	50/ .08	
7								193
				192.22	8	50 DO	50/ .08	
		END OF BOREHOLE		7.70				
8								
9								
10								

DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m: 20 40 60 80

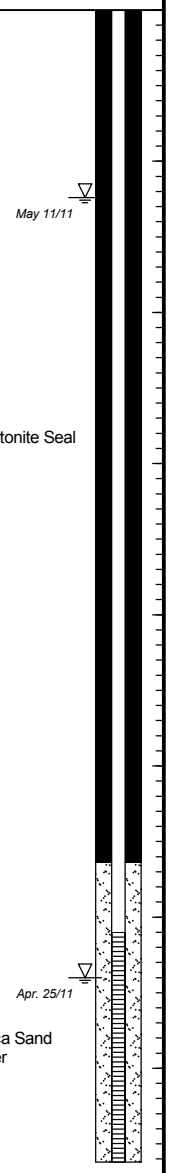
SHEAR STRENGTH Cu, kPa: 20 40 60 80 — nat V. + Q - ● — rem V. ⊕ U - ○

HYDRAULIC CONDUCTIVITY, k, cm/s: 10^{-6} 10^{-5} 10^{-4} 10^{-3}

WATER CONTENT PERCENT: Wp — W — Wl; 10 20 30 40

ADDITIONAL LAB. TESTING

INSTALLATION AND GROUNDWATER OBSERVATIONS



Water level in open borehole at a depth of 6.4 m bgs upon completion of drilling, Apr. 25/11

Groundwater level in monitoring well measured at a depth of 1.24 m bgs, May 11/11

LDN_BHS 11-1111-0052 WHITEVALE SITE.GPJ GLDR_LDN.GDT 6/8/11 DATA INPUT: JT 2011/05 SB 2011/04

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: CR

CHECKED: OS

MW-9-11-49

PROJECT: 11-1111-0052

RECORD OF BOREHOLE BH 11-49

SHEET 1 OF 1

LOCATION: SEE FIGURE 2

BORING DATE: April 18, 2011

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕; Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, WI) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
		GROUND SURFACE		193.61								
0	TRACK-MOUNTED CME-55 POWER AUGER 150 mm Dia. Solid Stem Augers	TOPSOIL		0.00 / 193.31								
		Dense to very dense light brown to grey SILTY SAND to SANDY SILT, trace to some gravel, some clay, contains cobbles and boulders (TILL)		0.30	1	AS	-	193				
1					2	50 DO	40					
					3	50 DO	40	192				
2					4	50 DO	86/ .28	191			MH	
3					5	50 DO	50/ .10					
		Becoming grey below approximately 3.8 m depth						190				
4												
					6	50 DO	50/ .05	189				
5												
								188				
6				187.49	7	50 DO	50/ .02					
		END OF BOREHOLE		6.12								
7												
8												
9												
10												

May 11/11

Bentonite Seal

Apr. 18/11

Silica Sand Filter

Borehole caved to a depth of 1.8 m bgs upon completion of drilling, Apr. 18/11

Water level in open portion of borehole at a depth of 1.8 m bgs upon completion of drilling, Apr. 18/11

Groundwater level in monitoring well measured at a depth of 0.66 m bgs, May 11/11

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: KF

CHECKED: OS

LDN_BHS 11-1111-0052 WHITEVALE SITE.GPJ GLDR_LDN.GDT 6/8/11 DATA INPUT: JT 2011/05 SB 2011/04

MW-9-11-50

PROJECT: 11-1111-0052

RECORD OF BOREHOLE BH 11-50

SHEET 1 OF 1

LOCATION: SEE FIGURE 2

BORING DATE: April 19, 2011

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕; Q - ●, U - ○)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl; 10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0	TRACK-MOUNTED CME-55 POWER AUGER 150 mm Dia. Solid Stem Augers	GROUND SURFACE		199.29								
		TOPSOIL		0.00 / 199.08								
		Very dense brown to grey SANDY SILT to SILTY SAND, some gravel, some clay (TILL)		0.20	1	AS	-	199				
1					2	50 DO	85					May 11/11
								198				
2					3	50 DO	50/ .15					
					4	50 DO	50/ .13	197				
3		Becoming grey below approximately 2.8 m depth			5	50 DO	50/ .13					Bentonite Seal
								196				
4												
								195				
5					6	50 DO	50/ .08					
								194				
6												
					7	50 DO	50/ .13	193				
7												Silica Sand Filter
								192				
8				191.39	8	50 DO	50/ .13				MH	
		END OF BOREHOLE		7.90								Groundwater level in monitoring well measured at a depth of 0.73 m bgs, May 11/11
9												
10												

LDN_BHS 11-1111-0052 WHITEVALE SITE.GPJ GLDR_LDN.GDT 6/8/11 DATA INPUT: JT 2011/05 SB 2011/04

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: AM

CHECKED: OS

PROJECT: 11-1111-0052

RECORD OF BOREHOLE BH 11-51

SHEET 1 OF 1

LOCATION: SEE FIGURE 2

BORING DATE: April 18, 2011

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, WI; 10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0		GROUND SURFACE		199.86								
		TOPSOIL		0.00								
				199.50	1	AS	-					
		Dense to very dense, brown to grey SILTY SAND to SANDY SILT, trace to some clay, trace to some gravel, contains cobbles, boulders and zones of sand, oxidation staining (TILL)		0.36				199				
1					2	50 DO	38					Apr. 18/11
					3	50 DO	67	198				
2												
					4	50 DO	50/ .13					
								197				
3	TRACK-MOUNTED CME-55 POWER AUGER 150 mm Dia. Solid Stem Augers				5	50 DO	50/ .13					
		Becoming grey below approximately 3.8 m depth						196				
4												
					6	50 DO	93	195				
5												
								194				
6					7	50 DO	50/ .15					
								193				
7												
				192.09	8	50 DO	50/ .15					
		END OF BOREHOLE		7.77								
8												Borehole caved to a depth of 1.8 m bgs upon completion of drilling, Apr. 18/11
												Water level in open portion of borehole at a depth of 1.2 m bgs upon completion of drilling, Apr. 18/11
9												
10												

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: AM

CHECKED: OS

LDN_BHS 11-1111-0052 WHITEVALE SITE.GPJ GLDR_LDN.GDT 6/8/11 DATA INPUT: JT 2011/05 SB 2011/04

RECORD OF BOREHOLE BH 11-52

PROJECT: 11-1111-0052

LOCATION: SEE FIGURE 2

SAMPLER HAMMER, 63.5kg; DROP, 760mm

BORING DATE: April 19, 2011

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

SHEET 1 OF 1

DATUM: GEODETIC

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, WI) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
		GROUND SURFACE		199.18								
0	TRACK-MOUNTED CME-55 POWER AUGER 150 mm Dia. Solid Stem Augers	TOPSOIL		0.00				199				
				198.83	1	AS	-					
		Very dense brown to grey SANDY SILT to SILTY SAND, trace to some clay, trace to some gravel, contains cobbles and boulders (TILL)		0.36								
1					2	50 DO	81	198				
					3	50 DO	50/ .15					
2								197				
					4	50 DO	50/ .13					
		Becoming grey below approximately 2.7 m depth										
3					5	50 DO	50/ .13	196			MH	
4								195				
					6	50 DO	50/ .13					
5								194				
6												
					7	50 DO	50/ .10	193				
7								192				
				191.51	8	50 DO	50/ .05					
		END OF BOREHOLE		7.67								Borehole open and dry upon completion of drilling, Apr. 19/11
8												
9												
10												

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: AM

CHECKED: OS

LDN_BHS 11-1111-0052 WHITEVALE SITE.GPJ GLDR_LDN.GDT 6/8/11 DATA INPUT: JT 2011/05 SB 2011/04

PROJECT: 11-1111-0052

RECORD OF BOREHOLE BH 11-53

SHEET 1 OF 1

LOCATION: SEE FIGURE 2

BORING DATE: April 19, 2011

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ●, rem V. ⊕ U - ○)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl; 10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0		GROUND SURFACE		204.17								
		TOPSOIL		0.00				204				
				203.87	1	AS	-					
		Compact brown SANDY SILT, trace clay, trace gravel, oxidation staining (TILL)		0.30								
1					2	50 DO	29	203				
				202.80								
		Dense brown SILTY FINE SAND, trace clay		1.37	3	50 DO	44					
2				202.04								▽ Apr. 19/11
		Very dense brown to grey SILTY SAND, trace to some clay, trace to some gravel, contains cobbles and boulders (TILL)		2.13	4	50 DO	50/ .15	202				
3	TRACK-MOUNTED POWER AUGER 150 mm Dia. Solid Stem Augers				5	50 DO	50/ .15	201				
4		Becoming grey below approximately 3.8 m depth						200				
5					6	50 DO	60/ .13	199				
6					7	50 DO	60/ .13	198				
7								197				
				196.47	8	50 DO	60/ .08					
		END OF BOREHOLE		7.70								Borehole caved to a depth of 2.3 m bgs upon completion of drilling, Apr. 19/11 Water level in open portion of borehole at a depth of 2.1 m bgs upon completion of drilling, Apr. 19/11
8												
9												
10												

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: AM

CHECKED: OS

LDN_BHS 11-1111-0052 WHITEVALE SITE.GPJ GLDR_LDN.GDT 6/8/11 DATA INPUT: JT 2011/05 SB 2011/04

MW-9-11-54

PROJECT: 11-1111-0052

RECORD OF BOREHOLE BH 11-54

SHEET 1 OF 1

LOCATION: SEE FIGURE 2

BORING DATE: April 19, 2011

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp — W — Wl, 10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0		GROUND SURFACE		202.78								
		TOPSOIL		0.00 / 202.48	1	AS	-					
		Brown to grey CLAYEY SILT, some sand (TILL)		0.30 / 202.02								
1	TRACK-MOUNTED CME-55 POWER AUGER 150 mm Dia. Solid Stem Augers	Compact to very dense brown to grey SANDY SILT to SILTY SAND, some to trace clay, trace to some gravel, contains cobbles and boulders (TILL)		0.76	2	50 DO	22	202				
					3	50 DO	36	201				
2					4	50 DO	50/ .15					*May 11/11*
								200				Bentonite Seal
3					5	50 DO	50/ .10					
		Becoming grey below approximately 3.8 m depth						199				
4												
					6	50 DO	50/ .05	198				
5												
								197				
6					7	50 DO	60/ .13					
								196				Silica Sand Filter
7				195.03	8	50 DO	60/ .13					
		END OF BOREHOLE		7.75								
8												Borehole open and dry upon completion of drilling, Apr. 19/11
												Groundwater level in monitoring well measured at a depth of 2.32 m bgs, May 11/11
9												
10												

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: AM

CHECKED: OS

LDN_BHS 11-1111-0052 WHITEVALE SITE.GPJ GLDR_LDN.GDT 6/8/11 DATA INPUT: JT 2011/05 SB 2011/04

PROJECT: 11-1111-0052

RECORD OF BOREHOLE BH 11-55

SHEET 1 OF 1

LOCATION: SEE FIGURE 2

BORING DATE: April 19, 2011

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕; Q - ●, U - ○)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, WI; 10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0		GROUND SURFACE		202.41								
		TOPSOIL		0.00 / 202.20								
	TRACK-MOUNTED CME-55 POWER AUGER 150 mm Dia. Solid Stem Augers	Dense to very dense brown to grey SANDY SILT to SILTY SAND, trace to some clay, trace to some gravel, contains cobbles and boulders, pockets of sand (TILL)		0.20	1	AS	-	202				
1					2	50 DO	42					
								201				
2					3	50 DO	67					
					4	50 DO	50/ .15	200				
3					5	50 DO	50/ .10					
								199				
4		Becoming grey below approximately 3.8 m depth										
					6	50 DO	50/ .13	198			MH	Apr. 19/11
5												
								197				
6					7	50 DO	50/ .13					
								196				
7												
				194.66	8	50 DO	50/ .13	195				
		END OF BOREHOLE		7.75								Water level in open borehole at a depth of 4.9 m bgs upon completion of drilling, Apr. 19/11
8												
9												
10												

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: AM

CHECKED: OS

LDN_BHS 11-1111-0052 WHITEVALE SITE.GPJ GLDR_LDN.GDT 6/8/11 DATA INPUT: JT 2011/05 SB 2011/04

MW-9-11-59

PROJECT: 11-1111-0052

RECORD OF BOREHOLE BH 11-59

SHEET 1 OF 1

LOCATION: SEE FIGURE 2

BORING DATE: April 19, 2011

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕; Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0		GROUND SURFACE		187.39								
		TOPSOIL		0.10								
		Dark brown CLAYEY SILT, some sand, trace gravel			1	AS	-	187				
				186.63								
1		Compact to very dense brown to grey SILTY SAND to SANDY SILT, trace to some clay, trace to some gravel, contains cobbles and boulders, pockets of sand (TILL)		0.76	2	50 DO	44	186				
					3	50 DO	30					Bentonite Seal
2					4	50 DO	22	185				
3					5	50 DO	50/ .15					May 11/11
	TRACK-MOUNTED POWER AUGER							184				
4	150 mm Dia. Solid Stem Augers	Becoming grey below approximately 3.8 m depth										
					6	50 DO	83	183				
5												
								182				
6					7	50 DO	50/ .08					
								181				Silica Sand Filter
7												
								180				
8				179.31	8	50 DO	78					
		END OF BOREHOLE		8.08								Borehole caved to a depth of 3 m bgs upon completion of drilling, Apr. 19/11
9												Groundwater level in monitoring well measured at a depth of 3.05 m bgs, May 11/11
10												

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: AM

CHECKED: OS

LDN_BHS 11-1111-0052 WHITEVALE SITE.GPJ GLDR_LDN.GDT 6/8/11 DATA INPUT: JT 2011/05 SB 2011/04

BHEE10/3-1

DILLON

PROJECT No. 92 3569 40 76
DATUM: Geodetic

BOREHOLE No. EE10/3-1
Sheet 1 of 3

PROJECT: IWA STEP 6 HYDROGEOLOGY
LOCATION: REGION OF DURHAM, SITE EE10

DATE: 2 February 1993
INSPECTOR: DB

DEPTH (m)	ELEV. DEPTH (m)	SYMBOLIC LOG	DESCRIPTION (1)	SAMPLE NUMBER	INTERVAL	TYPE	N VALUE	%RECOVERY	LABORATORY ANALYSIS	N VALUE (□) (Blows/0.3m) 20 40 60 80	MONITOR INSTALLATION DETAILS
	192.13										EE10/3 a,b,c,d
	191.4		TOPSOIL Dark brown; organic; sandy silty clay; soft; moist	1		AY	2	42			
1	0.7		SILTY CLAY TO SILT Medium brown; trace of coarse sand; firm to hard; moist	2		AY	6	75			0.69
	190.3			3		AY	49	12			
2	1.8		WEATHERED TILL Medium brown; silt and fine sand matrix with trace of clay; trace of fine gravel size clasts; massive; oxidation along horizontal fractures ; very dense; moist	4		AY	43	83	a		
3				5		AY	71	92	a		
				6		AY		29			
4	187.9			7		AY	241	87			
	4.3		SAND AND TILL Brown-grey to brown; gravelly sand; silty sand till interbedded; very dense; saturated	8		AY	188	79			
5				9		AY	289	96			
				10		AY	245	92			
6				11		AY	472				
7				12		AY	235	83			
				13		AY	196	79			
8			- Coarsening downwards from fine to coarse sand below 7.9 m	14		AY	117	67			
9				15		AY	361	46			
				16		AY	4	67	a		
10											
	181.3										
11	10.9		TILL Brown-grey; fine sand and silt matrix with trace to some clay; trace to some subrounded to subangular gravel to cobble size clasts of limestone and granite; massive; very dense; moist	17		AY	394	75			
12											
				18		AY	482	50			
13			- Increasing clast content with depth from 12.8 m to 22.2 m; dry below 12.8 m	19		AY	292	100			
				20		AY	424	78			
				22		DU		65			
14				21		AY		89	a		
15				23		DU		100			
16											
				24		DU		42			
17											
				25		DU		83			17.80
18				26		DU		100			
19											
				27		DU		100			

BHEE10/3-1

DILLON

PROJECT No. 92 3569 40 76
DATUM: Geodetic

BOREHOLE No. EE10/3-1
Sheet 2 of 3

PROJECT: IWA STEP 6 HYDROGEOLOGY
LOCATION: REGION OF DURHAM, SITE EE10

DATE: 2 February 1993
INSPECTOR: DB

DEPTH (m)	ELEV. DEPTH (m)	SYMBOLIC LOG	DESCRIPTION (1)	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE %RECOVERY	LABORATORY ANALYSIS	N VALUE (□) (Blows/0.3m) 20 40 60 80	MONITOR INSTALLATION DETAILS
21						X1 X2			abej p		20.01 20.55 a
				28		DU		100			21.44
22						D		0			22.07
23				29		DU		25			23.44
24				30		DU		100			24.54
25						X1 X2			abej p		25.04 b 25.45
26				31		DU		100			
27											
28				32		DU		100			
29				33		DU		100			
30											
31				34		DU		100			31.24
32						X1			abej		31.55 c
				35		DU X2		77	p		31.75
33	159.2 32.9		SAND AND SILT Brown-grey; fine-grained; trace to some clay; trace of medium to coarse sand; some laminations; some clay laminae								
34				36		DU		45			
35											
36			- Deformed laminations of silty clay below 36.0 m	37		DU		20			35.84
											36.45 d
37	154.6 37.5		TILL Fine sand matrix with some silt and clay; trace of subangular to subrounded fine gravel size clasts; some sand and clay lenses	38		DU		20			37.06
38				39		DU X1 X2		93	abej p		
39			- Mainly a fine sand matrix with trace of silt below 39.0 m								
				40		DU		45			

DILLON

	PROJECT No. 92 3569 40 76 DATUM: Geodetic	BOREHOLE No. EE10/3-1 Sheet 3 of 3
PROJECT: IWA STEP 6 HYDROGEOLOGY LOCATION: REGION OF DURHAM, SITE EE10		DATE: 2 February 1993 INSPECTOR: DB

DEPTH (m)	ELEV. DEPTH (m)	SYMBOLIC LOG	DESCRIPTION (1)	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE %RECOVERY	LABORATORY ANALYSIS	N VALUE (□) (Blows/0.3m) 20 40 60 80	MONITOR INSTALLATION DETAILS
41											39.93
42	150.1					D					
	42.1										
43			42.06 m - End of Borehole.								
44											
45			NOTE: Four vibrating wire piezometers installed.								
46											
47											
48											
49											
50											
51											
52											
53											
54											
55											
56											
57											
58											
59											

BHEE10/3-2

DILLON

PROJECT No. 92 3569 40 76
DATUM: Geodetic

BOREHOLE No. EE10/3-2
Sheet 1 of 1

PROJECT: IWA STEP 6 HYDROGEOLOGY
LOCATION: REGION OF DURHAM, SITE EE10

DATE: 3 February 1993
INSPECTOR: DB

DEPTH (m)	ELEV. DEPTH (m)	SYMBOLIC LOG	DESCRIPTION (1)	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE %RECOVERY	LABORATORY ANALYSIS	N VALUE (□) (Blows/0.3m) 20 40 60 80	MONITOR INSTALLATION DETAILS EE10/3A
	192.11										
	191.4		TOPSOIL Dark brown; organic; sandy silty clay; soft; moist								0.30
1	0.7		SILTY CLAY TO SILT Medium brown; trace coarse sand clasts; firm to hard; moist								0.91
	190.3										
2	1.8		WEATHERED TILL Medium brown; silt and fine sand matrix with trace of clay; trace of fine gravel size clasts; massive; oxidation along horizontal fractures ; very dense; moist								
3											
4	187.8										
	4.3		SAND AND TILL Brown-grey to brown; gravelly sand; silty sand till interbedded; very dense; saturated								
5											
6											
7											6.71
											7.47
8			- Coarsening downwards from fine to coarse sand below 7.9 m								
9											8.53
10	181.8										10.06
	10.4										10.24
11											
			10.36 m - End of Borehole.								
12											
13			NOTES: (1) Description of stratigraphy from borehole EE10/3-1. (2) Monitoring well construction of 50mm diameter, SCH 40, flush-threaded, PVC riser pipe with a 1.52 m long, No. 10 slot, screen. (3) Stickup is 0.80 m.								
14											
15											
16											
17											
18											
19											

BHEE10/4-1

DILLON

PROJECT No. 92 3569 40 76
DATUM: Geodetic

BOREHOLE No. EE10/4-1
Sheet 1 of 3

PROJECT: IWA STEP 6 HYDROGEOLOGY
LOCATION: REGION OF DURHAM, SITE EE10

DATE: 3 February 1993
INSPECTOR: VS

DEPTH (m)	ELEV. DEPTH (m)	DESCRIPTION (1)	SAMPLE NUMBER	INTERVAL	TYPE	N VALUE	%RECOVERY	LABORATORY ANALYSIS	N VALUE (□) (Blows/0.3m) 20 40 60 80	MONITOR INSTALLATION DETAILS
	197.65									EE10/4C
1		WEATHERED TILL Brown-grey; silty fine to medium sand matrix with trace of clay; trace of fine gravel size clasts; compact to dense; moist	1		AY	16	67			0.30 0.61
2			2		AY	40	46			
	195.1 2.6									
3		SAND Brown; gravelly medium to coarse sand; some silt and trace of clay; fine to coarse gravel; dense; wet	3		AY	41	67			
4		- Trace of fine to coarse gravel below approximately 4.1 m								
5			4		AY	30	96			
6			5		AY	54	100	a		
7										
8		- Interbed of silty fine sand till from approximately 7.7 m to 8.5 m	6		AY	140	100		> >	
9	188.4 9.3									
10		TILL Grey; fine sand and silt matrix with some clay; trace of gravel size clasts; scattered granitic boulder; very dense; moist	7		AY	132	100		> >	
11			8		AY	91	88			
12			9		DU		69			
13			10		DU		95			
14			11		DU		95			
15		- Boulder at 15.2 m								
16			12		DU		15			
17			13		DU		95			
18										
19			14		DU		100			

BHEE10/4-1

DILLON

PROJECT No. 92 3569 40 76
DATUM: Geodetic

BOREHOLE No. EE10/4-1
Sheet 2 of 3

PROJECT: IWA STEP 6 HYDROGEOLOGY
LOCATION: REGION OF DURHAM, SITE EE10

DATE: 3 February 1993
INSPECTOR: VS

DEPTH (m)	ELEV. DEPTH (m)	SYMBOLIC LOG	DESCRIPTION (1)	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE %RECOVERY	LABORATORY ANALYSIS	N VALUE (□) (Blows/0.3m) 20 40 60 80	MONITOR INSTALLATION DETAILS
21				15		DU		100			
22				16		DU		100			
23				17		DU		53			
24			- Gravelly silt and sand till from 24.4 m to 25.9 m								
25				18		DU		42			
26				19		DU		93			
27											
28				20		DU		90			
29											
30				21		DU		100			
31											
32			- Granodiorite boulder between 32.0 m and 33.5 m	22		DU		97			
33				23		DU		100			
34											
35				24		DU		83	a		
36				25		DU		98			
37	160.5										
	37.1		SILT AND CLAY TO SAND Grey; alternating layers of silt and clay; trace of fine to coarse sand in silty layers; coarsening downwards; moist to wet	26		DU		80			
38											
39				27		DU		97			

BHEE10/4-1

DILLON

PROJECT No. 92 3569 40 76
DATUM: Geodetic

BOREHOLE No. EE10/4-1
Sheet 3 of 3

PROJECT: IWA STEP 6 HYDROGEOLOGY
LOCATION: REGION OF DURHAM, SITE EE10

DATE: 3 February 1993
INSPECTOR: VS

DEPTH (m)	ELEV. DEPTH (m)	SYMBOLIC LOG	DESCRIPTION (1)	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE %RECOVERY	LABORATORY ANALYSIS	N VALUE (□) (Blows/0.3m) 20 40 60 80	MONITOR INSTALLATION DETAILS
41			- 25 mm thick gravel lens at 40.1 m	28		DU		88			
	156.1		- Layered sand and silt below 41.2 m								
42	41.6		TILL Brown-grey; fine sandy silt matrix; some subrounded to rounded gravel size clasts; massive	29		DU		67			
43											42.62
				30		DU		100			
44	153.5										44.02
	44.2		SAND Grey; fine grained; trace of silt			DZ					
45											
46											
47						D		0			47.07
48						D		0			47.24
49											
50											
51											
52											
	144.9										
53	52.7		SILTY CLAY								53.42
54						DZ					54.33
55											
56						D		0			55.85
	141.3										
	56.4		TILL Grey; clayey silt matrix; some gravel size clasts; moist	31		DU		92			
57											
	139.7										
58	57.9		57.91 m - End of Borehole.								
59			NOTES: (1) Monitoring well construction of 50mm diameter, SCH 40, flush-threaded, PVC riser pipe with a 3.05 m long, No. 10 slot, screen. (2) Stickup is 1.14 m.								

BHEE10/4-2

DILLON

PROJECT No. 92 3569 40 76
DATUM: Geodetic

BOREHOLE No. EE10/4-2
Sheet 1 of 2

PROJECT: IWA STEP 6 HYDROGEOLOGY
LOCATION: REGION OF DURHAM, SITE EE10

DATE: 4 February 1993
INSPECTOR: VS

DEPTH (m)	ELEV. DEPTH (m)	SYMBOLIC LOG	DESCRIPTION (1)	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE %RECOVERY	LABORATORY ANALYSIS	N VALUE (□) (Blows/0.3m) 20 40 60 80	MONITOR INSTALLATION DETAILS EE10/4B
	197.63										
1			WEATHERED TILL Brown-grey; silty fine to medium sand matrix with trace of clay; trace of fine gravel size clasts; compact to dense; moist								0.30 0.61
2	195.0 2.6										
3			SAND Brown; gravelly medium to coarse sand; some silt and trace of clay; fine to coarse gravel; dense; wet								
4			- Trace of fine to coarse gravel below approximately 4.1 m								
5											
6											
7											
8			- Interbed of silty fine sand till from approximately 7.7 m to 8.5 m								
9	188.4 9.3										
10			TILL Grey; fine sand and silt matrix with some clay; trace of gravel size clasts; scattered granitic boulder; very dense; moist								
11											
12											
13											
14											
15			- Boulder at 15.2 m								
16											
17											
18											
19											

BHEE10/4-2

DILLON

PROJECT No. 92 3569 40 76
DATUM: Geodetic

BOREHOLE No. EE10/4-2
Sheet 2 of 2

PROJECT: IWA STEP 6 HYDROGEOLOGY
LOCATION: REGION OF DURHAM, SITE EE10

DATE: 4 February 1993
INSPECTOR: VS

DEPTH (m)	ELEV. DEPTH (m)	SYMBOLIC LOG	DESCRIPTION (1)	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE %RECOVERY	LABORATORY ANALYSIS	N VALUE (□) (Blows/0.3m) 20 40 60 80	MONITOR INSTALLATION DETAILS
21											
22											
23											
24			- Gravelly silt and sand till from 24.4 m to 25.9 m								
25											
26											
27											
28											
29											
30											
31											31.29
32			- Granodiorite boulder between 32.0 m and 33.5 m								
33											32.84
34											
35											
36	161.6 36.0		35.99 m - End of Borehole.								35.89
37											
38											
39											

NOTES:
(1) Description of stratigraphy from borehole EE10/4-1.
(2) Monitoring well construction of 50mm diameter, SCH 40, flush-threaded, PVC riser pipe with a 3.05 m long, No. 10 slot, screen.
(3) Stickup is 1.10 m.

BHEE10/4-3

DILLON

PROJECT No. 92 3569 40 76
DATUM: Geodetic

BOREHOLE No. EE10/4-3
Sheet 1 of 1

PROJECT: IWA STEP 6 HYDROGEOLOGY
LOCATION: REGION OF DURHAM, SITE EE10

DATE: 4 February 1993
INSPECTOR: VS

DEPTH (m)	ELEV. DEPTH (m)	SYMBOLIC LOG	DESCRIPTION (1)	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE %RECOVERY	LABORATORY ANALYSIS	N VALUE (□) (Blows/0.3m) 20 40 60 80	MONITOR INSTALLATION DETAILS EE10/4A
	197.54										
1			WEATHERED TILL Brown-grey; silty fine to medium sand matrix with trace of clay; trace of fine gravel clasts; compact to dense; moist								0.30 0.61
2	195.0 2.6										2.06 2.62
3			SAND Brown; gravelly medium to coarse sand; some silt and trace of clay; fine to coarse gravel; dense; wet								
4			- Trace of fine to coarse gravel below approximately 4.1 m								
5											5.18
6	190.7 6.8										6.71
7											
8			6.81 m - End of Borehole.								
9											
10			NOTES: (1) Description of stratigraphy from borehole EE10/4-1. (2) Monitoring well construction of 50mm diameter, SCH 40, flush-threaded, PVC riser pipe with a 1.52 m long, No. 10 slot, screen. (3) Stickup is 1.18 m.								
11											
12											
13											
14											
15											
16											
17											
18											
19											

BHEE10/5-1

DILLON

PROJECT No. 92 3569 40 76
DATUM: Geodetic

BOREHOLE No. EE10/5-1
Sheet 1 of 2

PROJECT: IWA STEP 6 HYDROGEOLOGY
LOCATION: REGION OF DURHAM, SITE EE10

DATE: 8 February 1993
INSPECTOR: VS

DEPTH (m)	ELEV. DEPTH (m)	SYMBOLIC LOG	DESCRIPTION (1)	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE %RECOVERY	LABORATORY ANALYSIS	N VALUE (□) (Blows/0.3m) 20 40 60 80	MONITOR INSTALLATION DETAILS EE10/5C
	181.50										
1			SAND Brown-grey; silty sand; trace of clay; gravelly zone 0.2 m thick at 0.3 m; iron oxidation stains; dense								0.61 0.91
2				1		AY	36	90			
3	178.5 3.1		WEATHERED TILL Brown to brown-grey; fine sandy silt matrix; trace of gravel size clasts; very dense; dry	2		AY	122	100		> >	
4			- Gravelly and wet below 3.7 m; clasts range to cobble size	3		DU		38			
5											
6				4		DU		5			
7				5		DU		0			
8	173.6 7.9		TILL Grey; gravelly silt and sand; moist								
9				6		DU		5			
10				7		DU		0			
11											
12				8		DU		23			
13				9		DU		0			
14			- Some clay in matrix with trace of gravel clasts below 14.2 m								
15				10		DU		100	a		
16			- Fine to medium grained sand in matrix below 15.54 m								
17				11		DU		100			
18				12		DU		82			
19	162.9 18.6		TILL Grey; fine to medium sandy silt matrix with trace of clay; trace of gravel size clasts; interbedded clay and silt; moist	13		DU		100			

BHEE10/5-1

DILLON

PROJECT No. 92 3569 40 76
DATUM: Geodetic

BOREHOLE No. EE10/5-1
Sheet 2 of 2

PROJECT: IWA STEP 6 HYDROGEOLOGY
LOCATION: REGION OF DURHAM, SITE EE10

DATE: 8 February 1993
INSPECTOR: VS

DEPTH (m)	ELEV. DEPTH (m)	SYMBOLIC LOG	DESCRIPTION (1)	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE %RECOVERY	LABORATORY ANALYSIS	N VALUE (□) (Blows/0.3m) 20 40 60 80	MONITOR INSTALLATION DETAILS
21	161.4 20.1		SILTY CLAY Grey; decreasing silt content with depth to trace of silt	14		DU		100			
22	159.9 21.6		TILL Grey; gravelly silt and fine sand matrix; trace of clay; wet - Cobble at 22.3 m	15		DU		82			
23			- Decrease in clast content to trace of gravel below 23.2 m								23.06
24				16		DU		62			
25											24.61
26	155.9 25.7		SAND Grey; silty fine sand with trace of medium to coarse sand and clay; wet	17		DU		63			
27				18		DU		40	a		
28											27.66 27.84
29				19		DU		33			
30	150.7					DU		0			
31	30.8		30.78 m - End of Borehole.								
32											
33											
34			NOTES: (1) Monitoring well construction of 50mm diameter, SCH 40, flush-threaded, PVC riser pipe with a 3.05 m long, No. 10 slot, screen. (2) Stickup is 1.15 m.								
35											
36											
37											
38											
39											

BHEE10/5-2

DILLON

PROJECT No. 92 3569 40 76
DATUM: Geodetic

BOREHOLE No. EE10/5-2
Sheet 1 of 1

PROJECT: IWA STEP 6 HYDROGEOLOGY
LOCATION: REGION OF DURHAM, SITE EE10

DATE: 9 February 1993
INSPECTOR: VS

DEPTH (m)	ELEV. DEPTH (m)	SYMBOLIC LOG	DESCRIPTION (1)	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE %RECOVERY	LABORATORY ANALYSIS	N VALUE (□) (Blows/0.3m) 20 40 60 80	MONITOR INSTALLATION DETAILS EE10/5B
	181.35										
1			SAND Brown-grey; silty sand; trace of clay; gravelly zone 0.2 m thick at 0.3 m; iron oxidation stains; dense								0.61 0.91
2											
3	178.3 3.1										
	177.7 3.7		WEATHERED TILL Brown to brown-grey; silt and fine sand matrix; trace of gravel size clasts; very dense; dry								
4			SAND AND GRAVEL Brown-grey; fine to medium sand and gravel; very dense; wet								
5				1		AY	116	44		> >	
6				2		AY	405	18		> >	
	174.9 6.5										
7			TILL Brown-grey; fine sand matrix; trace to some gravel size clasts; moist to wet	3		AY		42			
	173.5 7.9										
8			TILL Grey; gravelly silt and sand; moist								
9											
10											
11											10.72
											11.38
12											12.27
13											
14	167.3 14.1										13.79 13.96
15			14.07 m - End of Borehole.								
16			NOTES: (1) Description of stratigraphy from 0 to 4.9 m and 7.0 m to 14.1 m from borehole EE10/5-1. (2) Monitoring well construction of 50mm diameter, SCH 40, flush-threaded, PVC riser pipe with a 1.52 m long, No. 10 slot, screen. (3) Stickup is 1.12 m.								
17											
18											
19											

BHEE10/5-3

DILLON

PROJECT No. 92 3569 40 76
DATUM: Geodetic

BOREHOLE No. EE10/5-3
Sheet 1 of 1

PROJECT: IWA STEP 6 HYDROGEOLOGY
LOCATION: REGION OF DURHAM, SITE EE10

DATE: 9 February 1993
INSPECTOR: VS

DEPTH (m)	ELEV. DEPTH (m)	SYMBOLIC LOG	DESCRIPTION (1)	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE %RECOVERY	LABORATORY ANALYSIS	N VALUE (□) (Blows/0.3m) 20 40 60 80	MONITOR INSTALLATION DETAILS EE10/5A
	181.20										
1			SAND Brown-grey; silty sand; trace of clay; gravelly zone 0.2 m thick at 0.3 m; iron oxidation stains; dense								0.61
2											
3	178.2 3.1										2.49
	177.5 3.7		WEATHERED TILL Brown to brown-grey; silt and fine sand matrix; trace of gravel size clasts; very dense; dry								3.15
4			SAND AND GRAVEL Brown; fine to medium sand and gravel; very dense; wet								
	176.3 4.9										4.67
5											
6			4.90 m - End of Borehole.								
7											
8			NOTES: (1) Description of stratigraphy from borehole EE10/5-2. (2) Monitoring well construction of 50mm diameter, SCH 40, flush-threaded, PVC riser pipe with a 1.52 m long, No. 10 slot, screen. (3) Stickup is 1.13 m.								
9											
10											
11											
12											
13											
14											
15											
16											
17											
18											
19											

Log of Borehole 38A

MW-10-38A

Project No. _____ Drawing No. _____

Project: Additional Monitoring Wells - Proposed Residential Development Sheet No. 1 of 1

Location: Part of Lot 25, Concession 5 (Part 1, Plan 40R-25906), Pickering, Ontario

N4862077 E650251

Date Drilled: May 13, 2011

Drill Type: CME 55

Datum: Geodetic

Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Field Vane Test

Combustible Vapour Reading
Natural Moisture
Plastic and Liquid Limit
Undrained Triaxial at % Strain at Failure
Penetrometer

GWL	SYMBOL	Soil Description	ELEV. m	DEPTH
		TOPSOIL - silt with rootlets; dark brown, very moist	198.60	0
		SANDY SILT TILL - wet sand seams, scattered gravel and cobbles, topsoil remains in upper level; brown changing to grey at ~3m, saturated and loose to ~0.75m, moist and very dense below	198.2	1
				2
				3
			194.5	4
		END OF BOREHOLE		

NOTES:

1. Groundwater monitoring well installed to 4.10m; sealed with bentonite from surface to 0.76m.

N Value: 20 40 60 80
Shear Strength: 0.1 MPa 0.2
/150mm
/125mm
/150mm

Combustible Vapour Reading (ppm): 250 500 750
Natural Moisture Content % Atterberg Limits (% Dry Weight): 10 20 30

SAMPLES

Natural Unit Weight kN/m³

LAGWGL02 BRM00360447BO.GPJ NEW.GDT 6/17/11

exp.

Time	Water Level (m)	Depth to Cave (m)
On completion (open hole)	Dry	
After 8 days (well)	0.02	

Log of Borehole 38B

MW-10-38B

Project No. _____ Drawing No. _____

Project: Additional Monitoring Wells - Proposed Residential Development Sheet No. 1 of 1

Location: Part of Lot 25, Concession 5 (Part 1, Plan 40R-25906), Pickering, Ontario

N4862077 E650251

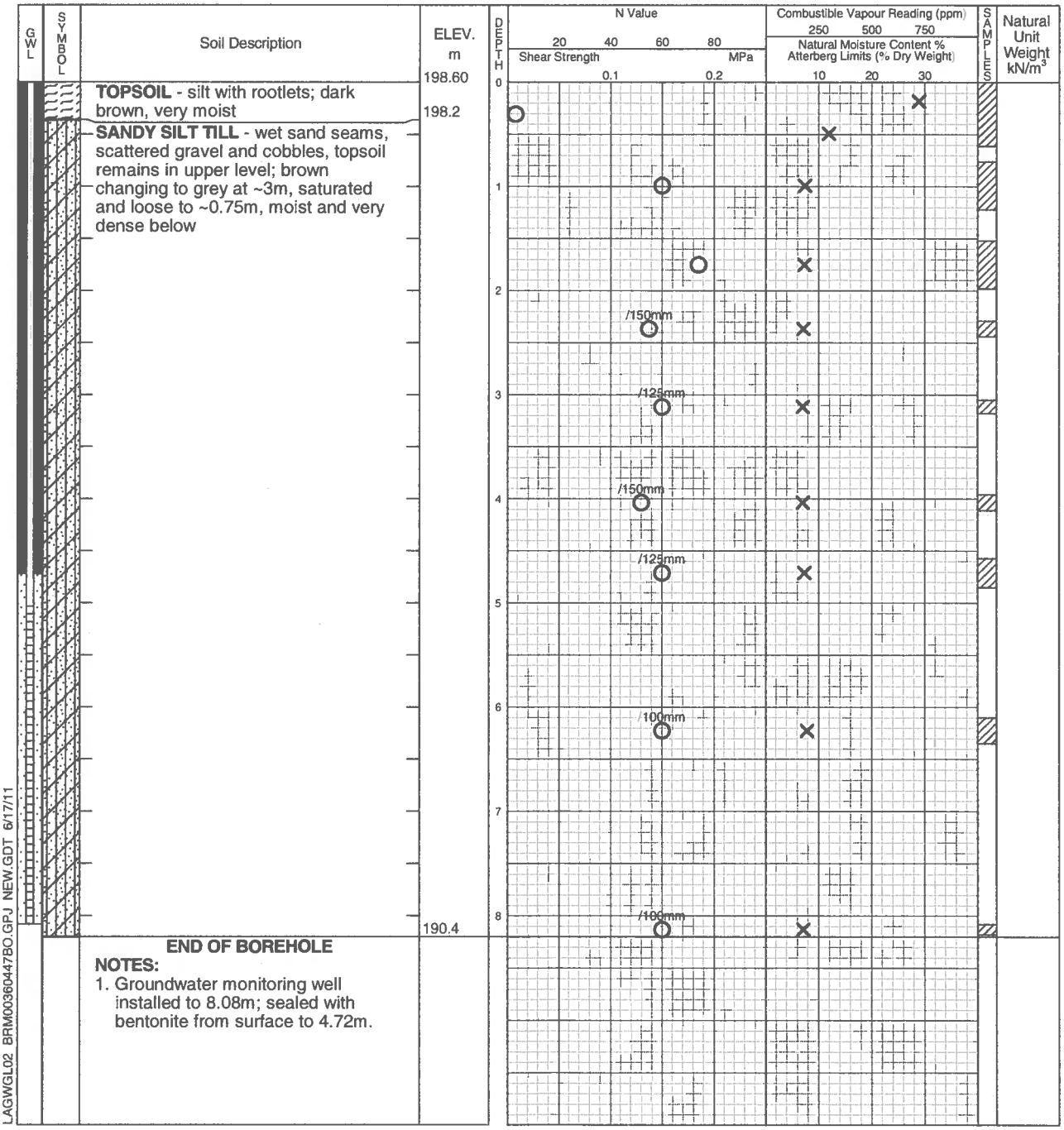
Date Drilled: May 13, 2011

Drill Type: CME 55

Datum: Geodetic

Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Field Vane Test

Combustible Vapour Reading
Natural Moisture
Plastic and Liquid Limit
Undrained Triaxial at % Strain at Failure
Penetrometer



LAGWGL02 BRM00360447BO.GPJ NEW.GDT 6/17/11

exp.

Time	Water Level (m)	Depth to Cave (m)
On completion (open hole)	Dry	
After 8 days (well)	0.02	

Log of Borehole LID MW-10-LID

Project No. _____ Drawing No. _____

Project: Additional Monitoring Wells - Proposed Residential Development Sheet No. 1 of 1

Location: Part of Lot 25, Concession 5 (Part 1, Plan 40R-25906), Pickering, Ontario

N4862189 E649882

Date Drilled: May 13, 2011

Drill Type: CME 55

Datum: Geodetic

Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Field Vane Test (S)

Combustible Vapour Reading
Natural Moisture
Plastic and Liquid Limit
Undrained Triaxial at % Strain at Failure
Penetrometer

GWL	SYMBOL	Soil Description	ELEV. m
		TOPSOIL - silt with rootlets; dark brown, moist	209.99
		SANDY SILT TILL - layers of wet silty fine sand and sandy silt, some gravel, topsoil remains in upper level; brown, saturated, compact to dense	209.7
		SANDY SILT - wet silty fine sand seams and layers; brown, saturated, dense	207.9
		SAND - sandy silt seams; brown, wet, very dense	206.0
		END OF BOREHOLE	204.7

NOTES:
1. Groundwater monitoring well installed to 5.25m; sealed with bentonite from surface to 1.90m.

DEPTH 0 1 2 3 4 5

N Value: 20 40 60 80
Shear Strength: 0.1 0.2 MPa

Combustible Vapour Reading (ppm): 250 500 750
Natural Moisture Content % Atterberg Limits (% Dry Weight): 10 20 30

SAMPLES

Natural Unit Weight kN/m³

LAGWGL02 BRM00360447BO.GPJ NEW.GDT 6/14/11

exp.

Time	Water Level (m)	Depth to Cave (m)
On completion (open hole)	3.05	
After 8 days (well)	0.83	

BH11-1

Log of Borehole 11-1

AME Materials Engineering

Project No.: 40840.289

Project Name: Seaton Lands- South of Taunton Road

Figure No. 2-1

Location: Whites Road and Taunton Road, Pickering

Date Drilled: 3/21/11

Drill Type:

Datum: Geodetic

Split Spoon Sample	▨	Combustible Vapour Reading	□
Auger Sample	▨	Natural Moisture Content	×
SPT (N) Value	●	Atterberg Limits	⊢—○
Dynamic Cone Test	——	Undrained Triaxial at % Strain at Failure	⊕
Shelby Tube	▨	Shear Strength by Penetrometer Test	▲
Shear Strength by Vane Test	✚ S		

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH
		TOPSOIL: ~500mm	170.63	0
		SILTY SAND/SANDY SILT TILL: brown to grey, some clay and trace of gravel, moist, loose to very dense.	170.13	1
		SILTY SAND TILL: brown, trace of clay and gravel, moist, compact to very dense.	168.53	2
		.....grey.		3
		End of borehole at 4.67 m	165.96	4

Standard Penetration Test N Value: 20 40 60 80

Shear Strength kPa: 50 100 150 200

Total Combustible Vapours (ppm): 25 50 75

Natural Moisture Content % Atterberg Limits (% Dry Weight): 10 20 30

SAMPLES

Natural Unit Weight kN/m³

6 37.5

9 50

21

26

50 for 100mm

LOG OF BOREHOLE OLD 40840.289- SITE 3.GPJ AME_ON.GDT 5/6/11

Notes:

Date/Time	Water Level (m)	Depth to Cave (m)
03/21/2011	3.96	3.96

Sheet No. 1 of 1

BH11-2

Log of Borehole 11-2

AME Materials Engineering

Project No.: 40840.289

Project Name: Seaton Lands- South of Taunton Road

Figure No. 2-2

Location: Whites Road and Taunton Road, Pickering

Date Drilled: 3/21/11

Drill Type:

Datum: Geodetic

Split Spoon Sample
Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Shear Strength by Vane Test
Combustible Vapour Reading
Natural Moisture Content
Atterberg Limits
Undrained Triaxial at % Strain at Failure
Shear Strength by Penetrometer Test

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH
		TOPSOIL: ~400mm	179.82	0
		SILTY SAND/SANDY SILT TILL: brown to grey, some clay and trace of gravel, moist, compact to very dense.	179.42	
		.....grey		5
		End of borehole at 6.20 m	173.62	6

Standard Penetration Test N Value
Shear Strength kPa: 20 40 60 80 / 50 100 150 200
Total Combustible Vapours (ppm): 25 50 75
Natural Moisture Content % Atterberg Limits (% Dry Weight): 10 20 30

SAMPLES

Natural Unit Weight kN/m³

4
24
50 for 280mm
50 for 150mm
50 for 280mm
50 for 280mm
50 for 280mm

LOG OF BOREHOLE OLD 40840.289- SITE 3.GPJ AME_ON.GDT 5/6/11

Notes:

Date/Time	Water Level (m)	Depth to Cave (m)
03/21/2011	4.50	5.75

BH11-3

Log of Borehole 11-3

AME Materials Engineering

Project No.: 40840.289

Project Name: Seaton Lands- South of Taunton Road

Figure No. 2-3

Location: Whites Road and Taunton Road, Pickering

Date Drilled: 3/22/11

Drill Type:

Datum: Geodetic

Split Spoon Sample	▨	Combustible Vapour Reading	□
Auger Sample	▨	Natural Moisture Content	×
SPT (N) Value	●	Atterberg Limits	⊢○
Dynamic Cone Test	—	Undrained Triaxial at % Strain at Failure	⊕
Shelby Tube	▨	Shear Strength by Penetrometer Test	▲
Shear Strength by Vane Test	✚ S		

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH
		TOPSOIL: ~400mm	169.05	0
		SILTY SAND/SANDY SILT TILL: brown to grey, some clay and trace of gravel, damp to moist, compact to very dense.	168.65	
		.....grey		1
				2
				3
				4
				5
			162.73	6
		End of borehole at 6.32 m		

Standard Penetration Test N Value / Shear Strength (20, 40, 60, 80 kPa; 50, 100, 150, 200)

Total Combustible Vapours (ppm) (25, 50, 75)

Natural Moisture Content % Atterberg Limits (% Dry Weight) (10, 20, 30)

SAMPLES

Natural Unit Weight kN/m³

7

25

27

50 for 230mm

50 for 230mm

50 for 280mm

50 for 200mm

LOG OF BOREHOLE OLD 40840.289- SITE 3.GPJ AME_ON.GDT 5/6/11

Notes:

Date/Time	Water Level (m)	Depth to Cave (m)
03/22/2011	4.57	Open

Sheet No. 1 of 1

BH11-4

Log of Borehole 11-4

AME Materials Engineering

Project No.: 40840.289

Project Name: Seaton Lands- South of Taunton Road

Figure No. 2-4

Location: Whites Road and Taunton Road, Pickering

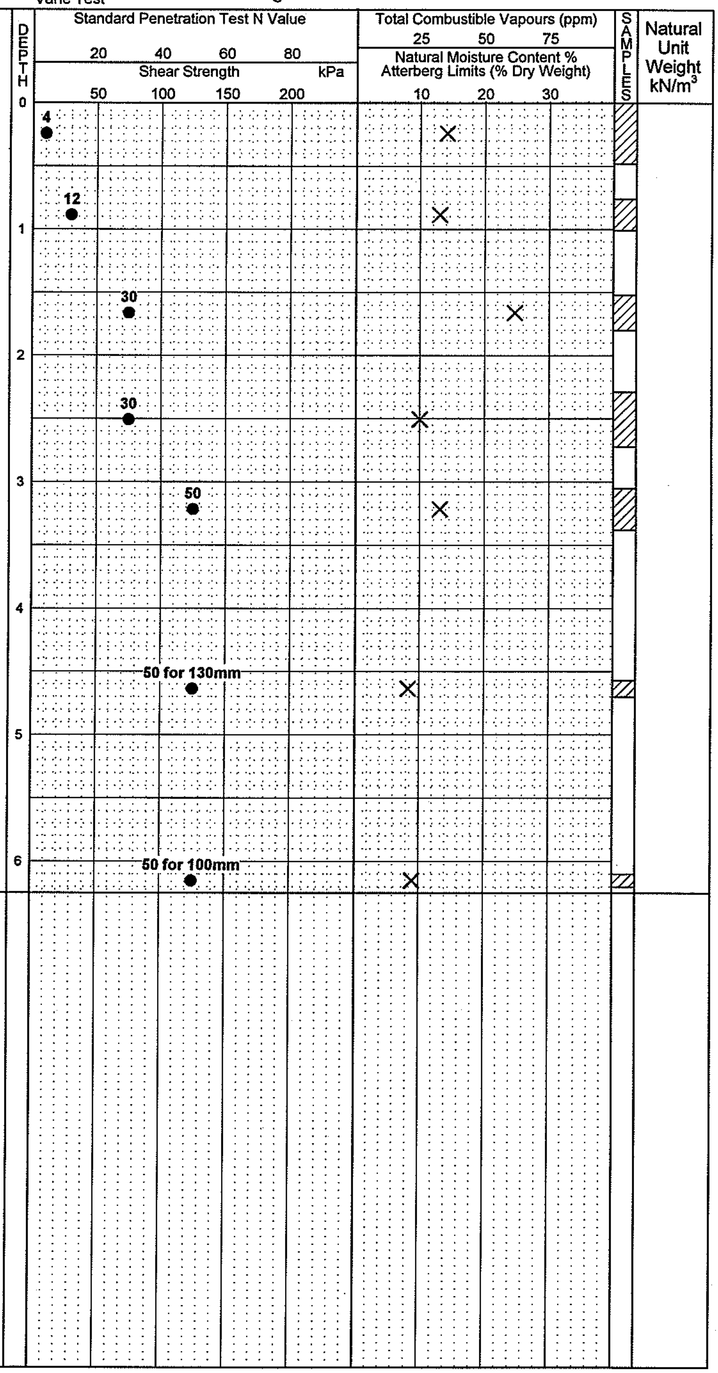
Date Drilled: 3/22/11

Drill Type:

Datum: Geodetic

Split Spoon Sample	▨	Combustible Vapour Reading	□
Auger Sample	▩	Natural Moisture Content	×
SPT (N) Value	●	Atterberg Limits	├──⊖
Dynamic Cone Test	———	Undrained Triaxial at % Strain at Failure	⊕
Shelby Tube	▨		
Shear Strength by Vane Test	✚ S	Shear Strength by Penetrometer Test	▲

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH
			166.69	0
		TOPSOIL: ~300mm	166.39	
		SILTY SAND/SANDY SILT TILL: brown to greyish brown, some clay and trace of gravel, moist to wet, compact to very dense.		
		...........greyish brown		
			160.44	
		End of borehole at 6.25 m		



Notes:

Date/Time	Water Level (m)	Depth to Cave (m)
03/22/2011	Dry	Open

Sheet No. 1 of 1

MW11-05

Log of Borehole 11-5

AME Materials Engineering

Project No.: 40840.289

Project Name: Seaton Lands- South of Taunton Road

Figure No. 2-5

Location: Whites Road and Taunton Road, Pickering

Date Drilled: 3/22/11

Drill Type:

Datum: Geodetic

Split Spoon Sample	▨	Combustible Vapour Reading	□
Auger Sample	▨	Natural Moisture Content	×
SPT (N) Value	●	Atterberg Limits	⊢—⊖
Dynamic Cone Test	——	Undrained Triaxial at % Strain at Failure	⊕
Shelby Tube	▨		
Shear Strength by Vane Test	✚ S	Shear Strength by Penetrometer Test	▲

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH
		TOPSOIL: ~200mm	170.52	0
		SILTY SAND/SANDY SILT TILL: brown to grey, some clay and trace of gravel, moist to wet, compact to very dense.	170.32	
		.....rootlets to 1.5m		1
				2
		.....grey		3
				4
				5
			164.30	6
		End of borehole at 6.22 m		

Standard Penetration Test N Value: 20 40 60 80

Shear Strength kPa: 50 100 150 200

Total Combustible Vapours (ppm): 25 50 75

Natural Moisture Content % Atterberg Limits (% Dry Weight): 10 20 30

SAMPLES

Natural Unit Weight kN/m³

2 ● 16 ● 16 ● 36 ● 20 ● 65 ● 50 for 130mm

LOG OF BOREHOLE OLD 40840.289- SITE 3.GPJ AME_ON.GDT 5/6/11

Notes:

Date/Time	Water Level (m)	Depth to Cave (m)
03/22/2011	0.76	Open
03/25/2011	0.64	
03/29/2011	0.26	
04/01/2011	0.20	
04/09/2011	0.21	

Sheet No. 1 of 1

BH11-6

Log of Borehole 11-6

AME Materials Engineering

Project No.: 40840.289

Project Name: Seaton Lands- South of Taunton Road

Figure No. 2-6

Location: Whites Road and Taunton Road, Pickering

Date Drilled: 3/22/11

Drill Type:

Datum: Geodetic

Legend: Split Spoon Sample; Auger Sample; SPT (N) Value ●; Dynamic Cone Test; Shelby Tube; Shear Strength by Vane Test; Combustible Vapour Reading □; Natural Moisture Content ×; Atterberg Limits; Undrained Triaxial at % Strain at Failure ⊕; Shear Strength by Penetrometer Test ▲

Depth (m)	Soil Description	Elev. (m)	SPT N Value
0		181.30	
0–0.3	**TOPSOIL:** ~300mm	181.00	3
0.3–7.92	**SILTY SAND/SANDY SILT TILL:** brown, some clay and trace of gravel, very moist, compact to very dense.		24; 26; 50 for 230mm; 50 for 300mm; 50 for 150mm; 50 for 230mm
7.92–9.60	**SAND:** grey, wet, loose.	173.38	6
9.60	End of borehole at 9.60 m	171.70	

Column headings: GWL; SYMBOL; SOIL DESCRIPTION; ELEV. m; DEPTH; Standard Penetration Test N Value (20, 40, 60, 80); Shear Strength kPa (50, 100, 150, 200); Total Combustible Vapours (ppm) (25, 50, 75); Natural Moisture Content %, Atterberg Limits (% Dry Weight) (10, 20, 30); SAMPLES; Natural Unit Weight kN/m^3

Notes:

Date/Time	Water Level (m)	Depth to Cave (m)
03/22/2011	8.40	8.40

MW11-07

Log of Borehole 11-7

AME Materials Engineering

Project No.: 40840.289

Project Name: Seaton Lands- South of Taunton Road

Figure No. 2-7

Location: Whites Road and Taunton Road, Pickering

Date Drilled: 3/23/11

Drill Type:

Datum: Geodetic

Split Spoon Sample
Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Shear Strength by Vane Test
Combustible Vapour Reading
Natural Moisture Content
Atterberg Limits
Undrained Triaxial at % Strain at Failure
Shear Strength by Penetrometer Test

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH
		TOPSOIL: ~300mm	170.89	0
		SILTY SAND/SANDY SILT TILL: brown to grey, some clay and trace of gravel, very wet, compact to very dense.	170.59	
		.....grey		
		End of borehole at 6.22 m	164.67	6

Standard Penetration Test N Value
Shear Strength kPa: 20 40 60 80 / 50 100 150 200
Total Combustible Vapours (ppm): 25 50 75
Natural Moisture Content % Atterberg Limits (% Dry Weight): 10 20 30

5
12
39
33
50 for 150mm
50 for 50mm
80 for 130mm

SAMPLES

Natural Unit Weight kN/m³

LOG OF BOREHOLE OLD 40840.289- SITE 3.GPJ AME_ON.GDT 5/6/11

Notes:

Date/Time	Water Level (m)	Depth to Cave (m)
03/23/2011	0.76	Open
03/25/2011	0.30	
03/29/2011	0.34	
04/01/2011	0.05	
04/09/2011	0.17	

Sheet No. 1 of 1

MW11-08

Log of Borehole 11-8

AME Materials Engineering

Project No.: 40840.289

Project Name: Seaton Lands- South of Taunton Road

Figure No. 2-8

Location: Whites Road and Taunton Road, Pickering

Date Drilled: 3/23/11

Drill Type:

Datum: Geodetic

Split Spoon Sample | Auger Sample | SPT (N) Value | Dynamic Cone Test | Shelby Tube | Shear Strength by Vane Test (S)

Combustible Vapour Reading | Natural Moisture Content | Atterberg Limits | Undrained Triaxial at % Strain at Failure | Shear Strength by Penetrometer Test

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH
		TOPSOIL: ~350mm	174.78	0
		SILTY SAND/SANDY SILT TILL: brown to grey, some clay and trace of gravel, moist to very moist, loose to very dense.	174.43	
		.....grey	168.53	6
		End of borehole at 6.25 m		

Standard Penetration Test N Value: 20 40 60 80 — Shear Strength: 50 100 150 200 kPa

Total Combustible Vapours (ppm): 25 50 75 — Natural Moisture Content % / Atterberg Limits (% Dry Weight): 10 20 30

SAMPLES | Natural Unit Weight kN/m³

5 | 4 | 14 | 36 | 50 for 410mm | 50 for 80mm | 50 for 150mm

LOG OF BOREHOLE OLD 40840.289- SITE 3.GPJ AME_ON.GDT 5/6/11

Notes:

Date/Time	Water Level (m)	Depth to Cave (m)
03/23/2011	1.52	Open
03/25/2011	0.03	
03/29/2011	0.38	
04/01/2011	0.20	
04/09/2011	0.38	

Sheet No. 1 of 1

BH11-9

Log of Borehole 11-9

AME Materials Engineering

Project No.: 40840.289

Project Name: Seaton Lands- South of Taunton Road

Figure No. 2-9

Location: Whites Road and Taunton Road, Pickering

Date Drilled: 3/23/11

Drill Type:

Datum: Geodetic

Split Spoon Sample	▨	Combustible Vapour Reading	□
Auger Sample	▨	Natural Moisture Content	×
SPT (N) Value	●	Atterberg Limits	⊢○
Dynamic Cone Test	——	Undrained Triaxial at % Strain at Failure	⊕
Shelby Tube	▨	Shear Strength by Penetrometer Test	▲
Shear Strength by Vane Test	✚ S		

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH
		TOPSOIL: ~200mm	165.48	0
		SILTY SAND/SANDY SILT TILL: brown to grey, some clay and trace of gravel, moist, loose to very dense.	165.28	
		.....grey	160.83	
		End of borehole at 4.65 m		

Standard Penetration Test N Value: 20 40 60 80

Shear Strength kPa: 50 100 150 200

Total Combustible Vapours (ppm): 25 50 75

Natural Moisture Content % Atterberg Limits (% Dry Weight): 10 20 30

SAMPLES

Natural Unit Weight kN/m³

3 ● 9 ● 16 ● 27 ● 50 for 430mm ● 50 for 80mm ●

LOG OF BOREHOLE OLD 40840.289- SITE 3.GPJ AME_ON.GDT 5/6/11

Notes:

Date/Time	Water Level (m)	Depth to Cave (m)
03/23/2011	Dry	Open

Sheet No. 1 of 1

BH11-10

Log of Borehole 11-10

AME Materials Engineering

Project No.: 40840.289

Project Name: Seaton Lands- South of Taunton Road

Figure No. 2-10

Location: Whites Road and Taunton Road, Pickering

Date Drilled: 3/23/11

Drill Type:

Datum: Geodetic

Split Spoon Sample	▨	Combustible Vapour Reading	□
Auger Sample	▨	Natural Moisture Content	×
SPT (N) Value	●	Atterberg Limits	⊢—○
Dynamic Cone Test	——	Undrained Triaxial at % Strain at Failure	⊕
Shelby Tube	▨	Shear Strength by Penetrometer Test	▲
Shear Strength by Vane Test	✚ S		

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH
		TOPSOIL: ~800mm	165.82	0
		SILTY SAND/SANDY SILT TILL: brown to grey, some clay and trace of gravel, moist to wet, loose to compact.	165.02	1
		.....grey and dry		3
		.....moist		6
		End of borehole at 6.50 m	159.32	

Standard Penetration Test N Value
Shear Strength kPa: 20 40 60 80 | 2 50 100 150 200
Total Combustible Vapours (ppm): 25 50 75
Natural Moisture Content % Atterberg Limits (% Dry Weight): 10 20 30
SAMPLES
Natural Unit Weight kN/m³

5
11
18
50
50 for 230mm
50 for 410mm

LOG OF BOREHOLE OLD 40840.289- SITE 3.GPJ AME_ON.GDT 5/6/11

Notes:

Date/Time	Water Level (m)	Depth to Cave (m)
03/23/2011	0.50	3.20

Sheet No. 1 of 1

MW11-11s

Log of Borehole 11-11A

AME Materials Engineering

Project No.: 40840.289

Project Name: Seaton Lands- South of Taunton Road

Figure No. 2-12

Location: Whites Road and Taunton Road, Pickering

Date Drilled: 3/29/11

Drill Type:

Datum: Geodetic

Split Spoon Sample	▨	Combustible Vapour Reading	□
Auger Sample	⊠	Natural Moisture Content	×
SPT (N) Value	●	Atterberg Limits	⊢○
Dynamic Cone Test	——	Undrained Triaxial at % Strain at Failure	⊕
Shelby Tube	■	Shear Strength by Penetrometer Test	▲
Shear Strength by Vane Test	S		

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH
		TOPSOIL: ~350mm	167.23	0
		SILTY SAND/SANDY SILT TILL: brown, some clay and trace of gravel, moist, compact to dense.	166.88	
		End of borehole at 3.96 m	163.27	4

Standard Penetration Test N Value: 20 40 60 80 — Shear Strength kPa: 50 100 150 200

Total Organic Vapours (ppm): 25 50 75 — Natural Moisture Content % Atterberg Limits (% Dry Weight): 10 20 30

SAMPLES

Natural Unit Weight kN/m³

3 15 20 20 30

LOG OF BOREHOLE OLD 40840.289- SITE 3.GPJ AME_ON.GDT 5/11/11

Notes:

Date/Time	Water Level (m)	Depth to Cave (m)
03/29/2011	3.45	Open
04/01/2011	0.80	
04/09/2011	0.65	

Sheet No. 1 of 1

MW11-11d

Log of Borehole 11-11

AME Materials Engineering

Project No.: 40840.289

Project Name: Seaton Lands- South of Taunton Road

Figure No. 2-11

Location: Whites Road and Taunton Road, Pickering

Date Drilled: 3/29/11

Drill Type:

Datum: Geodetic

Split Spoon Sample | Auger Sample | SPT (N) Value | Dynamic Cone Test | Shelby Tube | Shear Strength by Vane Test (S)

Combustible Vapour Reading | Natural Moisture Content | Atterberg Limits | Undrained Triaxial at % Strain at Failure | Shear Strength by Penetrometer Test

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m
		TOPSOIL: ~250mm	167.23
		SILTY SAND/SANDY SILT TILL: brown to grey, some clay and trace of gravel, moist, compact to very dense.	166.98
		.....grey and moist.	
		End of borehole at 9.30 m	157.93

Standard Penetration Test N Value: 20 40 60 80

Shear Strength kPa: 50 100 150 200

Total Organic Vapours (ppm): 25 50 75

Natural Moisture Content % Atterberg Limits (% Dry Weight): 10 20 30

DEPTH: 0 1 2 3 4 5 6 7 8 9

SAMPLES

Natural Unit Weight kN/m³

3 37.5

10 100

16

19

24

50 for 50mm

50 for 300mm

50 for 280mm

50 for 150mm

LOG OF BOREHOLE OLD 40840.289- SITE 3.GPJ AME_ON.GDT 5/11/11

Notes:

Date/Time	Water Level (m)	Depth to Cave (m)
03/29/2011	7.91	Open
04/01/2011	0.75	
04/09/2011	0.56	

Sheet No. 1 of 1

SPL Consultants Limited

LOG OF BOREHOLE BH13-1

MW-13-1

PROJECT: Mulberry Lane
CLIENT: Mattamy Homes
PROJECT LOCATION: Pickering, Ontario
DATUM: Geodetic
BH LOCATION: See Borehole Location Plan

DRILLING DATA
Method: Solid Stem Auger
Diameter: 115 mm
Date: Apr/30/2013

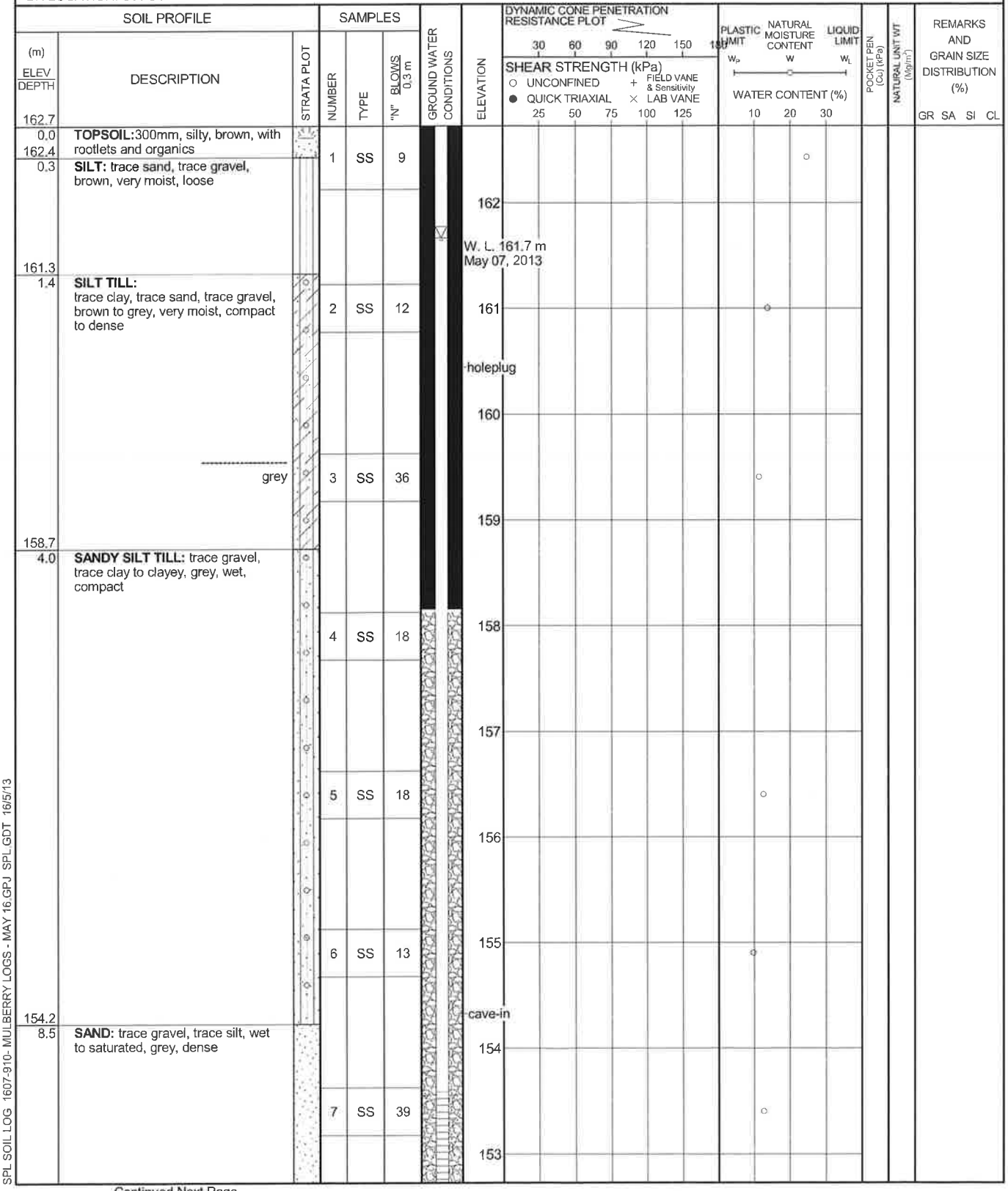
REF. NO.: 1607-910
ENCL NO.: 4

(m) ELEV / DEPTH	DESCRIPTION	NUMBER	TYPE	"N" BLOWS 0.3 m
162.7				
0.0 / 162.4	**TOPSOIL:** 300mm, silty, brown, with rootlets and organics	1	SS	9
0.3 / 161.3	**SILT:** trace sand, trace gravel, brown, very moist, loose			
1.4	**SILT TILL:** trace clay, trace sand, trace gravel, brown to grey, very moist, compact to dense	2	SS	12
	grey	3	SS	36
158.7				
4.0	**SANDY SILT TILL:** trace gravel, trace clay to clayey, grey, wet, compact	4	SS	18
		5	SS	18
		6	SS	13
154.2				
8.5	**SAND:** trace gravel, trace silt, wet to saturated, grey, dense	7	SS	39

Continued Next Page

GROUNDWATER ELEVATIONS
Shallow/ Single Installation ▽ ▼ Deep/Dual Installation ▽ ▼

GRAPH NOTES
+ 3, × 3: Numbers refer to Sensitivity
○ ε=3% Strain at Failure



SPL SOIL LOG 1607-910-MULBERRY LOGS - MAY 16.GPJ SPL.GDT 16/5/13

SPL Consultants Limited
Geotechnical Environmental Materials Hydrogeology

LOG OF BOREHOLE BH13-1

MW-13-1

PROJECT: Mulberry Lane
CLIENT: Mattamy Homes
PROJECT LOCATION: Pickering, Ontario
DATUM: Geodetic
BH LOCATION: See Borehole Location Plan

DRILLING DATA
Method: Solid Stem Auger
Diameter: 115 mm
Date: Apr/30/2013

REF. NO.: 1607-910
ENCL NO.: 4

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: "N" BLOWS 0.3 m	GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT (30 60 90 120 150 180) / SHEAR STRENGTH (kPa) ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE (25 50 75 100 125)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) (10 20 30)	POCKET PEN. (CU) (kPa)	NATURAL UNIT WT (Mg/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
	SAND: trace gravel, trace silt, wet to saturated, grey, dense(Continued)						screen					
151.7												
11.0	**SILT TILL:** some clay to clayey, trace gravel, very moist, very dense						151					
150.4			8	SS	50/ 125mm		cave-in					
12.3	**END OF BOREHOLE** Notes: 1) Water at 3.0mbgs in borehole upon completion. 2) Cave at 4.6mbgs in borehole upon completion. 3) Piezometer installed upon completion. 4) Water Level Records: Date WL (mbgs) May 7/13 1.06											

SPL SOIL LOG 1607-910-MULBERRY LOGS - MAY 16.GPJ SPL.GDT 16/5/13

GROUNDWATER ELEVATIONS
Shallow/ Single Installation ▽ ▼ Deep/Dual Installation ▽ ▼

GRAPH NOTES + 3 , × 3 : Numbers refer to Sensitivity ○ ε=3% Strain at Failure

SPL Consultants Limited
Geotechnical Environmental Materials Hydrogeology

LOG OF BOREHOLE BH13-2

MW-13-2

PROJECT: Mulberry Lane
CLIENT: Mattamy Homes
PROJECT LOCATION: Pickering, Ontario
DATUM: Geodetic
BH LOCATION: See Borehole Location Plan

DRILLING DATA
Method: Solid Stem Auger
Diameter: 115 mm
Date: Apr/30/2013

REF. NO.: 1607-910
ENCL NO.: 5

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" BLOWS 0.3 m	GROUND WATER CONDITIONS	ELEVATION
164.4							
0.0 / 163.9	**TOPSOIL:**500mm, silty, brown, wet		1	SS	0		164
0.5 / 163.0	**SILT:** trace clay and gravel, brown, wet, very loose						
1.4	**SANDY SILT TO SILTY SAND TILL:** trace gravel, trace clay to clayey, brown to grey, very moist, compact to very dense with occasional oxidization staining		2	SS	22		163
							162
			3	SS	32	▽	161
							160
	grey		4	SS	65		
							159
			5	SS	39		158
							157
			6	SS	22		
							156
			7	SS	32		155

W. L. 160.9 m
May 07, 2013
cave-in

DYNAMIC CONE PENETRATION RESISTANCE PLOT
30 60 90 120 150 180

SHEAR STRENGTH (kPa)
○ UNCONFINED + FIELD VANE & Sensitivity
● QUICK TRIAXIAL × LAB VANE
25 50 75 100 125

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%)
10 20 30

POCKET PEN (Cu) (kPa)

NATURAL UNIT WT (Mg/m³)

REMARKS AND GRAIN SIZE DISTRIBUTION (%)
GR SA SI CL

Continued Next Page

GROUNDWATER ELEVATIONS
Shallow/ Single Installation ▽ ▼ Deep/Dual Installation ▽ ▼

GRAPH NOTES
+ 3, × 3: Numbers refer to Sensitivity
○ ε=3% Strain at Failure

SPL SOIL LOG 1607-910- MULBERRY LOGS - MAY 16.GPJ SPL.GDT 16/5/13

SPL Consultants Limited

Geotechnical Environmental Materials Hydrogeology

MW-13-2

LOG OF BOREHOLE BH13-2

PROJECT: Mulberry Lane
CLIENT: Mattamy Homes
PROJECT LOCATION: Pickering, Ontario
DATUM: Geodetic
BH LOCATION: See Borehole Location Plan

DRILLING DATA
Method: Solid Stem Auger
Diameter: 115 mm
Date: Apr/30/2013

REF. NO.: 1607-910
ENCL NO.: 5

SOIL PROFILE (m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	SAMPLES NUMBER	TYPE	BLOWS/0.3 m "N"	GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT 30 60 90 120 150 180 / SHEAR STRENGTH (kPa) ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE 25 50 75 100 125	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) 10 20 30	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (Mg/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
	SANDY SILT TO SILTY SAND TILL: trace gravel, trace clay to clayey, brown to grey, very moist, compact to very dense with occasional oxidization staining(Continued)						154 screen 153				
151.7			8	SS	70		152 cave-in				
12.7	**END OF BOREHOLE** Notes: 1) Water at 1.5mbgs in borehole upon completion. 2) Cave at 4.0mbgs in borehole upon completion. 3) Piezometer installed upon completion. 4) Water Level Records: Date WL (mbgs) May 7/13 3.43										

SPL SOIL LOG 1607-910- MULBERRY LOGS - MAY 16 GPJ SPL GDT 16/5/13

GROUNDWATER ELEVATIONS
Shallow/ Single Installation ▽ ▼ Deep/Dual Installation ▽ ▼

GRAPH NOTES + 3, × 3: Numbers refer to Sensitivity ○ 8=3% Strain at Failure

SPL Consultants Limited

LOG OF BOREHOLE BH13-3

MW-13-3s/d

PROJECT: Mulberry Lane
CLIENT: Mattamy Homes
PROJECT LOCATION: Pickering, Ontario
DATUM: Geodetic
BH LOCATION: See Borehole Location Plan

DRILLING DATA
Method: Solid Stem Auger
Diameter: 115 mm
Date: Apr/26/2013

REF. NO.: 1607-910
ENCL NO.: 6

(m) ELEV / DEPTH	DESCRIPTION	NUMBER	TYPE	"N" BLOWS/0.3 m
155.2				
0.0 / 154.9	**TOPSOIL:** 300mm, clayey silt	1	SS	4
0.3	**CLAYEY SILT:** sandy to some sand, trace to some gravel, brown, wet, soft to stiff	2	SS	10
152.8				
2.4	**SILTY SAND TO SANDY SILT TILL:** some sand, some gravel, trace clay to clayey, brown, moist, dense to very dense	3	SS	37
		4	SS	71
		5	SS	50/100mm
148.2				
7.0	**SILTY SAND :** some gravel, trace clay, brown to grey, moist to wet, very dense	6	SS	90/200mm
		7	SS	50/100mm

GROUND WATER CONDITIONS: W. L. 155.2 m May 07, 2013; W. L. 147.0 m May 07, 2013

ELEVATION: 154, 153, 152, 151, 150, 149, 148, 147, 146

DYNAMIC CONE PENETRATION RESISTANCE PLOT: 20 40 60 80 100

SHEAR STRENGTH (kPa): ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE; 50 100 150 200 250

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L

WATER CONTENT (%): 10 20 30

POCKET PEN (Cu) (kPa)

NATURAL UNIT WT (Mg/m³)

REMARKS AND GRAIN SIZE DISTRIBUTION (%) — GR SA SI CL

Continued Next Page

GROUNDWATER ELEVATIONS
Shallow/ Single Installation ▽ ▼ Deep/Dual Installation ▽ ▼

GRAPH NOTES: + 3, × 3: Numbers refer to Sensitivity; ε=3% Strain at Failure

SPL SOIL LOG - 2 WELLS 1607-910- MULBERRY LOGS - MAY 16.GPJ SPL.GDT 16/5/13

SPL Consultants Limited
Geotechnical Environmental Materials Hydrogeology

LOG OF BOREHOLE BH13-3

MW-13-3s/d

PROJECT: Mulberry Lane
CLIENT: Mattamy Homes
PROJECT LOCATION: Pickering, Ontario
DATUM: Geodetic
BH LOCATION: See Borehole Location Plan

DRILLING DATA
Method: Solid Stem Auger
Diameter: 115 mm
Date: Apr/26/2013

REF. NO.: 1607-910
ENCL NO.: 6

SOIL PROFILE (m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	SAMPLES NUMBER	TYPE	"N" BLOWS 0.3 m	GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH (kPa) ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE 50 100 150 200 250	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) 10 20 30	POCKET PEN (Cu) (kPa)	NATURAL UNIT WT (Mg/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
145.0											
10.2	**SAND & GRAVEL:** trace silt, grey, wet, very dense		8	SS	89		145		○		
							144				
142.7			9	SS	50/ 125mm		143		○		
12.5	**END OF BOREHOLE** Notes: 1) Water at 9.1mbgs in borehole upon completion. 2) Piezometer installed at 12.2 m upon completion. 3) Monitoring Well installed at 4.6m upon completion. 3) Water Level Records: Date 50mm WL (mbgs) May 7/13 dry Date 25mm WL (mbgs) May 7/13 8.21										

SPL SOIL LOG - 2 WELLS 1607-910- MULBERRY LOGS - MAY 16.GPJ SPL.GDT 16/5/13

GROUNDWATER ELEVATIONS
Shallow/ Single Installation ▽ ▼ Deep/Dual Installation ▽ ▼

GRAPH NOTES + 3, × 3: Numbers refer to Sensitivity ○ ε=3% Strain at Failure

SPL Consultants Limited

MW-13-4

LOG OF BOREHOLE BH13-4

PROJECT: Mulberry Lane
CLIENT: Mattamy Homes
PROJECT LOCATION: Pickering, Ontario
DATUM: Geodetic
BH LOCATION: See Borehole Location Plan

DRILLING DATA
Method: Solid Stem Auger
Diameter: 115 mm
Date: Apr/26/2013

REF. NO.: 1607-910
ENCL NO.: 7

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" BLOWS 0.3 m	GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT (30 60 90 120 150 180) / SHEAR STRENGTH (kPa) ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE (25 50 75 100 125)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) (10 20 30)	POCKET PEN (Cu) (kPa)	NATURAL UNIT WT (kN/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
152.2												
0.0 / 151.9	**TOPSOIL:** 300mm		1	SS	2		152					
0.3	**SANDY SILT TILL:** trace gravel, trace clay to clayey, brown, moist, loose to dense		2	SS	9		151					
							150					
			3	SS	37		149					
148.2						▽ W. L. 148.3 m May 07, 2013	148					
4.0	**SAND & GRAVEL:** trace silt and clay, grey, wet, very dense		4	SS	68		147					
			5	SS	50/ 50mm		146					
			6	SS	50/ 125mm		145					
							144					
			7	SS	66		143					
142.6												
9.6	**END OF BOREHOLE** Note: 1) Water at 4.57mbgs in borehole											

Continued Next Page

GROUNDWATER ELEVATIONS
Shallow/ Single Installation ▽ ▼ Deep/Dual Installation ▽ ▼

GRAPH NOTES
+ 3, × 3: Numbers refer to Sensitivity
○ & =3% Strain at Failure

SPL SOIL LOG 1607-910- MULBERRY LOGS - MAY 16.GPJ SPL.GDT 16/5/13

SPL Consultants Limited
Geotechnical Environmental Materials Hydrogeology

LOG OF BOREHOLE BH13-4

MW-13-4

PROJECT: Mulberry Lane
CLIENT: Mattamy Homes
PROJECT LOCATION: Pickering, Ontario
DATUM: Geodetic
BH LOCATION: See Borehole Location Plan

DRILLING DATA
Method: Solid Stem Auger
Diameter: 115 mm
Date: Apr/26/2013

REF. NO.: 1607-910
ENCL NO.: 7

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT (30 60 90 120 150 180) / SHEAR STRENGTH (kPa) ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE (25 50 75 100 125)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) (10 20 30)	POCKET PEN (Cu) (kPa)	NATURAL UNIT WT (Mg/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%)
(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	BLOWS 0.3 m "N"							GR SA SI CL
	upon completion. 2) Monitoring Well installed upon completion. 3) Water Level Records: Date WL (mbgs) May 7/2013 3.84											

SPL SOIL LOG 1607-910- MULBERRY LOGS - MAY 16.GPJ SPL.GDT 16/5/13

GROUNDWATER ELEVATIONS
Shallow/ Single Installation ▽ ▼ Deep/Dual Installation ▽ ▼

GRAPH NOTES + 3, × 3: Numbers refer to Sensitivity ○ ε=3% Strain at Failure

SPL Consultants Limited
Geotechnical Environmental Materials Hydrogeology

LOG OF BOREHOLE BH13-5

MW-13-5

PROJECT: Mulberry Lane
CLIENT: Mattamy Homes
PROJECT LOCATION: Pickering, Ontario
DATUM: Geodetic
BH LOCATION: See Borehole Location Plan

DRILLING DATA
Method: Solid Stem Auger
Diameter: 115 mm
Date: Apr/24/2013

REF. NO.: 1607-910
ENCL NO.: 8

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" BLOWS 0.3 m	GROUND WATER CONDITIONS	ELEVATION
158.6 / 0.0	**TOPSOIL:** 150mm, brown sand						
158.4 / 0.2	**FILL:** sand, trace silt, trace organics, brown, very moist to wet, very loose		1	SS	0		
157.2 / 1.4	**SANDY SILT TILL:** trace gravel, trace clay to clayey, brown, very moist, compact		2	SS	14		
155.8 / 2.8	**SAND:** Fine sand, trace gravel, trace silt, brown, very moist, very dense		3	SS	50		
154.2 / 4.4	**SANDY SILT TILL:** trace gravel, trace clay to clayey, brown, wet fissures, oxidized, moist, very dense		4	SS	50		
152.7 / 5.9	**CLAYEY SILT TILL:** trace gravel, trace sand, brown, moist, very dense		5	SS	92/ 275mm		
151.6 / 7.0	**FINE TO MEDIUM SAND:** some clay and silt, trace gravel, moist, very dense with occasional stratfied layers		6	SS	50/ 100mm		
			7	SS	50/ 150mm		

DYNAMIC CONE PENETRATION RESISTANCE PLOT: 30 60 90 120 150 180

SHEAR STRENGTH (kPa)
○ UNCONFINED
● QUICK TRIAXIAL
+ FIELD VANE & Sensitivity
× LAB VANE
25 50 75 100 125

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%)
10 20 30

158 157 156 155 154 153 152 151 150 149

POCKET PEN. (Cu) (kPa)
NATURAL UNIT WT (Mg/m³)

REMARKS AND GRAIN SIZE DISTRIBUTION (%)
GR SA SI CL

SPL SOIL LOG 1607-910- MULBERRY LOGS - MAY 16.GPJ SPL.GDT 16/5/13

Continued Next Page

GROUNDWATER ELEVATIONS
Shallow/ Single Installation ▽ ▼ Deep/Dual Installation ▽ ▼

GRAPH NOTES
+ 3, × 3: Numbers refer to Sensitivity
○ ε=3% Strain at Failure

SPL Consultants Limited
Geotechnical Environmental Materials Hydrogeology

LOG OF BOREHOLE BH13-5

MW-13-5

PROJECT: Mulberry Lane
CLIENT: Mattamy Homes
PROJECT LOCATION: Pickering, Ontario
DATUM: Geodetic
BH LOCATION: See Borehole Location Plan

DRILLING DATA
Method: Solid Stem Auger
Diameter: 115 mm
Date: Apr/24/2013

REF. NO.: 1607-910
ENCL NO.: 8

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	SAMPLES: NUMBER	TYPE	"N" BLOWS 0.3 m	GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT (30 60 90 120 150 180) / SHEAR STRENGTH (kPa) ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE (25 50 75 100 125)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) (10 20 30)	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (Mg/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
	FINE TO MEDIUM SAND: some clay and silt, trace gravel, moist, very dense with occasional stratfied layers(Continued)		8	SS	50/ 100mm		148		○			
146.7							147					
11.9	**SILTY SAND TILL:** trace clay, trace gravel, grey, moist, very dense		9	SS	50/ 100mm		146		○			
							145					
							144					
			10	SS	50/ 75mm		143		○			
142.1						▽						
16.5	**SAND:** trace silt, grey, saturated, very dense						W. L. 142.1 m May 07, 2013					
							141					
140.0			11	SS	93/ 300mm							
18.6	**END OF BOREHOLE** Notes: 1) Water at 6.1m mbgs in borehole upon completion. 2) Monitoring Well installed upon completion. 3) Water Level Records: Date May 7/13 WL (mbgs) 16.53						140					

SPL SOIL LOG 1607-910- MULBERRY LOGS - MAY 16.GPJ SPL.GDT 16/5/13

GROUNDWATER ELEVATIONS
Shallow/ Single Installation ▽ ▼ Deep/Dual Installation ▽ ▼

GRAPH NOTES: $+^{3}$, $\times^{3}$: Numbers refer to Sensitivity ○ ε_f=3% Strain at Failure

SPL Consultants Limited
Geotechnical Environmental Materials Hydrogeology

LOG OF BOREHOLE BH13-6

MW-13-6

PROJECT: Mulberry Lane
CLIENT: Mattamy Homes
PROJECT LOCATION: Pickering, Ontario
DATUM: Geodetic
BH LOCATION: See Borehole Location Plan

DRILLING DATA
Method: Solid Stem Auger
Diameter: 115 mm
Date: Apr/25/2013

REF. NO.: 1607-910
ENCL NO.: 9

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" BLOWS/0.3 m	GROUND WATER CONDITIONS	ELEVATION
157.7							
0.0 / 157.4	**TOPSOIL:**300mm, silty sand		1	SS	5		
0.3 / 156.6	**CLAYEY SILT:**some sand, brown,very moist, firm						157
1.1	**SANDY SILT TILL:** trace clay to clayey, some gravel, brown, moist, dense		2	SS	35		holeplug 156
							155
153.6			3	SS	50		
4.1	**SAND & GRAVEL:** trace silt, brown, wet, very dense						154
			4	SS	50/150mm		153
							cuttings 152
			5	SS	50/125mm		
							151
			6	SS	97/200mm		150
149.3							holeplug
8.4	**SAND:** trace gravel, trace clay, brown, wet fissures, oxidized, moist, very dense						149
			7	AS	-		sand 148

DYNAMIC CONE PENETRATION RESISTANCE PLOT
30 60 90 120 150 180

SHEAR STRENGTH (kPa)
○ UNCONFINED + FIELD VANE & Sensitivity
● QUICK TRIAXIAL × LAB VANE
25 50 75 100 125

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%)
10 20 30

POCKET PEN. (Cu) (kPa)

NATURAL UNIT WT (Mg/m³)

REMARKS AND GRAIN SIZE DISTRIBUTION (%)
GR SA SI CL

SPL SOIL LOG 1607-910- MULBERRY LOGS - MAY 16.GPJ SPL.GDT 16/5/13

Continued Next Page

GROUNDWATER ELEVATIONS
Shallow/ Single Installation ▽ ▼ Deep/Dual Installation ▼ ▼

GRAPH NOTES
+ 3, × 3. Numbers refer to Sensitivity
C ε=3% Strain at Failure

SPL Consultants Limited

LOG OF BOREHOLE BH13-6

MW-13-6

PROJECT: Mulberry Lane
CLIENT: Mattamy Homes
PROJECT LOCATION: Pickering, Ontario
DATUM: Geodetic
BH LOCATION: See Borehole Location Plan

DRILLING DATA
Method: Solid Stem Auger
Diameter: 115 mm
Date: Apr/25/2013

REF. NO.: 1607-910
ENCL NO.: 9

SOIL PROFILE (m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	SAMPLES NUMBER	TYPE	"N" BLOWS 0.3 m	GROUND WATER CONDITIONS	ELEVATION
	SAND: trace gravel, trace clay, brown, wet fissures, oxidized, moist, very dense(Continued)		8	SS	50/ 125mm		147
146.3 / 11.4	**CLAYEY SILT TILL:** trace gravel, trace sand, brown, moist, hard		9	SS	50/ 100mm	screen	146
144.4 / 13.3	**FINE TO MEDIUM SAND:** some clay, trace gravel and silt, grey, moist, very dense		10	SS	50/ 100mm	W. L. 145.2 m May 07, 2013	144
142.3 / 15.4	**END OF BOREHOLE** Notes: 1) Monitoring Well installed upon completion. 2) Water Level Records: Date May 7/13 WL (mbgs) 12.47		11	AS	-	cave-in	143

DYNAMIC CONE PENETRATION RESISTANCE PLOT: 30 60 90 120 150 180

SHEAR STRENGTH (kPa): ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE; 25 50 75 100 125

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L

WATER CONTENT (%): 10 20 30

POCKET PEN (Cu) (kPa)

NATURAL UNIT WT (Mg/m³)

REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL

SPL SOIL LOG 1607-910- MULBERRY LOGS - MAY 16 GPJ SPL.GDT 16/5/13

GROUNDWATER ELEVATIONS
Shallow/ Single Installation ▽ ▼ Deep/Dual Installation ▽ ▼

GRAPH NOTES + 3, × 3: Numbers refer to Sensitivity ○ ε=3% Strain at Failure

SPL Consultants Limited

LOG OF BOREHOLE BH13-7

MW-13-7

PROJECT: Mulberry Lane
CLIENT: Mattamy Homes
PROJECT LOCATION: Pickering, Ontario
DATUM: Geodetic
BH LOCATION: See Borehole Location Plan

DRILLING DATA
Method: Solid Stem Auger
Diameter: 115 mm
Date: Apr/25/2013

REF. NO.: 1607-910
ENCL NO.: 10

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" BLOWS/0.3 m	GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT (30 60 90 120 150 180) / SHEAR STRENGTH (kPa) ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE (25 50 75 100 125)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L / WATER CONTENT (%) (10 20 30)	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (Mg/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
155.9												
0.0	**FILL:** silty sand with some clay, brown, wet		1	SS	3							
154.9							155					
1.0	**SILTY SAND TILL:** trace gravel, trace to some clay, brown, moist, compact						holeplug					
			2	SS	27		154					
153.5												
2.4	**SAND AND SILT TILL:** trace to some clay, trace gravel, grey, moist, dense to very dense						153					
			3	SS	40							
							152					
			4	SS	50		cuttings					
							151					
						▽	W. L. 150.7 m May 07, 2013					
							150					
			5	SS	54							
							149					
							holeplug					
			6	SS	90		148					
							147					
							sand					
			7	SS	52							
							146					

Continued Next Page

GROUNDWATER ELEVATIONS
Shallow Single Installation ▽ ▼ Deep/Dual Installation ▽ ▼

GRAPH NOTES: + 3, × 3: Numbers refer to Sensitivity ○ 8=3% Strain at Failure

SPL SOIL LOG 1607-910-MULBERRY LOGS - MAY 16.GPJ SPL.GDT 16/5/13

SPL Consultants Limited
Geotechnical Environmental Materials Hydrogeology

MW-13-7

LOG OF BOREHOLE BH13-7

PROJECT: Mulberry Lane
CLIENT: Mattamy Homes
PROJECT LOCATION: Pickering, Ontario
DATUM: Geodetic
BH LOCATION: See Borehole Location Plan

DRILLING DATA
Method: Solid Stem Auger
Diameter: 115 mm
Date: Apr/25/2013

REF. NO.: 1607-910
ENCL NO.: 10

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: "N" BLOWS 0.3 m	GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT (30 60 90 120 150 180) / SHEAR STRENGTH (kPa) ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE (25 50 75 100 125)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L / WATER CONTENT (%) (10 20 30)	POCKET PEN (Cu) (kPa)	NATURAL UNIT WT (Mg/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
	SAND AND SILT TILL: trace to some clay, trace gravel, grey, moist, dense to very dense (Continued)											
			8	SS	60		145					
							screen					
							144					
143.3			9	SS	39				○			
12.7	**END OF BOREHOLE** Notes: 1) Water at 9.1mbgs in borehole upon completion. 2) Monitoring Well installed upon completion. 3) Water Level Records: Date WL (mbgs) May 7/13 5.18											

SPL SOIL LOG 1607-910- MULBERRY LOGS - MAY 16.GPJ SPL.GDT 16/5/13

GROUNDWATER ELEVATIONS
Shallow/ Single Installation ▽ ▼ Deep/Dual Installation ▽ ▼

GRAPH NOTES + 3, × 3: Numbers refer to Sensitivity ○ ε=3% Strain at Failure

SPL Consultants Limited

LOG OF BOREHOLE BH13-8

MW-13-8s/d

PROJECT: Mulberry Lane
CLIENT: Mattamy Homes
PROJECT LOCATION: Pickering, Ontario
DATUM: Geodetic
BH LOCATION: See Borehole Location Plan

DRILLING DATA
Method: Solid Stem Auger
Diameter: 115 mm
Date: Apr/24/2013

REF. NO.: 1607-910
ENCL NO.: 11

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" BLOWS/0.3 m	GROUND WATER CONDITIONS	ELEVATION
157.0							
0.0 / 156.5	**TOPSOIL:**460mm, sandy silt, trace gravel, trace organics, brown, moist		1	SS	4		
0.5 / 155.5	**FILL:** SAND trace gravel, brown, very moist, loose						156
1.5 / 154.5	**SILTY SAND** trace gravel, trace clay, dark brown to brown, moist to wet, compact to very dense		2	SS	21		holeplug 155
2.5	**SILTY SAND TILL:** trace clay, trace gravel, grey, moist, very dense		3	SS	75		154
	Saturated layer from cuttings at 3.7m.						153
151.2			4	SS	73/275mm		152
5.8 / 149.8	**CLAYEY SILT TILL:** trace gravel, trace sand, grey, moist, hard, (PP=4.5kpa)		5	SS	38		151
7.2	**SILTY CLAY TILL:** trace sand, trace gravel, grey, moist, hard (PP=4.5kpa)		6	SS	59		150 cuttings 149
			7	SS	86/300mm		148

W. L. 149.0 m May 07, 2013

DYNAMIC CONE PENETRATION RESISTANCE PLOT: 20 40 60 80 100

SHEAR STRENGTH (kPa): ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE; 50 100 150 200 250

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L

WATER CONTENT (%): 10 20 30

POCKET PEN. (Cu) (kPa)

NATURAL UNIT WT (Mg/m³)

REMARKS AND GRAIN SIZE DISTRIBUTION (%) — GR SA SI CL

Continued Next Page

GROUNDWATER ELEVATIONS
Shallow/ Single Installation ▽ ▼ Deep/Dual Installation ▽ ▼

GRAPH NOTES: + 3, × 3: Numbers refer to Sensitivity; ○ ε=3% Strain at Failure

SPL SOIL LOG - 2 WELLS 1607-910- MULBERRY LOGS - MAY 16.GPJ SPL.GDT 16/5/13

SPL Consultants Limited
Geotechnical Environmental Materials Hydrogeology

LOG OF BOREHOLE BH13-8

MW-13-8s/d

PROJECT: Mulberry Lane
CLIENT: Mattamy Homes
PROJECT LOCATION: Pickering, Ontario
DATUM: Geodetic
BH LOCATION: See Borehole Location Plan

DRILLING DATA
Method: Solid Stem Auger
Diameter: 115 mm
Date: Apr/24/2013

REF. NO.: 1607-910
ENCL NO.: 11

SOIL PROFILE (m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	SAMPLES NUMBER	TYPE	"N" BLOWS 0.3 m	GROUND WATER CONDITIONS	ELEVATION
145.1 / 0.0	**SILTY CLAY TILL:** trace sand, trace gravel, grey, moist, hard (PP=4.5kpa)(Continued)						
	Saturated sandy gravel layer of 75mm at 11.0m		8	SS	80		146
							145
11.9 / 133.2	**FINE SAND:** trace silt, trace gravel, grey, saturated, very dense		9	SS	50/ 150mm	holeplug W. L. 144.4 m May 07, 2013	144
	very moist, cobbles at 13.7m		10	SS	74/ 275mm	sand	143
142.1 / 3.0						screen	142
14.9 / 130.2	**SILTY CLAY TILL:** trace sand, trace gravel, occasional fine sand saturated layers, grey, moist, hard (PP=4.5kpa)		11	SS	50/ 125mm		141
			12	SS	50/ 100mm	holeplug	
						sandy	
			13	SS	50/ 150mm		138
						screen	

DYNAMIC CONE PENETRATION RESISTANCE PLOT: 20 40 60 80 100
SHEAR STRENGTH (kPa): ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE; 50 100 150 200 250
PLASTIC LIMIT / NATURAL MOISTURE CONTENT / LIQUID LIMIT: W_P W W_L
WATER CONTENT (%): 10 20 30
POCKET PEN. (Cu) (kPa)
NATURAL UNIT WT (Mg/m³)
REMARKS AND GRAIN SIZE DISTRIBUTION (%): GR SA SI CL

Continued Next Page

GROUNDWATER ELEVATIONS
Shallow/ Single Installation ▽ ▼ Deep/Dual Installation ▽ ▼

GRAPH NOTES: + 3, × 3: Numbers refer to Sensitivity; ○ ε=3% Strain at Failure

SPL SOIL LOG - 2 WELLS 1607-910- MULBERRY LOGS - MAY 16.GPJ SPL GDT 16/5/13

SPL Consultants Limited

LOG OF BOREHOLE BH13-8

MW-13-8s/d

PROJECT: Mulberry Lane
CLIENT: Mattamy Homes
PROJECT LOCATION: Pickering, Ontario
DATUM: Geodetic
BH LOCATION: See Borehole Location Plan

DRILLING DATA
Method: Solid Stem Auger
Diameter: 115 mm
Date: Apr/24/2013

REF. NO.: 1607-910
ENCL NO.: 11

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH (kPa) ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE (50 100 150 200 250)	PLASTIC LIMIT w_P — NATURAL MOISTURE CONTENT w — LIQUID LIMIT w_L / WATER CONTENT (%) (10 20 30)	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (Mg/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%)
(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	BLOWS/0.3 m "N"							GR SA SI CL
	SILTY CLAY TILL: trace sand, trace gravel, occasional fine sand saturated layers, grey, moist, hard (PP=4.5kpa)(Continued)		14	SS	70							
							136					
135.3			15	SS	77		sand					
21.8	**END OF BOREHOLE** Notes: 1) Water at 3.9mbgs in borehole upon completion. 2) Cave at 6.4mbgs in borehole upon completion. 3) Monitoring Well installed upon completion. 4) Water Level Records: Date WL (mbgs) May 7/13 12.65											

GROUNDWATER ELEVATIONS
Shallow/ Single Installation ▽ ▼ Deep/Dual Installation ▽ ▼

GRAPH NOTES + 3, × 3: Numbers refer to Sensitivity ○ ε=3% Strain at Failure

SPL SOIL LOG - 2 WELLS 1607-910- MULBERRY LOGS - MAY 16.GPJ SPL.GDT 16/5/13

SPL Consultants Limited
Geotechnical Environmental Materials Hydrogeology

LOG OF BOREHOLE BH13-9

MW-13-9

PROJECT: Mulberry Lane
CLIENT: Mattamy Homes
PROJECT LOCATION: Pickering, Ontario
DATUM: Geodetic
BH LOCATION: See Borehole Location Plan

DRILLING DATA
Method: Solid Stem Auger
Diameter: 115 mm
Date: Apr/24/2013

REF. NO.: 1607-910
ENCL NO.: 12

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" BLOWS 0.3 m	GROUND WATER CONDITIONS	ELEVATION
156.1							
0.0 / 155.8	**TOPSOIL:**300mm, brown		1	SS	7		
0.3 / 154.6	**FILL:** SILTY SAND trace clay, some gravel, brown, wet, very dense						
1.5	**SILTY SAND TILL:** some gravel, trace clay, brown, very moist to wet, very dense		2	SS	50		
			3	SS	80		
			4	SS	110	W. L. 151.5 m May 07, 2013	
150.9							
5.2	**FINE SILTY SAND** : trace gravel, trace clay, brown, very moist to wet, very dense		5	SS	99		
			6	SS	55/ 150mm		
147.7							
8.4	**FINE TO MEDIUM SAND:**trace to some gravel, trace silt, grey, wet, very dense					W. L. 147.2 m May 07, 2013	
			7	SS	93		

DYNAMIC CONE PENETRATION RESISTANCE PLOT: 20 40 60 80 100

SHEAR STRENGTH (kPa): ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE — 50 100 150 200 250

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L

WATER CONTENT (%): 10 20 30

POCKET PEN (Cu) (kPa)

NATURAL UNIT WT (Mg/m³)

REMARKS AND GRAIN SIZE DISTRIBUTION (%) — GR SA SI CL

Continued Next Page

GROUNDWATER ELEVATIONS
Shallow/ Single Installation ▽ ▼ Deep/Dual Installation ▽ ▼

GRAPH NOTES: + 3 , × 3 . Numbers refer to Sensitivity ○ ε=3% Strain at Failure

SPL SOIL LOG - 2 WELLS 1607-910- MULBERRY LOGS - MAY 16.GPJ SPL.GDT 16/5/13

SPL Consultants Limited
Geotechnical Environmental Materials Hydrogeology

MW-13-9

LOG OF BOREHOLE BH13-9

PROJECT: Mulberry Lane
CLIENT: Mattamy Homes
PROJECT LOCATION: Pickering, Ontario
DATUM: Geodetic
BH LOCATION: See Borehole Location Plan

DRILLING DATA
Method: Solid Stem Auger
Diameter: 115 mm
Date: Apr/24/2013

REF. NO.: 1607-910
ENCL NO.: 12

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: "N" BLOWS 0.3 m	GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH (kPa) ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE (50 100 150 200 250)	PLASTIC LIMIT W_P / NATURAL MOISTURE CONTENT W / LIQUID LIMIT W_L / WATER CONTENT (%) (10 20 30)	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (Mg/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
	FINE TO MEDIUM SAND: trace to some gravel, trace silt, grey, wet, very dense (Continued)						146					
			8	SS	70		145					
			9	SS	87		144					
			10	SS	6		143					
			11	SS	-		142					
			12	SS	-		141					
			13	SS	-		140					
137.3							139					
18.8	**END OF BOREHOLE**						138					

Notes:
1) Water at 5.5mbgs in borehole upon completion.
2) Cave at 7.6mbgs in borehole upon completion.
3) Monitoring Well installed upon completion.
4) Water Level Records:

Continued Next Page

GROUNDWATER ELEVATIONS
Shallow/ Single Installation ▽ ▼ Deep/Dual Installation ▽ ▼

GRAPH NOTES: + 3, × 3: Numbers refer to Sensitivity; ○ ε=3% Strain at Failure

SPL SOIL LOG - 2 WELLS 1607-910- MULBERRY LOGS - MAY 16.GPJ SPL.GDT 16/5/13

SPL Consultants Limited
Geotechnical Environmental Materials Hydrogeology

LOG OF BOREHOLE BH13-9

MW-13-9

PROJECT: Mulberry Lane
CLIENT: Mattamy Homes
PROJECT LOCATION: Pickering, Ontario
DATUM: Geodetic
BH LOCATION: See Borehole Location Plan

DRILLING DATA
Method: Solid Stem Auger
Diameter: 115 mm
Date: Apr/24/2013

REF. NO.: 1607-910
ENCL NO.: 12

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH (kPa) ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE (50 100 150 200 250)	PLASTIC LIMIT w_P — NATURAL MOISTURE CONTENT w — LIQUID LIMIT w_L / WATER CONTENT (%) (10 20 30)	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (Mg/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%)
(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" BLOWS 0.3 m							GR SA SI CL
	Date WL (mbgs) May 7/13 4.57											

GROUNDWATER ELEVATIONS
Shallow/ Single Installation ▽ ▼ Deep/Dual Installation ▽ ▼

GRAPH NOTES + 3, × 3: Numbers refer to Sensitivity ○ ε=3% Strain at Failure

SPL SOIL LOG - 2 WELLS 1607-910- MULBERRY LOGS - MAY 16.GPJ SPL.GDT 16/5/13

SPL Consultants Limited
Geotechnical Environmental Materials Hydrogeology

LOG OF BOREHOLE BH13-10

MW-13-10s/d

PROJECT: Mulberry Lane
CLIENT: Mattamy Homes
PROJECT LOCATION: Pickering, Ontario
DATUM: Geodetic
BH LOCATION: See Borehole Location Plan

DRILLING DATA
Method: Solid Stem Auger
Diameter: 115 mm
Date: Apr/24/2013

REF. NO.: 1607-910
ENCL NO.: 13

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" BLOWS 0.3 m	GROUND WATER CONDITIONS	ELEVATION
156.7 / 0.0	**TOPSOIL:** 200mm, brown sandy, trace rootlets, some organics						
156.5 / 0.2	**FILL:** SAND trace silt, brown, moist, very loose		1	SS	2		
155.2 / 1.5	**SANDY SILT TILL TO SILTY SAND TILL:** trace gravel, trace clay to clayey, brown, very moist to wet, compact to dense with occasional oxidization		2	SS	10		
			3	SS	23		
	grey		4	SS	77/ 275mm		
			5	SS	50/ 100mm		
			6	SS	75		
148.3 / 8.4	**MEDIUM SAND:** trace gravel, moist, grey, very dense		7	SS	50/ 125mm		

W. L. 156.7 m
May 07, 2013

DYNAMIC CONE PENETRATION RESISTANCE PLOT
20 40 60 80 100

SHEAR STRENGTH (kPa)
○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE
50 100 150 200 250

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%)
10 20 30

POCKET PEN. (Cu) (kPa)

NATURAL UNIT WT (Mg/m³)

REMARKS AND GRAIN SIZE DISTRIBUTION (%)
GR SA SI CL

Continued Next Page

GROUNDWATER ELEVATIONS
Shallow/ Single Installation ▽ ▼ Deep/Dual Installation ▽ ▼

GRAPH NOTES
+ 3, × 3: Numbers refer to Sensitivity
○ ε=3% Strain at Failure

SPL SOIL LOG - 2 WELLS 1607-910- MULBERRY LOGS - MAY 16 GPJ SPL.GDT 16/5/13

SPL Consultants Limited

LOG OF BOREHOLE BH13-10

MW-13-10s/d

PROJECT: Mulberry Lane
CLIENT: Mattamy Homes
PROJECT LOCATION: Pickering, Ontario
DATUM: Geodetic
BH LOCATION: See Borehole Location Plan

DRILLING DATA
Method: Solid Stem Auger
Diameter: 115 mm
Date: Apr/24/2013

REF. NO.: 1607-910
ENCL NO.: 13

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" BLOWS/0.3 m	GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH (kPa) ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE (50 100 150 200 250)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L / WATER CONTENT (%) (10 20 30)	POCKET PEN (Cu) (kPa)	NATURAL UNIT WT (Mg/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
	MEDIUM SAND: trace gravel, moist, grey, very dense(Continued)											
			8	SS	50/75mm		146		○			
145.3												
11.4	**SILTY SAND TILL:** trace clay, trace gravel, grey, moist, very dense						145					
144.2			9	SS	50/125mm				○			
12.5	**END OF BOREHOLE**											

Notes:
1) Monitoring Well installed upon completion at 7.62 m.
2) Piezometer installed upon completion at 12.19 m.
2) Water Level Records:

Date	50mm	WL (mbgs)
May 7/13		dry

Date	25mm	WL (mbgs)
May 7/13		dry

SPL SOIL LOG - 2 WELLS 1607-910- MULBERRY LOGS - MAY 16.GPJ SPL.GDT 16/5/13

GROUNDWATER ELEVATIONS
Shallow/ Single Installation ▽ ▼ Deep/Dual Installation ▽ ▼

GRAPH NOTES + 3, × 3: Numbers refer to Sensitivity ○ ε=3% Strain at Failure

SPL Consultants Limited
Geotechnical Environmental Materials Hydrogeology

MW-13-201

LOG OF BOREHOLE BH-201

PROJECT: Whitevale Road
CLIENT: Mattamy Homes
PROJECT LOCATION: Pickering, Ontario
DATUM: Geodetic
BH LOCATION: See Borehole Location Plan N 0 E 1

DRILLING DATA
Method: Solid Stem Auger
Diameter: 130 mm
Date: May/02/2012

REF. NO.: 1609-910
ENCL NO.: 4

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" BLOWS/0.3 m	GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT (30 60 90 120 150 180) / SHEAR STRENGTH (kPa) ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE (25 50 75 100 125)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) (10 20 30)	POCKET PEN (Cu) (kPa)	NATURAL UNIT WT (Mg/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
197.2												
0.0 / 196.9	**TOPSOIL:** 300mm, silty, brown, with rootlets and organics, wet, very loose		1	SS	1		stick-up casing					
0.3	**SANDY SILT TILL:** some sand, trace gravel, trace clay to clayey, brown, wet, very loose to dense, with occasional layers of fine saturated sands and occasional cobbles and boulders						196					
			2	SS	45		holeplug					
							195					
194.7												
2.5	**SILT TILL:** some sand, trace gravel and clay, grey, very moist, very dense with occasional cobbles and boulders						194					
			3	SS	50/125mm							
							193					
			4	SS	61	▽	W. L. 192.3 m May 07, 2013					
							192 cutting					
			5	SS	50/100mm		191					
							190					
			6	SS	50/75mm		holeplug					
							sand					
			7	SS	50/50mm		188					

Continued Next Page

GROUNDWATER ELEVATIONS
Shallow/ Single Installation ▽ ▼ Deep/Dual Installation ▽ ▼

GRAPH NOTES: + 3, × 3: Numbers refer to Sensitivity ○ ε=3% Strain at Failure

SPL SOIL LOG 1609-910-WHITEVALE-LOGS - MAY16.GPJ SPL.GDT 16/5/13

SPL Consultants Limited
Geotechnical Environmental Materials Hydrogeology

LOG OF BOREHOLE BH-201

MW-13-201

PROJECT: Whitevale Road
CLIENT: Mattamy Homes
PROJECT LOCATION: Pickering, Ontario
DATUM: Geodetic
BH LOCATION: See Borehole Location Plan N 0 E 1

DRILLING DATA
Method: Solid Stem Auger
Diameter: 130 mm
Date: May/02/2012

REF. NO.: 1609-910
ENCL NO.: 4

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" BLOWS/0.3 m	GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT (30 60 90 120 150 180) / SHEAR STRENGTH (kPa) ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE (25 50 75 100 125)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L / WATER CONTENT (%) (10 20 30)	POCKET PEN (Cu) (kPa)	NATURAL UNIT WT (Mg/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
	SILT TILL: some sand, trace gravel and clay, grey, very moist, very dense with occasional cobbles and boulders(Continued)						187					
							screen					
							186					
184.9			8	SS	50/125mm		185					
12.3	**END OF BOREHOLE** Notes: 1) Water at 6.4mbgs in borehole upon completion. 2) Cave at 9.45mbgs in borehole upon completion. 2) Piezometer installed upon completion. 3) Water Level Records: Date WL (mbgs) May 07/13 4.89											

SPL SOIL LOG 1609-910- WHITEVALE -LOGS - MAY16.GPJ SPL.GDT 16/5/13

GROUNDWATER ELEVATIONS
Shallow/ Single Installation ▽ ▼ Deep/Dual Installation ▽ ▼

GRAPH NOTES + 3, × 3: Numbers refer to Sensitivity; ε 50 =3% Strain at Failure

SPL Consultants Limited

LOG OF BOREHOLE BH-202

MW-13-202

PROJECT: Whitevale Road
CLIENT: Mattamy Homes
PROJECT LOCATION: Pickering, Ontario
DATUM: Geodetic
BH LOCATION: See Borehole Location Plan N 0 E 1

DRILLING DATA
Method: Solid Stem Auger
Diameter: 130 mm
Date: May/02/2012

REF. NO.: 1609-910
ENCL NO.: 5

(m) ELEV / DEPTH	DESCRIPTION	NUMBER	TYPE	"N" BLOWS 0.3 m	ELEVATION
199.6					
0.0 / 199.3	**TOPSOIL:**300mm, silty, brown, with rootlets and organics, wet, very loose	1	SS	1	flushmont
0.3	**SANDY SILT TILL:** some sand, trace gravel, trace clay to clayey, brown to grey, very moist, loose to very dense with occasional fine saturated sand layers, occasional cobbles and boulders				199
	with bluish grey fissures and fissures with iron and oxidization staining	2	SS	43	198
		3	SS	52	197
					holeplug
	grey at 4.6m	4	SS	50/ 150mm	195
					W. L. 194.0 m May 07, 2013
		5	SS	78	193
					sand
		6	SS	80	192
					191
					screen
		7	SS	50/ 125mm	190

DYNAMIC CONE PENETRATION RESISTANCE PLOT: 30 60 90 120 150 180

SHEAR STRENGTH (kPa): ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE — 25 50 75 100 125

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L

WATER CONTENT (%): 10 20 30

POCKET PEN (Cu) (kPa)

NATURAL UNIT WT (Mg/m³)

REMARKS AND GRAIN SIZE DISTRIBUTION (%) — GR SA SI CL

Continued Next Page

GROUNDWATER ELEVATIONS

Shallow/ Single Installation ▽ ▼ Deep/Dual Installation ▽ ▼

GRAPH NOTES: + 3, × 3. Numbers refer to Sensitivity ○ ε=3% Strain at Failure

SPL SOIL LOG 1609-910- WHITEVALE -LOGS - MAY16.GPJ SPL.GDT 16/5/13

SPL Consultants Limited

Geotechnical Environmental Materials Hydrogeology

LOG OF BOREHOLE BH-202

MW-13-202

PROJECT: Whitevale Road	DRILLING DATA	
CLIENT: Mattamy Homes	Method: Solid Stem Auger	
PROJECT LOCATION: Pickering, Ontario	Diameter: 130 mm	REF. NO.: 1609-910
DATUM: Geodetic	Date: May/02/2012	ENCL NO.: 5
BH LOCATION: See Borehole Location Plan N 0 E 1		

(m) ELEV DEPTH	SOIL PROFILE: DESCRIPTION	STRATA PLOT	SAMPLES: NUMBER	TYPE	"N" BLOWS/0.3 m	GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT (30 60 90 120 150 180); SHEAR STRENGTH (kPa) ○ UNCONFINED + FIELD VANE & Sensitivity ● QUICK TRIAXIAL × LAB VANE (25 50 75 100 125)	PLASTIC LIMIT W_P / NATURAL MOISTURE CONTENT W / LIQUID LIMIT W_L; WATER CONTENT (%) (10 20 30)	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (Mg/m^3)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
189.2 10.4	**END OF BOREHOLE** Notes: 1) Water at 3.05m bgs in borehole upon completion. 2) Cave at 5.18m bgs in borehole upon completion. 3) Piezometer installed upon completion. 4) Water Level Records: Date WL (mbgs) May 7/13 5.60											

GROUNDWATER ELEVATIONS

Shallow/ Single Installation ▽ ▼ Deep/Dual Installation ▼ ▽

GRAPH NOTES: + 3, × 3: Numbers refer to Sensitivity; ○ ε=3% Strain at Failure

SPL SOIL LOG 1609-910- WHITEVALE -LOGS - MAY16.GPJ SPL.GDT 16/5/13

SPL Consultants Limited

LOG OF BOREHOLE BH-203

MW-13-203

PROJECT: Whitevale Road
CLIENT: Mattamy Homes
PROJECT LOCATION: Pickering, Ontario
DATUM: Geodetic
BH LOCATION: See Borehole Location Plan N 0 E 1

DRILLING DATA
Method: Solid Stem Auger
Diameter: 130 mm
Date: May/02/2012

REF. NO.: 1609-910
ENCL NO.: 6

(m) ELEV / DEPTH	DESCRIPTION	NUMBER	TYPE	BLOWS 0.3 m "N"	ELEVATION
195.9					
0.0 / 195.6	**TOPSOIL:** 300mm, silty, brown, with rootlets and organics, wet, very loose	1	SS	1	stick-up casing
0.3 / 195.1	**SILT:** some sand, trace gravel, trace clay, brown, wet, very loose				
0.8	**SANDY SILT TILL:** some sand, trace to some gravel, trace clay to clayey, brown to grey, very moist, dense to very dense with occasional cobbles and boulders and with occasional oxidization and iron staining in fissures	2A	SS	46	195
		2B	SS	50/ 125mm	holeplug
					194
					193
	grey	3	SS	50/ 125mm	
					192
		4	SS	75	W. L. 191.1 m May 07, 2013
					cutting
					190
		5	SS	50/ 125mm	
					189
		6	SS	50/ 150mm	
					188
					holeplug
					187
		7	SS	50	sand
					186

DYNAMIC CONE PENETRATION RESISTANCE PLOT: 30 60 90 120 150 180

SHEAR STRENGTH (kPa): ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE; 25 50 75 100 125

PLASTIC LIMIT w_P — NATURAL MOISTURE CONTENT w — LIQUID LIMIT w_L

WATER CONTENT (%): 10 20 30

POCKET PEN (Cu) (kPa)

NATURAL UNIT WT (Mg/m³)

REMARKS AND GRAIN SIZE DISTRIBUTION (%) — GR SA SI CL

Continued Next Page

GROUNDWATER ELEVATIONS
Shallow/ Single Installation ▽ ▼ Deep/Dual Installation ▽ ▼

GRAPH NOTES: + 3, × 3: Numbers refer to Sensitivity; ○ ε=3% Strain at Failure

SPL SOIL LOG 1609-910- WHITEVALE -LOGS - MAY16.GPJ SPL.GDT 16/5/13

SPL Consultants Limited
Geotechnical Environmental Materials Hydrogeology

MW-13-203

LOG OF BOREHOLE BH-203

PROJECT: Whitevale Road
CLIENT: Mattamy Homes
PROJECT LOCATION: Pickering, Ontario
DATUM: Geodetic
BH LOCATION: See Borehole Location Plan N 0 E 1

DRILLING DATA
Method: Solid Stem Auger
Diameter: 130 mm
Date: May/02/2012

REF. NO.: 1609-910
ENCL NO.: 6

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: "N" BLOWS/0.3 m	GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT (30 60 90 120 150 180) / SHEAR STRENGTH (kPa) ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE (25 50 75 100 125)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L / WATER CONTENT (%) (10 20 30)	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (Mg/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
	SANDY SILT TILL: some sand, trace to some gravel, trace clay to clayey, brown to grey, very moist, dense to very dense with occasional cobbles and boulders and with occasional oxidization and iron staining in fissures(Continued)						185 screen					
							184					
183.3			9	SS	99/ 280mm							
12.6	**END OF BOREHOLE** Notes: 1) Water at 7.62mbgs in borehole upon completion. 2) Piezometer installed upon completion. 3) Water Level Records: Date WL (mbgs) May 7, 2013 4.80											

SPL SOIL LOG 1609-910- WHITEVALE -LOGS - MAY16.GPJ SPL.GDT 16/5/13

GROUNDWATER ELEVATIONS
Shallow/ Single Installation ▽ ▼ Deep/Dual Installation ▽ ▼

GRAPH NOTES + 3, × 3, Numbers refer to Sensitivity ○ ε=3% Strain at Failure

SPL Consultants Limited

LOG OF BOREHOLE BH-204

MW-13-204

PROJECT: Whitevale Road
CLIENT: Mattamy Homes
PROJECT LOCATION: Pickering, Ontario
DATUM: Geodetic
BH LOCATION: See Borehole Location Plan N 0 E 1

DRILLING DATA
Method: Solid Stem Auger
Diameter: 130mm
Date: Apr/29/2013

REF. NO.: 1609-910
ENCL NO.: 7

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	SAMPLES NUMBER	TYPE	"N" BLOWS 0.3 m	GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT (30 60 90 120 150) / SHEAR STRENGTH (kPa) ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE (25 50 75 100 125)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) (10 20 30)	POCKET PEN (Cu) (kPa)	NATURAL UNIT WT (Mg/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
197.7												
0.0 / 197.4	**TOPSOIL:** 300mm, silty, brown, with rootlets and organics, wet, very loose						stick-up casing					
0.3	**SILTY SAND TILL TO SANDY SILT TILL:** trace gravel, trace clay to clayey, brown to grey, very moist, very dense with occasional cobbles and boulders						197					
			1	SS	50/ 125mm		196		○			
							195 holeplug					
			2	SS	50/ 125mm				○			
							194					
			3	SS	50/ 100mm		193		○			
	grey						192 sand					
			4	SS	50/ 125mm				○			
							191					
			5	SS	50/ 125mm		190 screen		○			
							189					
			6	SS	50/ 100mm		W. L. 188.7 m May 07, 2013		○			
							188					

Continued Next Page

GROUNDWATER ELEVATIONS
Shallow/ Single Installation ▽ ▼ Deep/Dual Installation ▽ ▼

GRAPH NOTES: + 3, × 3: Numbers refer to Sensitivity; ○ ε=3% Strain at Failure

SPL SOIL LOG 1609-910- WHITEVALE -LOGS - MAY16.GPJ SPL.GDT 16/5/13

SPL Consultants Limited

LOG OF BOREHOLE BH-204

MW-13-204

PROJECT: Whitevale Road
CLIENT: Mattamy Homes
PROJECT LOCATION: Pickering, Ontario
DATUM: Geodetic
BH LOCATION: See Borehole Location Plan N 0 E 1

DRILLING DATA
Method: Solid Stem Auger
Diameter: 130mm
Date: Apr/29/2013

REF. NO.: 1609-910
ENCL NO.: 7

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: "N" BLOWS 0.3 m	GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT (30 60 90 120 150) / SHEAR STRENGTH (kPa) ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE (25 50 75 100 125)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) (10 20 30)	POCKET PEN (Cu) (kPa)	NATURAL UNIT WT (Mg/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
	SILTY SAND TILL TO SANDY SILT TILL: trace gravel, trace clay to clayey, brown to grey, very moist, very dense with occasional cobbles and boulders(Continued)		7	SS	50/ 75mm		cave-in		○			
185.4							186					
12.3	**END OF BOREHOLE**		8	SS	50/ 100mm				○			

Notes:
1) Water at 9.1mbgs in borehole upon completion.
2) Cave at 9.1mbgs in borehole upon completion.
2) Piezometer installed upon completion.
3) Water Level Records:

Date	WL (mbgs)
May 7, 2013	9.0

SPL SOIL LOG 1609-910- WHITEVALE -LOGS - MAY16.GPJ SPL.GDT 16/5/13

GROUNDWATER ELEVATIONS
Shallow/ Single Installation ▽ ▼ Deep/Dual Installation ▽ ▼

GRAPH NOTES + 3, × 3: Numbers refer to Sensitivity ○ ε=3% Strain at Failure

SPL Consultants Limited

MW-13-209

LOG OF BOREHOLE BH13-209

PROJECT: Whitevale Road
CLIENT: Mattamy Homes
PROJECT LOCATION: Pickering, Ontario
DATUM: Geodetic
BH LOCATION: See Borehole Location Plan N 0 E 1

DRILLING DATA
Method: Hollow Stem Auger
Diameter: 200 mm
Date: Apr/29/2013

REF. NO.: 1609-910
ENCL NO.: 8

SOIL PROFILE (m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	SAMPLES NUMBER	TYPE	"N" BLOWS 0.3 m	GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT 30 60 90 120 150 180 / SHEAR STRENGTH (kPa) ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE 25 50 75 100 125	PLASTIC LIMIT W_P / NATURAL MOISTURE CONTENT W / LIQUID LIMIT W_L / WATER CONTENT (%) 10 20 30	POCKET PEN (Cu) (kPa)	NATURAL UNIT WT (Mg/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
186.6											
0.0 / 186.0	**TOPSOIL:**600mm, silty, brown, with rootlets and organics, wet, very loose		1	SS	2		stick-up casing				
0.6	**SANDY SILT TILL:** trace clay to clayey, trace to some gravel, brown to grey, moist to very moist, dense to very dense		2	SS	33		186 185 holeplug				
	grey at 3.1		3	SS	57		184 183				
			4	SS	54		182 181				
			5	SS	49		cutting 180				
			6	SS	56		W. L. 179.3 m May 07, 2013 179				
			7	SS	64		178 177				

Continued Next Page

GROUNDWATER ELEVATIONS
Shallow/ Single Installation ▽ ▼ Deep/Dual Installation ▽ ▼

GRAPH NOTES: + 3, × 3: Numbers refer to Sensitivity ○ ε=3% Strain at Failure

SPL SOIL LOG 1609-910- WHITEVALE -LOGS - MAY16.GPJ SPL.GDT 16/5/13

SPL Consultants Limited

LOG OF BOREHOLE BH13-209

MW-13-209

PROJECT: Whitevale Road
CLIENT: Mattamy Homes
PROJECT LOCATION: Pickering, Ontario
DATUM: Geodetic
BH LOCATION: See Borehole Location Plan N 0 E 1

DRILLING DATA
Method: Hollow Stem Auger
Diameter: 200 mm
Date: Apr/29/2013

REF. NO.: 1609-910
ENCL NO.: 8

(m) ELEV DEPTH	SOIL PROFILE DESCRIPTION	SAMPLE NUMBER	TYPE	"N" BLOWS/0.3 m	GROUND WATER CONDITIONS	ELEVATION	NATURAL MOISTURE CONTENT W (%)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
	SANDY SILT TILL: trace clay to clayey, trace to some gravel, brown to grey, moist to very moist, dense to very dense(Continued)					176		
					holeplug			
						175		
					sand			
		8	SS	53		174	○ (~7)	
						173		
					screen			
						172		
171.1		9	SS	50/100mm	sand		○ (~7)	
15.5	**END OF BOREHOLE**							

Notes:
1) Water at 1.8mbgs in borehole upon completion.
2) Piezometer installed upon completion.
3) Water Level Records:

Date	WL (mbgs)
May 7, 2013	7.27

DYNAMIC CONE PENETRATION RESISTANCE PLOT: 30 60 90 120 150 180
SHEAR STRENGTH (kPa): ○ UNCONFINED + FIELD VANE & Sensitivity ● QUICK TRIAXIAL × LAB VANE; 25 50 75 100 125
PLASTIC LIMIT W_P, NATURAL MOISTURE CONTENT W, LIQUID LIMIT W_L; WATER CONTENT (%) 10 20 30
POCKET PEN (Cu) (kPa); NATURAL UNIT WT (Mg/m³)

GROUNDWATER ELEVATIONS
Shallow/ Single Installation ▽ ▼ Deep/Dual Installation ▼ ▽

GRAPH NOTES: +3, ×3: Numbers refer to Sensitivity; ○ ε=3% Strain at Failure

SPL Consultants Limited
Geotechnical Environmental Materials Hydrogeology

LOG OF BOREHOLE BH13-210

MW-13-210

PROJECT: Whitevale Road
CLIENT: Mattamy Homes
PROJECT LOCATION: Pickering, Ontario
DATUM: Geodetic
BH LOCATION: See Borehole Location Plan N 0 E 1

DRILLING DATA
Method: Hollow Stem Auger
Diameter: 200 mm
Date: Apr/27/2013

REF. NO.: 1609-910
ENCL NO.: 9

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" BLOWS 0.3 m	GROUND WATER CONDITIONS	ELEVATION
181.9							
0.0 / 181.6	**TOPSOIL:** 300mm, silt, with some organics, rootlets, dark brown, moist		1	SS	3		
0.3	**FILL:** clayey silt trace sand, trace gravel, some rootlets and organics, brown, very moist to wet, soft to stiff						holeplug
180.1			2	SS	12		180
1.8	**SANDY SILT TILL:** trace clay to clayey, trace gravel, brown to grey, very moist, compact to very dense						179
	greyish brown at 3.1m		3	SS	62		178
							cutting
			4	SS	71		177
	grey at 5.6m						176
			5	SS	65		175
			6	SS	50/ 125mm		174
							holeplug
							sand 173
			7	SS	50/ 150mm		172

DYNAMIC CONE PENETRATION RESISTANCE PLOT
30 60 90 120 150 180

SHEAR STRENGTH (kPa)
○ UNCONFINED + FIELD VANE & Sensitivity
● QUICK TRIAXIAL × LAB VANE
25 50 75 100 125

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%)
10 20 30

POCKET PEN. (Cu) (kPa)

NATURAL UNIT WT (Mg/m³)

REMARKS AND GRAIN SIZE DISTRIBUTION (%)
GR SA SI CL

SPL SOIL LOG 1609-910- WHITEVALE -LOGS - MAY16.GPJ SPL.GDT 16/5/13

Continued Next Page

GROUNDWATER ELEVATIONS
Shallow/ Single Installation ▽ ▼ Deep/Dual Installation ▽ ▼

GRAPH NOTES
+ 3, × 3: Numbers refer to Sensitivity
○ ε=3% Strain at Failure

SPL Consultants Limited

MW-13-210

LOG OF BOREHOLE BH13-210

PROJECT: Whitevale Road
CLIENT: Mattamy Homes
PROJECT LOCATION: Pickering, Ontario
DATUM: Geodetic
BH LOCATION: See Borehole Location Plan N 0 E 1

DRILLING DATA
Method: Hollow Stem Auger
Diameter: 200 mm
Date: Apr/27/2013

REF. NO.: 1609-910
ENCL NO.: 9

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: "N" BLOWS/0.3 m	GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT (30 60 90 120 150 180) / SHEAR STRENGTH (kPa) (25 50 75 100 125): ○ UNCONFINED, ● QUICK TRIAXIAL, + FIELD VANE & Sensitivity, × LAB VANE	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L — WATER CONTENT (%) (10 20 30)	POCKET PEN (Cu) (kPa)	NATURAL UNIT WT (Mg/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
	SANDY SILT TILL: trace clay to clayey, trace gravel, brown to grey, very moist, compact to very dense(Continued)						screen				
							171				
							W. L. 170.5 m May 07, 2013				
							170				
169.2			8	SS	59		sand	○			
12.7	**END OF BOREHOLE** Notes: 1) Water at 9.8m bgs in borehole upon completion. 2) Monitoring Well installed upon completion. 3) Water Level Records: Date WL (mbgs) May 7, 2013 11.43										

SPL SOIL LOG 1609-910- WHITEVALE -LOGS - MAY16.GPJ SPL.GDT 16/5/13

GROUNDWATER ELEVATIONS
Shallow/ Single Installation ▽ ▼ Deep/Dual Installation ▼ ▼

GRAPH NOTES + 3, × 3. Numbers refer to Sensitivity ○ ε=3% Strain at Failure

SPL Consultants Limited
Geotechnical Environmental Materials Hydrogeology

MW-13-211

LOG OF BOREHOLE BH13-211

PROJECT: Whitevale Road
CLIENT: Mattamy Homes
PROJECT LOCATION: Pickering, Ontario
DATUM: Geodetic
BH LOCATION: See Borehole Location Plan N 0 E 1

DRILLING DATA
Method: Hollow Stem Auger
Diameter: 200 mm
Date: Apr/26/2013

REF. NO.: 1609-910
ENCL NO.: 10

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" BLOWS 0.3 m	GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT (30 60 90 120 150 180) / SHEAR STRENGTH (kPa) (25 50 75 100 125) ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) (10 20 30)	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (Mg/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
181.4												
0.0 / 181.1	**TOPSOIL:**300mm, sandy, dark brown		1	SS	3		181					
0.3 / 180.5	**FILL:** clayey silt, brown, wet, soft											
0.9	**SANDY SILT TILL:** trace to some gravel, trace clay to clayey, brown to grey, moist, dense to very dense		2	SS	38		180					
								holeplug				
						▽		W. L. 179.1 m May 07, 2013				
	brown/grey at 3.1m		3	SS	32		178					
			4	SS	40		177					
							176					
			5	SS	42		175					
	grey at 7.6m		6	SS	50/ 150mm		174					
								cutting				
			7	SS	62		172					

Continued Next Page

GROUNDWATER ELEVATIONS
Shallow/ Single Installation ▽ ▼ Deep/Dual Installation ▽ ▼

GRAPH NOTES: + 3, × 3, Numbers refer to Sensitivity; C ε=3% Strain at Failure

SPL SOIL LOG 1609-910- WHITEVALE -LOGS - MAY16.GPJ SPL.GDT 16/5/13

SPL Consultants Limited

MW-13-211

LOG OF BOREHOLE BH13-211

PROJECT: Whitevale Road
CLIENT: Mattamy Homes
PROJECT LOCATION: Pickering, Ontario
DATUM: Geodetic
BH LOCATION: See Borehole Location Plan N 0 E 1

DRILLING DATA
Method: Hollow Stem Auger
Diameter: 200 mm
Date: Apr/26/2013

REF. NO.: 1609-910
ENCL NO.: 10

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	SAMPLES: NUMBER	TYPE	"N" BLOWS/0.3 m	GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT (30 60 90 120 150 180) / SHEAR STRENGTH (kPa) ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE (25 50 75 100 125)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) (10 20 30)	POCKET PEN (Cu) (kPa)	NATURAL UNIT WT (Mg/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
	SANDY SILT TILL: trace to some gravel, trace clay to clayey, brown to grey, moist, dense to very dense(Continued)						171					
			8	SS	74		170		○			
			9	SS	38		169		○			
							168					
							holeplug					
							167					
							sand					
			10	SS	60		166		○			
							165					
							screen					
			11	SS	50/150mm		164		○			
162.8			12	SS	50/150mm		163 sand		○			
18.6	**END OF BOREHOLE** Notes: 1) Water at 7.0mbgs in borehole upon completion. 2)Piezometer installed upon completion. 3) Water Level Records: Date WL (mbgs) May 7, 2013 2.31											

SPL SOIL LOG 1609-910- WHITEVALE -LOGS - MAY16.GPJ SPL.GDT 16/5/13

GROUNDWATER ELEVATIONS
Shallow/ Single Installation ▽ ▼ Deep/Dual Installation ▽ ▼

GRAPH NOTES + 3, × 3, Numbers refer to Sensitivity ○ ε=3% Strain at Failure

SPL Consultants Limited
Geotechnical Environmental Materials Hydrogeology

LOG OF BOREHOLE BH13-212

MW-13-212

PROJECT: Whitevale Road
CLIENT: Mattamy Homes
PROJECT LOCATION: Pickering, Ontario
DATUM: Geodetic
BH LOCATION: See Borehole Location Plan N 0 E 1

DRILLING DATA
Method: Hollow Stem Auger
Diameter: 200 mm
Date: Apr/29/2013

REF. NO.: 1609-910
ENCL NO.: 11

ELEV / DEPTH (m)	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" BLOWS/0.3 m	GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT (30 60 90 120 150 180) / SHEAR STRENGTH (kPa) ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE (25 50 75 100 125)	PLASTIC LIMIT W_P / NATURAL MOISTURE CONTENT W / LIQUID LIMIT W_L / WATER CONTENT (%) (10 20 30)	POCKET PEN (Cu) (kPa)	NATURAL UNIT WT (Mg/m^3)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
169.0												
0.0 / 168.8	**TOPSOIL:**2000mm											
0.2 / 168.1	**FILL:** sandy silt, trace gravel, trace rootlets, dark brown to brown, moist, loose		1	SS	8							
0.9	**SANDY SILT TO SILTY SAND TILL:** some gravel, trace clay to clayey, brown, moist, loose to very dense		2	SS	5		holeplug					
			3	SS	63		167					
			4	SS	66							
			5	SS	75		166					
							165					
			6	SS	72	▽	W. L. 164.5 m May 07, 2013					
							164					
							163					
			7	SS	50/150mm							
							162					
			8	SS	50/150mm		161 holeplug					
160.6												
8.4	**COARSE SAND & GRAVEL:**brown, moist, very dense						sand					
			9	SS	50/150mm		160					

Continued Next Page

GROUNDWATER ELEVATIONS
Shallow/ Single Installation ▽ ▼ Deep/Dual Installation ▽ ▼

GRAPH NOTES: + 3, × 3: Numbers refer to Sensitivity; ○ ε=3% Strain at Failure

SPL SOIL LOG 1609-910- WHITEVALE -LOGS - MAY16.GPJ SPL.GDT 16/5/13

MW-13-212

SPL Consultants Limited

LOG OF BOREHOLE BH13-212

PROJECT: Whitevale Road
CLIENT: Mattamy Homes
PROJECT LOCATION: Pickering, Ontario
DATUM: Geodetic
BH LOCATION: See Borehole Location Plan N 0 E 1

DRILLING DATA
Method: Hollow Stem Auger
Diameter: 200 mm
Date: Apr/29/2013

REF. NO.: 1609-910
ENCL NO.: 11

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" BLOWS 0.3 m	GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT (30 60 90 120 150 180) / SHEAR STRENGTH (kPa) ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE (25 50 75 100 125)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L / WATER CONTENT (%) (10 20 30)	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (Mg/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
158.3	**COARSE SAND & GRAVEL:** brown, moist, very dense (Continued)											
10.7	**FINE SANDY SILT:** grey, wet, very dense						screen					
							158					
							157					
156.5			10		50/ 150mm		sand					
12.5	**END OF BOREHOLE** Notes: 1) Water at 10.7mbgs in borehole upon completion. 2) Piezometer installed upon completion. 3) Water Level Records: Date WL (mbgs) May 7, 2013 4.49											

SPL SOIL LOG 1609-910- WHITEVALE -LOGS - MAY16.GPJ SPL.GDT 16/5/13

GROUNDWATER ELEVATIONS
Shallow/ Single Installation ▽ ▼ Deep/Dual Installation ▼ ▼

GRAPH NOTES + 3, × 3: Numbers refer to Sensitivity ○ ε=3% Strain at Failure

SPL Consultants Limited

MW-13-213

LOG OF BOREHOLE BH13-213

PROJECT: Whitevale Road
CLIENT: Mattamy Homes
PROJECT LOCATION: Pickering, Ontario
DATUM: Geodetic
BH LOCATION: See Borehole Location Plan N 0 E 1

DRILLING DATA
Method: Solid Stem Auger
Diameter: 130 mm
Date: Apr/30/2013

REF. NO.: 1609-910
ENCL NO.: 12

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT (30 60 90 120 150) / SHEAR STRENGTH (kPa) (50 75 100 125)	PLASTIC LIMIT / NATURAL MOISTURE CONTENT / LIQUID LIMIT	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (Mg/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%)
(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" BLOWS 0.3 m							GR SA SI CL
162.0 0.0	**TOPSOIL:** 150mm											
161.8 0.2	**FILL:** silt with some sand, trace clay, trace gravel, wet to moist, brown, loose		1	SS	5							
161.1 0.9	**SANDY SILT TILL:** trace clay to clayey, trace gravel, brown, very moist, occasional oxidation and fissures, compact to very dense		2	SS	26		holeplug					
			3	SS	80							
157.1 4.9	**SAND:** medium to fine, some silt, containing cobbles, brown to grey, moist to very moist, brown to grey, very dense to coimpact		4	SS	50/ 125mm							
	grey at 6.3m		5	SS	92		cave-in screen					
			6	SS	50/ 125mm							
			7	SS	12							

Continued Next Page

GROUNDWATER ELEVATIONS
Shallow/ Single Installation ▽ ▼ Deep/Dual Installation ▽ ▼

GRAPH NOTES: $+^3$, $\times^3$: Numbers refer to Sensitivity; ○ ε=3% Strain at Failure

SPL SOIL LOG 1609-910- WHITEVALE -LOGS - MAY16.GPJ SPL.GDT 16/5/13

SPL Consultants Limited

LOG OF BOREHOLE BH13-213

MW-13-213

PROJECT: Whitevale Road
CLIENT: Mattamy Homes
PROJECT LOCATION: Pickering, Ontario
DATUM: Geodetic
BH LOCATION: See Borehole Location Plan N 0 E 1

DRILLING DATA
Method: Solid Stem Auger
Diameter: 130 mm
Date: Apr/30/2013

REF. NO.: 1609-910
ENCL NO.: 12

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" BLOWS 0.3 m	GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT 30 60 90 120 150 180 / SHEAR STRENGTH (kPa) ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE 25 50 75 100 125	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L / WATER CONTENT (%) 10 20 30	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (Mg/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
	SAND: medium to fine, some silt, containing cobbles, brown to grey, moist to very moist, brown to grey, very dense to coimpact(Continued)											
			8	SS	28		cave-in 151		○			
							150					
149.3			9	SS	31				○			
12.7	**END OF BOREHOLE** Note: 1) Water at 5.2mbgs in borehole upon completion. 2) Piezometer installed upon completion. 3) Water Level Records: Date WL May 7, 2013 0.35m above ground surface											

SPL SOIL LOG 1609-910-WHITEVALE-LOGS-MAY16.GPJ SPL.GDT 16/5/13

GROUNDWATER ELEVATIONS
Shallow/ Single Installation ▽ ▼ Deep/Dual Installation ▽ ▼

GRAPH NOTES + 3, × 3: Numbers refer to Sensitivity ○ ε=3% Strain at Failure

SPL Consultants Limited

MW-13-214

LOG OF BOREHOLE BH13-214

PROJECT: Whitevale Road
CLIENT: Mattamy Homes
PROJECT LOCATION: Pickering, Ontario
DATUM: Geodetic
BH LOCATION: See Borehole Location Plan N 0 E 1

DRILLING DATA
Method: Solid Stem Auger
Diameter: 130mm
Date: Apr/26/2013

REF. NO.: 1609-910
ENCL NO.: 13

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" BLOWS 0.3 m	GROUND WATER CONDITIONS	ELEVATION
178.4 / 0.0	**TOPSOIL:** 150mm, brown sand						
178.2 / 0.2	**SILTY SAND :** trace clay, trace gravel, brown, wet, loose		1	SS	4		178
			2	SS	9	W. L. 176.4 m May 07, 2013	177
175.7 / 2.7	**SILTY SAND TILL:** trace clay, some gravel, brown, wet, dense to very dense		3	SS	38		176
			4	SS	50/ 100mm		175
173.1 / 5.3	**SAND & GRAVEL:** trace silt, brown, wet, very dense		5	SS	65		174
			6	SS	50/ 150mm		173
170.0 / 8.4	**SANDY SILT TILL TO SILTY SAND TILL:** trace clay to clayey, trace to some gravel, brown to grey, wet, very dense		7	SS	50/ 125mm		172
							171
							170
							169

DYNAMIC CONE PENETRATION RESISTANCE PLOT: 30 60 90 120 150

SHEAR STRENGTH (kPa): ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE; 25 50 75 100 125

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L

WATER CONTENT (%): 10 20 30

POCKET PEN (Cu) (kPa)

NATURAL UNIT WT (Mg/m³)

REMARKS AND GRAIN SIZE DISTRIBUTION (%): GR SA SI CL

sand

screen

SPL SOIL LOG 1609-910- WHITEVALE -LOGS - MAY16.GPJ SPL.GDT 16/5/13

Continued Next Page

GROUNDWATER ELEVATIONS

Shallow/ Single Installation ▽ ▼ Deep/Dual Installation ▽ ▼

GRAPH NOTES: $+^3$, $\times^3$: Numbers refer to Sensitivity; ○ ε=3% Strain at Failure

SPL Consultants Limited
Geotechnical Environmental Materials Hydrogeology

LOG OF BOREHOLE BH13-214

MW-13-214

PROJECT: Whitevale Road
CLIENT: Mattamy Homes
PROJECT LOCATION: Pickering, Ontario
DATUM: Geodetic
BH LOCATION: See Borehole Location Plan N 0 E 1

DRILLING DATA
Method: Solid Stem Auger
Diameter: 130mm
Date: Apr/26/2013

REF. NO.: 1609-910
ENCL NO.: 13

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	SAMPLES: NUMBER	TYPE	"N" BLOWS/0.3m	GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT (30 60 90 120 150 180) / SHEAR STRENGTH (kPa) ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE (25 50 75 100 125)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L / WATER CONTENT (%) (10 20 30)	POCKET PEN (Cu) (kPa)	NATURAL UNIT WT (Mg/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
	SANDY SILT TILL TO SILTY SAND TILL: trace clay to clayey, trace to some gravel, brown to grey, wet, very dense(Continued)		8	SS	50/125mm		168					
							167					
	grey at 12.2m		9	SS	50/125mm		166					
							165					
								cuttings				
							164					
			10	SS	50/100mm		163					
							162					
							161					
160.0			11	SS	50/100mm							
18.4	**END OF BOREHOLE** Notes: 1) Water at 3.1mbgs in borehole upon completion. 2) Piezometer installed upon completion. 3) Water Level Records: Date WL (mbgs) May 7,2013 2.0											

SPL SOIL LOG 1609-910- WHITEVALE -LOGS - MAY16.GPJ SPL.GDT 16/5/13

GROUNDWATER ELEVATIONS
Shallow/ Single Installation ▽ ▼ Deep/Dual Installation ▽ ▼

GRAPH NOTES + 3, × 3: Numbers refer to Sensitivity ○ ε=3% Strain at Failure

SPL Consultants Limited

LOG OF BOREHOLE BH-215

MW-13-215

PROJECT: Whitevale Road
CLIENT: Mattamy Homes
PROJECT LOCATION: Pickering, Ontario
DATUM: Geodetic
BH LOCATION: See Borehole Location Plan N 0 E 1

DRILLING DATA
Method: Solid Stem Auger
Diameter: 130mm
Date: Apr/26/2013

REF. NO.: 1609-910
ENCL NO.: 14

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" BLOWS 0.3 m	GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT (30 60 90 120 150 180) / SHEAR STRENGTH (kPa) ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE (25 50 75 100 125)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L / WATER CONTENT (%) (10 20 30)	POCKET PEN (Cu) (kPa)	NATURAL UNIT WT (Mg/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0												
0.0 / 0.2	**TOPSOIL:** 250mm, silty, brown, with rootlets and organics, wet, very loose		1	SS	4							
0.2	**CLAYEY SILT:** some sand, brown, wet, soft											
1.5							holeplug					
1.5	**SANDY SILT TILL:** trace clay to clayey, trace gravel, brown, moist to wet, dense to very dense with occasional boulders and cobbles and occasional iron staining in fissures		2	SS	36							
			3	SS	77		cutting					
			4	SS	50/ 125mm							
			5	SS	50/ 150mm		holeplug					
7.7												
7.7	**SAND & GRAVEL:** trace silt, brown, moist, very dense		6	SS	50/ 150mm		sand					
	grey		7	SS	50/ 150mm		W. L. 8.5 m May 07, 2013 screen					

Continued Next Page

GROUNDWATER ELEVATIONS
Shallow/ Single Installation ▽ ▼ Deep/Dual Installation ▽ ▼

GRAPH NOTES: + 3, × 3: Numbers refer to Sensitivity; ○ ε=3% Strain at Failure

SPL SOIL LOG 1609-910- WHITEVALE -LOGS - MAY16.GPJ SPL.GDT 16/5/13

SPL Consultants Limited

LOG OF BOREHOLE BH-215

MW-13-215

PROJECT: Whitevale Road
CLIENT: Mattamy Homes
PROJECT LOCATION: Pickering, Ontario
DATUM: Geodetic
BH LOCATION: See Borehole Location Plan N 0 E 1

DRILLING DATA
Method: Solid Stem Auger
Diameter: 130mm
Date: Apr/26/2013

REF. NO.: 1609-910
ENCL NO.: 14

SOIL PROFILE (m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	SAMPLES NUMBER	TYPE	"N" BLOWS 0.3 m	GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT 30 60 90 120 150 180 / SHEAR STRENGTH (kPa) ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE 25 50 75 100 125	PLASTIC LIMIT w_P — NATURAL MOISTURE CONTENT w — LIQUID LIMIT w_L / WATER CONTENT (%) 10 20 30	POCKET PEN (Cu) (kPa)	NATURAL UNIT WT (Mg/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
	SAND & GRAVEL: trace silt, brown, moist, very dense(Continued)										
11.4											
11.4	**SILTY FINE SAND:** grey,wet, very dense						cave-in				
12.5			8	SS	50/ 100mm				○		
12.5	**END OF BOREHOLE** Notes: 1) No free water in borehole upon completion. 2) No cave in borehole upon completion. 2) Piezometer installed upon completion. 3) Water Level Records: Date WL (mbgs) May 7, 2013 8.47										

SPL SOIL LOG 1609-910- WHITEVALE -LOGS - MAY16.GPJ SPL.GDT 16/5/13

GROUNDWATER ELEVATIONS
Shallow/ Single Installation ▽ ▼ Deep/Dual Installation ▽ ▼

GRAPH NOTES + 3, × 3, Numbers refer to Sensitivity ○ ε=3% Strain at Failure

SPL Consultants Limited

MW-13-216

LOG OF BOREHOLE BH-216

PROJECT: Whitevale Road
CLIENT: Mattamy Homes
PROJECT LOCATION: Pickering, Ontario
DATUM: Geodetic
BH LOCATION: See Borehole Location Plan N 0 E 1

DRILLING DATA
Method: Solid Stem Auger
Diameter: 130mm
Date: Apr/26/2013

REF. NO.: 1609-910
ENCL NO.: 15

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" BLOWS 0.3 m	GROUND WATER CONDITIONS	ELEVATION
173.2							173
0.0 / 172.9	**TOPSOIL:**230mm, silty, brown, with rootlets and organics, wet, very loose		1	SS	3		
0.2	**CLAYEY SILT:** some sand, brown, wet, soft to stiff						172
171.6							
1.5	**SANDY SILT TILL:** trace clay to clayey, trace to some gravel, brown to grey, moist to wet, compact to very dense with occasional boulders and cobbles and occasional iron staining in fissures		2	SS	14		holeplug
							171
			3	SS	32		170
							169
	grey		4	SS	79		168
							cutting
	some clay to clayey silt till, hard		5	SS	45		167
							166
			6	SS	82		165
							holeplug
							sand
			7	SS	88		164

W. L. 163.4 m
May 07, 2013

DYNAMIC CONE PENETRATION RESISTANCE PLOT: 30 60 90 120 150 180

SHEAR STRENGTH (kPa): ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE; 25 50 75 100 125

PLASTIC LIMIT w_p | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L

WATER CONTENT (%): 10 20 30

POCKET PEN (Cu) (kPa)

NATURAL UNIT WT (Mg/m³)

REMARKS AND GRAIN SIZE DISTRIBUTION (%)

GR SA SI CL

Continued Next Page

GROUNDWATER ELEVATIONS

Shallow/ Single Installation ▽ ▼ Deep/Dual Installation ▽ ▼

GRAPH NOTES: $+^3$, $\times^3$: Numbers refer to Sensitivity ○ $^{\varepsilon}$=3% Strain at Failure

SPL SOIL LOG 1609-910- WHITEVALE -LOGS - MAY16.GPJ SPL.GDT 16/5/13

SPL Consultants Limited

MW-13-216

LOG OF BOREHOLE BH-216

PROJECT: Whitevale Road
CLIENT: Mattamy Homes
PROJECT LOCATION: Pickering, Ontario
DATUM: Geodetic
BH LOCATION: See Borehole Location Plan N 0 E 1

DRILLING DATA
Method: Solid Stem Auger
Diameter: 130mm
Date: Apr/26/2013

REF. NO.: 1609-910
ENCL NO.: 15

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: "N" BLOWS 0.3 m	GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT (30 60 90 120 150 180) / SHEAR STRENGTH (kPa) ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE (25 50 75 100 125)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L / WATER CONTENT (%) (10 20 30)	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (Mg/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
	SANDY SILT TILL: trace clay to clayey, trace to some gravel, brown to grey, moist to wet, compact to very dense with occasional boulders and cobbles and occasional iron staining in fissures(Continued)						163					
			8	SS	65		screen		○			
							162					
160.9			9	SS	50/ 100mm		161 sand		○			
12.3	**END OF BOREHOLE** Notes: 1) No free water in borehole upon completion. 2) No cave in borehole upon completion. 2) Piezometer installed upon completion. 3) Water Level Records: Date WL (mbgs) May 7, 2013 9.72											

SPL SOIL LOG 1609-910- WHITEVALE -LOGS - MAY16.GPJ SPL.GDT 16/5/13

GROUNDWATER ELEVATIONS
Shallow/ Single Installation ▽ ▼ Deep/Dual Installation ▽ ▼

GRAPH NOTES + 3, × 3: Numbers refer to Sensitivity ○ ε=3% Strain at Failure

SPL Consultants Limited

MW-13-217

LOG OF BOREHOLE BH-217

PROJECT: Whitevale Road
CLIENT: Mattamy Homes
PROJECT LOCATION: Pickering, Ontario
DATUM: Geodetic
BH LOCATION: See Borehole Location Plan N 0 E 1

DRILLING DATA
Method: Solid Stem Auger
Diameter: 130mm
Date: Apr/26/2013

REF. NO.: 1609-910
ENCL NO.: 16

SOIL PROFILE (m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	SAMPLES NUMBER	TYPE	BLOWS 0.3 m "N"	GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT / SHEAR STRENGTH (kPa) ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%)	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (Mg/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
172.4								30 60 90 120 150 180 / 25 50 75 100 125	10 20 30			
0.0	**TOPSOIL:**900mm, clayey silt, brown, some clay with rootlets and organics, dark brown, wet, soft		1	SS	5		172					
171.5						W. L. 171.8 m May 07, 2013						
0.9	**SANDY SILT TILL:** trace gravel, trace clay to clayey, moist, brown to grey, dense		2	SS	45	sand / screen	170					
	grey		3	SS	69		169					
							168					
			4	SS	55							
							167					
						sand						
			5	SS	74		166					
							165					
164.0							164					
8.4	**END OF BOREHOLE**											

Notes:
1) Water at 4.0mbgs in borehole upon completion.
2) No cave in borehole upon completion.
3) Piezometer installed upon completion.
4) Water Level Records:

Date	WL (mbgs)
May 07/13	0.6

GROUNDWATER ELEVATIONS
Shallow/ Single Installation ▽ ▼ Deep/Dual Installation ▽ ▼

GRAPH NOTES + 3, × 3, Numbers refer to Sensitivity ○ ε=3% Strain at Failure

SPL SOIL LOG 1609-910- WHITEVALE -LOGS - MAY16.GPJ SPL.GDT 16/5/13

SPL Consultants Limited

MW-13-218s/d

LOG OF BOREHOLE BH-218

PROJECT: Whitevale Road
CLIENT: Mattamy Homes
PROJECT LOCATION: Pickering, Ontario
DATUM: Geodetic
BH LOCATION: See Borehole Location Plan N 0 E 1

DRILLING DATA
Method: Solid Stem Auger
Diameter: 130mm
Date: Apr/26/2013

REF. NO.: 1609-910
ENCL NO.: 17

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" BLOWS/0.3 m	GROUND WATER CONDITIONS	ELEVATION
172.6							
0.0 / 172.3	**TOPSOIL:** 250mm, silt, with some clay, trace gravel, dark brown, very moist to wet, compact		1	SS	12		172
0.3	**FILL:** clayey silt, trace gravel, trace to some sand, brown, very moist, stiff					W. L. 171.2 m May 07, 2013	
171.1							
1.5	**SANDY SILT TILL:** trace clay to clayey, trace to some gravel, brown to grey, moist to wet, compact to very dense		2	SS	31	holeplug	
							170
			3	SS	31		169
	grey at 4.0 m					sand	
			4	SS	24		168
							167
			5	SS	50/125mm	screen W. L. 166.1 m May 07, 2013	
	Zone of fine sand at 7.9m, grey, wet		6	SS	35		165
						holeplug	164
			7	SS	46		163

DYNAMIC CONE PENETRATION RESISTANCE PLOT: 20 40 60 80 100

SHEAR STRENGTH (kPa): ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE; 50 100 150 200 250

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L

WATER CONTENT (%): 10 20 30

POCKET PEN. (Cu) (kPa)

NATURAL UNIT WT (Mg/m³)

REMARKS AND GRAIN SIZE DISTRIBUTION (%)

GR SA SI CL

Continued Next Page

GROUNDWATER ELEVATIONS

Shallow/ Single Installation ▽ ▼ Deep/Dual Installation ▽ ▼

GRAPH NOTES: + 3, × 3: Numbers refer to Sensitivity; ○ ε=3% Strain at Failure

SPL SOIL LOG - 2 WELLS 1609-910- WHITEVALE -LOGS - MAY16.GPJ SPL.GDT 16/5/13

SPL Consultants Limited
Geotechnical Environmental Materials Hydrogeology

LOG OF BOREHOLE BH-218

MW-13-218s/d

PROJECT: Whitevale Road
CLIENT: Mattamy Homes
PROJECT LOCATION: Pickering, Ontario
DATUM: Geodetic
BH LOCATION: See Borehole Location Plan N 0 E 1

DRILLING DATA
Method: Solid Stem Auger
Diameter: 130mm
Date: Apr/26/2013

REF. NO.: 1609-910
ENCL NO.: 17

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	SAMPLES NUMBER	TYPE	"N" BLOWS/0.3 m	GROUND WATER CONDITIONS	ELEVATION
161.9 /	**SANDY SILT TILL:** trace clay to clayey, trace to some gravel, brown to grey, moist to wet, compact to very dense(Continued)						162
10.7 / 158.6	**SAND AND SILT:** trace gravel, trace to some clay, wet, grey, compact to very dense		8	SS	17		161
			9	SS	32		160
							cuttings
							159
							158
14.0 /	**SILTY CLAY TILL:** some sand, trace to some gravel, wet, grey, very stiff		10	SS	27		157
							156
							holeplug
							155
							sand
			11	SS	29		154
							153
							screen

DYNAMIC CONE PENETRATION RESISTANCE PLOT
20 40 60 80 100

SHEAR STRENGTH (kPa)
○ UNCONFINED + FIELD VANE & Sensitivity
● QUICK TRIAXIAL × LAB VANE
50 100 150 200 250

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%)
10 20 30

POCKET PEN. (Cu) (kPa)
NATURAL UNIT WT (Mg/m³)
REMARKS AND GRAIN SIZE DISTRIBUTION (%)
GR SA SI CL

Continued Next Page

GROUNDWATER ELEVATIONS
Shallow/ Single Installation ▽ ▼ Deep/Dual Installation ▼ ▼

GRAPH NOTES
+ 3, × 3: Numbers refer to Sensitivity
○ ε=3% Strain at Failure

SPL SOIL LOG - 2 WELLS 1609-910- WHITEVALE -LOGS - MAY16.GPJ SPL.GDT 16/5/13

SPL Consultants Limited
Geotechnical Environmental Materials Hydrogeology

MW-13-218s/d

LOG OF BOREHOLE BH-218

PROJECT: Whitevale Road
CLIENT: Mattamy Homes
PROJECT LOCATION: Pickering, Ontario
DATUM: Geodetic
BH LOCATION: See Borehole Location Plan N 0 E 1

DRILLING DATA
Method: Solid Stem Auger
Diameter: 130mm
Date: Apr/26/2013

REF. NO.: 1609-910
ENCL NO.: 17

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" BLOWS 0.3 m	GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH (kPa) ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE (50 100 150 200 250)	PLASTIC LIMIT W_P / NATURAL MOISTURE CONTENT W / LIQUID LIMIT W_L / WATER CONTENT (%) (10 20 30)	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (Mg/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
152.6 / 20.1	**SANDY SILT TILL:** some clay, trace gravel, wet, grey, compact						152					
150.8			12	SS	21		sand 151					
21.8	**END OF BOREHOLE** Note: 1) Water at 7.3mbgs in borehole upon completion. 2) Shallow and deep monitoring Wells installed upon completion. 3) Water Level Records: Date WL (mbgs) May 07/13 Deep Well: 6.51 Shallow Well: 1.37											

SPL SOIL LOG - 2 WELLS 1609-910-WHITEVALE -LOGS - MAY16.GPJ SPL.GDT 16/5/13

GROUNDWATER ELEVATIONS
Shallow/ Single Installation ▽ ▼ Deep/Dual Installation ▼ ▼

GRAPH NOTES + 3, × 3: Numbers refer to Sensitivity ○ ε=3% Strain at Failure

MW-13-219

SPL Consultants Limited

LOG OF BOREHOLE BH-219

PROJECT: Whitevale Road
CLIENT: Mattamy Homes
PROJECT LOCATION: Pickering, Ontario
DATUM: Geodetic
BH LOCATION: See Borehole Location Plan N 0 E 1

DRILLING DATA
Method: Solid Stem Auger
Diameter: 130mm
Date: Apr/29/2013

REF. NO.: 1609-910
ENCL NO.: 18

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	BLOWS/0.3 m "N"	GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT (30 60 90 120 150 180) / SHEAR STRENGTH (kPa) ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE (25 50 75 100 125)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) (10 20 30)	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (Mg/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
192.8												
0.0 / 192.4	**TOPSOIL:** 250mm, silt, with some clay, trace gravel, dark brown, very moist to wet, compact		1	SS	4							
0.5 / 191.7	**CLAYEY SILT:** trace gravel, trace clay, trace to some sand, brown, very moist, soft						W. L. 192.2 m May 07, 2013					
1.1	**SANDY SILT TILL:** trace clay to clayey, trace gravel, brown to grey, moist to wet, zones/layers of gravel and sand, compact to very dense		2	SS	50/125mm		191					
							holeplug					
							190					
			3	SS	50/100mm							
	grey at 4.0m						189					
							sand					
			4	SS	28		188					
							187					
							screen					
			5	SS	34		186					
			6	SS	57		185					
							sand					
							184					
183.2			7	SS	63							
9.6	**END OF BOREHOLE** Note: 1) Water at 4.3mbgs in borehole upon completion. 2) Monitoring Well installed upon completion.											

Continued Next Page

GROUNDWATER ELEVATIONS
Shallow/ Single Installation ▽ ▼ Deep/Dual Installation ▽ ▼

GRAPH NOTES: + 3, × 3: Numbers refer to Sensitivity; C ε=3% Strain at Failure

SPL SOIL LOG 1609-910- WHITEVALE -LOGS - MAY16.GPJ SPL.GDT 16/5/13

SPL Consultants Limited
Geotechnical Environmental Materials Hydrogeology

MW-13-219

LOG OF BOREHOLE BH-219

PROJECT: Whitevale Road
CLIENT: Mattamy Homes
PROJECT LOCATION: Pickering, Ontario
DATUM: Geodetic
BH LOCATION: See Borehole Location Plan N 0 E 1

DRILLING DATA
Method: Solid Stem Auger
Diameter: 130mm
Date: Apr/29/2013

REF. NO.: 1609-910
ENCL NO.: 18

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT 30 60 90 120 150 180 / SHEAR STRENGTH (kPa) ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE 25 50 75 100 125	PLASTIC LIMIT w_P — NATURAL MOISTURE CONTENT w — LIQUID LIMIT w_L / WATER CONTENT (%) 10 20 30	POCKET PEN. (CU) (kPa)	NATURAL UNIT WT (Mg/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" BLOWS 0.3 m						
	3) Water Level Records: Date WL (mbgs) May 07/13 0.59										

SPL SOIL LOG 1609-910- WHITEVALE -LOGS - MAY16.GPJ SPL.GDT 16/5/13

GROUNDWATER ELEVATIONS
Shallow/ Single Installation ▽ ▼ Deep/Dual Installation ▽ ▼

GRAPH NOTES + 3, × 3: Numbers refer to Sensitivity ○ ε=3% Strain at Failure

SPL Consultants Limited

LOG OF BOREHOLE BH-220

MW-13-220

PROJECT: Whitevale Road
CLIENT: Mattamy Homes
PROJECT LOCATION: Pickering, Ontario
DATUM: Geodetic
BH LOCATION: See Borehole Location Plan N 0 E 1

DRILLING DATA
Method: Solid Stem Auger
Diameter: 130mm
Date: Apr/27/2013

REF. NO.: 1609-910
ENCL NO.: 19

(m) ELEV / DEPTH	DESCRIPTION	NUMBER	TYPE	"N" BLOWS/0.3 m	ELEVATION	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
178.8						
0.0 / 178.4	**TOPSOIL:**400mm, silt, with some clay, some organics, trace rootlets, wet to saturated, loose	1	SS	3		
0.4 / 177.7	**CLAYEY SILT :** trace gravel, trace to some sand, brown, wet, soft				178	
1.1	**SANDY SILT TILL:** trace clay to clayey, trace to some gravel, brown to grey, moist to wet, compact to very dense with occasional layers of sand and gravel	2	SS	28	W. L. 177.2 m May 07, 2013	
					holeplug	
					176	
		3	SS	50/125mm		
					175	
	grey	4	SS	50/125mm	174	
					173	
		5	SS	50/125mm		
					cave-in	
					screen	
		6	SS	50/100mm	171	
					170	
169.5		7	SS	50/125mm	cave-in	
9.3	**END OF BOREHOLE** Note: 1) Water at 4.0mbgs in borehole upon completion. 2) Monitoring Well installed upon					

DYNAMIC CONE PENETRATION RESISTANCE PLOT: 30 60 90 120 150 180
SHEAR STRENGTH (kPa): ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE; 25 50 75 100 125
PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%): 10 20 30
POCKET PEN. (Cu) (kPa)
NATURAL UNIT WT (Mg/m³)

Continued Next Page

GROUNDWATER ELEVATIONS
Shallow/ Single Installation ▽ ▼ Deep/Dual Installation ▽ ▼

GRAPH NOTES: + 3, × 3: Numbers refer to Sensitivity ○ ε=3% Strain at Failure

SPL SOIL LOG 1609-910- WHITEVALE -LOGS - MAY16.GPJ SPL.GDT 16/5/13

SPL Consultants Limited

LOG OF BOREHOLE BH-220

MW-13-220

PROJECT: Whitevale Road
CLIENT: Mattamy Homes
PROJECT LOCATION: Pickering, Ontario
DATUM: Geodetic
BH LOCATION: See Borehole Location Plan N 0 E 1

DRILLING DATA
Method: Solid Stem Auger
Diameter: 130mm
Date: Apr/27/2013

REF. NO.: 1609-910
ENCL NO.: 19

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT / SHEAR STRENGTH (kPa)	PLASTIC LIMIT / NATURAL MOISTURE CONTENT / LIQUID LIMIT / WATER CONTENT (%)	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (Mg/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%)
(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	BLOWS/0.3 m "N"			30 60 90 120 150 180	10 20 30			GR SA SI CL
	completion. 3) Water Level Records: Date WL (mbgs) May 07/13 1.61							○ UNCONFINED + FIELD VANE & Sensitivity ● QUICK TRIAXIAL × LAB VANE 25 50 75 100 125				

SPL SOIL LOG 1609-910- WHITEVALE -LOGS - MAY16.GPJ SPL.GDT 16/5/13

GROUNDWATER ELEVATIONS

Shallow/ Single Installation ▽ ▼ Deep/Dual Installation ▽ ▼

GRAPH NOTES + 3, × 3: Numbers refer to Sensitivity ○ ε=3% Strain at Failure

PROJECT: 11-1111-0068

RECORD OF BOREHOLE BH19-1 MW19-1s/d

SHEET 1 OF 1

LOCATION: SEE FIGURE 2

BORING DATE: June 6, 2011

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOWS/0.3m	ELEVATION	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl; 10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS (B / A)
		GROUND SURFACE		156.34							
0	TRACK MOUNTED POWER AUGER 160 mm Dia. Augers	TOPSOIL		0.00 / 156.03				156			
		Compact to very dense moist brown to grey SILTY SAND to SANDY SILT, some clay, trace to some gravel, containing cobbles/ boulders (TILL)		0.31	1	AS	-				50 mm Dia Monitoring Well (B)
1					2	50 DO	18	155			Bentonite Seal (B)
					3	50 DO	46				
2											50 mm Dia Monitoring Well (A)
					4	50 DO	41	154			Bentonite Seal (A)
3					5	50 DO	77	153			
				152.30							Sand (B)
4		Very dense grey wet SANDY SILT, trace clay		4.04				152			
					6A	50 DO	71				Silica Sand (A)
5		Very dense to compact wet grey SILTY SAND to SANDY SILT, trace to some gravel		151.46 / 4.88	6B			151			
6					7	50 DO	50/ .15	150			Sand (A)
7								149			Water encountered during drilling at a depth of 4.42 m below ground surface, June 6, 2011
8					8	50 DO	50/ .15				Caved (A)
								148			Water level at a depth of 2.74 m below ground surface upon completion of drilling, June 6, 2011
9					9	50 DO	26	147			borehole caved to a depth of 6.7 m below ground surface upon completion of drilling, June 6, 2011
				146.74							
		END OF BOREHOLE		9.60							
10											

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: AM

CHECKED: OS

LDN_ENV 11-1111-0068.GPJ GLDR_LDN.GDT 7/12/11 DATA INPUT: MK JUNE 2011

PROJECT: 11-1111-0068

RECORD OF BOREHOLE BH19-2 MW19-2

SHEET 1 OF 1

LOCATION: SEE FIGURE 2

BORING DATE: June 6, 2011

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
		GROUND SURFACE		174.56								
0	TRACK MOUNTED POWER AUGER 160 mm Dia. Augers	TOPSOIL		0.00 / 174.23								
		Hard moist brown CLAYEY SILT, some sand, trace to some gravel (TILL)		0.33	1	AS	-	174				50 mm Dia. Monitoring Well
1					2	50 DO	38					
				173.19								
		Very dense moist brown to grey SANDY SILT to SILTY SAND, some clay, trace to some gravel, contains cobbles and boulders (TILL)		1.37	3	50 DO	68	173				Bentonite Seal
2												
					4	AS	-	172				
3					5	50 DO	50/ .13					
								171				
4												
								170				
					6	50 DO	42					
5												Sand
								169				
6					7	50 DO	59					
				168.01								
		END OF BOREHOLE		6.55								Water encountered during drilling at a depth of 6.4 m below ground surface, June 6, 2011 Water level at a depth of 5.94 m below ground surface upon completion of drilling, June 6, 2011
7												
8												
9												
10												

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: AM

CHECKED: OS

LDN_BHS 11-1111-0068.GPJ GLDR_LDN.GDT 7/12/11 DATA INPUT: MK JUNE 2011

PROJECT: 11-1111-0068

RECORD OF BOREHOLE BH19-3 MW19-3

SHEET 1 OF 1

LOCATION: SEE FIGURE 2

BORING DATE: June 1, 2011

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
		GROUND SURFACE		180.45								
0	TRACK MOUNTED POWER AUGER 160 mm Dia. Augers	TOPSOIL		0.00 / 180.20				180				
		Compact to very dense wet to moist brown SILTY SAND to SANDY SILT, trace to some clay, trace to some gravel, containing cobbles and boulders (TILL)		0.25	1	AS	-					50 mm Dia. Monitoring Well
1					2	50 DO	16	179				
2					3	50 DO	56					Bentonite Seal
								178				
					4	50 DO	38					
3												
					5	50 DO	50/.1					
				176.58				177				
4		Very stiff to hard moist brown to grey CLAYEY SILT, trace to some sand, trace to some gravel (TILL)		3.87								
								176				
5					6	50 DO	33					
												Sand
								175				
6												
					7	50 DO	17	174				
				173.90								
		END OF BOREHOLE		6.55								
7												Water encountered during drilling at a depth of 1.22m below ground surface, June 1, 2011
												Water level at a depth of 1.83 m below ground surface upon completion of drilling, June 1, 2011
8												
9												
10												

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: AM

CHECKED: OS

LDN_BHS 11-1111-0068.GPJ GLDR_LDN.GDT 7/12/11 DATA INPUT: MK JUNE 2011

PROJECT: 11-1111-0068

RECORD OF BOREHOLE BH19-4 MW19-4

SHEET 1 OF 1

LOCATION: SEE FIGURE 2

BORING DATE: June 2, 2011

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80)	SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3})	WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
		GROUND SURFACE		169.35										
0	TRACK MOUNTED POWER AUGER 160 mm Dia. Augers	TOPSOIL		0.00 / 169.07				169						
		Compact to very dense moist brown to grey SILTY SAND to SANDY SILT, trace clay, trace to some gravel, contains cobbles and boulders (TILL)		0.28	1	50 DO	-							50 mm Dia. Monitoring Well
1					2	50 DO	14							
								168						
					3	50 DO	37							
2														Bentonite Seal
					4	50 DO	50/ .13	167						
3														
					5	50 DO	50/ .15							
								166						
4														
								165						
					6	50 DO	50/ .15							
5														
								164						Sand
6				163.10	7	50 DO	50/ .15							
		END OF BOREHOLE		6.25										Water encountered during drilling at a depth of 6.1 mbelow ground surface, June 2, 2011
7														Water level in borehole at a depth of 5.64 m below ground surface upon completion of drilling, June 2, 2011
8														
9														
10														

LDN_BHS 11-1111-0068.GPJ GLDR_LDN.GDT 7/12/11 DATA INPUT: MK JUNE 2011

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: AZ

CHECKED: OS

PROJECT: 11-1111-0068

RECORD OF BOREHOLE BH19-5 MW19-5s/d

SHEET 1 OF 1

LOCATION: SEE FIGURE 2

BORING DATE: June 2, 2011

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl; 10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
		GROUND SURFACE		162.40							
0		TOPSOIL		0.00 / 162.09				162			
		Moist dark brown to brown SANDY SILT, trace clay, trace gravel		0.31 / 161.64	1	AS	-				50 mm Dia. Monitoring Well
1		Compact to very dense moist brown to grey SANDY SILT, trace to some clay, trace to some gravel (TILL)		0.76	2	50 DO	26				Bentonite Seal
					3	50 DO	25	161			
2					4	50 DO	28	160			
3					5	50 DO	40	159			Sand
4	TRACK MOUNTED POWER AUGER 160 mm Dia. Augers							158			
5					6	50 DO	51				
								157			
6					7	50 DO	78/ .23	156			
7		Becoming grey below approximately 7.01 m depth									Water encountered during drilling at a depth of 6.1 m below ground surface, June 2, 2011
					8	50 DO	50/ .15	155			Water level in borehole at a depth of 8.53 m below ground surface upon completion of drilling, June 2, 2011
8								154			Sand
9				153.15	9	50 DO	50/ .1				
		END OF BOREHOLE		9.25							
10											

50 mm Dia. Monitoring Well

Bentonite Seal

Sand

B A

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: AZ

CHECKED: OS

LDN_ENV 11-1111-0068.GPJ GLDR_LDN.GDT 7/12/11 DATA INPUT: MK JUNE 2011

PROJECT: 11-1111-0068

RECORD OF BOREHOLE BH19-6 MW19-6s/d

SHEET 1 OF 1

LOCATION: SEE FIGURE 2

BORING DATE: May 31, 2011

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl; 10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0		GROUND SURFACE		169.57							
	TRACK MOUNTED POWER AUGER 160 mm Dia. Augers	TOPSOIL		0.00 / 169.26							
		Brown to dark brown moist SANDY SILT, trace to some clay		0.31 / 168.81	1	AS	-	169			50 mm Dia. Monitoring Well
1		Compact to very dense moist to wet grey SILTY SAND, trace to some clay, trace to some gravel, containing cobbles and boulders, sand seams (TILL)		0.76	2	50 DO	25				Bentonite Seal
					3	50 DO	57	168			
2					4	50 DO	69	167			
3					5	50 DO	81				Bentonite Seal
								166			Sand
4											
					6	50 DO	74	165			
5											
								164			
6					7	50 DO	37				
								163			
7											
					8	50 DO	57	162			Water encountered during drilling at a depth of 5.79 m below ground surface, May 31, 2011
8											Water level at a depth of 5.49 m below ground surface upon completion of drilling, May 31, 2011
								161			Sand
9				160.30	9	AS	50/.13				
		END OF BOREHOLE		9.27							
10											

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: AM

CHECKED: OS

LDN_ENV 11-1111-0068.GPJ GLDR_LDN.GDT 7/12/11 DATA INPUT: MK JUNE 2011

PROJECT: 11-1111-0068

RECORD OF BOREHOLE BH19-7 MW19-7s/d

SHEET 1 OF 1

LOCATION: SEE FIGURE 2

BORING DATE: May 31, 2011

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl; 10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0		GROUND SURFACE		183.70							
		TOPSOIL		0.00 / 183.45							
		Compact to very dense moist brown to grey SILTY SAND to SANDY SILT, trace to some clay, trace to some gravel, contains cobbles and boulders (TILL)		0.25	1	AS	-	183			50 mm Dia. Monitoring Well; Bentonite Seal
1					2	50 DO	25				
								182			
2					3	50 DO	23				
					4	50 DO	27	181			
3					5	50 DO	56				Bentonite Seal
								180			Sand
4	TRACK MOUNTED POWER AUGER 160 mm Dia. Augers			179.66							
		Hard moist grey CLAYEY SILT, some sand, trace to some gravel (TILL)		4.04	6	50 DO	42	179			
5											
				178.14				178			
		Dense to very dense moist to wet grey SILTY AND to SANDY SILT, trace to some clay, trace to some gravel, contains cobbles and boulders, sand seams (TILL)		5.56	7	AS	50/ .13				
6								177			
7											
					8	50 DO	37	176			Water encountered during drilling at a depth of 4.57 m below ground surface, May 31, 2011
8											Water level at a depth of 6.71 m below ground surface upon completion of drilling, May 31, 2011
								175			Sand
9				174.25	9	50 DO	50/ .15				
		END OF BOREHOLE		9.45							
10											

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: AM

CHECKED: OS

LDN_ENV 11-1111-0068.GPJ GLDR_LDN.GDT 7/12/11 DATA INPUT: MK JUNE 2011

PROJECT: 11-1111-0068

RECORD OF BOREHOLE BH19-8 MW19-8s/d

SHEET 1 OF 1

LOCATION: SEE FIGURE 2

BORING DATE: May 31, 2011

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOWS/0.3m	ELEVATION	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl; 10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS (B / A)
		GROUND SURFACE		198.58							
0		TOPSOIL		0.00							
				198.12	1	AS	-	198			50 mm Dia. Monitoring Well (B)
		Brown moist to wet CLAYEY SILT, some sand, trace to some gravel (TILL)		0.46							50 mm Dia. Monitoring Well (A)
				197.82							
1		Very dense moist brown to grey SANDY SILT to SILTY SAND, trace to some clay, trace to some gravel, contains cobbles and boulders (TILL)		0.76	2	50 DO	50/.15				Bentonite Seal
					3	50 DO	50/.08	197			
2					4	50 DO	50/.1	196			
3					5	50 DO	50/.1				Bentonite Seal (A)
								195			Silica Sand Filter (B)
4	TRACK MOUNTED POWER AUGER 160 mm Dia. Augers				6	50 DO	50/.13	194			
5											
								193			
6					7	50 DO	50/.13				
								192			
7											
								191			Water encountered during drilling at a depth of 8.53 m below ground surface, May 31, 2011
8					8	50 DO	50/.13				Water level at a depth of 8.84 m below ground surface upon completion of drilling, May 31, 2011
								190			Silica Sand Filter (A)
9				189.36	9	50 DO	50/.08				
		END OF BOREHOLE		9.22							
10											

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: AM

CHECKED: OS

LDN_ENV 11-1111-0068.GPJ GLDR_LDN.GDT 7/12/11 DATA INPUT: MK JUNE 2011

PROJECT: 11-1111-0068

RECORD OF BOREHOLE BH21C-1 MW21C-1

SHEET 1 OF 1

LOCATION: SEE FIGURE 2

BORING DATE: June 15, 2011

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl; 10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0		GROUND SURFACE		205.00				205				
		TOPSOIL		0.00								
				204.72								
	TRACK MOUNTED POWER AUGER 160 mm Dia. Augers	Dense to very dense moist to wet brown to grey SILTY SAND, trace to some gravel, zones of sand, containing cobbles and boulders		0.28	1	AS	-					50 mm Dia. Monitoring Well
1					2	50 DO	36	204				
					3	50 DO	58					
2								203				
					4	AS	-					
3					5	50 DO	50/ .13	202				Bentonite Seal
4								201				
					6	50 DO	50/ .10					
5								200				
				199.44								
		Very dense moist grey SILTY SAND, trace clay, trace to some gravel, containing cobbles and boulders (TILL)		5.56								
6					7	50 DO	50/ .13	199				
7								198				
					8	50 DO	50/ .13					Sand
8								197				Water encountered during drilling at a depth of 3.05 m below ground surface, June 15, 2011
9					9	50 DO	50/ .12	196				Water level at a depth of 5.49 m below ground surface upon completion of drilling, June 15, 2011
				195.70								
		END OF BOREHOLE		9.30								
10												

DEPTH SCALE
1 : 50

Golder Associates

LOGGED: AM
CHECKED: AM

LDN_BHS 11-1111-0068.GPJ GLDR_LDN.GDT 7/12/11 DATA INPUT: MK JUNE 2011

PROJECT: 11-1111-0068

RECORD OF BOREHOLE BH21C-2 MW21C-2

SHEET 1 OF 1

LOCATION: SEE FIGURE 2

BORING DATE: June 16, 2011

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (20 40 60 80) nat V. + Q - ● rem V. ⊕ U - ○	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT Wp W Wl (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0		GROUND SURFACE		210.69								
		TOPSOIL		0.00 / 210.38								
	TRACK MOUNTED POWER AUGER 160 mm Dia. Augers	Dense moist brown SANDY SILT to SILTY SAND, trace clay, trace to some gravel (TILL)		0.31	1	AS	-	210				50 mm Dia. Monitoring Well
1					2	50 DO	36					
				209.32								
		Dense to very dense moist to wet brown to grey SANDY SILT to SILTY SAND, trace clay, trace to some gravel, containing cobbles and boulders		1.37	3	50 DO	58	209				
2					4	AS	-					
								208				
3					5	50 DO	50/ .13					Bentonite Seal
								207				
4												
					6	50 DO	50/ .08	206				
5												
								205				
6					7	50 DO	50/ .13					
								204				
7				203.60								
		Very dense grey moist SILTY SAND, trace clay, some gravel (TILL)		7.09	8	50 DO	50/ .13	203				Sand
8												Water encountered during drilling at a depth of 4.72 m below ground surface, June 16, 2011
								202				
9				201.47	9	50 DO	50/ .15					Water level at a depth of 5.18 m below ground surface upon completion of drilling, June 16, 2011
		END OF BOREHOLE		9.22								
10												

LDN_BHS 11-1111-0068.GPJ GLDR_LDN.GDT 7/12/11 DATA INPUT: MK JUNE 2011

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: AM

CHECKED: AM

BH101

JOB NO: 1103-S079

LOG OF BOREHOLE NO: 101

FIGURE NO: 1

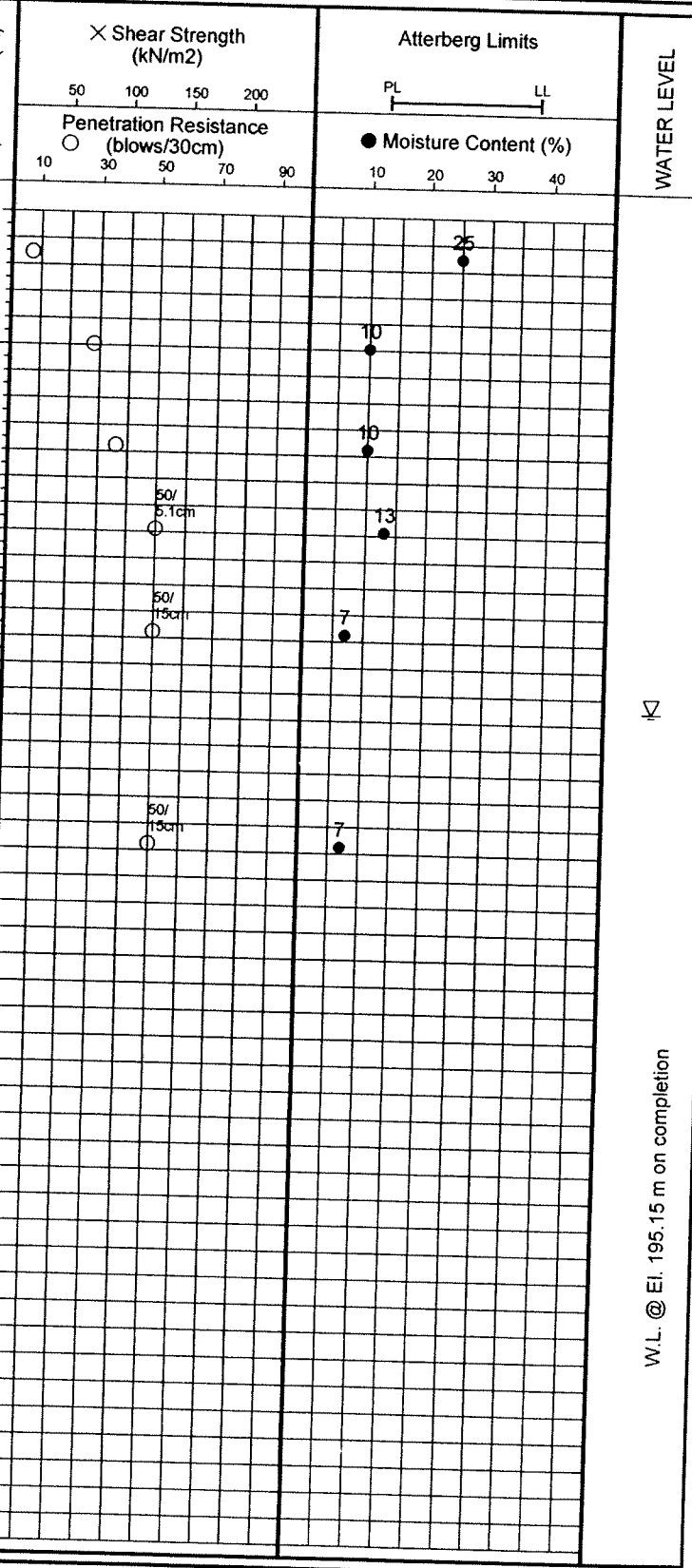
JOB DESCRIPTION: Geotechnical Investigation and Well Installation for Study by Others

JOB LOCATION: Various Locations along Whitevale Road, City of Pickering

METHOD OF BORING: Flight-Auger

DATE: March 31, 2011

Depth / Elev. (m)	SOIL DESCRIPTION	SAMPLES Number	Type	Blows/30cm	Depth Scale (m)
0.0 / 198.85	Ground Surface				0
	36 cm TOPSOIL				
	Brown, firm to hard	1	DO	7	
	SILTY CLAY, Till				1
	sandy, a trace of gravel occ. sand and silt seams and layers, cobbles and boulders	2	DO	28	
		3	DO	36	2
2.1 / 196.75	Very dense				
		4	DO	50/ 5.1	
	SILTY SAND, Till				3
	some clay, a trace of gravel occ. clay and silt seams and layers, cobbles and boulders	5	DO	50/ 15	
	brown / grey				4
4.9 / 193.95	**END OF BOREHOLE**	6	DO	50/ 15	5
					6
					7
					8
					9
					10



Soil Engineers Ltd.

BH102

JOB NO: 1103-S079

LOG OF BOREHOLE NO: 102

FIGURE NO: 2

JOB DESCRIPTION: Geotechnical Investigation and Well Installation for Study by Others

JOB LOCATION: Various Locations along Whitevale Road, City of Pickering

METHOD OF BORING: Flight-Auger

DATE: March 31, 2011

Depth / Elev. (m)	SOIL DESCRIPTION	SAMPLES Number	Type	Blows/30cm
0.0 / 200.35	Ground Surface			
	20 cm TOPSOIL			
	Brown, very stiff to hard	1	DO	17
	SILTY CLAY, Till			
	sandy, a trace of gravel occ. sand and silt seams and layers, cobbles and boulders	2	DO	86
1.4 / 198.95	Very dense	3	DO	50/ 5.1
	SILTY SAND, Till			
	some clay, a trace of gravel occ. clay and silt seams and layers, brown grey cobbles and boulders	4	DO	50/ 15
		5	DO	50/ 15
4.7 / 195.65	**END OF BOREHOLE**	6	DO	50/ 15

Depth Scale (m)

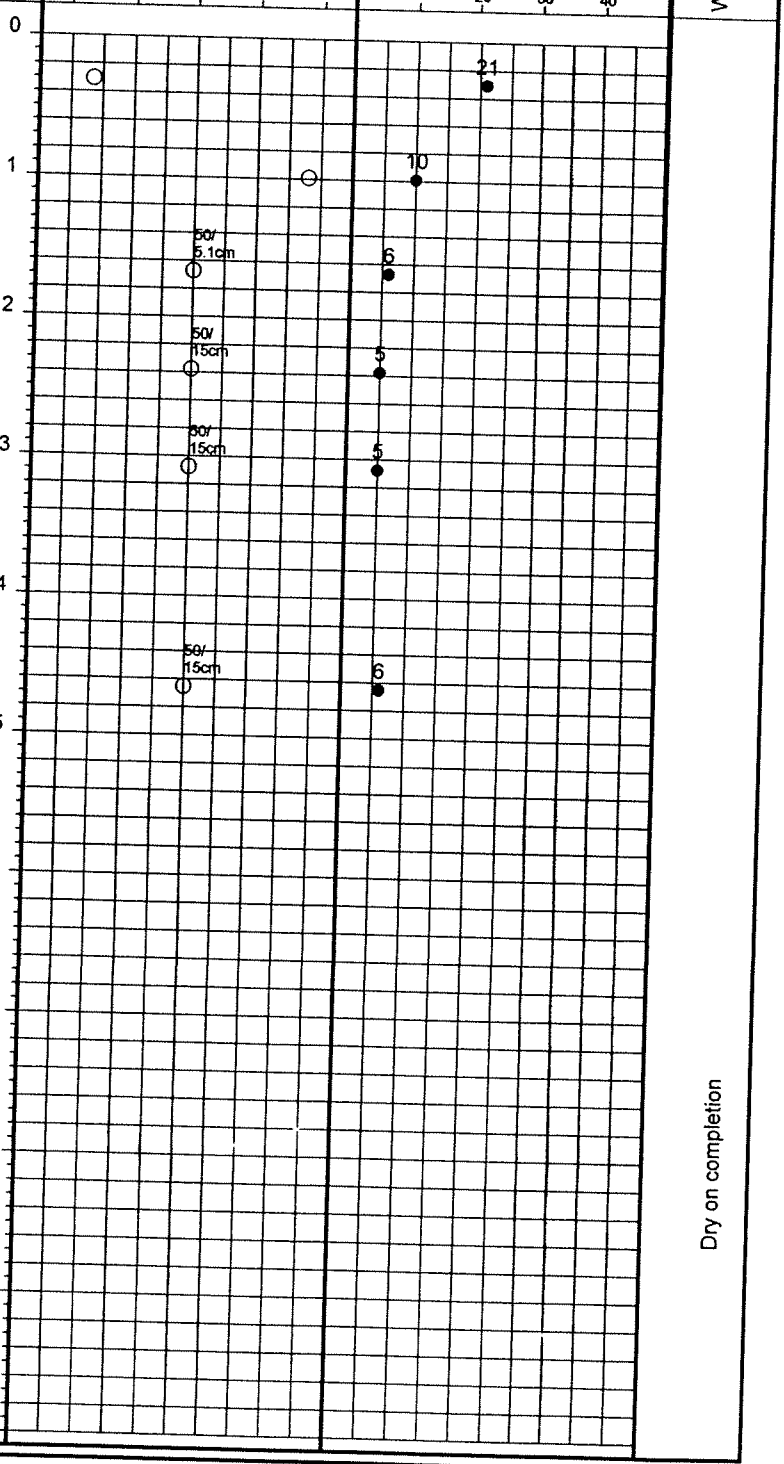
× Shear Strength (kN/m2) — 50, 100, 150, 200

○ Penetration Resistance (blows/30cm) — 10, 30, 50, 70, 90

Atterberg Limits — PL, LL

● Moisture Content (%) — 10, 20, 30, 40

WATER LEVEL



Dry on completion

Soil Engineers Ltd.

BH103

JOB NO: 1103-S079

LOG OF BOREHOLE NO: 103

FIGURE NO: 3

JOB DESCRIPTION: Geotechnical Investigation and Well Installation for Study by Others

JOB LOCATION: Various Locations along Whitevale Road, City of Pickering

METHOD OF BORING: Flight-Auger

DATE: March 31, 2011

Depth / Elev. (m)	SOIL DESCRIPTION	SAMPLES Number	Type	Blows/30cm
0.0 / 200.24	Ground Surface			
	20 cm TOPSOIL			
	Soft to hard	1	DO	4
		2	DO	46
	SILTY CLAY, Till	3	DO	86
		4	DO	50/ 15
	brown grey silty sand till	5	DO	50/ 15
	sandy, a trace of gravel occ. sand and silt seams and layers, cobbles and boulders			
4.7 / 195.54	**END OF BOREHOLE**	6	DO	50/ 15

Depth Scale (m): 0 1 2 3 4 5 6 7 8 9 10

× Shear Strength (kN/m2): 50 100 150 200

Penetration Resistance (blows/30cm) ○: 10 30 50 70 90

Penetration values: 50/15cm; 50/15cm; 50/15cm

Atterberg Limits: PL — LL

Moisture Content (%) ●: 10 20 30 40

Moisture values: 25, 8, 7, 8, 7, 7

WATER LEVEL: Dry on completion

Soil Engineers Ltd.

JOB NO: 1209-S058

LOG OF BOREHOLE NO: 267

FIGURE NO: 67

BH 267

JOB DESCRIPTION: Proposed Residential Development

JOB LOCATION: Whitevale Road between North Road and Sideline 26
City of Pickering

METHOD OF BORING: Flight-Auger

DATE: November 15, 2012

Depth Elev. (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value
0.0	Ground Surface			
205.2	**23 cm TOPSOIL**	1A	DO	3
	Soft to hard	1B	CS	
	weathered	2	DO	36
		3	DO	43
	SILTY CLAY, Till	4	DO	36
		5	DO	53
	sandy, a trace of gravel occ. wet sand and silt seams and layers, cobbles and boulders — brown grey	6	DO	48
6.4		7	DO	50/15
198.8	**END OF BOREHOLE**			

Depth Scale (m): 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10

× Shear Strength (kN/m2): 50, 100, 150, 200

Penetration Resistance (blows/30cm) ○: 10, 30, 50, 70, 90

Atterberg Limits: PL — LL

● Moisture Content (%): 10, 20, 30, 40

Moisture Content values: 26, 19, 8, 7, 8, 7, 7, 6

50/15cm

WATER LEVEL: Dry on completion

Soil Engineers Ltd.

JOB NO: 1209-S058

LOG OF BOREHOLE NO: 268

FIGURE NO: 68

BH 268

JOB DESCRIPTION: Proposed Residential Development

JOB LOCATION: Whitevale Road between North Road and Sideline 26
City of Pickering

METHOD OF BORING: Flight-Auger

DATE: November 15, 2012

Depth Elev. (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value
0.0	Ground Surface			
201.7	**23 cm TOPSOIL**	1A	DO	3
	Soft to hard	1B		
	weathered	2	DO	45
	SILTY CLAY, Till	3	DO	65
		4	DO	50/15
	sandy, a trace of gravel occ. wet sand and silt seams and layers, cobbles and boulders	5	DO	50/15
	brown grey			
4.7		6	DO	60/15
197.0	**END OF BOREHOLE**			

Depth Scale (m): 0 1 2 3 4 5 6 7 8 9 10

× Shear Strength (kN/m2): 50 100 150 200

○ Penetration Resistance (blows/30cm): 10 30 50 70 90

50/15cm
50/15cm
60/15cm

Atterberg Limits: PL — LL

● Moisture Content (%): 10 20 30 40

34
16
8
7
6
7
6

WATER LEVEL

W.L. @ El. 197.4 m on completion

Soil Engineers Ltd.

JOB NO: 1209-S058

LOG OF BOREHOLE NO: 269

FIGURE NO: 69

BH 269

JOB DESCRIPTION: Proposed Residential Development

JOB LOCATION: Whitevale Road between North Road and Sideline 26
City of Pickering

METHOD OF BORING: Flight-Auger

DATE: November 15, 2012

Depth / Elev. (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value
0.0 / 202.9	Ground Surface			
	18 cm TOPSOIL	1A		
	Stiff to hard	1B	DO	10
	weathered	2	DO	24
		3	DO	27
	SILTY CLAY, Till	4	DO	55/15
		5	DO	52/15
	sandy, a trace of gravel occ. wet sand and silt seams and layers, cobbles and boulders — brown / grey	6	DO	50
		7	Do	38
6.6 / 196.3	**END OF BOREHOLE**			

Depth Scale (m): 0 1 2 3 4 5 6 7 8 9 10

× Shear Strength (kN/m2): 50 100 150 200

○ Penetration Resistance (blows/30cm): 10 30 50 70 90

○ 55/15cm

○ 52/15cm

Atterberg Limits: PL — LL

● Moisture Content (%): 10 20 30 40

● 18, 12, 8, 8, 7, 6, 6, 6

WATER LEVEL

▽ W.L. @ El. 201.4 m on completion

Soil Engineers Ltd.

JOB NO: 1209-S058

LOG OF BOREHOLE NO: 270

FIGURE NO: 70

BH 270

JOB DESCRIPTION: Proposed Residential Development

JOB LOCATION: Whitevale Road between North Road and Sideline 26
City of Pickering

METHOD OF BORING: Flight-Auger

DATE: November 15, 2012

Depth Elev. (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value
0.0	Ground Surface			
204.1	**23 cm TOPSOIL**	1A	DO	4
	Firm to hard	1B		
	weathered	2	DO	50/15
		3	DO	50/15
	SILTY CLAY, Till	4	DO	50/8
	brown / grey	5	DO	53/15
	sandy, a trace of gravel occ. wet sand and silt seams and layers, cobbles and boulders	6	DO	50/8
6.2		7	DO	70/15
197.9	**END OF BOREHOLE**			

Depth Scale (m): 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10

× Shear Strength (kN/m2): 50, 100, 150, 200

○ Penetration Resistance (blows/30cm): 10, 30, 50, 70, 90

○ 50/15cm; ○ 50/15cm; ○ 50/8cm; ○ 53/15cm; ○ 50/8cm; ○ 70/15cm

Atterberg Limits: PL — LL

● Moisture Content (%): 10, 20, 30, 40

● 27; ● 13; ● 6; ● 6; ● 5; ● 5; ● 6; ● 6

WATER LEVEL: Dry on completion

Soil Engineers Ltd.

JOB NO: 1209-S058

LOG OF BOREHOLE NO: 271

FIGURE NO: 71

BH 271

JOB DESCRIPTION: Proposed Residential Development

JOB LOCATION: Whitevale Road between North Road and Sideline 26
City of Pickering

METHOD OF BORING: Flight-Auger

DATE: November 15, 2012

Depth Elev. (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value	Depth Scale (m)	Shear Strength (kN/m2) / Penetration Resistance (blows/30cm)	Atterberg Limits / Moisture Content (%)	WATER LEVEL
0.0	Ground Surface				0			
203.0	**23 cm TOPSOIL**	1A	DO	5			22	
	Firm to hard	1B					9	
	weathered	2	DO	33	1		8	
		3	DO	53			8	▽
	SILTY CLAY, Till				2			
		4	DO	50/15		50/15cm	6	
	brown grey							
		5	DO	50/15	3	50/15cm	4	
	sandy, a trace of gravel occ. wet sand and silt seams and layers, cobbles and boulders				4			
		6	DO	50/15		50/15cm	6	
					5			
		7	DO	53/15	6	53/15cm	6	
7.0		8	DO	55/15	7	55/15cm	6	
196.0	**END OF BOREHOLE**				8			
					9			
					10			

W.L. @ El. 201.5 m on completion

Soil Engineers Ltd.

JOB NO: 1209-S058

LOG OF BOREHOLE NO: 272

FIGURE NO: 72

BH 272

JOB DESCRIPTION: Proposed Residential Development

JOB LOCATION: Whitevale Road between North Road and Sideline 26
City of Pickering

METHOD OF BORING: Flight-Auger

DATE: November 15, 2012

Depth / Elev. (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value
0.0	Ground Surface			
199.6	**25 cm TOPSOIL**	1A	DO	6
	Brown, firm to hard	1B		
	SILTY CLAY, Till sandy, a trace of gravel occ. wet sand and silt seams and layers, cobbles and boulders — weathered	2	DO	19
1.8		3A	DO	50
197.8	Very dense — brown / grey	3B		
		4	DO	72
	SILTY SAND, Till	5	DO	50/15
	some clay, a trace of gravel occ. wet sand and silt seams and layers, cobbles and boulders	6	DO	50/15
4.9				
194.7	**END OF BOREHOLE**			

Depth Scale (m): 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10

× Shear Strength (kN/m2): 50, 100, 150, 200

○ Penetration Resistance (blows/30cm): 10, 30, 50, 70, 90

○ 50/15cm

○ 50/15cm

Atterberg Limits: PL — LL

● Moisture Content (%): 10, 20, 30, 40

● 27

● 11

● 9

● 9

● 9

● 6

● 6

● 12

WATER LEVEL: Dry on completion

Soil Engineers Ltd.

JOB NO: 1209-S058

LOG OF BOREHOLE NO: 273

FIGURE NO: 73

BH 273

JOB DESCRIPTION: Proposed Residential Development

JOB LOCATION: Whitevale Road between North Road and Sideline 26
City of Pickering

METHOD OF BORING: Flight-Auger

DATE: November 15, 2012

Depth Elev. (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value
0.0	Ground Surface			
204.7	**25 cm TOPSOIL**	1A	DO	3
	Soft to hard	1B		
	weathered	2	DO	63
		3	DO	50/10
	SILTY CLAY, Till			
		4	DO	50/8
	brown / grey			
	sandy, a trace of gravel occ. wet sand and silt seams and layers, cobbles and boulders	5	DO	50/8
4.7		6	DO	60/15
200.0	**END OF BOREHOLE**			

Depth Scale (m): 0 1 2 3 4 5 6 7 8 9 10

× Shear Strength (kN/m2): 50 100 150 200

○ Penetration Resistance (blows/30cm): 10 30 50 70 90

○ 50/10cm
○ 50/8cm
○ 50/8cm
○ 60/15cm

Atterberg Limits: PL — LL

● Moisture Content (%): 10 20 30 40

● 26
● 14
● 8
● 5
● 6
● 5
● 5

WATER LEVEL: Dry on completion

Soil Engineers Ltd.

JOB NO: 1209-S058

LOG OF BOREHOLE NO: 274

FIGURE NO: 74

BH 274

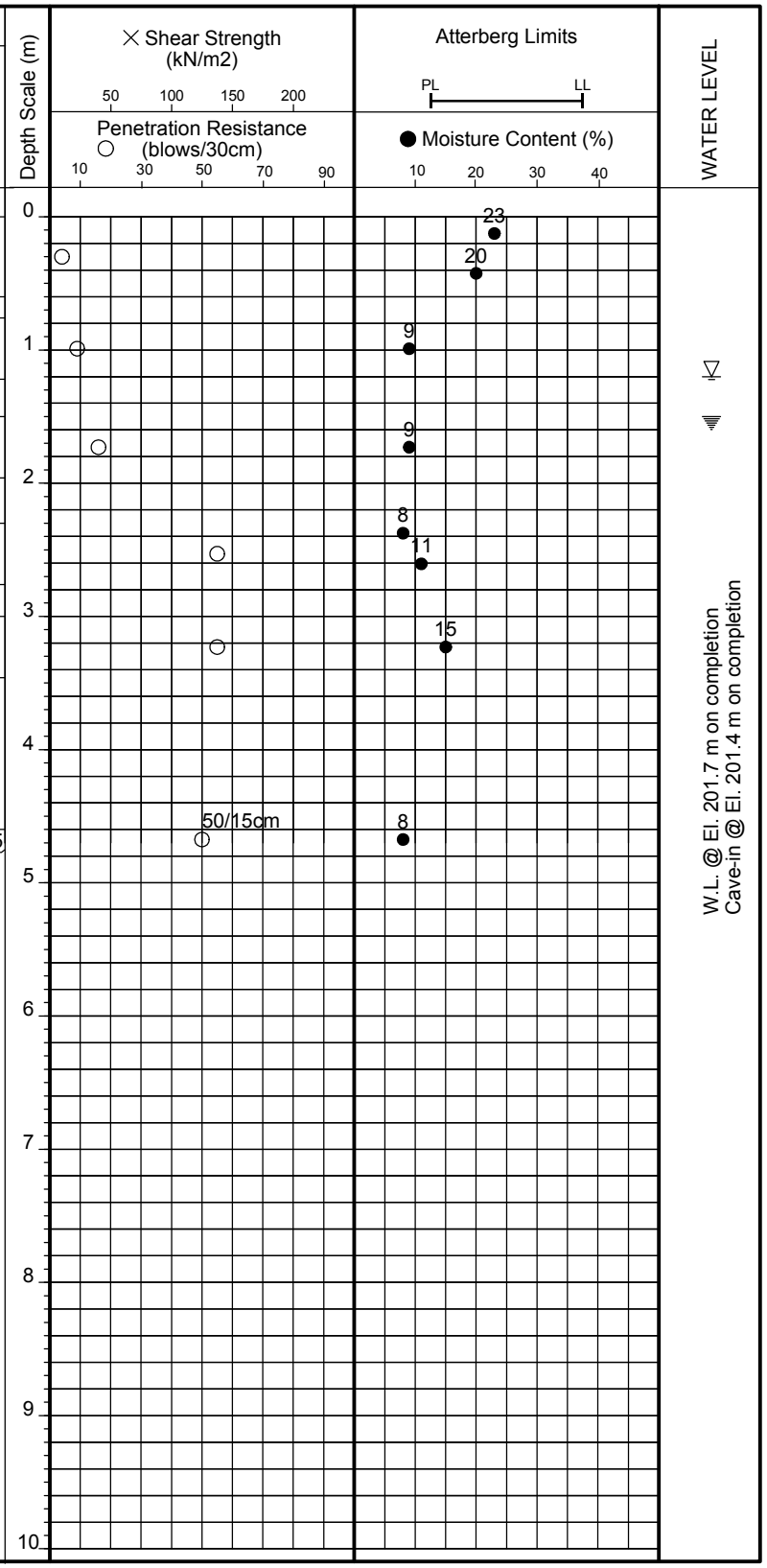
JOB DESCRIPTION: Proposed Residential Development

JOB LOCATION: Whitevale Road between North Road and Sideline 26
City of Pickering

METHOD OF BORING: Flight-Auger

DATE: November 15, 2012

Depth / Elev. (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value
0.0	Ground Surface			
202.9	**25 cm TOPSOIL**	1A	DO	4
	Brown, soft to stiff	1B		
	SILTY CLAY, Till	2	DO	9
	sandy, a trace of gravel occ. wet sand and silt seams and layers, cobbles and boulders — weathered	3	DO	16
2.1				
200.8	Brown, very dense	4A	DO	55
	sand layer	4B		
	SILTY SAND, Till	5	DO	55
	some clay, a trace of gravel occ. wet sand and silt seams and layers, cobbles and boulders			
4.0				
198.9	Grey, hard **SILTY CLAY, Till** sandy, a trace of gravel occ. wet sand and silt seams and layers, cobbles and boulders	6	DO	50/15
4.7				
198.2	**END OF BOREHOLE**			



Soil Engineers Ltd.

JOB NO: 1209-S058

LOG OF BOREHOLE NO: 275

FIGURE NO: 75

BH 275

JOB DESCRIPTION: Proposed Residential Development

JOB LOCATION: Whitevale Road between North Road and Sideline 26
City of Pickering

METHOD OF BORING: Flight-Auger

DATE: November 15, 2012

Depth Elev. (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value
0.0	Ground Surface			
199.8	**30 cm TOPSOIL**	1A	DO	5
	Brown, firm to hard	1B		
	SILTY CLAY, Till weathered	2	DO	17
	sandy, a trace of gravel occ. wet sand and silt seams and layers, cobbles and boulders	3	DO	33
2.1	boulder			
197.7	Very dense	4	DO	50/15
	SILTY SAND, Till	5	DO	50/15
	some clay, a trace of gravel occ. wet sand and silt seams and layers, cobbles and boulders brown grey			
4.7		6	DO	50/15
195.1	**END OF BOREHOLE**			

Depth Scale (m): 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10

× Shear Strength (kN/m2): 50, 100, 150, 200

○ Penetration Resistance (blows/30cm): 10, 30, 50, 70, 90

○ 50/15cm

○ 50/15cm

○ 50/15cm

Atterberg Limits: PL — LL

● Moisture Content (%): 10, 20, 30, 40

● 28

● 16

● 11

● 10

● 8

● 7

● 6

WATER LEVEL: Dry on completion

Soil Engineers Ltd.

PROJECT: 11-1111-0068

RECORD OF BOREHOLE BHL-1 MWL-1

SHEET 1 OF 2

LOCATION: SEE FIGURE 2

BORING DATE: June 23, 2011

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0	TRACK-MOUNTED POWER AUGER 160 mm Dia. Augers	GROUND SURFACE		160.09								
		TOPSOIL		0.00 / 159.81				160				
		Moist dark brown sandy silt, trace to some clay, trace to some gravel (FILL)		0.28 / 159.33	1	AS	-					50 mm Dia. Monitoring Well
1		Very dense moist brown/ grey SAND and GRAVEL, trace silt, containing cobbles and boulders		0.76 / 158.72	2	50 DO	82	159				
		Hard brown moist CLAYEY SILT, some sand, trace to some gravel, containing cobbles and boulders (TILL)		1.37	3	50 DO	33					
2					4	AS	-	158				
				157.35								
		Very dense brown moist SANDY SILT, trace to some clay, trace to some gravel, containing cobbles and boulders (TILL)		2.74	5	50 DO	70	157				Bentonite Seal
3												
4				156.05								
		Hard to very stiff moist to wet grey CLAYEY SILT, some sand, trace to some gravel, sand seams, containing cobbles and boulders (TILL)		4.04	6	50 DO	30	156				
5								155				
6					7	50 DO	22	154				
7				153.00				153				
		Very dense moist grey SANDY SILT to SILTY SAND, trace to some clay, trace to some gravel, containing cobbles and boulders (TILL)		7.09	8	50 DO	50/ .15					
8								152				
9					9	50 DO	50/ .10	151				
10		--- CONTINUED NEXT PAGE ---										

DEPTH SCALE 1 : 50

Golder Associates

LOGGED: AM

CHECKED: AM

LDN_BHS 11-1111-0068.GPJ GLDR_LDN.GDT 7/12/11 DATA INPUT: MK JUNE 2011

PROJECT: 11-1111-0068

RECORD OF BOREHOLE BHL-1 MWL-1

SHEET 2 OF 2

LOCATION: SEE FIGURE 2

BORING DATE: June 23, 2011

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80)	SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕; Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3})	WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
		--- CONTINUED FROM PREVIOUS PAGE ---												
10	TRACK-MOUNTED POWER AUGER 160 mm Dia. Augers			149.95				150						
		Very dense moist grey SILTY SAND to SANDY SILT, trace to some gravel, containing cobbles and boulders		10.14	10	50 DO	50/ .08							Sand
11								149						
12								148						Water encountered during drilling at a depth of 4.88 m below ground surface, June 23, 2011
		END OF BOREHOLE		147.77 12.32	11	50 DO	50/ .13							Water level in borehole at a depth of 4.57 m below ground surface upon completion of drilling, June 23, 2011
13														
14														
15														
16														
17														
18														
19														
20														

DEPTH SCALE
1 : 50

Golder Associates

LOGGED: AM
CHECKED: AM

LDN_BHS 11-1111-0068.GPJ GLDR_LDN.GDT 7/12/11 DATA INPUT: MK JUNE 2011

PROJECT: 11-1111-0068

RECORD OF BOREHOLE BHL-2 MWL-2

SHEET 1 OF 2

LOCATION: SEE FIGURE 2

BORING DATE: June 6, 2011

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
		GROUND SURFACE		160.15								
0	TRACK MOUNTED POWER AUGER 160 mm Dia. Augers	TOPSOIL		0.00				160				
				159.82	1	AS	-					50 mm Dia. Monitoring Well
		Brown moist SANDY SILT, trace clay		0.33								
				159.39								
1		Stiff to hard moist brown to grey CLAYEY SILT, trace to some sand, trace to some gravel, contains cobbles and boulders (TILL)		0.76	2	50 DO	10	159				
					3	50 DO	36					
2								158				
					4	50 DO	42					
3		Becoming grey at approximately 3.05 m depth			5	50 DO	50/ .1	157				Bentonite Seal
4								156				
5					6	50 DO	19					
				154.59				155				
		Very dense moist grey SANDY SILT, some clay, trace to some gravel, containing cobbles and boulders (TILL)		5.56								
6					7	50 DO	91	154				
7								153				
					8	50 DO	50/ .15					
8								152				
				151.54								
		Very dense wet grey SILTY SAND, trace to some gravel, zones of sand		8.61								
9					9	50 DO	50/ .1	151				
10		--- CONTINUED NEXT PAGE ---										

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: AM

CHECKED: OS

LDN_BHS 11-1111-0068.GPJ GLDR_LDN.GDT 7/12/11 DATA INPUT: MK JUNE 2011

PROJECT: 11-1111-0068

RECORD OF BOREHOLE BHL-2 MWL-2

SHEET 2 OF 2

LOCATION: SEE FIGURE 2

BORING DATE: June 6, 2011

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
		--- CONTINUED FROM PREVIOUS PAGE ---										
10	TRACK MOUNTED POWER AUGER 160 mm Dia. Augers	Very dense moist grey SANDY SILT, trace clay, trace gravel (TILL)		150.01 10.14	10	50 DO	50/ .08	150				Sand Cave
11								149				
12				147.88	11	50 DO	50/ .08	148				
		END OF BOREHOLE		12.27								Water encountered during drilling at a depth of 7.01 m below ground surface, June 6, 2011 Water level at a depth of 2.13 m below ground surface upon completion of drilling, June 6, 2011
13												
14												
15												
16												
17												
18												
19												
20												

DEPTH SCALE
1 : 50

Golder Associates

LOGGED: AM
CHECKED: OS

LDN_BHS 11-1111-0068.GPJ GLDR_LDN.GDT 7/12/11 DATA INPUT: MK JUNE 2011

BURNSIDE

[THE DIFFERENCE IS OUR PEOPLE]

Appendix N19-C
Groundwater Elevation Monitoring

TABLE N19 - C1
Groundwater Elevations - Observation Wells

	Well Depth (mbgl)	Stick-up (m)	Measuring Point Elevation (masl)	Apr-09		May-09		Jun-09		Jul-09	
				Water Level (mbgl)	Elevation (masl)	Water Level (mbgl)	Elevation (masl)	Water Level (mbgl)	Elevation (masl)	Water Level (mbgl)	Elevation (masl)
MW-1-11-1	5.31	0.86	166.91	-	-	-	-	-	-	-	-
MW-1-11-2	5.59	0.58	163.66	-	-	-	-	-	-	-	-
MW-1-11-6	2.96	1.22	155.36	-	-	-	-	-	-	-	-
MW-1-11-10s	3.18	0.90	157.38	-	-	-	-	-	-	-	-
MW-1-11-10d	6.92	0.79	157.27	-	-	-	-	-	-	-	-
MW-1-11-11	7.65	1.13	160.21	-	-	-	-	-	-	-	-
MW-2-11-2	5.15	0.91	178.05	-	-	-	-	-	-	-	-
MW-2-11-6	8.28	0.86	173.63	-	-	-	-	-	-	-	-
MW-2-11-9s	4.39	0.82	181.44	-	-	-	-	-	-	-	-
MW-2-11-9d	8.54	0.73	181.35	-	-	-	-	-	-	-	-
MW-2-11-12s	4.66	0.87	183.76	-	-	-	-	-	-	-	-
MW-2-11-12d	9.36	0.68	183.57	-	-	-	-	-	-	-	-
MW-2-11-16s	4.76	0.90	182.57	-	-	-	-	-	-	-	-
MW-2-11-16d	9.12	0.89	182.56	-	-	-	-	-	-	-	-
MW-2-11-19	5.42	0.69	195.39	-	-	-	-	-	-	-	-
MW-2-11-21	9.43	0.94	185.79	-	-	-	-	-	-	-	-
MW-2-11-23s	4.81	0.78	190.29	-	-	-	-	-	-	-	-
MW-2-11-23d	9.33	0.75	190.26	-	-	-	-	-	-	-	-
MW-2-11-25	6.56	0.75	198.35	-	-	-	-	-	-	-	-
MW-2-11-26	6.19	1.18	198.51	-	-	-	-	-	-	-	-
MW-2-11-30	9.25	0.78	194.49	-	-	-	-	-	-	-	-
MW-2-90-2	6.14	0.78	161.41	3.79	156.84	4.73	155.90	5.74	154.89	6.12	154.51
MW-2-90-4	6.10	0.80	162.77	dry	dry	dry	dry	dry	dry	6.09	155.88
MW-2-90-6	6.15	0.72	160.87	0.33	159.82	1.75	158.40	2.06	158.09	0.89	159.26
MW-2-90-8	4.36	1.18	154.39	3.34	149.87	dry	dry	dry	dry	4.35	148.86
MW-2-91-1	6.06	0.82	184.18	-	-	1.05	182.31	1.21	182.15	0.42	182.94
MW-2-91-2	6.00	0.66	185.63	-	-	1.57	183.40	1.51	183.46	0.62	184.35
MW-2-91-3	6.06	0.72	177.94	-	-	0.33	176.89	0.35	176.87	-0.05	177.27
MW-2-92-1	6.20	0.75	188.35	-0.71	188.31	-0.09	187.69	0.02	187.58	0.26	187.34
MW-2-92-2	6.13	0.71	201.81	1.05	200.05	2.12	198.98	2.67	198.43	3.19	197.91
MW-2-92-4	6.09	0.73	202.08	5.77	195.58	5.90	195.45	-	-	dry	dry
MW-2-92-8	5.70	0.80	184.29	0.16	183.33	0.80	182.69	0.88	182.61	1.16	182.33
MW-2-92-15s	2.95	0.81	184.58	-	-	-	-	1.11	182.66	0.99	182.78
MW-2-92-15d	5.19	0.80	184.60	-	-	-	-	1.27	182.53	1.73	182.07
MW-2-93-1	5.97	0.96	191.02	0.41	189.65	1.02	189.04	0.94	189.12	0.96	189.10
MW-2-93-4	5.98	0.89	202.01	0.95	200.17	0.99	200.13	0.93	200.19	0.73	200.39
MW-2-93-5	5.88	0.89	209.31	1.29	207.13	2.08	206.34	2.36	206.06	2.78	205.64
MW-3-10-8	4.97	0.82	215.08	-	-	-	-	0.77	213.49	0.38	213.88
MW-3-10-22	6.14	0.63	201.66	-	-	-	-	0.84	200.19	0.22	200.81
MW-4-2-6	5.49	0.71	202.67	-	-	-	-	-	-	-	-
MW-4-2-7s	5.38	0.82	184.81	-	-	-	-	-	-	-	-
MW-4-2-7d	8.43	0.77	184.74	-	-	-	-	-	-	-	-
MW-5-1	8.14	1.00	206.51	-	-	-	-	0.43	205.08	1.18	204.33
MW-7-1	-	0.85	199.35	-	-	-	-	-	-	14.84	183.66
MW-9-11-12B	4.29	1.07	182.50	-	-	-	-	-	-	-	-
MW-9-11-12A	9.00	1.00	182.31	-	-	-	-	-	-	-	-
MW-9-11-13	7.61	1.04	190.88	-	-	-	-	-	-	-	-
MW-9-11-14	7.70	1.04	186.52	-	-	-	-	-	-	-	-
MW 9-11-15-WN*	7.38	1.00	197.14	-	-	-	-	-	-	-	-
MW-9-11-16	7.68	0.98	200.23	-	-	-	-	-	-	-	-
MW-9-11-17B	4.35	1.11	190.96	-	-	-	-	-	-	-	-
MW-9-11-17A	9.06	1.03	191.05	-	-	-	-	-	-	-	-
MW-9-11-18	7.44	0.92	187.62	-	-	-	-	-	-	-	-
MW-9-11-39	6.89	1.09	184.66	-	-	-	-	-	-	-	-
MW-9-11-40	6.06	0.81	191.25	-	-	-	-	-	-	-	-
MW-9-11-42	7.88	1.02	182.64	-	-	-	-	-	-	-	-
MW-9-11-44	7.31	1.07	191.93	-	-	-	-	-	-	-	-

*denotes an instrument which is shared by more than one Neighbourhood
"-' denotes data that are unavailable
mbgl - meters below ground level
masl - meters above sea level

TABLE N19 - C1
Groundwater Elevations - Observation Wells

	Well Depth (mbgl)	Stick-up (m)	Measuring Point Elevation (masl)	Aug-09		Sep-09		Oct-09		Nov-09	
				Water Level (mbgl)	Elevation (masl)	Water Level (mbgl)	Elevation (masl)	Water Level (mbgl)	Elevation (masl)	Water Level (mbgl)	Elevation (masl)
MW-1-11-1	5.31	0.86	166.91	-	-	-	-	-	-	-	-
MW-1-11-2	5.59	0.58	163.66	-	-	-	-	-	-	-	-
MW-1-11-6	2.96	1.22	155.36	-	-	-	-	-	-	-	-
MW-1-11-10s	3.18	0.90	157.38	-	-	-	-	-	-	-	-
MW-1-11-10d	6.92	0.79	157.27	-	-	-	-	-	-	-	-
MW-1-11-11	7.65	1.13	160.21	-	-	-	-	-	-	-	-
MW-2-11-2	5.15	0.91	178.05	-	-	-	-	-	-	-	-
MW-2-11-6	8.28	0.86	173.63	-	-	-	-	-	-	-	-
MW-2-11-9s	4.39	0.82	181.44	-	-	-	-	-	-	-	-
MW-2-11-9d	8.54	0.73	181.35	-	-	-	-	-	-	-	-
MW-2-11-12s	4.66	0.87	183.76	-	-	-	-	-	-	-	-
MW-2-11-12d	9.36	0.68	183.57	-	-	-	-	-	-	-	-
MW-2-11-16s	4.76	0.90	182.57	-	-	-	-	-	-	-	-
MW-2-11-16d	9.12	0.89	182.56	-	-	-	-	-	-	-	-
MW-2-11-19	5.42	0.69	195.39	-	-	-	-	-	-	-	-
MW-2-11-21	9.43	0.94	185.79	-	-	-	-	-	-	-	-
MW-2-11-23s	4.81	0.78	190.29	-	-	-	-	-	-	-	-
MW-2-11-23d	9.33	0.75	190.26	-	-	-	-	-	-	-	-
MW-2-11-25	6.56	0.75	198.35	-	-	-	-	-	-	-	-
MW-2-11-26	6.19	1.18	198.51	-	-	-	-	-	-	-	-
MW-2-11-30	9.25	0.78	194.49	-	-	-	-	-	-	-	-
MW-2-90-2	6.14	0.78	161.41	6.10	154.53	6.10	154.53	dry	dry	dry	dry
MW-2-90-4	6.10	0.80	162.77	dry	dry	dry	dry	dry	dry	dry	dry
MW-2-90-6	6.15	0.72	160.87	2.17	157.98	2.74	157.41	3.06	157.09	2.22	157.93
MW-2-90-8	4.36	1.18	154.39	dry	dry	dry	dry	dry	dry	dry	dry
MW-2-91-1	6.06	0.82	184.18	1.50	181.86	2.23	181.13	1.61	181.75	1.28	182.08
MW-2-91-2	6.00	0.66	185.63	1.85	183.12	2.59	182.38	1.69	183.28	1.34	183.63
MW-2-91-3	6.06	0.72	177.94	0.35	176.87	1.65	175.57	1.41	175.81	0.75	176.47
MW-2-92-1	6.20	0.75	188.35	0.10	187.50	0.38	187.22	-0.01	187.61	-0.18	187.78
MW-2-92-2	6.13	0.71	201.81	2.69	198.41	3.07	198.03	0.42	200.68	2.24	198.86
MW-2-92-4	6.09	0.73	202.08	dry	dry	dry	dry	dry	dry	dry	dry
MW-2-92-8	5.70	0.80	184.29	0.88	182.61	1.24	182.25	0.63	182.86	0.43	183.06
MW-2-92-15s	2.95	0.81	184.58	1.79	181.98	2.49	181.28	2.54	181.23	2.48	181.29
MW-2-92-15d	5.19	0.80	184.60	1.75	182.05	2.78	181.02	3.11	180.69	3.59	180.21
MW-2-93-1	5.97	0.96	191.02	1.18	188.88	1.79	188.27	0.70	189.36	0.55	189.51
MW-2-93-4	5.98	0.89	202.01	1.19	199.93	1.17	199.95	0.73	200.39	0.78	200.34
MW-2-93-5	5.88	0.89	209.31	2.80	205.62	3.42	205.00	3.66	204.76	3.24	205.18
MW-3-10-8	4.97	0.82	215.08	0.98	213.28	1.35	212.91	0.71	213.55	0.57	213.69
MW-3-10-22	6.14	0.63	201.66	1.21	199.82	1.40	199.63	0.46	200.57	0.32	200.71
MW-4-2-6	5.49	0.71	202.67	-	-	1.54	200.42	1.13	200.83	-	-
MW-4-2-7s	5.38	0.82	184.81	-	-	dry	dry	dry	dry	dry	dry
MW-4-2-7d	8.43	0.77	184.74	-	-	8.30	175.67	8.40	175.57	8.25	175.72
MW-5-1	8.14	1.00	206.51	-	-	1.48	204.03	0.66	204.85	0.42	205.09
MW-7-1	-	0.85	199.35	14.96	183.54	15.11	183.39	15.34	183.16	15.15	183.35
MW-9-11-12B	4.29	1.07	182.50	-	-	-	-	-	-	-	-
MW-9-11-12A	9.00	1.00	182.31	-	-	-	-	-	-	-	-
MW-9-11-13	7.61	1.04	190.88	-	-	-	-	-	-	-	-
MW-9-11-14	7.70	1.04	186.52	-	-	-	-	-	-	-	-
MW 9-11-15-WN*	7.38	1.00	197.14	-	-	-	-	-	-	-	-
MW-9-11-16	7.68	0.98	200.23	-	-	-	-	-	-	-	-
MW-9-11-17B	4.35	1.11	190.96	-	-	-	-	-	-	-	-
MW-9-11-17A	9.06	1.03	191.05	-	-	-	-	-	-	-	-
MW-9-11-18	7.44	0.92	187.62	-	-	-	-	-	-	-	-
MW-9-11-39	6.89	1.09	184.66	-	-	-	-	-	-	-	-
MW-9-11-40	6.06	0.81	191.25	-	-	-	-	-	-	-	-
MW-9-11-42	7.88	1.02	182.64	-	-	-	-	-	-	-	-
MW-9-11-44	7.31	1.07	191.93	-	-	-	-	-	-	-	-

*denotes an instrument which is shared by more than one Neighbourhood
"-' denotes data that are unavailable
mbgl - meters below ground level
masl - meters above sea level

TABLE N19 - C1
Groundwater Elevations - Observation Wells

	Well Depth (mbgl)	Stick-up (m)	Measuring Point Elevation (masl)	Dec-09		Jan-10		Feb-10		Mar-10	
				Water Level (mbgl)	Elevation (masl)	Water Level (mbgl)	Elevation (masl)	Water Level (mbgl)	Elevation (masl)	Water Level (mbgl)	Elevation (masl)
MW-1-11-1	5.31	0.86	166.91	-	-	-	-	-	-	-	-
MW-1-11-2	5.59	0.58	163.66	-	-	-	-	-	-	-	-
MW-1-11-6	2.96	1.22	155.36	-	-	-	-	-	-	-	-
MW-1-11-10s	3.18	0.90	157.38	-	-	-	-	-	-	-	-
MW-1-11-10d	6.92	0.79	157.27	-	-	-	-	-	-	-	-
MW-1-11-11	7.65	1.13	160.21	-	-	-	-	-	-	-	-
MW-2-11-2	5.15	0.91	178.05	-	-	-	-	-	-	-	-
MW-2-11-6	8.28	0.86	173.63	-	-	-	-	-	-	-	-
MW-2-11-9s	4.39	0.82	181.44	-	-	-	-	-	-	-	-
MW-2-11-9d	8.54	0.73	181.35	-	-	-	-	-	-	-	-
MW-2-11-12s	4.66	0.87	183.76	-	-	-	-	-	-	-	-
MW-2-11-12d	9.36	0.68	183.57	-	-	-	-	-	-	-	-
MW-2-11-16s	4.76	0.90	182.57	-	-	-	-	-	-	-	-
MW-2-11-16d	9.12	0.89	182.56	-	-	-	-	-	-	-	-
MW-2-11-19	5.42	0.69	195.39	-	-	-	-	-	-	-	-
MW-2-11-21	9.43	0.94	185.79	-	-	-	-	-	-	-	-
MW-2-11-23s	4.81	0.78	190.29	-	-	-	-	-	-	-	-
MW-2-11-23d	9.33	0.75	190.26	-	-	-	-	-	-	-	-
MW-2-11-25	6.56	0.75	198.35	-	-	-	-	-	-	-	-
MW-2-11-26	6.19	1.18	198.51	-	-	-	-	-	-	-	-
MW-2-11-30	9.25	0.78	194.49	-	-	-	-	-	-	-	-
MW-2-90-2	6.14	0.78	161.41	dry	dry	dry	dry	dry	dry	dry	dry
MW-2-90-4	6.10	0.80	162.77	dry	dry	dry	dry	dry	dry	dry	dry
MW-2-90-6	6.15	0.72	160.87	1.44	158.71	1.32	158.83	2.02	158.13	0.55	159.60
MW-2-90-8	4.36	1.18	154.39	dry	dry	dry	dry	dry	dry	3.71	149.50
MW-2-91-1	6.06	0.82	184.18	0.72	182.64	0.50	182.86	1.32	182.04	0.16	183.20
MW-2-91-2	6.00	0.66	185.63	1.30	183.67	1.27	183.70	frozen	frozen	0.12	184.85
MW-2-91-3	6.06	0.72	177.94	0.29	176.93	0.25	176.97	1.44	175.78	-0.11	177.33
MW-2-92-1	6.20	0.75	188.35	frozen	frozen	frozen	frozen	frozen	frozen	-0.65	188.25
MW-2-92-2	6.13	0.71	201.81	1.74	199.36	1.58	199.52	2.96	198.14	1.23	199.87
MW-2-92-4	6.09	0.73	202.08	dry	dry	dry	dry	dry	dry	dry	dry
MW-2-92-8	5.70	0.80	184.29	0.32	183.17	0.30	183.19	0.77	182.72	0.08	183.41
MW-2-92-15s	2.95	0.81	184.58	2.35	181.42	2.17	181.60	2.95	180.82	1.47	182.30
MW-2-92-15d	5.19	0.80	184.60	3.81	179.99	3.60	180.20	4.08	179.72	1.79	182.01
MW-2-93-1	5.97	0.96	191.02	0.62	189.44	0.55	189.51	1.38	188.68	0.15	189.91
MW-2-93-4	5.98	0.89	202.01	0.87	200.25	0.83	200.29	0.93	200.19	0.78	200.34
MW-2-93-5	5.88	0.89	209.31	1.83	206.59	1.45	206.97	3.47	204.95	1.63	206.79
MW-3-10-8	4.97	0.82	215.08	0.31	213.95	0.24	214.02	1.33	212.93	0.35	213.91
MW-3-10-22	6.14	0.63	201.66	0.22	200.81	0.26	200.77	0.84	200.19	0.23	200.80
MW-4-2-6	5.49	0.71	202.67	0.33	201.63	0.20	201.76	1.09	200.87	0.15	201.81
MW-4-2-7s	5.38	0.82	184.81	dry	dry	dry	dry	dry	dry	dry	dry
MW-4-2-7d	8.43	0.77	184.74	7.62	176.35	7.56	176.41	7.78	176.19	7.29	176.68
MW-5-1	8.14	1.00	206.51	0.15	205.36	0.18	205.33	0.72	204.79	0.29	205.22
MW-7-1	-	0.85	199.35	15.23	183.27	15.00	183.50	15.21	183.29	14.96	183.54
MW-9-11-12B	4.29	1.07	182.50	-	-	-	-	-	-	-	-
MW-9-11-12A	9.00	1.00	182.31	-	-	-	-	-	-	-	-
MW-9-11-13	7.61	1.04	190.88	-	-	-	-	-	-	-	-
MW-9-11-14	7.70	1.04	186.52	-	-	-	-	-	-	-	-
MW 9-11-15-WN*	7.38	1.00	197.14	-	-	-	-	-	-	-	-
MW-9-11-16	7.68	0.98	200.23	-	-	-	-	-	-	-	-
MW-9-11-17B	4.35	1.11	190.96	-	-	-	-	-	-	-	-
MW-9-11-17A	9.06	1.03	191.05	-	-	-	-	-	-	-	-
MW-9-11-18	7.44	0.92	187.62	-	-	-	-	-	-	-	-
MW-9-11-39	6.89	1.09	184.66	-	-	-	-	-	-	-	-
MW-9-11-40	6.06	0.81	191.25	-	-	-	-	-	-	-	-
MW-9-11-42	7.88	1.02	182.64	-	-	-	-	-	-	-	-
MW-9-11-44	7.31	1.07	191.93	-	-	-	-	-	-	-	-

*denotes an instrument which is shared by more than one Neighbourhood
"-' denotes data that are unavailable
mbgl - meters below ground level
masl - meters above sea level

TABLE N19 - C1
Groundwater Elevations - Observation Wells

	Well Depth (mbgl)	Stick-up (m)	Measuring Point Elevation (masl)	May-10		Jul-10		Oct-10		Dec-10	
				Water Level (mbgl)	Elevation (masl)	Water Level (mbgl)	Elevation (masl)	Water Level (mbgl)	Elevation (masl)	Water Level (mbgl)	Elevation (masl)
MW-1-11-1	5.31	0.86	166.91	-	-	-	-	-	-	-	-
MW-1-11-2	5.59	0.58	163.66	-	-	-	-	-	-	-	-
MW-1-11-6	2.96	1.22	155.36	-	-	-	-	-	-	-	-
MW-1-11-10s	3.18	0.90	157.38	-	-	-	-	-	-	-	-
MW-1-11-10d	6.92	0.79	157.27	-	-	-	-	-	-	-	-
MW-1-11-11	7.65	1.13	160.21	-	-	-	-	-	-	-	-
MW-2-11-2	5.15	0.91	178.05	-	-	-	-	-	-	-	-
MW-2-11-6	8.28	0.86	173.63	-	-	-	-	-	-	-	-
MW-2-11-9s	4.39	0.82	181.44	-	-	-	-	-	-	-	-
MW-2-11-9d	8.54	0.73	181.35	-	-	-	-	-	-	-	-
MW-2-11-12s	4.66	0.87	183.76	-	-	-	-	-	-	-	-
MW-2-11-12d	9.36	0.68	183.57	-	-	-	-	-	-	-	-
MW-2-11-16s	4.76	0.90	182.57	-	-	-	-	-	-	-	-
MW-2-11-16d	9.12	0.89	182.56	-	-	-	-	-	-	-	-
MW-2-11-19	5.42	0.69	195.39	-	-	-	-	-	-	-	-
MW-2-11-21	9.43	0.94	185.79	-	-	-	-	-	-	-	-
MW-2-11-23s	4.81	0.78	190.29	-	-	-	-	-	-	-	-
MW-2-11-23d	9.33	0.75	190.26	-	-	-	-	-	-	-	-
MW-2-11-25	6.56	0.75	198.35	-	-	-	-	-	-	-	-
MW-2-11-26	6.19	1.18	198.51	-	-	-	-	-	-	-	-
MW-2-11-30	9.25	0.78	194.49	-	-	-	-	-	-	-	-
MW-2-90-2	6.14	0.78	161.41	dry	dry	dry	dry	dry	dry	dry	dry
MW-2-90-4	6.10	0.80	162.77	dry	dry	dry	dry	dry	dry	dry	dry
MW-2-90-6	6.15	0.72	160.87	1.97	158.18	1.67	158.48	3.31	156.84	0.95	159.20
MW-2-90-8	4.36	1.18	154.39	dry	dry	dry	dry	dry	dry	dry	dry
MW-2-91-1	6.06	0.82	184.18	0.30	183.06	1.06	182.30	2.03	181.33	0.45	182.91
MW-2-91-2	6.00	0.66	185.63	1.94	183.03	1.61	183.36	1.54	183.43	0.76	184.21
MW-2-91-3	6.06	0.72	177.94	0.81	176.41	0.64	176.58	2.07	175.15	-0.27	177.49
MW-2-92-1	6.20	0.75	188.35	0.30	187.30	0.16	187.44	0.35	187.25	frozen	frozen
MW-2-92-2	6.13	0.71	201.81	2.91	198.19	2.06	199.04	3.05	198.05	1.18	199.92
MW-2-92-4	6.09	0.73	202.08	dry	dry	dry	dry	dry	dry	dry	dry
MW-2-92-8	5.70	0.80	184.29	1.00	182.49	0.82	182.67	1.02	182.47	0.35	183.14
MW-2-92-15s	2.95	0.81	184.58	2.97	180.80	2.68	181.09	2.90	180.87	1.59	182.18
MW-2-92-15d	5.19	0.80	184.60	4.24	179.56	4.03	179.77	4.69	179.11	4.92	178.88
MW-2-93-1	5.97	0.96	191.02	1.02	189.04	0.85	189.21	1.00	189.06	0.51	189.55
MW-2-93-4	5.98	0.89	202.01	0.14	200.98	missing	-	-	-	-	-
MW-2-93-5	5.88	0.89	209.31	2.98	205.44	3.30	205.12	4.11	204.31	1.65	206.77
MW-3-10-8	4.97	0.82	215.08	1.32	212.94	0.78	213.48	0.74	213.52	0.71	213.55
MW-3-10-22	6.14	0.63	201.66	1.08	199.95	0.57	200.46	0.50	200.53	0.42	200.61
MW-4-2-6	5.49	0.71	202.67	1.20	200.76	1.69	200.27	1.48	200.48	0.47	201.49
MW-4-2-7s	5.38	0.82	184.81	dry	dry	dry	dry	dry	dry	dry	dry
MW-4-2-7d	8.43	0.77	184.74	7.61	176.36	7.68	176.29	dry	dry	7.65	176.32
MW-5-1	8.14	1.00	206.51	0.61	204.90	0.47	205.04	0.46	205.05	0.11	205.40
MW-7-1	-	0.85	199.35	-	-	-	-	-	-	-	-
MW-9-11-12B	4.29	1.07	182.50	-	-	-	-	-	-	-	-
MW-9-11-12A	9.00	1.00	182.31	-	-	-	-	-	-	-	-
MW-9-11-13	7.61	1.04	190.88	-	-	-	-	-	-	-	-
MW-9-11-14	7.70	1.04	186.52	-	-	-	-	-	-	-	-
MW 9-11-15-WN*	7.38	1.00	197.14	-	-	-	-	-	-	-	-
MW-9-11-16	7.68	0.98	200.23	-	-	-	-	-	-	-	-
MW-9-11-17B	4.35	1.11	190.96	-	-	-	-	-	-	-	-
MW-9-11-17A	9.06	1.03	191.05	-	-	-	-	-	-	-	-
MW-9-11-18	7.44	0.92	187.62	-	-	-	-	-	-	-	-
MW-9-11-39	6.89	1.09	184.66	-	-	-	-	-	-	-	-
MW-9-11-40	6.06	0.81	191.25	-	-	-	-	-	-	-	-
MW-9-11-42	7.88	1.02	182.64	-	-	-	-	-	-	-	-
MW-9-11-44	7.31	1.07	191.93	-	-	-	-	-	-	-	-

*denotes an instrument which is shared by more than one Neighbourhood
"-' denotes data that are unavailable
mbgl - meters below ground level
masl - meters above sea level

TABLE N19 - C1
Groundwater Elevations - Observation Wells

	Well Depth (mbgl)	Stick-up (m)	Measuring Point Elevation (masl)	Mar-11		Apr-11		May-11		Jun-11	
				Water Level (mbgl)	Elevation (masl)	Water Level (mbgl)	Elevation (masl)	Water Level (mbgl)	Elevation (masl)	Water Level (mbgl)	Elevation (masl)
MW-1-11-1	5.31	0.86	166.91	-	-	0.10	165.95	0.36	165.69	0.49	165.56
MW-1-11-2	5.59	0.58	163.66	-	-	2.19	160.89	-	-	4.46	158.62
MW-1-11-6	2.96	1.22	155.36	-	-	0.18	153.96	0.42	153.72	0.49	153.65
MW-1-11-10s	3.18	0.90	157.38	-	-	dry	dry	3.08	153.40	3.08	153.40
MW-1-11-10d	6.92	0.79	157.27	-	-	dry	dry	dry	dry	dry	dry
MW-1-11-11	7.65	1.13	160.21	-	-	2.16	156.92	2.25	156.83	2.46	156.62
MW-2-11-2	5.15	0.91	178.05	-	-	-	-	4.01	173.13	2.58	174.56
MW-2-11-6	8.28	0.86	173.63	-	-	0.00	172.77	0.64	172.13	0.75	172.02
MW-2-11-9s	4.39	0.82	181.44	-	-	-	-	0.78	179.84	0.88	179.74
MW-2-11-9d	8.54	0.73	181.35	-	-	-	-	7.34	173.28	6.97	173.65
MW-2-11-12s	4.66	0.87	183.76	-	-	-	-	0.86	182.03	0.95	181.94
MW-2-11-12d	9.36	0.68	183.57	-	-	-	-	0.87	182.02	0.97	181.92
MW-2-11-16s	4.76	0.90	182.57	-	-	-	-	1.23	180.44	1.34	180.33
MW-2-11-16d	9.12	0.89	182.56	-	-	-	-	2.09	179.58	2.23	179.44
MW-2-11-19	5.42	0.69	195.39	-	-	-	-	0.63	194.07	0.65	194.05
MW-2-11-21	9.43	0.94	185.79	-	-	0.19	184.66	0.77	184.08	0.95	183.90
MW-2-11-23s	4.81	0.78	190.29	-	-	0.20	189.31	0.84	188.67	0.87	188.64
MW-2-11-23d	9.33	0.75	190.26	-	-	0.24	189.27	0.88	188.63	0.91	188.60
MW-2-11-25	6.56	0.75	198.35	-	-	-	-	0.63	196.97	0.70	196.90
MW-2-11-26	6.19	1.18	198.51	-	-	0.73	196.60	0.64	196.69	0.61	196.72
MW-2-11-30	9.25	0.78	194.49	-	-	-	-	0.67	193.04	0.92	192.79
MW-2-90-2	6.14	0.78	161.41	dry	dry	dry	dry	dry	dry	dry	dry
MW-2-90-4	6.10	0.80	162.77	dry	dry	dry	dry	dry	dry	dry	dry
MW-2-90-6	6.15	0.72	160.87	0.57	159.58	0.54	159.61	0.97	159.18	1.42	158.73
MW-2-90-8	4.36	1.18	154.39	dry	dry	dry	dry	dry	dry	dry	dry
MW-2-91-1	6.06	0.82	184.18	frozen	frozen	-0.01	183.37	0.53	182.83	0.66	182.70
MW-2-91-2	6.00	0.66	185.63	0.35	184.62	0.29	184.68	0.93	184.04	1.03	183.94
MW-2-91-3	6.06	0.72	177.94	-0.42	177.64	-0.32	177.54	0.00	177.22	0.09	177.13
MW-2-92-1	6.20	0.75	188.35	frozen	frozen	flowing	flowing	-0.51	188.11	-0.30	187.90
MW-2-92-2	6.13	0.71	201.81	0.87	200.23	0.78	200.32	1.32	199.78	1.54	199.56
MW-2-92-4	6.09	0.73	202.08	dry	dry	5.86	195.49	dry	dry	5.85	195.50
MW-2-92-8	5.70	0.80	184.29	0.20	183.29	0.14	183.35	0.45	183.04	0.63	182.86
MW-2-92-15s	2.95	0.81	184.58	1.08	182.69	1.25	182.52	1.55	182.22	1.49	182.28
MW-2-92-15d	5.19	0.80	184.60	3.77	180.03	3.61	180.19	3.00	180.80	2.32	181.48
MW-2-93-1	5.97	0.96	191.02	0.03	190.03	0.06	190.00	0.71	189.35	0.83	189.23
MW-2-93-4	5.98	0.89	202.01	-	-	-	-	0.81	200.31	-	-
MW-2-93-5	5.88	0.89	209.31	1.52	206.90	1.51	206.91	2.19	206.23	1.86	206.56
MW-3-10-8	4.97	0.82	215.08	0.22	214.04	0.24	214.02	0.91	213.35	0.97	213.29
MW-3-10-22	6.14	0.63	201.66	0.28	200.75	0.21	200.82	0.64	200.39	0.78	200.25
MW-4-2-6	5.49	0.71	202.67	0.38	201.58	0.45	201.51	0.64	201.32	0.83	201.13
MW-4-2-7s	5.38	0.82	184.81	dry	dry	dry	dry	dry	dry	dry	dry
MW-4-2-7d	8.43	0.77	184.74	6.66	177.31	6.67	177.30	6.63	177.34	6.83	177.14
MW-5-1	8.14	1.00	206.51	frozen	frozen	0.08	205.43	0.43	205.08	0.53	204.98
MW-7-1	-	0.85	199.35	-	-	-	-	-	-	-	-
MW-9-11-12B	4.29	1.07	182.50	-	-	-	-	2.07	179.36	2.34	179.09
MW-9-11-12A	9.00	1.00	182.31	-	-	-	-	3.18	178.13	3.58	177.73
MW-9-11-13	7.61	1.04	190.88	-	-	-	-	0.29	189.55	0.62	189.22
MW-9-11-14	7.70	1.04	186.52	-	-	-	-	0.76	184.72	0.99	184.49
MW 9-11-15-WN*	7.38	1.00	197.14	0.89	195.25	-	-	-	-	1.13	195.01
MW-9-11-16	7.68	0.98	200.23	-	-	-	-	0.74	198.51	0.86	198.39
MW-9-11-17B	4.35	1.11	190.96	-	-	-	-	0.67	189.18	0.71	189.14
MW-9-11-17A	9.06	1.03	191.05	-	-	-	-	0.54	189.48	0.59	189.43
MW-9-11-18	7.44	0.92	187.62	-	-	-	-	-0.33	187.03	-0.06	186.76
MW-9-11-39	6.89	1.09	184.66	-	-	-	-	3.19	180.38	3.38	180.19
MW-9-11-40	6.06	0.81	191.25	-	-	-	-	0.58	189.86	0.39	190.05
MW-9-11-42	7.88	1.02	182.64	-	-	-	-	1.68	179.94	1.16	180.46
MW-9-11-44	7.31	1.07	191.93	-	-	-	-	0.87	189.99	0.93	189.93

*denotes an instrument which is shared by more than one Neighbourhood
"-' denotes data that are unavailable
mbgl - meters below ground level
masl - meters above sea level

TABLE N19 - C1
Groundwater Elevations - Observation Wells

	Well Depth (mbgl)	Stick-up (m)	Measuring Point Elevation (masl)	Oct-11		Nov-11		May-12		Jul-12	
				Water Level (mbgl)	Elevation (masl)	Water Level (mbgl)	Elevation (masl)	Water Level (mbgl)	Elevation (masl)	Water Level (mbgl)	Elevation (masl)
MW-1-11-1	5.31	0.86	166.91	1.32	164.73	0.22	165.83	0.73	165.32	1.55	164.50
MW-1-11-2	5.59	0.58	163.66	4.80	158.28	3.89	159.19	3.60	159.48	4.55	158.53
MW-1-11-6	2.96	1.22	155.36	1.40	152.74	0.34	153.80	0.25	153.89	1.12	153.02
MW-1-11-10s	3.18	0.90	157.38	3.16	153.32	3.08	153.40	3.08	153.40	3.08	153.40
MW-1-11-10d	6.92	0.79	157.27	dry	dry	dry	dry	6.84	149.64	dry	dry
MW-1-11-11	7.65	1.13	160.21	7.46	151.62	7.53	151.55	4.98	154.10	6.66	152.42
MW-2-11-2	5.15	0.91	178.05	dry	dry	5.13	172.01	4.75	172.39	dry	dry
MW-2-11-6	8.28	0.86	173.63	0.08	172.69	0.60	172.17	1.07	171.70	1.62	171.15
MW-2-11-9s	4.39	0.82	181.44	2.08	178.54	0.46	180.16	1.09	179.53	missing	-
MW-2-11-9d	8.54	0.73	181.35	5.07	175.55	0.53	180.09	1.14	179.48	missing	-
MW-2-11-12s	4.66	0.87	183.76	2.87	180.02	0.83	182.06	4.07	178.82	4.48	178.41
MW-2-11-12d	9.36	0.68	183.57	2.84	180.05	0.88	182.01	5.71	177.18	7.29	175.60
MW-2-11-16s	4.76	0.90	182.57	3.25	178.42	1.63	180.04	1.94	179.73	2.56	179.11
MW-2-11-16d	9.12	0.89	182.56	4.51	177.16	2.82	178.85	2.95	178.72	3.59	178.08
MW-2-11-19	5.42	0.69	195.39	1.36	193.34	0.03	194.67	0.66	194.04	1.15	193.55
MW-2-11-21	9.43	0.94	185.79	3.90	180.95	1.01	183.84	1.82	183.03	2.99	181.86
MW-2-11-23s	4.81	0.78	190.29	2.30	187.21	0.47	189.04	1.10	188.41	2.00	187.51
MW-2-11-23d	9.33	0.75	190.26	2.29	187.22	0.53	188.98	1.15	188.36	2.07	187.44
MW-2-11-25	6.56	0.75	198.35	0.73	196.87	0.27	197.33	0.65	196.95	1.41	196.19
MW-2-11-26	6.19	1.18	198.51	2.48	194.85	0.66	196.67	0.78	196.55	1.78	195.55
MW-2-11-30	9.25	0.78	194.49	2.61	191.10	0.92	192.79	0.90	192.81	2.36	191.35
MW-2-90-2	6.14	0.78	161.41	dry	dry	dry	dry	dry	dry	dry	dry
MW-2-90-4	6.10	0.80	162.77	dry	dry	6.14	155.83	dry	dry	dry	dry
MW-2-90-6	6.15	0.72	160.87	4.74	155.41	2.13	158.02	1.89	158.26	2.29	157.86
MW-2-90-8	4.36	1.18	154.39	3.34	149.87	dry	dry	dry	dry	dry	dry
MW-2-91-1	6.06	0.82	184.18	2.86	180.50	0.84	182.52	0.65	182.71	2.34	181.02
MW-2-91-2	6.00	0.66	185.63	0.99	183.98	0.88	184.09	1.83	183.14	missing	-
MW-2-91-3	6.06	0.72	177.94	0.05	177.17	0.14	177.08	2.04	175.18	missing	-
MW-2-92-1	6.20	0.75	188.35	0.93	186.67	-0.48	188.08	-0.18	187.78	1.06	186.54
MW-2-92-2	6.13	0.71	201.81	3.68	197.42	2.07	199.03	2.29	198.81	2.86	198.24
MW-2-92-4	6.09	0.73	202.08	destroyed	-	-	-	-	-	-	-
MW-2-92-8	5.70	0.80	184.29	1.96	181.53	0.37	183.12	0.58	182.91	1.76	181.73
MW-2-92-15s	2.95	0.81	184.58	dry	dry	2.31	181.46	2.52	181.25	2.72	181.05
MW-2-92-15d	5.19	0.80	184.60	4.04	179.76	4.49	179.31	3.41	180.39	4.25	179.55
MW-2-93-1	5.97	0.96	191.02	2.46	187.60	0.41	189.65	0.98	189.08	1.87	188.19
MW-2-93-4	5.98	0.89	202.01	missing	-	-	-	-	-	-	-
MW-2-93-5	5.88	0.89	209.31	4.18	204.24	2.79	205.63	3.42	205.00	3.86	204.56
MW-3-10-8	4.97	0.82	215.08	0.49	213.77	0.69	213.57	1.30	212.96	1.96	212.30
MW-3-10-22	6.14	0.63	201.66	0.43	200.60	0.25	200.78	0.56	200.47	1.50	199.53
MW-4-2-6	5.49	0.71	202.67	2.21	199.75	0.62	201.34	0.85	201.11	2.04	199.92
MW-4-2-7s	5.38	0.82	184.81	dry	dry	dry	dry	dry	dry	dry	dry
MW-4-2-7d	8.43	0.77	184.74	dry	dry	7.94	176.03	7.46	176.51	8.44	175.53
MW-5-1	8.14	1.00	206.51	0.76	204.75	0.17	205.34	0.39	205.12	1.31	204.20
MW-7-1	-	0.85	199.35	-	-	-	-	-	-	-	-
MW-9-11-12B	4.29	1.07	182.50	4.02	177.41	2.66	178.77	0.68	180.75	2.07	179.36
MW-9-11-12A	9.00	1.00	182.31	7.19	174.12	5.17	176.14	0.58	180.73	2.02	179.29
MW-9-11-13	7.61	1.04	190.88	0.60	189.24	0.22	189.62	0.49	189.35	0.56	189.28
MW-9-11-14	7.70	1.04	186.52	2.00	183.48	0.66	184.82	1.01	184.47	1.96	183.52
MW 9-11-15-WN*	7.38	1.00	197.14	0.33	195.81	0.58	195.56	1.45	194.69	2.33	193.81
MW-9-11-16	7.68	0.98	200.23	2.08	197.17	0.57	198.68	1.22	198.03	1.80	197.45
MW-9-11-17B	4.35	1.11	190.96	0.22	189.63	0.15	189.70	0.73	189.12	1.35	188.50
MW-9-11-17A	9.06	1.03	191.05	0.15	189.87	0.09	189.93	0.68	189.34	1.28	188.74
MW-9-11-18	7.44	0.92	187.62	s/u destroyed	184.56	flowing	flowing	0.33	186.37	0.55	186.15
MW-9-11-39	6.89	1.09	184.66	6.80	176.77	5.79	177.78	5.10	178.47	6.70	176.87
MW-9-11-40	6.06	0.81	191.25	1.50	188.94	0.08	190.36	0.56	189.88	2.10	188.34
MW-9-11-42	7.88	1.02	182.64	2.55	179.07	1.18	180.44	1.42	180.20	1.84	179.78
MW-9-11-44	7.31	1.07	191.93	s/u destroyed	-	0.45	190.41	0.04	190.82	destroyed	-

*denotes an instrument which is shared by more than one Neighbourhood
"-' denotes data that are unavailable
mbgl - meters below ground level
masl - meters above sea level

TABLE N19 - C1
Groundwater Elevations - Observation Wells

	Well Depth (mbgl)	Stick-up (m)	Measuring Point Elevation (masl)	Sep-12		Nov-12		May-13		Jun-13	
				Water Level (mbgl)	Elevation (masl)	Water Level (mbgl)	Elevation (masl)	Water Level (mbgl)	Elevation (masl)	Water Level (mbgl)	Elevation (masl)
MW-1-11-1	5.31	0.86	166.91	1.07	164.98	0.19	165.86	-	-	-	-
MW-1-11-2	5.59	0.58	163.66	4.65	158.43	3.78	159.30	-	-	-	-
MW-1-11-6	2.96	1.22	155.36	0.58	153.56	0.30	153.84	-	-	-	-
MW-1-11-10s	3.18	0.90	157.38	3.08	153.40	3.08	153.40	-	-	-	-
MW-1-11-10d	6.92	0.79	157.27	dry	dry	dry	dry	-	-	-	-
MW-1-11-11	7.65	1.13	160.21	7.46	151.62	7.01	152.07	-	-	-	-
MW-2-11-2	5.15	0.91	178.05	5.12	172.02	dry	dry	-	-	-	-
MW-2-11-6	8.28	0.86	173.63	1.39	171.38	0.65	172.12	-	-	0.98	171.79
MW-2-11-9s	4.39	0.82	181.44	1.24	179.38	0.57	180.05	-	-	-	-
MW-2-11-9d	8.54	0.73	181.35	1.83	178.79	0.51	180.11	-	-	-	-
MW-2-11-12s	4.66	0.87	183.76	1.33	181.56	0.67	182.22	-	-	-	-
MW-2-11-12d	9.36	0.68	183.57	1.42	181.47	0.60	182.29	-	-	-	-
MW-2-11-16s	4.76	0.90	182.57	2.63	179.04	1.54	180.13	-	-	-	-
MW-2-11-16d	9.12	0.89	182.56	4.12	177.55	2.63	179.04	-	-	-	-
MW-2-11-19	5.42	0.69	195.39	0.59	194.11	0.32	194.38	-	-	-	-
MW-2-11-21	9.43	0.94	185.79	1.93	182.92	1.00	183.85	-	-	-	-
MW-2-11-23s	4.81	0.78	190.29	0.52	188.99	0.79	188.72	-	-	-	-
MW-2-11-23d	9.33	0.75	190.26	0.58	188.93	0.86	188.65	-	-	-	-
MW-2-11-25	6.56	0.75	198.35	0.50	197.10	1.02	196.58	-	-	-	-
MW-2-11-26	6.19	1.18	198.51	1.12	196.21	0.16	197.17	-	-	-	-
MW-2-11-30	9.25	0.78	194.49	1.51	192.20	0.87	192.84	-	-	-	-
MW-2-90-2	6.14	0.78	161.41	dry	dry	dry	dry	-	-	-	-
MW-2-90-4	6.10	0.80	162.77	dry	dry	dry	dry	-	-	-	-
MW-2-90-6	6.15	0.72	160.87	2.32	157.83	1.75	158.40	-	-	-	-
MW-2-90-8	4.36	1.18	154.39	dry	dry	dry	dry	-	-	-	-
MW-2-91-1	6.06	0.82	184.18	1.98	181.38	0.97	182.39	-	-	-	-
MW-2-91-2	6.00	0.66	185.63	destroyed	-	-	-	-	-	-	-
MW-2-91-3	6.06	0.72	177.94	destroyed	-	-	-	-	-	-	-
MW-2-92-1	6.20	0.75	188.35	destroyed	-	-	-	-	-	-	-
MW-2-92-2	6.13	0.71	201.81	destroyed	-	-	-	-	-	-	-
MW-2-92-4	6.09	0.73	202.08	-	-	-	-	-	-	-	-
MW-2-92-8	5.70	0.80	184.29	1.33	182.16	0.43	183.06	-	-	-	-
MW-2-92-15s	2.95	0.81	184.58	2.53	181.24	1.96	181.81	-	-	-	-
MW-2-92-15d	5.19	0.80	184.60	5.09	178.71	5.03	178.77	-	-	-	-
MW-2-93-1	5.97	0.96	191.02	destroyed	-	-	-	-	-	-	-
MW-2-93-4	5.98	0.89	202.01	-	-	-	-	-	-	-	-
MW-2-93-5	5.88	0.89	209.31	destroyed	-	-	-	-	-	-	-
MW-3-10-8	4.97	0.82	215.08	1.04	213.22	0.72	213.54	-	-	-	-
MW-3-10-22	6.14	0.63	201.66	0.55	200.48	0.40	200.63	-	-	-	-
MW-4-2-6	5.49	0.71	202.67	1.60	200.36	1.01	200.95	-	-	-	-
MW-4-2-7s	5.38	0.82	184.81	dry	dry	dry	dry	-	-	-	-
MW-4-2-7d	8.43	0.77	184.74	dry	dry	7.98	175.99	-	-	-	-
MW-5-1	8.14	1.00	206.51	0.28	205.23	0.30	205.21	-	-	-	-
MW-7-1	-	0.85	199.35	-	-	-	-	-	-	-	-
MW-9-11-12B	4.29	1.07	182.50	dry	dry	destroyed	-	-	-	-	-
MW-9-11-12A	9.00	1.00	182.31	7.72	173.59	destroyed	-	-	-	-	-
MW-9-11-13	7.61	1.04	190.88	0.39	189.45	0.13	189.71	-	-	-	-
MW-9-11-14	7.70	1.04	186.52	1.80	183.68	1.02	184.46	-	-	-	-
MW 9-11-15-WN*	7.38	1.00	197.14	1.49	194.65	0.71	195.43	-	-	-	-
MW-9-11-16	7.68	0.98	200.23	1.30	197.95	0.70	198.55	-	-	-	-
MW-9-11-17B	4.35	1.11	190.96	0.24	189.61	0.60	189.25	-	-	-	-
MW-9-11-17A	9.06	1.03	191.05	0.17	189.85	0.53	189.49	-	-	-	-
MW-9-11-18	7.44	0.92	187.62	0.39	186.31	0.26	186.44	-	-	-	-
MW-9-11-39	6.89	1.09	184.66	dry	dry	dry	dry	-	-	-	-
MW-9-11-40	6.06	0.81	191.25	2.22	188.22	0.62	189.82	-	-	-	-
MW-9-11-42	7.88	1.02	182.64	2.33	179.29	1.35	180.27	-	-	-	-
MW-9-11-44	7.31	1.07	191.93	-	-	-	-	-	-	-	-

*denotes an instrument which is shared by more than one Neighbourhood
"-' denotes data that are unavailable
mbgl - meters below ground level
masl - meters above sea level

TABLE N19 - C1
Groundwater Elevations - Observation Wells

	Well Depth (mbgl)	Stick-up (m)	Measuring Point Elevation (masl)	Jul-13	
				Water Level (mbgl)	Elevation (masl)
MW-1-11-1	5.31	0.86	166.91	-	-
MW-1-11-2	5.59	0.58	163.66	-	-
MW-1-11-6	2.96	1.22	155.36	-	-
MW-1-11-10s	3.18	0.90	157.38	-	-
MW-1-11-10d	6.92	0.79	157.27	-	-
MW-1-11-11	7.65	1.13	160.21	-	-
MW-2-11-2	5.15	0.91	178.05	-	-
MW-2-11-6	8.28	0.86	173.63	1.15	171.62
MW-2-11-9s	4.39	0.82	181.44	-	-
MW-2-11-9d	8.54	0.73	181.35	-	-
MW-2-11-12s	4.66	0.87	183.76	-	-
MW-2-11-12d	9.36	0.68	183.57	-	-
MW-2-11-16s	4.76	0.90	182.57	-	-
MW-2-11-16d	9.12	0.89	182.56	-	-
MW-2-11-19	5.42	0.69	195.39	-	-
MW-2-11-21	9.43	0.94	185.79	-	-
MW-2-11-23s	4.81	0.78	190.29	-	-
MW-2-11-23d	9.33	0.75	190.26	-	-
MW-2-11-25	6.56	0.75	198.35	-	-
MW-2-11-26	6.19	1.18	198.51	-	-
MW-2-11-30	9.25	0.78	194.49	-	-
MW-2-90-2	6.14	0.78	161.41	-	-
MW-2-90-4	6.10	0.80	162.77	-	-
MW-2-90-6	6.15	0.72	160.87	-	-
MW-2-90-8	4.36	1.18	154.39	-	-
MW-2-91-1	6.06	0.82	184.18	-	-
MW-2-91-2	6.00	0.66	185.63	-	-
MW-2-91-3	6.06	0.72	177.94	-	-
MW-2-92-1	6.20	0.75	188.35	-	-
MW-2-92-2	6.13	0.71	201.81	-	-
MW-2-92-4	6.09	0.73	202.08	-	-
MW-2-92-8	5.70	0.80	184.29	-	-
MW-2-92-15s	2.95	0.81	184.58	-	-
MW-2-92-15d	5.19	0.80	184.60	-	-
MW-2-93-1	5.97	0.96	191.02	-	-
MW-2-93-4	5.98	0.89	202.01	-	-
MW-2-93-5	5.88	0.89	209.31	-	-
MW-3-10-8	4.97	0.82	215.08	-	-
MW-3-10-22	6.14	0.63	201.66	-	-
MW-4-2-6	5.49	0.71	202.67	-	-
MW-4-2-7s	5.38	0.82	184.81	-	-
MW-4-2-7d	8.43	0.77	184.74	-	-
MW-5-1	8.14	1.00	206.51	-	-
MW-7-1	-	0.85	199.35	-	-
MW-9-11-12B	4.29	1.07	182.50	-	-
MW-9-11-12A	9.00	1.00	182.31	-	-
MW-9-11-13	7.61	1.04	190.88	-	-
MW-9-11-14	7.70	1.04	186.52	-	-
MW 9-11-15-WN*	7.38	1.00	197.14	-	-
MW-9-11-16	7.68	0.98	200.23	-	-
MW-9-11-17B	4.35	1.11	190.96	-	-
MW-9-11-17A	9.06	1.03	191.05	-	-
MW-9-11-18	7.44	0.92	187.62	-	-
MW-9-11-39	6.89	1.09	184.66	-	-
MW-9-11-40	6.06	0.81	191.25	-	-
MW-9-11-42	7.88	1.02	182.64	-	-
MW-9-11-44	7.31	1.07	191.93	-	-

*denotes an instrument which is shared by more than one Neighbourhood
"-' denotes data that are unavailable
mbgl - meters below ground level
masl - meters above sea level

TABLE N19 - C1
Groundwater Elevations - Observation Wells

	Well Depth (mbgl)	Stick-up (m)	Measuring Point Elevation (masl)	Apr-09		May-09		Jun-09		Jul-09	
				Water Level (mbgl)	Elevation (masl)	Water Level (mbgl)	Elevation (masl)	Water Level (mbgl)	Elevation (masl)	Water Level (mbgl)	Elevation (masl)
MW-9-11-48	7.75	0.95	199.92	-	-	-	-	-	-	-	-
MW-9-11-49	4.45	1.03	193.61	-	-	-	-	-	-	-	-
MW-9-11-50	8.00	1.00	199.29	-	-	-	-	-	-	-	-
MW-9-11-54	7.68	1.00	202.78	-	-	-	-	-	-	-	-
MW-9-11-59	7.38	1.10	187.39	-	-	-	-	-	-	-	-
MW-10-38A	4.10	0.81	199.41	-	-	-	-	-	-	-	-
MW-10-38B	8.05	0.96	199.56	-	-	-	-	-	-	-	-
MW-10-LID	5.25	0.83	210.82	-	-	-	-	-	-	-	-
MW-13-1	12.30	-	**162.70**	-	-	-	-	-	-	-	-
MW-13-2	12.30	-	**164.40**	-	-	-	-	-	-	-	-
MW-13-3s	4.70	-	**155.20**	-	-	-	-	-	-	-	-
MW-13-3d	12.20	-	**155.20**	-	-	-	-	-	-	-	-
MW-13-4	9.20	-	**152.20**	-	-	-	-	-	-	-	-
MW-13-5	18.30	-	**158.60**	-	-	-	-	-	-	-	-
MW-13-6	13.70	-	**157.70**	-	-	-	-	-	-	-	-
MW-13-7	12.60	-	**155.90**	-	-	-	-	-	-	-	-
MW-13-8s	16.40	-	**157.00**	-	-	-	-	-	-	-	-
MW-13-8d	21.30	-	**157.00**	-	-	-	-	-	-	-	-
MW-13-9	13.70	-	**156.10**	-	-	-	-	-	-	-	-
MW-13-10s	7.60	-	**156.70**	-	-	-	-	-	-	-	-
MW-13-10d	12.30	-	**156.70**	-	-	-	-	-	-	-	-
MW-13-201	12.30	-	**197.20**	-	-	-	-	-	-	-	-
MW-13-202	10.30	-	**199.50**	-	-	-	-	-	-	-	-
MW-13-203	12.60	-	**195.90**	-	-	-	-	-	-	-	-
MW-13-204	9.10	-	**197.70**	-	-	-	-	-	-	-	-
MW-13-209	15.30	-	**186.60**	-	-	-	-	-	-	-	-
MW-13-210	12.30	-	**181.90**	-	-	-	-	-	-	-	-
MW-13-211	18.30	-	**181.40**	-	-	-	-	-	-	-	-
MW-13-212	12.20	-	**169.00**	-	-	-	-	-	-	-	-
MW-13-213	9.10	-	**162.00**	-	-	-	-	-	-	-	-
MW-13-214	9.00	-	**178.40**	-	-	-	-	-	-	-	-
MW-13-215	10.90	-	**182.00**	-	-	-	-	-	-	-	-
MW-13-216	12.20	-	**173.20**	-	-	-	-	-	-	-	-
MW-13-217	3.00	-	**172.40**	-	-	-	-	-	-	-	-
MW-13-218s	7.60	-	**172.60**	-	-	-	-	-	-	-	-
MW-13-218d	21.20	-	**172.60**	-	-	-	-	-	-	-	-
MW-13-219	7.60	-	**192.80**	-	-	-	-	-	-	-	-
MW-13-220	9.20	-	**178.80**	-	-	-	-	-	-	-	-
MW19-1s	4.57	0.94	157.28	-	-	-	-	-	-	-	-
MW19-1d	0.41	0.96	157.30	-	-	-	-	-	-	-	-
MW19-2	6.02	1.05	175.61	-	-	-	-	-	-	-	-
MW19-3	6.20	1.07	181.52	-	-	-	-	-	-	-	-
MW19-4	6.02	0.98	190.33	-	-	-	-	-	-	-	-
MW19-5s	4.54	1.02	163.42	-	-	-	-	-	-	-	-
MW19-5d	9.16	0.95	163.35	-	-	-	-	-	-	-	-
MW19-6s	4.40	0.83	170.40	-	-	-	-	-	-	-	-
MW19-6d	9.14	0.88	170.45	-	-	-	-	-	-	-	-
MW19-7s	4.43	0.77	184.47	-	-	-	-	-	-	-	-
MW19-7d	9.08	0.86	184.56	-	-	-	-	-	-	-	-
MW19-8s	4.51	0.92	199.50	-	-	-	-	-	-	-	-
MW19-8d	9.07	0.95	199.53	-	-	-	-	-	-	-	-
MW21C-1	8.98	1.05	206.05	-	-	-	-	-	-	-	-
MW21C-2	9.27	0.98	211.67	-	-	-	-	-	-	-	-
MWL-1	12.31	0.95	161.04	-	-	-	-	-	-	-	-
MWL-2	11.73	0.90	161.05	-	-	-	-	-	-	-	-

Bold font denotes ground surface elevation rather than measuring point

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mbgl - meters below ground level
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TABLE N19 - C1
Groundwater Elevations - Observation Wells

	Well Depth (mbgl)	Stick-up (m)	Measuring Point Elevation (masl)	Aug-09		Sep-09		Oct-09		Nov-09	
				Water Level (mbgl)	Elevation (masl)	Water Level (mbgl)	Elevation (masl)	Water Level (mbgl)	Elevation (masl)	Water Level (mbgl)	Elevation (masl)
MW-9-11-48	7.75	0.95	199.92	-	-	-	-	-	-	-	-
MW-9-11-49	4.45	1.03	193.61	-	-	-	-	-	-	-	-
MW-9-11-50	8.00	1.00	199.29	-	-	-	-	-	-	-	-
MW-9-11-54	7.68	1.00	202.78	-	-	-	-	-	-	-	-
MW-9-11-59	7.38	1.10	187.39	-	-	-	-	-	-	-	-
MW-10-38A	4.10	0.81	199.41	-	-	-	-	-	-	-	-
MW-10-38B	8.05	0.96	199.56	-	-	-	-	-	-	-	-
MW-10-LID	5.25	0.83	210.82	-	-	-	-	-	-	-	-
MW-13-1	12.30	-	**162.70**	-	-	-	-	-	-	-	-
MW-13-2	12.30	-	**164.40**	-	-	-	-	-	-	-	-
MW-13-3s	4.70	-	**155.20**	-	-	-	-	-	-	-	-
MW-13-3d	12.20	-	**155.20**	-	-	-	-	-	-	-	-
MW-13-4	9.20	-	**152.20**	-	-	-	-	-	-	-	-
MW-13-5	18.30	-	**158.60**	-	-	-	-	-	-	-	-
MW-13-6	13.70	-	**157.70**	-	-	-	-	-	-	-	-
MW-13-7	12.60	-	**155.90**	-	-	-	-	-	-	-	-
MW-13-8s	16.40	-	**157.00**	-	-	-	-	-	-	-	-
MW-13-8d	21.30	-	**157.00**	-	-	-	-	-	-	-	-
MW-13-9	13.70	-	**156.10**	-	-	-	-	-	-	-	-
MW-13-10s	7.60	-	**156.70**	-	-	-	-	-	-	-	-
MW-13-10d	12.30	-	**156.70**	-	-	-	-	-	-	-	-
MW-13-201	12.30	-	**197.20**	-	-	-	-	-	-	-	-
MW-13-202	10.30	-	**199.50**	-	-	-	-	-	-	-	-
MW-13-203	12.60	-	**195.90**	-	-	-	-	-	-	-	-
MW-13-204	9.10	-	**197.70**	-	-	-	-	-	-	-	-
MW-13-209	15.30	-	**186.60**	-	-	-	-	-	-	-	-
MW-13-210	12.30	-	**181.90**	-	-	-	-	-	-	-	-
MW-13-211	18.30	-	**181.40**	-	-	-	-	-	-	-	-
MW-13-212	12.20	-	**169.00**	-	-	-	-	-	-	-	-
MW-13-213	9.10	-	**162.00**	-	-	-	-	-	-	-	-
MW-13-214	9.00	-	**178.40**	-	-	-	-	-	-	-	-
MW-13-215	10.90	-	**182.00**	-	-	-	-	-	-	-	-
MW-13-216	12.20	-	**173.20**	-	-	-	-	-	-	-	-
MW-13-217	3.00	-	**172.40**	-	-	-	-	-	-	-	-
MW-13-218s	7.60	-	**172.60**	-	-	-	-	-	-	-	-
MW-13-218d	21.20	-	**172.60**	-	-	-	-	-	-	-	-
MW-13-219	7.60	-	**192.80**	-	-	-	-	-	-	-	-
MW-13-220	9.20	-	**178.80**	-	-	-	-	-	-	-	-
MW19-1s	4.57	0.94	157.28	-	-	-	-	-	-	-	-
MW19-1d	0.41	0.96	157.30	-	-	-	-	-	-	-	-
MW19-2	6.02	1.05	175.61	-	-	-	-	-	-	-	-
MW19-3	6.20	1.07	181.52	-	-	-	-	-	-	-	-
MW19-4	6.02	0.98	190.33	-	-	-	-	-	-	-	-
MW19-5s	4.54	1.02	163.42	-	-	-	-	-	-	-	-
MW19-5d	9.16	0.95	163.35	-	-	-	-	-	-	-	-
MW19-6s	4.40	0.83	170.40	-	-	-	-	-	-	-	-
MW19-6d	9.14	0.88	170.45	-	-	-	-	-	-	-	-
MW19-7s	4.43	0.77	184.47	-	-	-	-	-	-	-	-
MW19-7d	9.08	0.86	184.56	-	-	-	-	-	-	-	-
MW19-8s	4.51	0.92	199.50	-	-	-	-	-	-	-	-
MW19-8d	9.07	0.95	199.53	-	-	-	-	-	-	-	-
MW21C-1	8.98	1.05	206.05	-	-	-	-	-	-	-	-
MW21C-2	9.27	0.98	211.67	-	-	-	-	-	-	-	-
MWL-1	12.31	0.95	161.04	-	-	-	-	-	-	-	-
MWL-2	11.73	0.90	161.05	-	-	-	-	-	-	-	-

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TABLE N19 - C1
Groundwater Elevations - Observation Wells

	Well Depth (mbgl)	Stick-up (m)	Measuring Point Elevation (masl)	Dec-09		Jan-10		Feb-10		Mar-10	
				Water Level (mbgl)	Elevation (masl)	Water Level (mbgl)	Elevation (masl)	Water Level (mbgl)	Elevation (masl)	Water Level (mbgl)	Elevation (masl)
MW-9-11-48	7.75	0.95	199.92	-	-	-	-	-	-	-	-
MW-9-11-49	4.45	1.03	193.61	-	-	-	-	-	-	-	-
MW-9-11-50	8.00	1.00	199.29	-	-	-	-	-	-	-	-
MW-9-11-54	7.68	1.00	202.78	-	-	-	-	-	-	-	-
MW-9-11-59	7.38	1.10	187.39	-	-	-	-	-	-	-	-
MW-10-38A	4.10	0.81	199.41	-	-	-	-	-	-	-	-
MW-10-38B	8.05	0.96	199.56	-	-	-	-	-	-	-	-
MW-10-LID	5.25	0.83	210.82	-	-	-	-	-	-	-	-
MW-13-1	12.30	-	**162.70**	-	-	-	-	-	-	-	-
MW-13-2	12.30	-	**164.40**	-	-	-	-	-	-	-	-
MW-13-3s	4.70	-	**155.20**	-	-	-	-	-	-	-	-
MW-13-3d	12.20	-	**155.20**	-	-	-	-	-	-	-	-
MW-13-4	9.20	-	**152.20**	-	-	-	-	-	-	-	-
MW-13-5	18.30	-	**158.60**	-	-	-	-	-	-	-	-
MW-13-6	13.70	-	**157.70**	-	-	-	-	-	-	-	-
MW-13-7	12.60	-	**155.90**	-	-	-	-	-	-	-	-
MW-13-8s	16.40	-	**157.00**	-	-	-	-	-	-	-	-
MW-13-8d	21.30	-	**157.00**	-	-	-	-	-	-	-	-
MW-13-9	13.70	-	**156.10**	-	-	-	-	-	-	-	-
MW-13-10s	7.60	-	**156.70**	-	-	-	-	-	-	-	-
MW-13-10d	12.30	-	**156.70**	-	-	-	-	-	-	-	-
MW-13-201	12.30	-	**197.20**	-	-	-	-	-	-	-	-
MW-13-202	10.30	-	**199.50**	-	-	-	-	-	-	-	-
MW-13-203	12.60	-	**195.90**	-	-	-	-	-	-	-	-
MW-13-204	9.10	-	**197.70**	-	-	-	-	-	-	-	-
MW-13-209	15.30	-	**186.60**	-	-	-	-	-	-	-	-
MW-13-210	12.30	-	**181.90**	-	-	-	-	-	-	-	-
MW-13-211	18.30	-	**181.40**	-	-	-	-	-	-	-	-
MW-13-212	12.20	-	**169.00**	-	-	-	-	-	-	-	-
MW-13-213	9.10	-	**162.00**	-	-	-	-	-	-	-	-
MW-13-214	9.00	-	**178.40**	-	-	-	-	-	-	-	-
MW-13-215	10.90	-	**182.00**	-	-	-	-	-	-	-	-
MW-13-216	12.20	-	**173.20**	-	-	-	-	-	-	-	-
MW-13-217	3.00	-	**172.40**	-	-	-	-	-	-	-	-
MW-13-218s	7.60	-	**172.60**	-	-	-	-	-	-	-	-
MW-13-218d	21.20	-	**172.60**	-	-	-	-	-	-	-	-
MW-13-219	7.60	-	**192.80**	-	-	-	-	-	-	-	-
MW-13-220	9.20	-	**178.80**	-	-	-	-	-	-	-	-
MW19-1s	4.57	0.94	157.28	-	-	-	-	-	-	-	-
MW19-1d	0.41	0.96	157.30	-	-	-	-	-	-	-	-
MW19-2	6.02	1.05	175.61	-	-	-	-	-	-	-	-
MW19-3	6.20	1.07	181.52	-	-	-	-	-	-	-	-
MW19-4	6.02	0.98	190.33	-	-	-	-	-	-	-	-
MW19-5s	4.54	1.02	163.42	-	-	-	-	-	-	-	-
MW19-5d	9.16	0.95	163.35	-	-	-	-	-	-	-	-
MW19-6s	4.40	0.83	170.40	-	-	-	-	-	-	-	-
MW19-6d	9.14	0.88	170.45	-	-	-	-	-	-	-	-
MW19-7s	4.43	0.77	184.47	-	-	-	-	-	-	-	-
MW19-7d	9.08	0.86	184.56	-	-	-	-	-	-	-	-
MW19-8s	4.51	0.92	199.50	-	-	-	-	-	-	-	-
MW19-8d	9.07	0.95	199.53	-	-	-	-	-	-	-	-
MW21C-1	8.98	1.05	206.05	-	-	-	-	-	-	-	-
MW21C-2	9.27	0.98	211.67	-	-	-	-	-	-	-	-
MWL-1	12.31	0.95	161.04	-	-	-	-	-	-	-	-
MWL-2	11.73	0.90	161.05	-	-	-	-	-	-	-	-

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mbgl - meters below ground level
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TABLE N19 - C1
Groundwater Elevations - Observation Wells

	Well Depth (mbgl)	Stick-up (m)	Measuring Point Elevation (masl)	May-10		Jul-10		Oct-10		Dec-10	
				Water Level (mbgl)	Elevation (masl)	Water Level (mbgl)	Elevation (masl)	Water Level (mbgl)	Elevation (masl)	Water Level (mbgl)	Elevation (masl)
MW-9-11-48	7.75	0.95	199.92	-	-	-	-	-	-	-	-
MW-9-11-49	4.45	1.03	193.61	-	-	-	-	-	-	-	-
MW-9-11-50	8.00	1.00	199.29	-	-	-	-	-	-	-	-
MW-9-11-54	7.68	1.00	202.78	-	-	-	-	-	-	-	-
MW-9-11-59	7.38	1.10	187.39	-	-	-	-	-	-	-	-
MW-10-38A	4.10	0.81	199.41	-	-	-	-	-	-	-	-
MW-10-38B	8.05	0.96	199.56	-	-	-	-	-	-	-	-
MW-10-LID	5.25	0.83	210.82	-	-	-	-	-	-	-	-
MW-13-1	12.30	-	**162.70**	-	-	-	-	-	-	-	-
MW-13-2	12.30	-	**164.40**	-	-	-	-	-	-	-	-
MW-13-3s	4.70	-	**155.20**	-	-	-	-	-	-	-	-
MW-13-3d	12.20	-	**155.20**	-	-	-	-	-	-	-	-
MW-13-4	9.20	-	**152.20**	-	-	-	-	-	-	-	-
MW-13-5	18.30	-	**158.60**	-	-	-	-	-	-	-	-
MW-13-6	13.70	-	**157.70**	-	-	-	-	-	-	-	-
MW-13-7	12.60	-	**155.90**	-	-	-	-	-	-	-	-
MW-13-8s	16.40	-	**157.00**	-	-	-	-	-	-	-	-
MW-13-8d	21.30	-	**157.00**	-	-	-	-	-	-	-	-
MW-13-9	13.70	-	**156.10**	-	-	-	-	-	-	-	-
MW-13-10s	7.60	-	**156.70**	-	-	-	-	-	-	-	-
MW-13-10d	12.30	-	**156.70**	-	-	-	-	-	-	-	-
MW-13-201	12.30	-	**197.20**	-	-	-	-	-	-	-	-
MW-13-202	10.30	-	**199.50**	-	-	-	-	-	-	-	-
MW-13-203	12.60	-	**195.90**	-	-	-	-	-	-	-	-
MW-13-204	9.10	-	**197.70**	-	-	-	-	-	-	-	-
MW-13-209	15.30	-	**186.60**	-	-	-	-	-	-	-	-
MW-13-210	12.30	-	**181.90**	-	-	-	-	-	-	-	-
MW-13-211	18.30	-	**181.40**	-	-	-	-	-	-	-	-
MW-13-212	12.20	-	**169.00**	-	-	-	-	-	-	-	-
MW-13-213	9.10	-	**162.00**	-	-	-	-	-	-	-	-
MW-13-214	9.00	-	**178.40**	-	-	-	-	-	-	-	-
MW-13-215	10.90	-	**182.00**	-	-	-	-	-	-	-	-
MW-13-216	12.20	-	**173.20**	-	-	-	-	-	-	-	-
MW-13-217	3.00	-	**172.40**	-	-	-	-	-	-	-	-
MW-13-218s	7.60	-	**172.60**	-	-	-	-	-	-	-	-
MW-13-218d	21.20	-	**172.60**	-	-	-	-	-	-	-	-
MW-13-219	7.60	-	**192.80**	-	-	-	-	-	-	-	-
MW-13-220	9.20	-	**178.80**	-	-	-	-	-	-	-	-
MW19-1s	4.57	0.94	157.28	-	-	-	-	-	-	-	-
MW19-1d	0.41	0.96	157.30	-	-	-	-	-	-	-	-
MW19-2	6.02	1.05	175.61	-	-	-	-	-	-	-	-
MW19-3	6.20	1.07	181.52	-	-	-	-	-	-	-	-
MW19-4	6.02	0.98	190.33	-	-	-	-	-	-	-	-
MW19-5s	4.54	1.02	163.42	-	-	-	-	-	-	-	-
MW19-5d	9.16	0.95	163.35	-	-	-	-	-	-	-	-
MW19-6s	4.40	0.83	170.40	-	-	-	-	-	-	-	-
MW19-6d	9.14	0.88	170.45	-	-	-	-	-	-	-	-
MW19-7s	4.43	0.77	184.47	-	-	-	-	-	-	-	-
MW19-7d	9.08	0.86	184.56	-	-	-	-	-	-	-	-
MW19-8s	4.51	0.92	199.50	-	-	-	-	-	-	-	-
MW19-8d	9.07	0.95	199.53	-	-	-	-	-	-	-	-
MW21C-1	8.98	1.05	206.05	-	-	-	-	-	-	-	-
MW21C-2	9.27	0.98	211.67	-	-	-	-	-	-	-	-
MWL-1	12.31	0.95	161.04	-	-	-	-	-	-	-	-
MWL-2	11.73	0.90	161.05	-	-	-	-	-	-	-	-

Bold font denotes ground surface elevation rather than measuring point

*denotes an instrument which is shared by more than one Neighbourhood
"-' denotes data that are unavailable
mbgl - meters below ground level
masl - meters above sea level

TABLE N19 - C1
Groundwater Elevations - Observation Wells

	Well Depth (mbgl)	Stick-up (m)	Measuring Point Elevation (masl)	Mar-11		Apr-11		May-11		Jun-11	
				Water Level (mbgl)	Elevation (masl)	Water Level (mbgl)	Elevation (masl)	Water Level (mbgl)	Elevation (masl)	Water Level (mbgl)	Elevation (masl)
MW-9-11-48	7.75	0.95	199.92	-	-	-	-	1.29	197.68	-	-
MW-9-11-49	4.45	1.03	193.61	-	-	-	-	0.76	191.82	0.77	191.81
MW-9-11-50	8.00	1.00	199.29	-	-	-	-	0.73	197.57	0.92	197.37
MW-9-11-54	7.68	1.00	202.78	-	-	-	-	1.83	199.95	0.67	201.11
MW-9-11-59	7.38	1.10	187.39	-	-	-	-	2.63	183.66	0.97	185.32
MW-10-38A	4.10	0.81	199.41	-	-	-	-	-	-	0.79	197.81
MW-10-38B	8.05	0.96	199.56	-	-	-	-	-	-	0.78	197.82
MW-10-LID	5.25	0.83	210.82	-	-	-	-	-	-	1.68	208.31
MW-13-1	12.30	-	**162.70**	-	-	-	-	-	-	-	-
MW-13-2	12.30	-	**164.40**	-	-	-	-	-	-	-	-
MW-13-3s	4.70	-	**155.20**	-	-	-	-	-	-	-	-
MW-13-3d	12.20	-	**155.20**	-	-	-	-	-	-	-	-
MW-13-4	9.20	-	**152.20**	-	-	-	-	-	-	-	-
MW-13-5	18.30	-	**158.60**	-	-	-	-	-	-	-	-
MW-13-6	13.70	-	**157.70**	-	-	-	-	-	-	-	-
MW-13-7	12.60	-	**155.90**	-	-	-	-	-	-	-	-
MW-13-8s	16.40	-	**157.00**	-	-	-	-	-	-	-	-
MW-13-8d	21.30	-	**157.00**	-	-	-	-	-	-	-	-
MW-13-9	13.70	-	**156.10**	-	-	-	-	-	-	-	-
MW-13-10s	7.60	-	**156.70**	-	-	-	-	-	-	-	-
MW-13-10d	12.30	-	**156.70**	-	-	-	-	-	-	-	-
MW-13-201	12.30	-	**197.20**	-	-	-	-	-	-	-	-
MW-13-202	10.30	-	**199.50**	-	-	-	-	-	-	-	-
MW-13-203	12.60	-	**195.90**	-	-	-	-	-	-	-	-
MW-13-204	9.10	-	**197.70**	-	-	-	-	-	-	-	-
MW-13-209	15.30	-	**186.60**	-	-	-	-	-	-	-	-
MW-13-210	12.30	-	**181.90**	-	-	-	-	-	-	-	-
MW-13-211	18.30	-	**181.40**	-	-	-	-	-	-	-	-
MW-13-212	12.20	-	**169.00**	-	-	-	-	-	-	-	-
MW-13-213	9.10	-	**162.00**	-	-	-	-	-	-	-	-
MW-13-214	9.00	-	**178.40**	-	-	-	-	-	-	-	-
MW-13-215	10.90	-	**182.00**	-	-	-	-	-	-	-	-
MW-13-216	12.20	-	**173.20**	-	-	-	-	-	-	-	-
MW-13-217	3.00	-	**172.40**	-	-	-	-	-	-	-	-
MW-13-218s	7.60	-	**172.60**	-	-	-	-	-	-	-	-
MW-13-218d	21.20	-	**172.60**	-	-	-	-	-	-	-	-
MW-13-219	7.60	-	**192.80**	-	-	-	-	-	-	-	-
MW-13-220	9.20	-	**178.80**	-	-	-	-	-	-	-	-
MW19-1s	4.57	0.94	157.28	-	-	-	-	-	-	1.63	154.71
MW19-1d	0.41	0.96	157.30	-	-	-	-	-	-	Damaged	
MW19-2	6.02	1.05	175.61	-	-	-	-	-	-	0.52	174.04
MW19-3	6.20	1.07	181.52	-	-	-	-	-	-	2.08	178.37
MW19-4	6.02	0.98	190.33	-	-	-	-	-	-	2.68	186.67
MW19-5s	4.54	1.02	163.42	-	-	-	-	-	-	2.95	159.45
MW19-5d	9.16	0.95	163.35	-	-	-	-	-	-	4.32	158.08
MW19-6s	4.40	0.83	170.40	-	-	-	-	-	-	-	-
MW19-6d	9.14	0.88	170.45	-	-	-	-	-	-	5.02	164.55
MW19-7s	4.43	0.77	184.47	-	-	-	-	-	-	1.27	182.43
MW19-7d	9.08	0.86	184.56	-	-	-	-	-	-	0.92	182.78
MW19-8s	4.51	0.92	199.50	-	-	-	-	-	-	0.89	197.69
MW19-8d	9.07	0.95	199.53	-	-	-	-	-	-	0.93	197.65
MW21C-1	8.98	1.05	206.05	-	-	-	-	-	-	1.62	203.38
MW21C-2	9.27	0.98	211.67	-	-	-	-	-	-	Not found	
MWL-1	12.31	0.95	161.04	-	-	-	-	-	-		
MWL-2	11.73	0.90	161.05	-	-	-	-	-	-	-0.27	160.42

Bold font denotes ground surface elevation rather than measuring point

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"-' denotes data that are unavailable
mbgl - meters below ground level
masl - meters above sea level

TABLE N19 - C1
Groundwater Elevations - Observation Wells

	Well Depth (mbgl)	Stick-up (m)	Measuring Point Elevation (masl)	Oct-11		Nov-11		May-12		Jul-12	
				Water Level (mbgl)	Elevation (masl)	Water Level (mbgl)	Elevation (masl)	Water Level (mbgl)	Elevation (masl)	Water Level (mbgl)	Elevation (masl)
MW-9-11-48	7.75	0.95	199.92	2.24	196.73	1.63	197.34	1.65	197.32	2.05	196.92
MW-9-11-49	4.45	1.03	193.61	0.82	191.76	0.43	192.15	1.23	191.35	1.79	190.79
MW-9-11-50	8.00	1.00	199.29	1.31	196.98	0.25	198.04	0.83	197.46	1.94	196.35
MW-9-11-54	7.68	1.00	202.78	1.19	200.59	0.89	200.89	1.42	200.36	1.17	200.61
MW-9-11-59	7.38	1.10	187.39	-0.08	186.37	-0.05	186.34	destroyed	-	-	-
MW-10-38A	4.10	0.81	199.41	1.56	197.04	-0.02	198.62	0.44	198.16	1.20	197.40
MW-10-38B	8.05	0.96	199.56	1.59	197.01	-0.03	198.63	0.37	198.23	1.13	197.47
MW-10-LID	5.25	0.83	210.82	2.46	207.53	1.66	208.33	1.95	208.04	2.50	207.49
MW-13-1	12.30	-	**162.70**	-	-	-	-	-	-	-	-
MW-13-2	12.30	-	**164.40**	-	-	-	-	-	-	-	-
MW-13-3s	4.70	-	**155.20**	-	-	-	-	-	-	-	-
MW-13-3d	12.20	-	**155.20**	-	-	-	-	-	-	-	-
MW-13-4	9.20	-	**152.20**	-	-	-	-	-	-	-	-
MW-13-5	18.30	-	**158.60**	-	-	-	-	-	-	-	-
MW-13-6	13.70	-	**157.70**	-	-	-	-	-	-	-	-
MW-13-7	12.60	-	**155.90**	-	-	-	-	-	-	-	-
MW-13-8s	16.40	-	**157.00**	-	-	-	-	-	-	-	-
MW-13-8d	21.30	-	**157.00**	-	-	-	-	-	-	-	-
MW-13-9	13.70	-	**156.10**	-	-	-	-	-	-	-	-
MW-13-10s	7.60	-	**156.70**	-	-	-	-	-	-	-	-
MW-13-10d	12.30	-	**156.70**	-	-	-	-	-	-	-	-
MW-13-201	12.30	-	**197.20**	-	-	-	-	-	-	-	-
MW-13-202	10.30	-	**199.50**	-	-	-	-	-	-	-	-
MW-13-203	12.60	-	**195.90**	-	-	-	-	-	-	-	-
MW-13-204	9.10	-	**197.70**	-	-	-	-	-	-	-	-
MW-13-209	15.30	-	**186.60**	-	-	-	-	-	-	-	-
MW-13-210	12.30	-	**181.90**	-	-	-	-	-	-	-	-
MW-13-211	18.30	-	**181.40**	-	-	-	-	-	-	-	-
MW-13-212	12.20	-	**169.00**	-	-	-	-	-	-	-	-
MW-13-213	9.10	-	**162.00**	-	-	-	-	-	-	-	-
MW-13-214	9.00	-	**178.40**	-	-	-	-	-	-	-	-
MW-13-215	10.90	-	**182.00**	-	-	-	-	-	-	-	-
MW-13-216	12.20	-	**173.20**	-	-	-	-	-	-	-	-
MW-13-217	3.00	-	**172.40**	-	-	-	-	-	-	-	-
MW-13-218s	7.60	-	**172.60**	-	-	-	-	-	-	-	-
MW-13-218d	21.20	-	**172.60**	-	-	-	-	-	-	-	-
MW-13-219	7.60	-	**192.80**	-	-	-	-	-	-	-	-
MW-13-220	9.20	-	**178.80**	-	-	-	-	-	-	-	-
MW19-1s	4.57	0.94	157.28	2.26	154.08	1.92	154.42	2.02	154.32	2.64	153.70
MW19-1d	0.41	0.96	157.30	-	-	-	-	-	-	-	-
MW19-2	6.02	1.05	175.61	0.57	173.99	0.04	174.52	0.72	173.84	1.26	173.30
MW19-3	6.20	1.07	181.52	3.56	176.89	2.07	178.38	2.17	178.28	2.99	177.46
MW19-4	6.02	0.98	190.33	3.98	185.37	3.25	186.10	3.00	186.35	3.80	185.55
MW19-5s	4.54	1.02	163.42	dry	dry	3.50	158.90	3.87	158.53	4.57	157.83
MW19-5d	9.16	0.95	163.35	6.05	156.35	4.61	157.79	4.89	157.51	5.48	156.92
MW19-6s	4.40	0.83	170.40	dry	dry	4.19	165.38	dry	dry	4.43	165.14
MW19-6d	9.14	0.88	170.45	7.40	162.17	4.89	164.68	6.22	163.35	6.88	162.69
MW19-7s	4.43	0.77	184.47	1.95	181.75	0.90	182.80	0.84	182.86	1.45	182.25
MW19-7d	9.08	0.86	184.56	1.52	182.18	1.04	182.66	0.85	182.85	1.41	182.29
MW19-8s	4.51	0.92	199.50	1.40	197.18	0.10	198.48	0.65	197.93	1.50	197.08
MW19-8d	9.07	0.95	199.53	1.12	197.46	0.03	198.55	0.67	197.91	1.46	197.12
MW21C-1	8.98	1.05	206.05	2.37	202.63	0.61	204.39	0.65	204.35	2.05	202.95
MW21C-2	9.27	0.98	211.67	4.10	206.59	3.24	207.45	2.54	208.15	3.82	206.87
MWL-1	12.31	0.95	161.04	8.46	151.63	7.59	152.50	7.83	152.26	8.57	151.52
MWL-2	11.73	0.90	161.05	0.56	159.59	0.08	160.07	0.18	159.97	0.80	159.35

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TABLE N19 - C1
Groundwater Elevations - Observation Wells

	Well Depth (mbgl)	Stick-up (m)	Measuring Point Elevation (masl)	Sep-12		Nov-12		May-13		Jun-13	
				Water Level (mbgl)	Elevation (masl)	Water Level (mbgl)	Elevation (masl)	Water Level (mbgl)	Elevation (masl)	Water Level (mbgl)	Elevation (masl)
MW-9-11-48	7.75	0.95	199.92	2.03	196.94	1.54	197.43	-	-	-	-
MW-9-11-49	4.45	1.03	193.61	1.27	191.31	0.72	191.86	-	-	-	-
MW-9-11-50	8.00	1.00	199.29	0.81	197.48	0.57	197.72	-	-	-	-
MW-9-11-54	7.68	1.00	202.78	destroyed	-	-	-	-	-	-	-
MW-9-11-59	7.38	1.10	187.39	-	-	-	-	-	-	-	-
MW-10-38A	4.10	0.81	199.41	0.12	198.48	0.54	198.06	-	-	-	-
MW-10-38B	8.05	0.96	199.56	0.03	198.57	0.24	198.36	-	-	-	-
MW-10-LID	5.25	0.83	210.82	2.56	207.43	1.62	208.37	-	-	-	-
MW-13-1	12.30	-	**162.70**	-	-	-	-	1.06	161.64	-	-
MW-13-2	12.30	-	**164.40**	-	-	-	-	3.43	160.97	-	-
MW-13-3s	4.70	-	**155.20**	-	-	-	-	dry	dry	-	-
MW-13-3d	12.20	-	**155.20**	-	-	-	-	8.21	146.99	-	-
MW-13-4	9.20	-	**152.20**	-	-	-	-	3.84	148.36	-	-
MW-13-5	18.30	-	**158.60**	-	-	-	-	16.53	142.07	-	-
MW-13-6	13.70	-	**157.70**	-	-	-	-	12.47	145.23	-	-
MW-13-7	12.60	-	**155.90**	-	-	-	-	5.18	150.72	-	-
MW-13-8s	16.40	-	**157.00**	-	-	-	-	8.00	149.00	-	-
MW-13-8d	21.30	-	**157.00**	-	-	-	-	12.65	144.35	-	-
MW-13-9	13.70	-	**156.10**	-	-	-	-	4.57	151.53	-	-
MW-13-10s	7.60	-	**156.70**	-	-	-	-	dry	dry	-	-
MW-13-10d	12.30	-	**156.70**	-	-	-	-	dry	dry	-	-
MW-13-201	12.30	-	**197.20**	-	-	-	-	4.89	192.31	-	-
MW-13-202	10.30	-	**199.50**	-	-	-	-	5.60	193.90	-	-
MW-13-203	12.60	-	**195.90**	-	-	-	-	4.80	191.10	-	-
MW-13-204	9.10	-	**197.70**	-	-	-	-	9.00	188.70	-	-
MW-13-209	15.30	-	**186.60**	-	-	-	-	7.27	179.33	-	-
MW-13-210	12.30	-	**181.90**	-	-	-	-	11.43	170.47	-	-
MW-13-211	18.30	-	**181.40**	-	-	-	-	2.31	179.09	3.52	177.88
MW-13-212	12.20	-	**169.00**	-	-	-	-	4.49	164.51	-	-
MW-13-213	9.10	-	**162.00**	-	-	-	-	-0.35	162.35	-	-
MW-13-214	9.00	-	**178.40**	-	-	-	-	2.00	176.40	-	-
MW-13-215	10.90	-	**182.00**	-	-	-	-	8.47	173.53	-	-
MW-13-216	12.20	-	**173.20**	-	-	-	-	9.72	163.48	-	-
MW-13-217	3.00	-	**172.40**	-	-	-	-	0.60	171.80	1.42	170.98
MW-13-218s	7.60	-	**172.60**	-	-	-	-	1.37	171.23	2.04	170.56
MW-13-218d	21.20	-	**172.60**	-	-	-	-	6.51	166.09	7.31	165.29
MW-13-219	7.60	-	**192.80**	-	-	-	-	0.59	192.21	-	-
MW-13-220	9.20	-	**178.80**	-	-	-	-	1.61	177.19	-	-
MW19-1s	4.57	0.94	157.28	2.48	153.86	2.20	154.14	-	-	-	-
MW19-1d	0.41	0.96	157.30	-	-	-	-	-	-	-	-
MW19-2	6.02	1.05	175.61	-	-	0.37	174.19	-	-	-	-
MW19-3	6.20	1.07	181.52	3.69	176.76	1.84	178.61	-	-	-	-
MW19-4	6.02	0.98	190.33	3.98	185.37	3.36	185.99	-	-	-	-
MW19-5s	4.54	1.02	163.42	dry	dry	dry	dry	-	-	-	-
MW19-5d	9.16	0.95	163.35	6.02	156.38	4.91	157.49	-	-	-	-
MW19-6s	4.40	0.83	170.40	dry	dry	dry	dry	-	-	-	-
MW19-6d	9.14	0.88	170.45	7.54	162.03	6.25	163.32	-	-	-	-
MW19-7s	4.43	0.77	184.47	1.05	182.65	0.85	182.85	-	-	-	-
MW19-7d	9.08	0.86	184.56	1.35	182.35	1.04	182.66	-	-	-	-
MW19-8s	4.51	0.92	199.50	0.61	197.97	0.58	198.00	-	-	-	-
MW19-8d	9.07	0.95	199.53	0.41	198.17	0.61	197.97	-	-	-	-
MW21C-1	8.98	1.05	206.05	1.19	203.81	0.48	204.52	-	-	-	-
MW21C-2	9.27	0.98	211.67	4.18	206.51	3.38	207.31	-	-	-	-
MWL-1	12.31	0.95	161.04	8.65	151.44	7.47	152.62	-	-	-	-
MWL-2	11.73	0.90	161.05	0.72	159.43	0.34	159.81	-	-	-	-

Bold font denotes ground surface elevation rather than measuring point

*denotes an instrument which is shared by more than one Neighbourhood
"-' denotes data that are unavailable
mbgl - meters below ground level
masl - meters above sea level

TABLE N19 - C1
Groundwater Elevations - Observation Wells

	Well Depth (mbgl)	Stick-up (m)	Measuring Point Elevation (masl)	Jul-13	
				Water Level (mbgl)	Elevation (masl)
MW-9-11-48	7.75	0.95	199.92	-	-
MW-9-11-49	4.45	1.03	193.61	-	-
MW-9-11-50	8.00	1.00	199.29	-	-
MW-9-11-54	7.68	1.00	202.78	-	-
MW-9-11-59	7.38	1.10	187.39	-	-
MW-10-38A	4.10	0.81	199.41	-	-
MW-10-38B	8.05	0.96	199.56	-	-
MW-10-LID	5.25	0.83	210.82	-	-
MW-13-1	12.30	-	**162.70**	-	-
MW-13-2	12.30	-	**164.40**	-	-
MW-13-3s	4.70	-	**155.20**	-	-
MW-13-3d	12.20	-	**155.20**	-	-
MW-13-4	9.20	-	**152.20**	-	-
MW-13-5	18.30	-	**158.60**	-	-
MW-13-6	13.70	-	**157.70**	-	-
MW-13-7	12.60	-	**155.90**	-	-
MW-13-8s	16.40	-	**157.00**	-	-
MW-13-8d	21.30	-	**157.00**	-	-
MW-13-9	13.70	-	**156.10**	-	-
MW-13-10s	7.60	-	**156.70**	-	-
MW-13-10d	12.30	-	**156.70**	-	-
MW-13-201	12.30	-	**197.20**	-	-
MW-13-202	10.30	-	**199.50**	-	-
MW-13-203	12.60	-	**195.90**	-	-
MW-13-204	9.10	-	**197.70**	-	-
MW-13-209	15.30	-	**186.60**	-	-
MW-13-210	12.30	-	**181.90**	-	-
MW-13-211	18.30	-	**181.40**	4.67	176.74
MW-13-212	12.20	-	**169.00**	-	-
MW-13-213	9.10	-	**162.00**	-	-
MW-13-214	9.00	-	**178.40**	-	-
MW-13-215	10.90	-	**182.00**	-	-
MW-13-216	12.20	-	**173.20**	-	-
MW-13-217	3.00	-	**172.40**	1.37	171.03
MW-13-218s	7.60	-	**172.60**	2.19	170.41
MW-13-218d	21.20	-	**172.60**	7.41	165.19
MW-13-219	7.60	-	**192.80**	-	-
MW-13-220	9.20	-	**178.80**	-	-
MW19-1s	4.57	0.94	157.28	-	-
MW19-1d	0.41	0.96	157.30	-	-
MW19-2	6.02	1.05	175.61	-	-
MW19-3	6.20	1.07	181.52	-	-
MW19-4	6.02	0.98	190.33	-	-
MW19-5s	4.54	1.02	163.42	-	-
MW19-5d	9.16	0.95	163.35	-	-
MW19-6s	4.40	0.83	170.40	-	-
MW19-6d	9.14	0.88	170.45	-	-
MW19-7s	4.43	0.77	184.47	-	-
MW19-7d	9.08	0.86	184.56	-	-
MW19-8s	4.51	0.92	199.50	-	-
MW19-8d	9.07	0.95	199.53	-	-
MW21C-1	8.98	1.05	206.05	-	-
MW21C-2	9.27	0.98	211.67	-	-
MWL-1	12.31	0.95	161.04	-	-
MWL-2	11.73	0.90	161.05	-	-

Bold font denotes ground surface elevation rather than measuring point

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"-' denotes data that are unavailable
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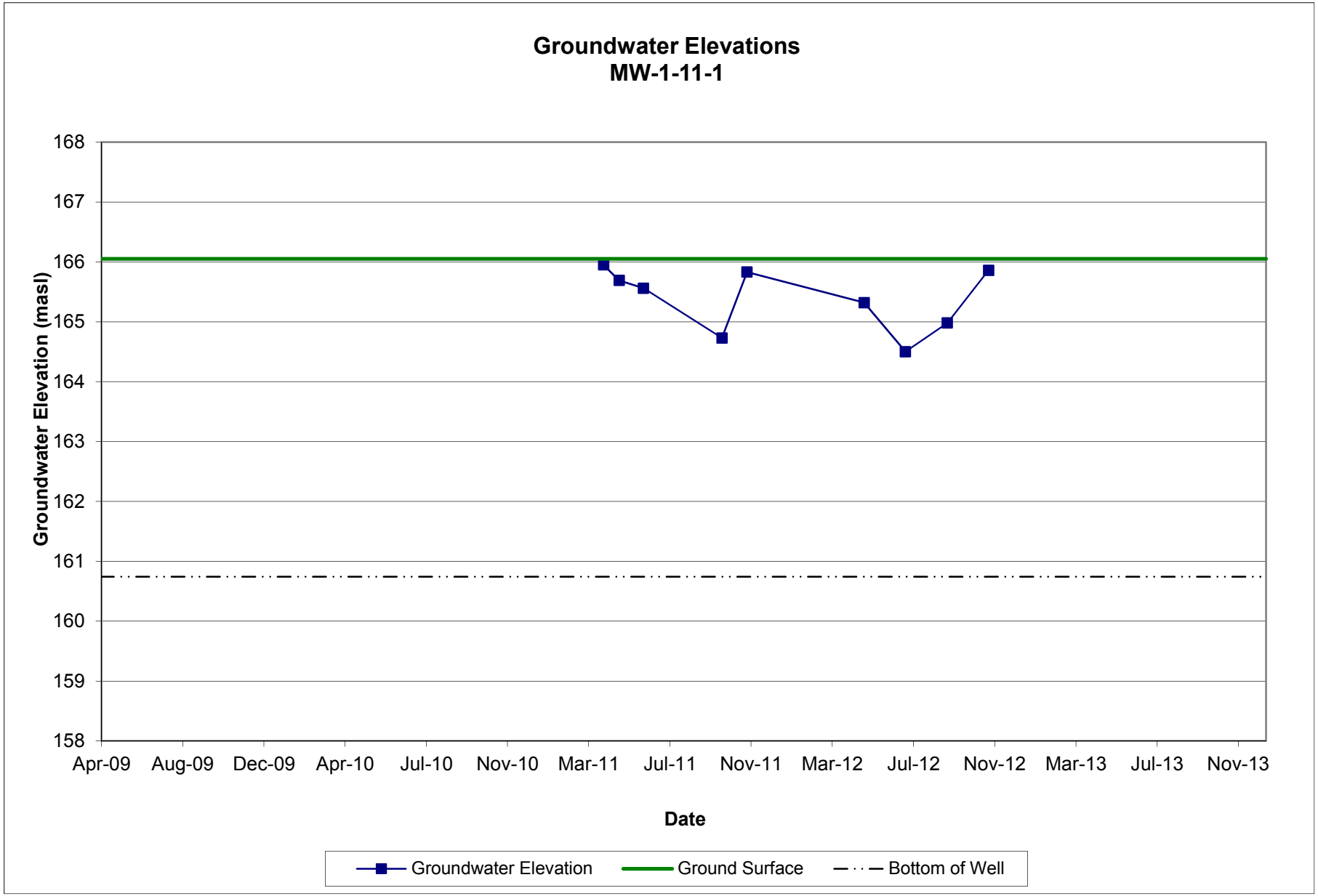

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Figure N19-C1

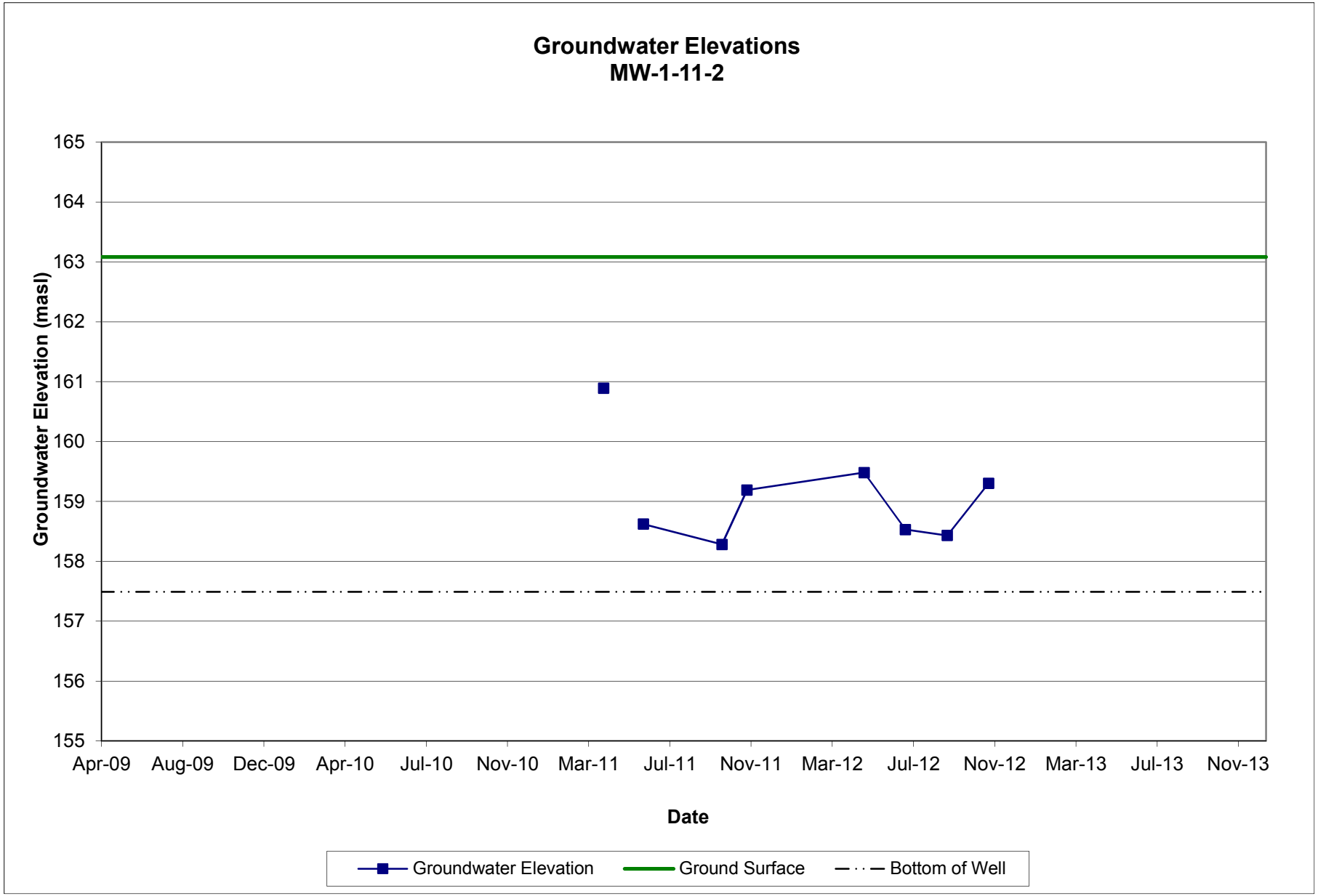

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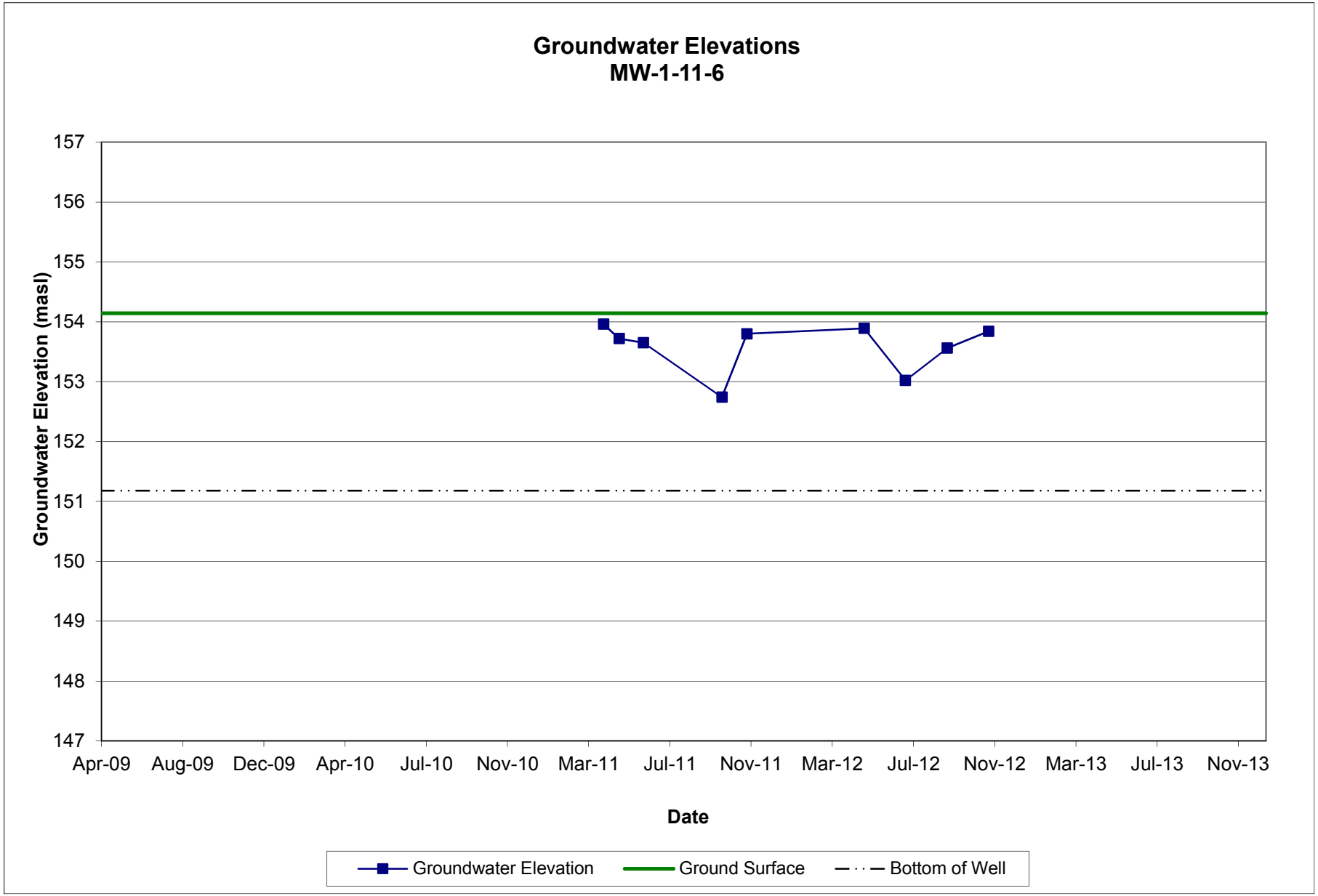
Figure N19-C2



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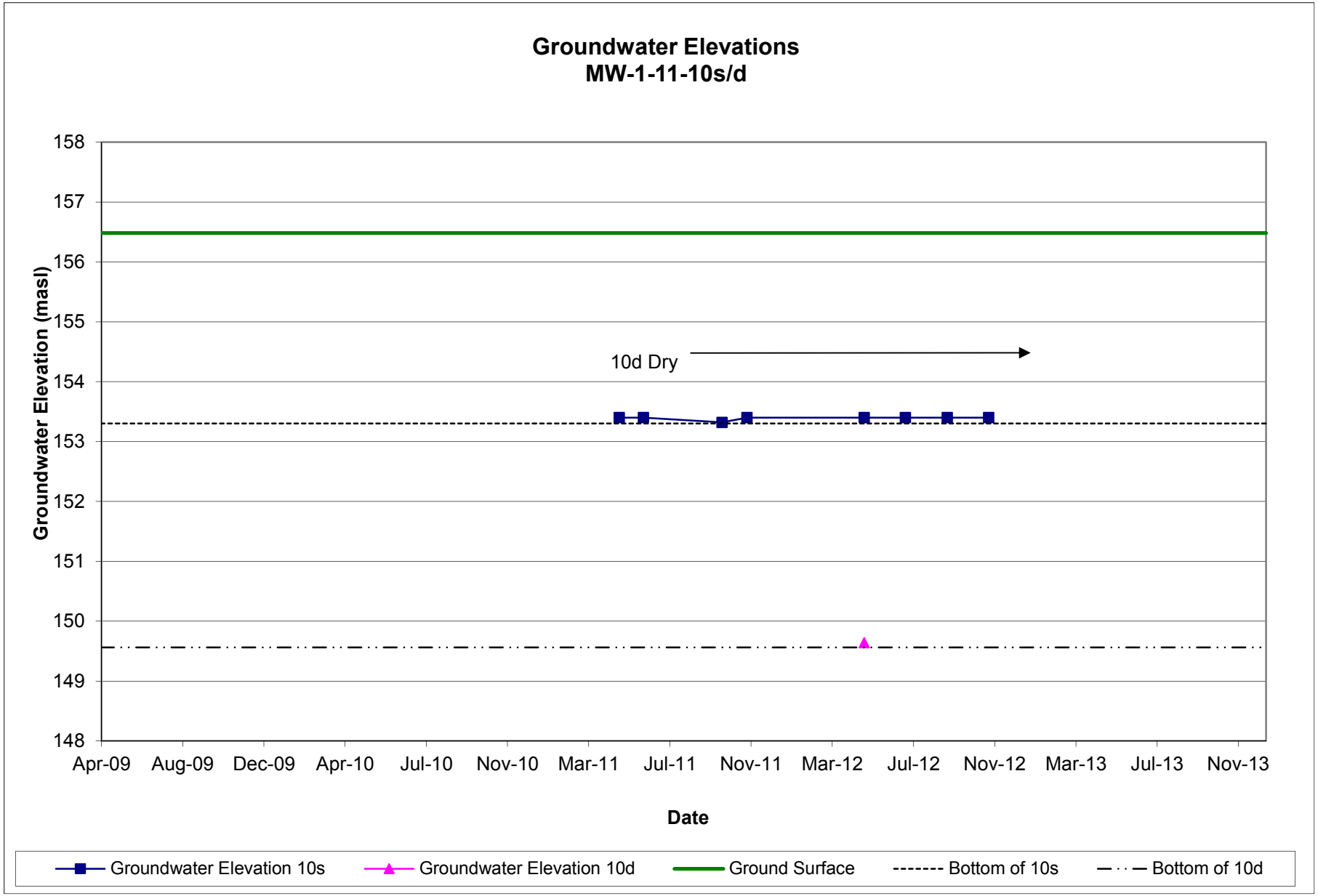

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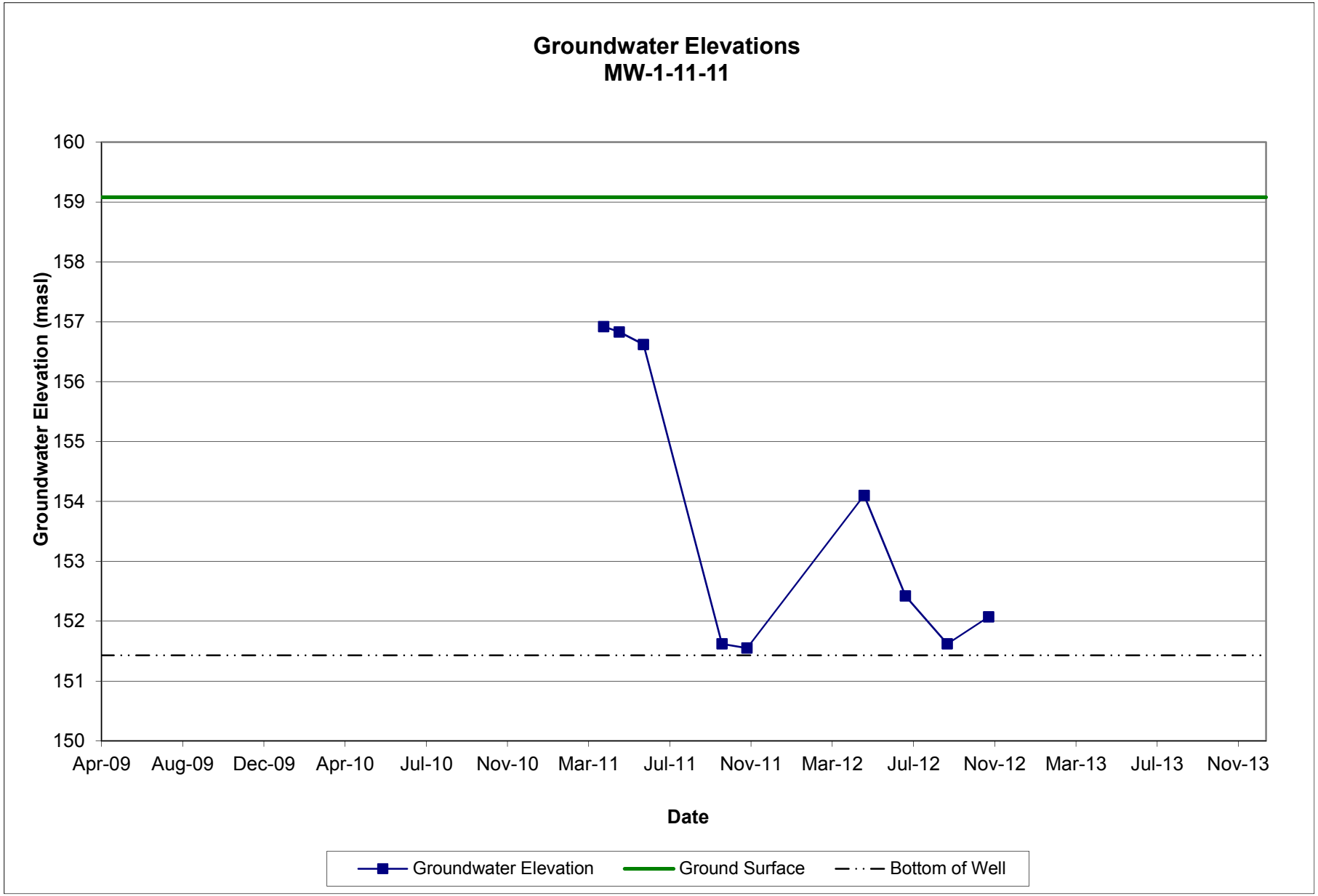

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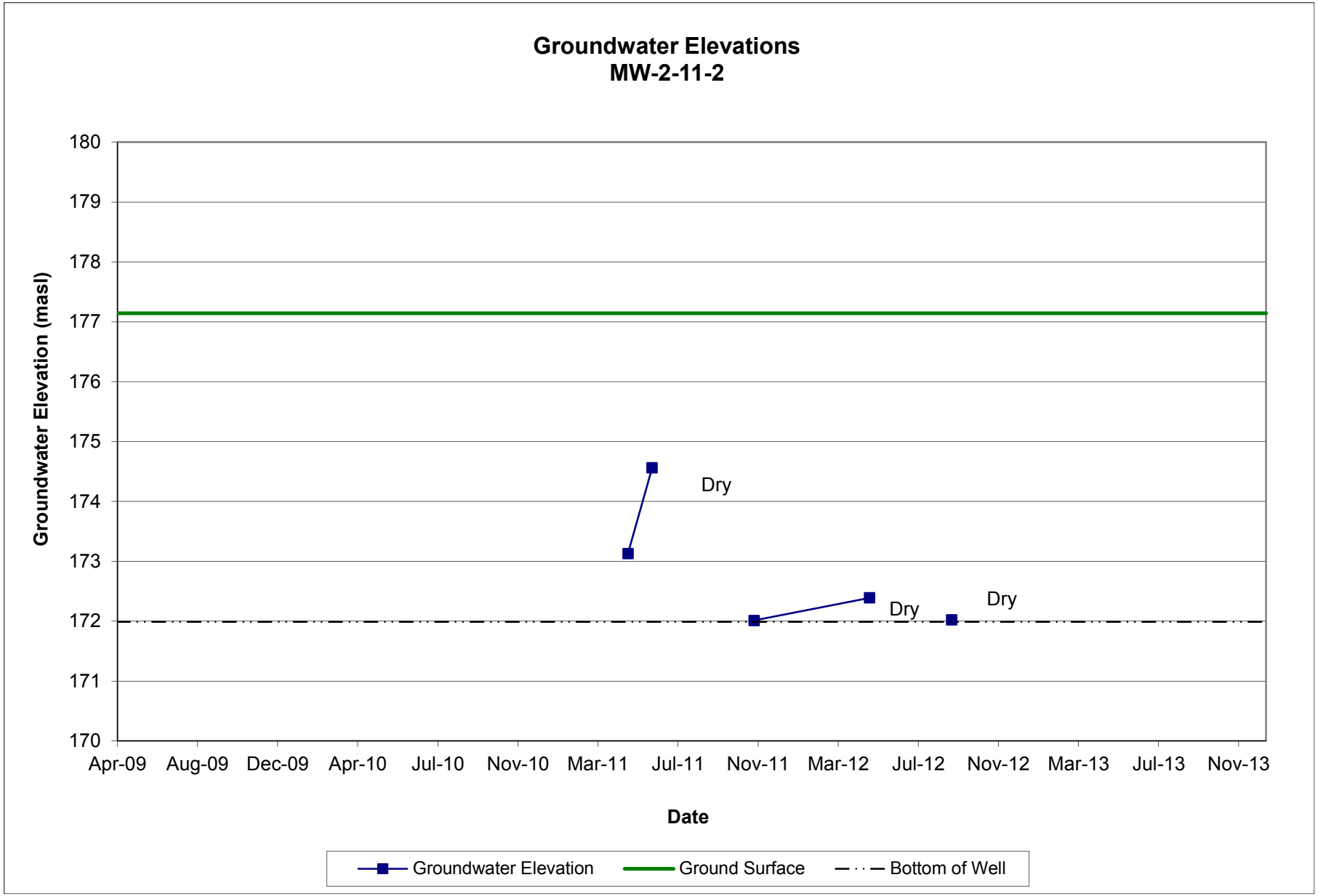

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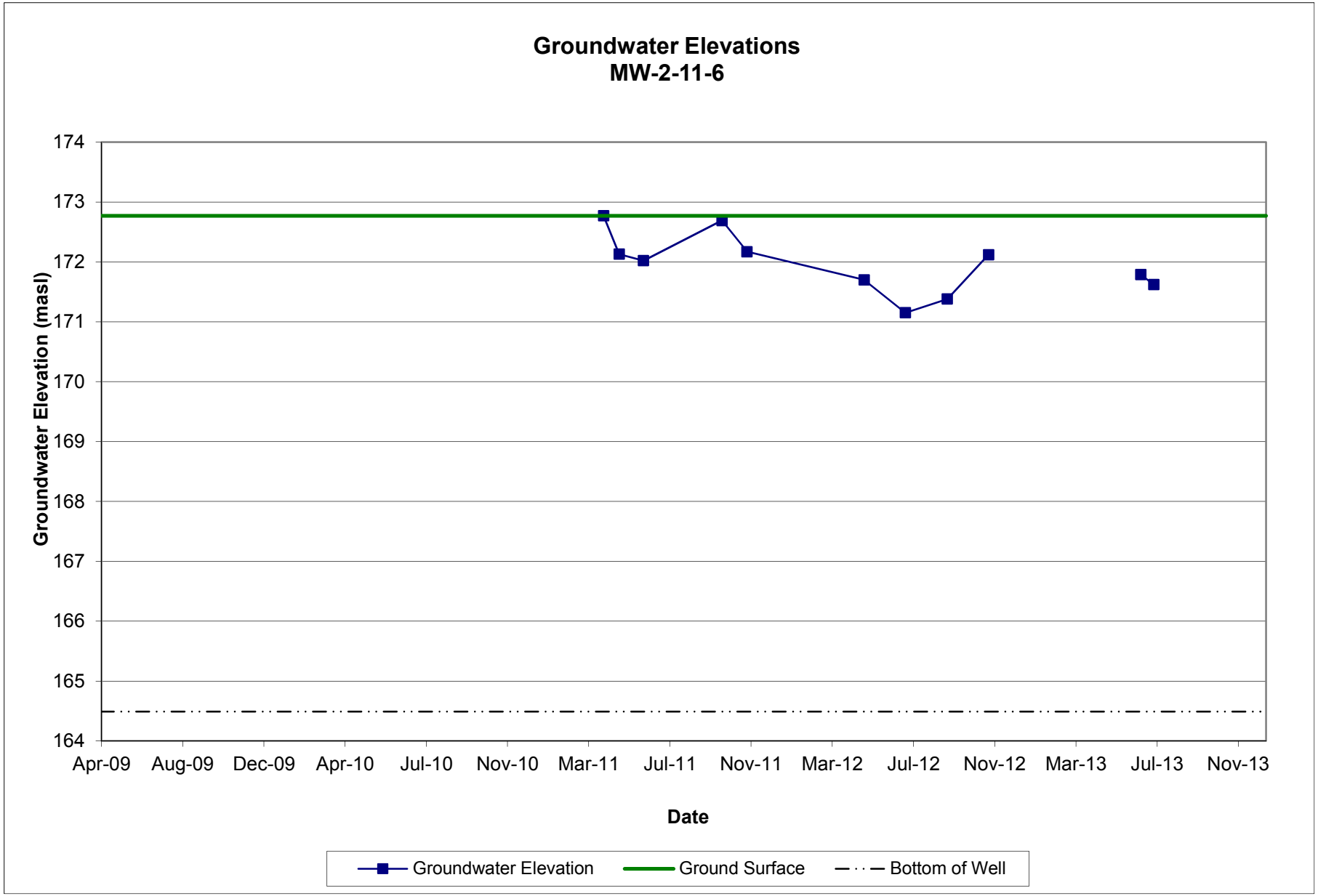

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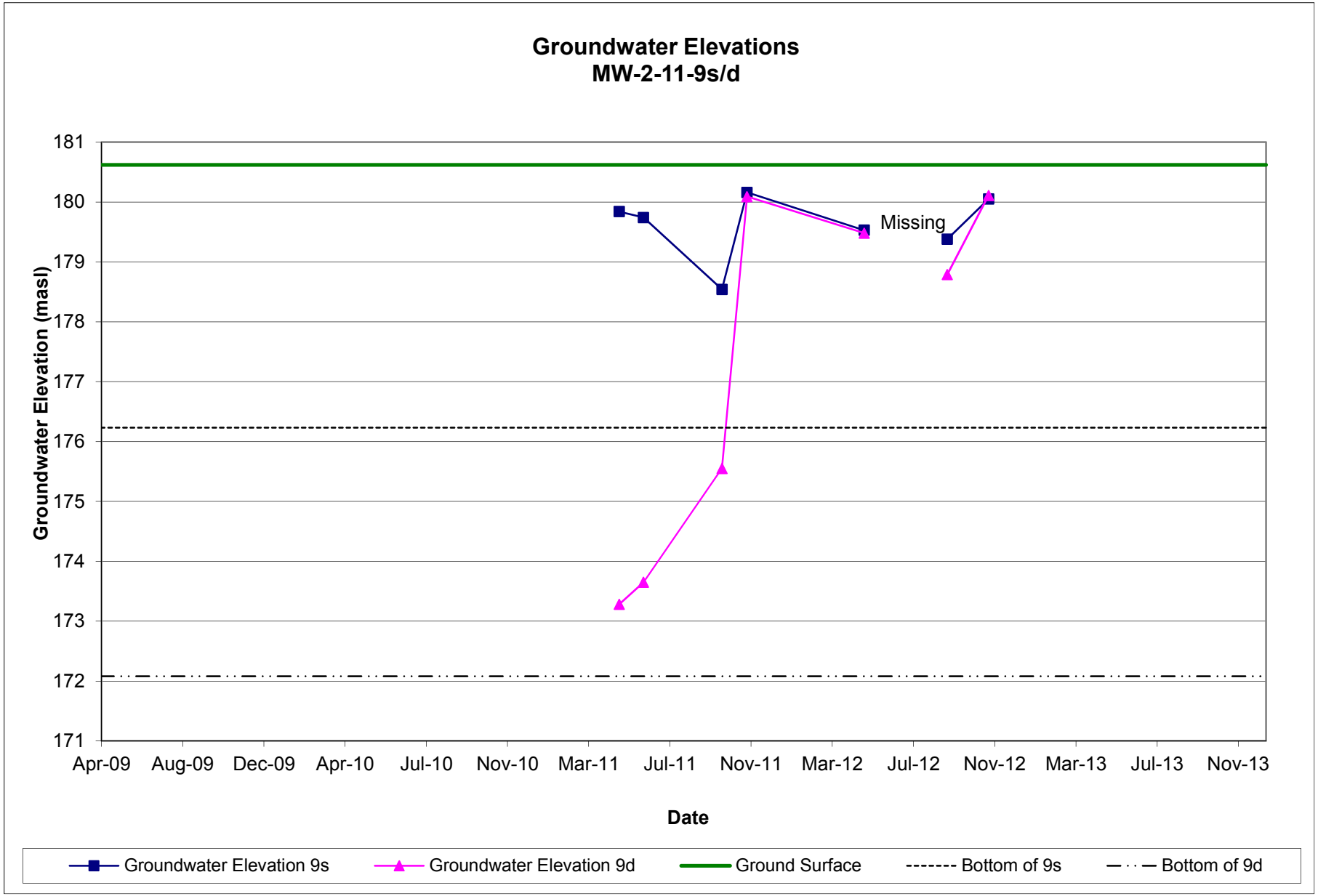

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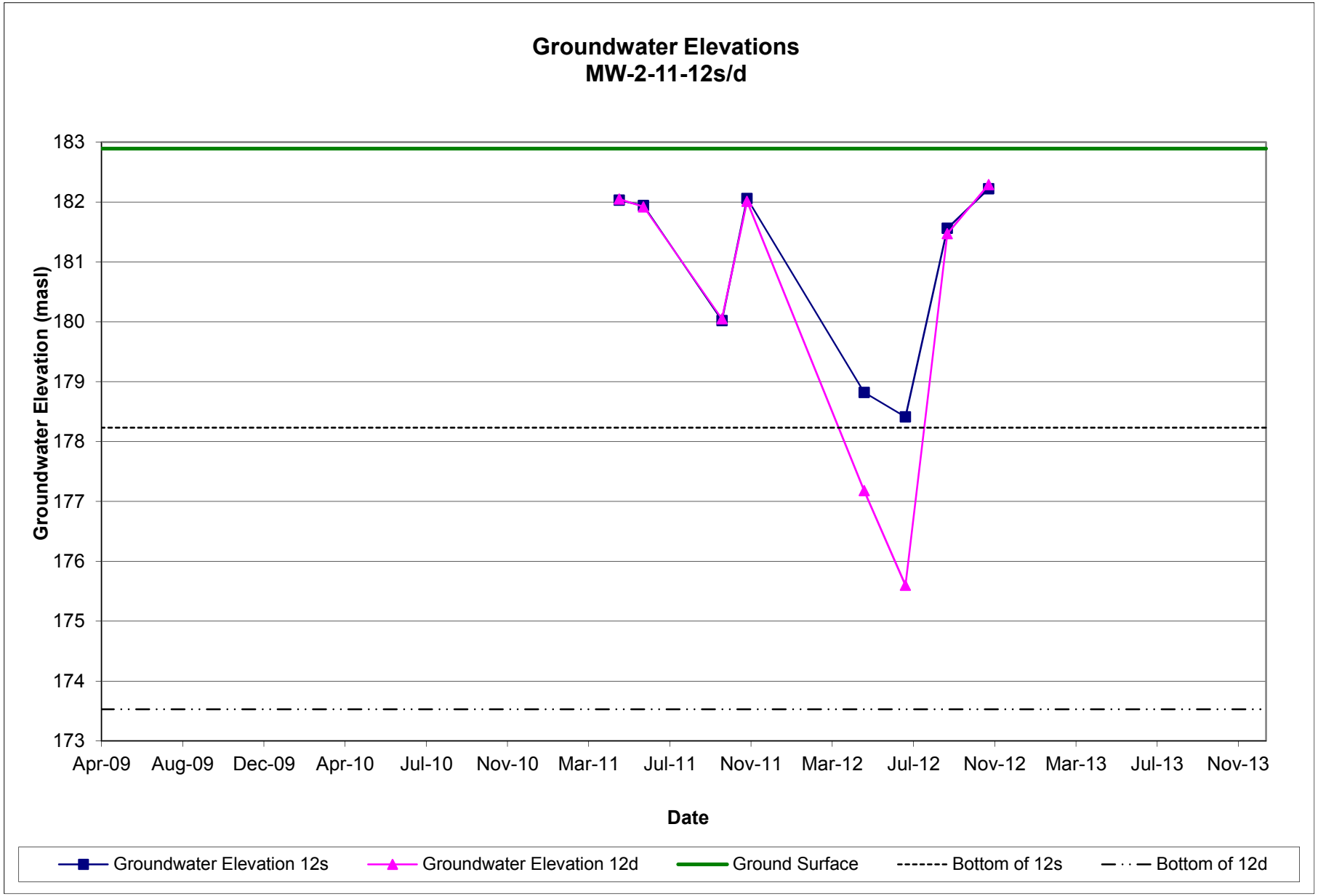

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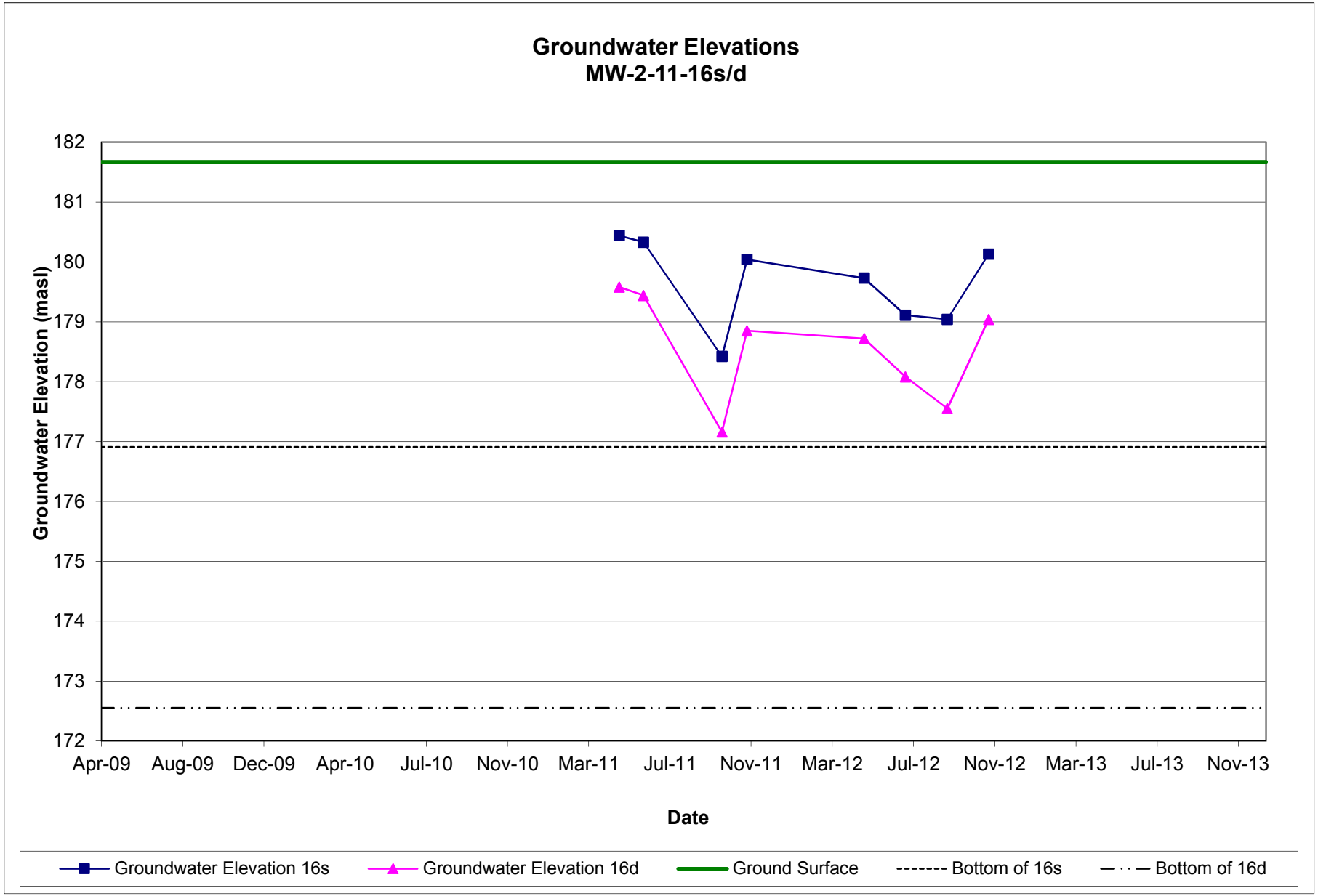
Figure N19-C9



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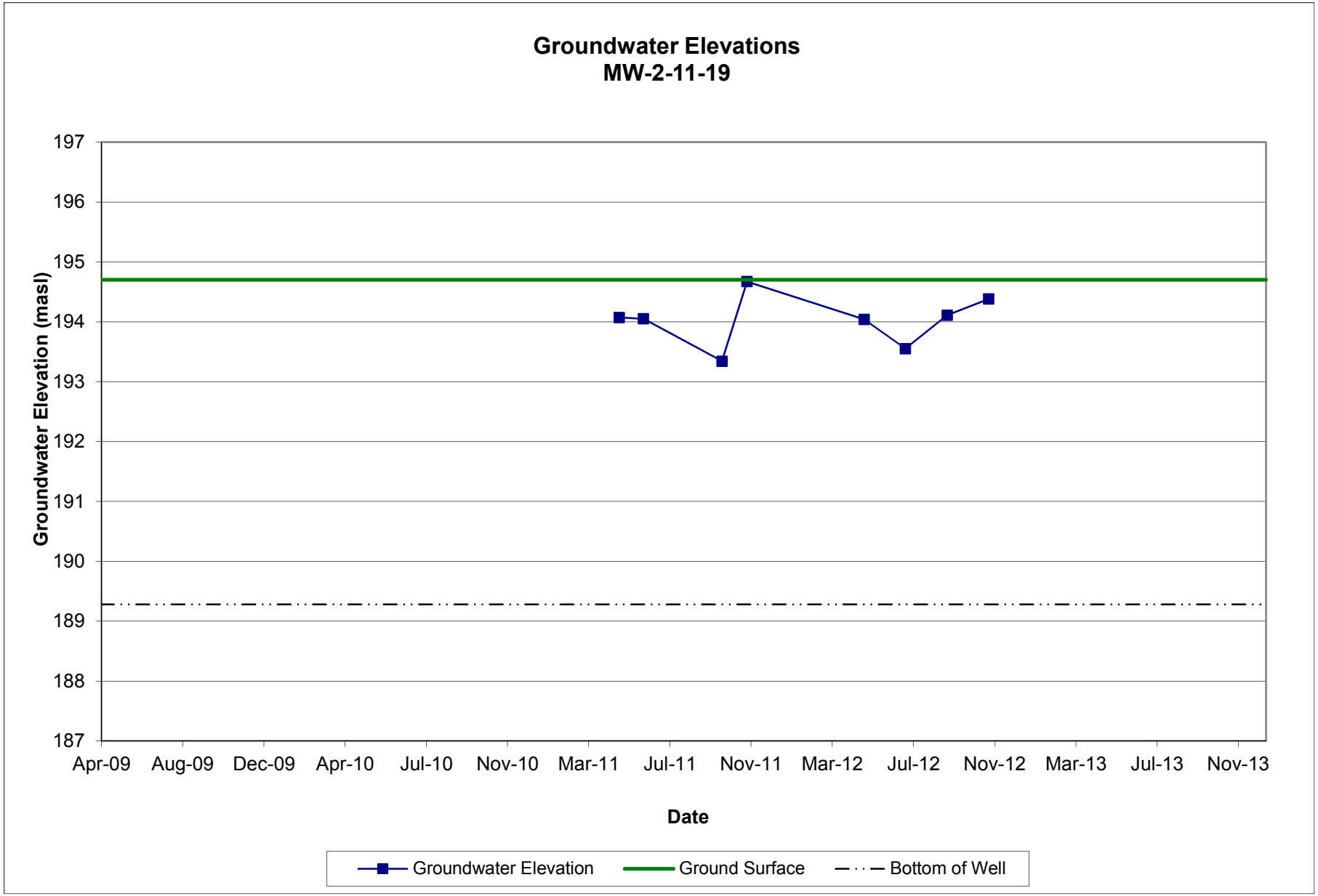

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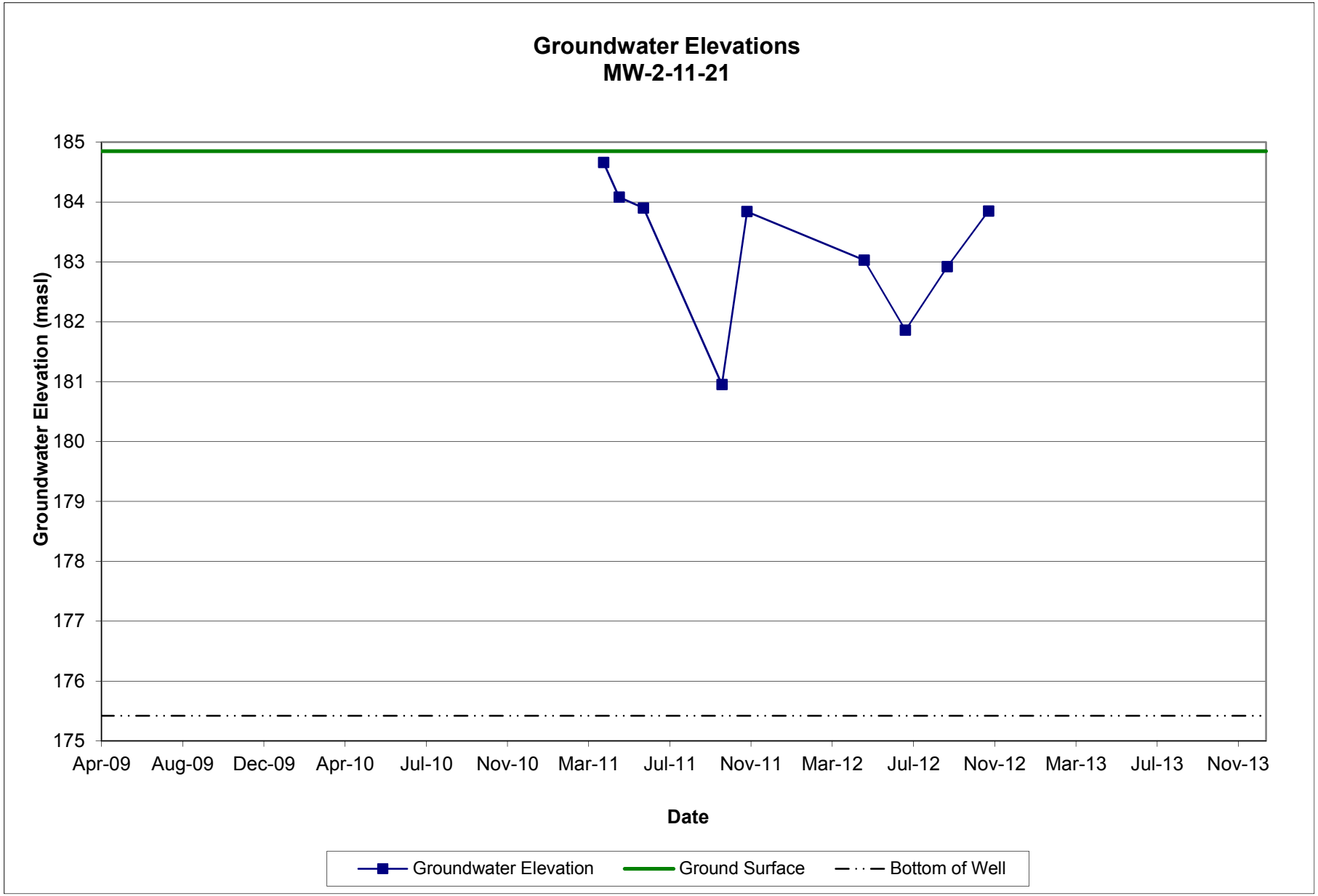

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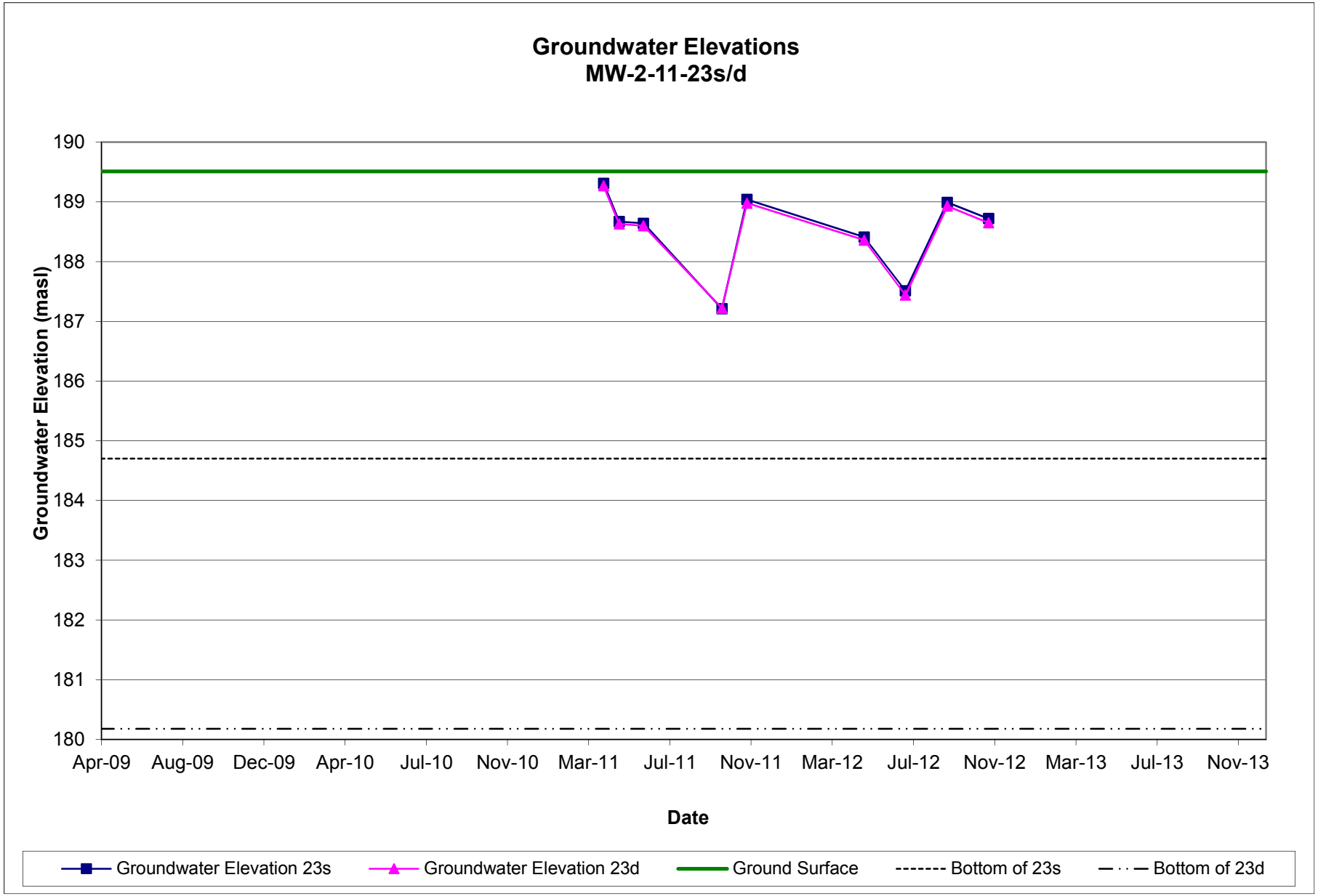

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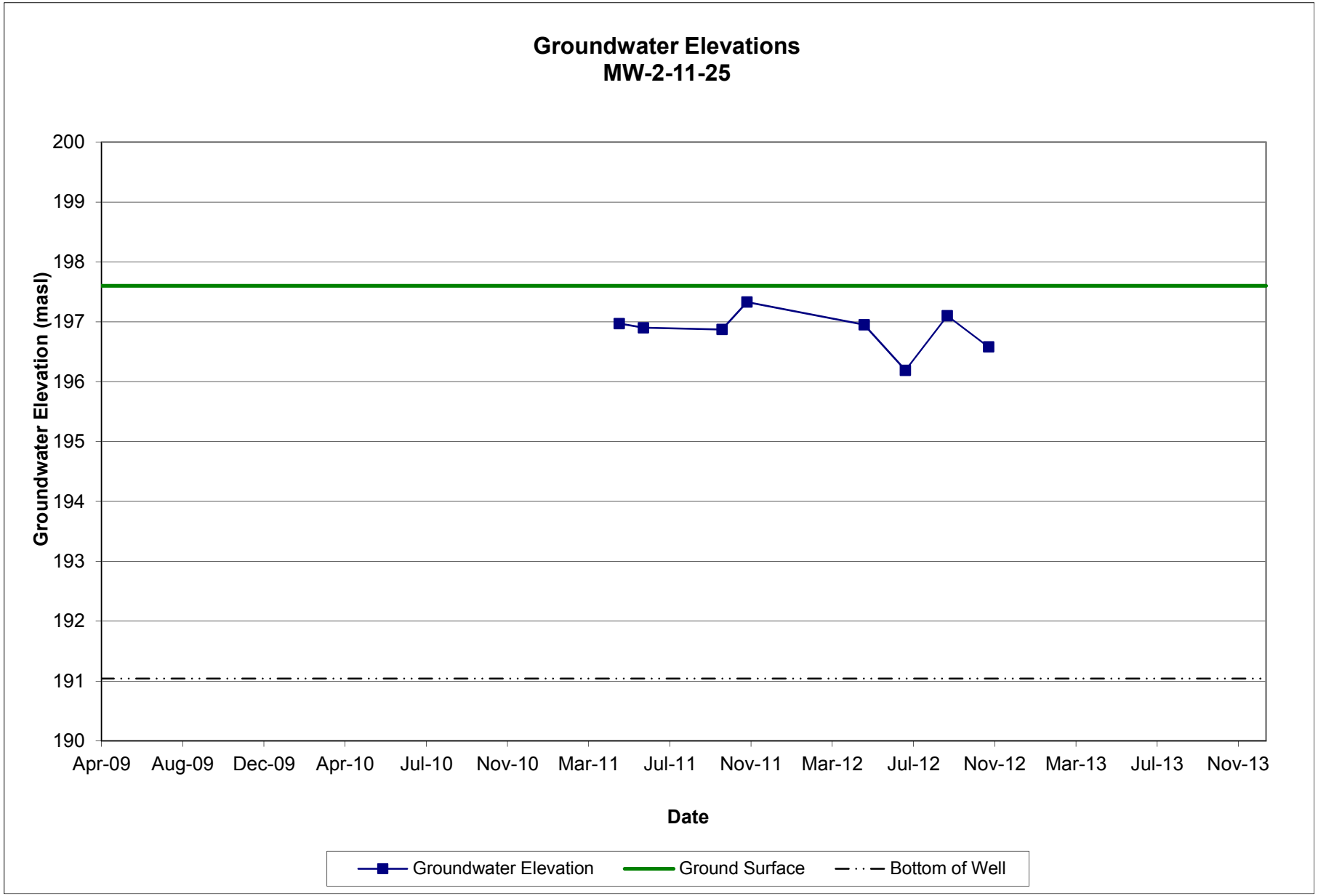
Figure N19-C13



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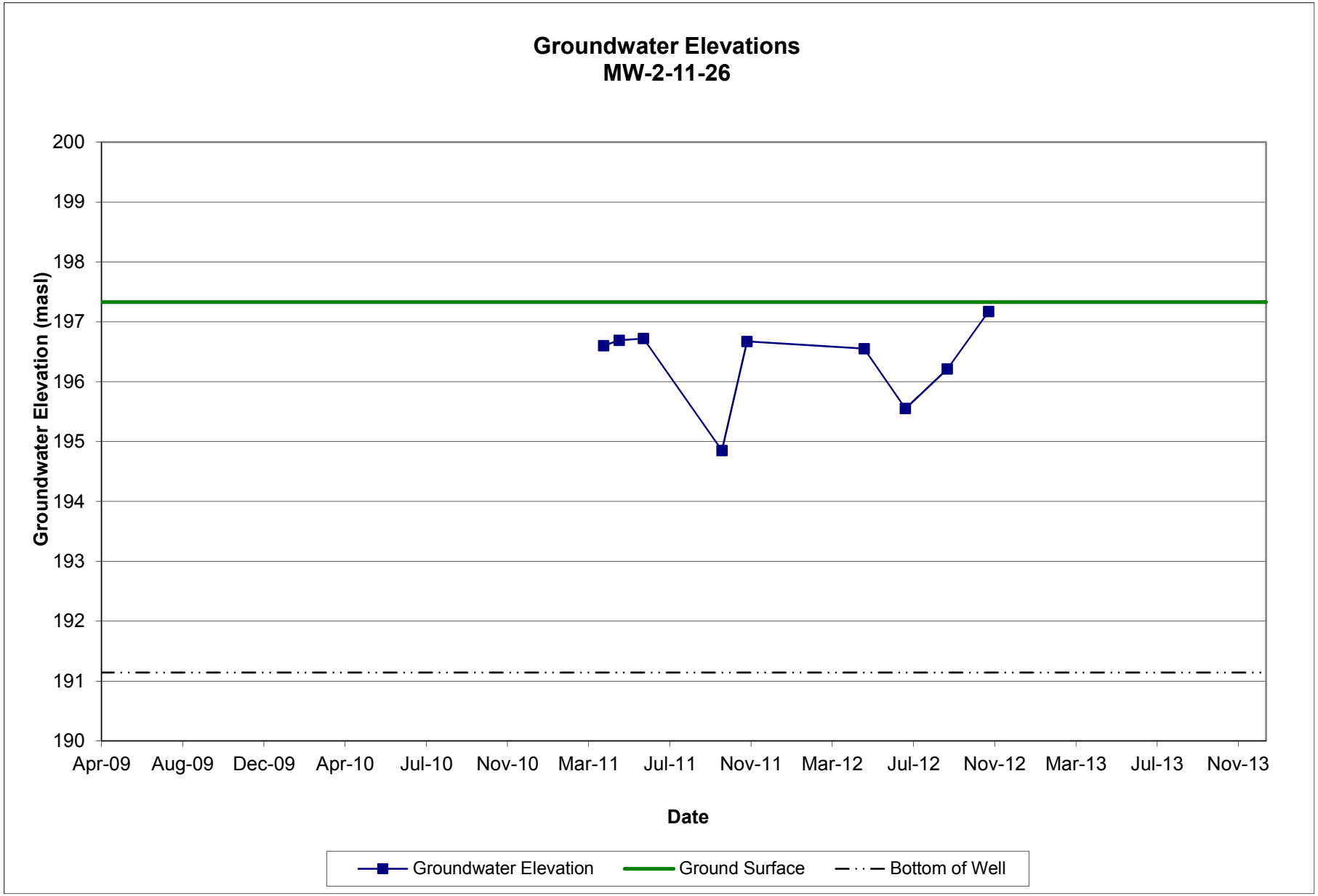

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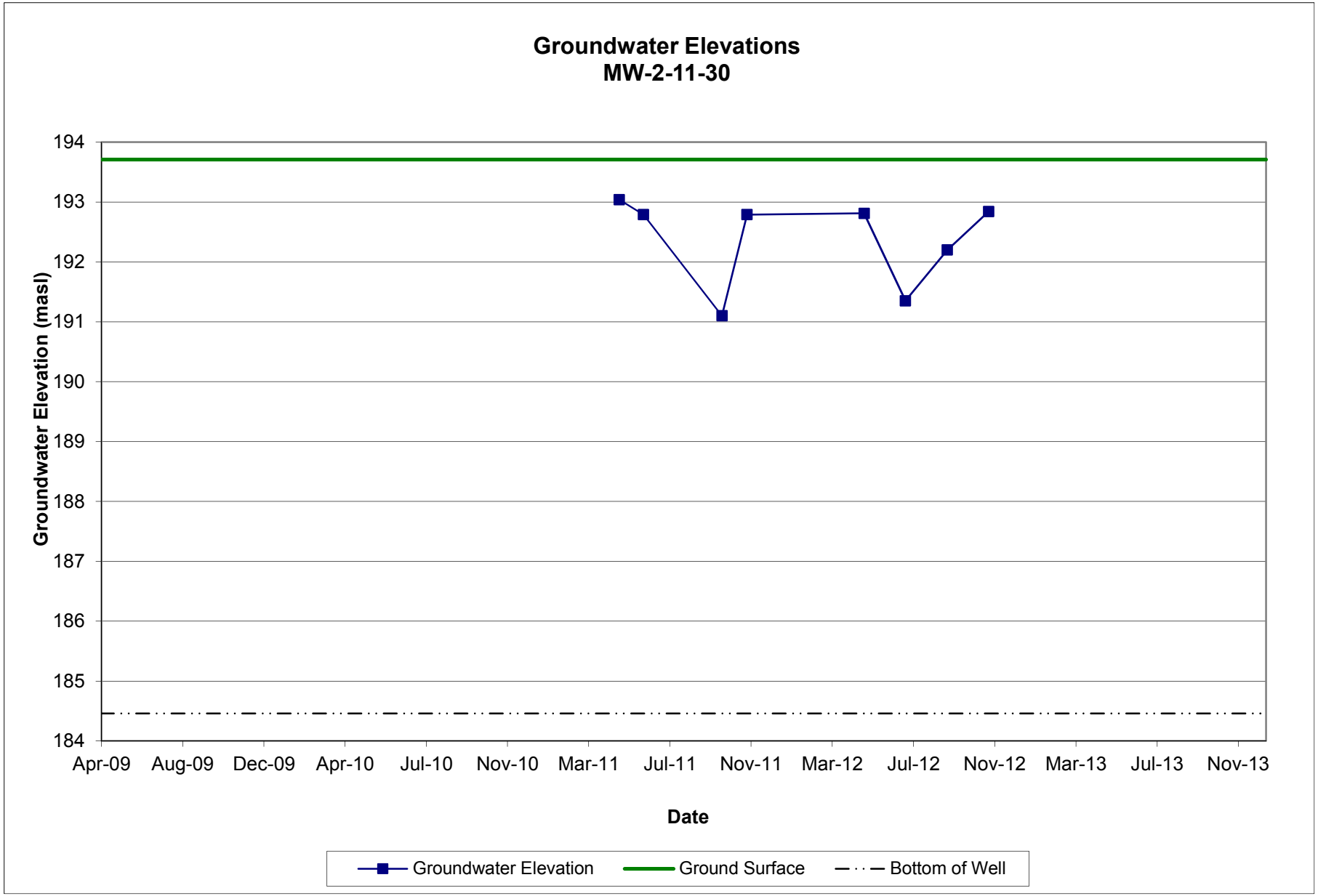

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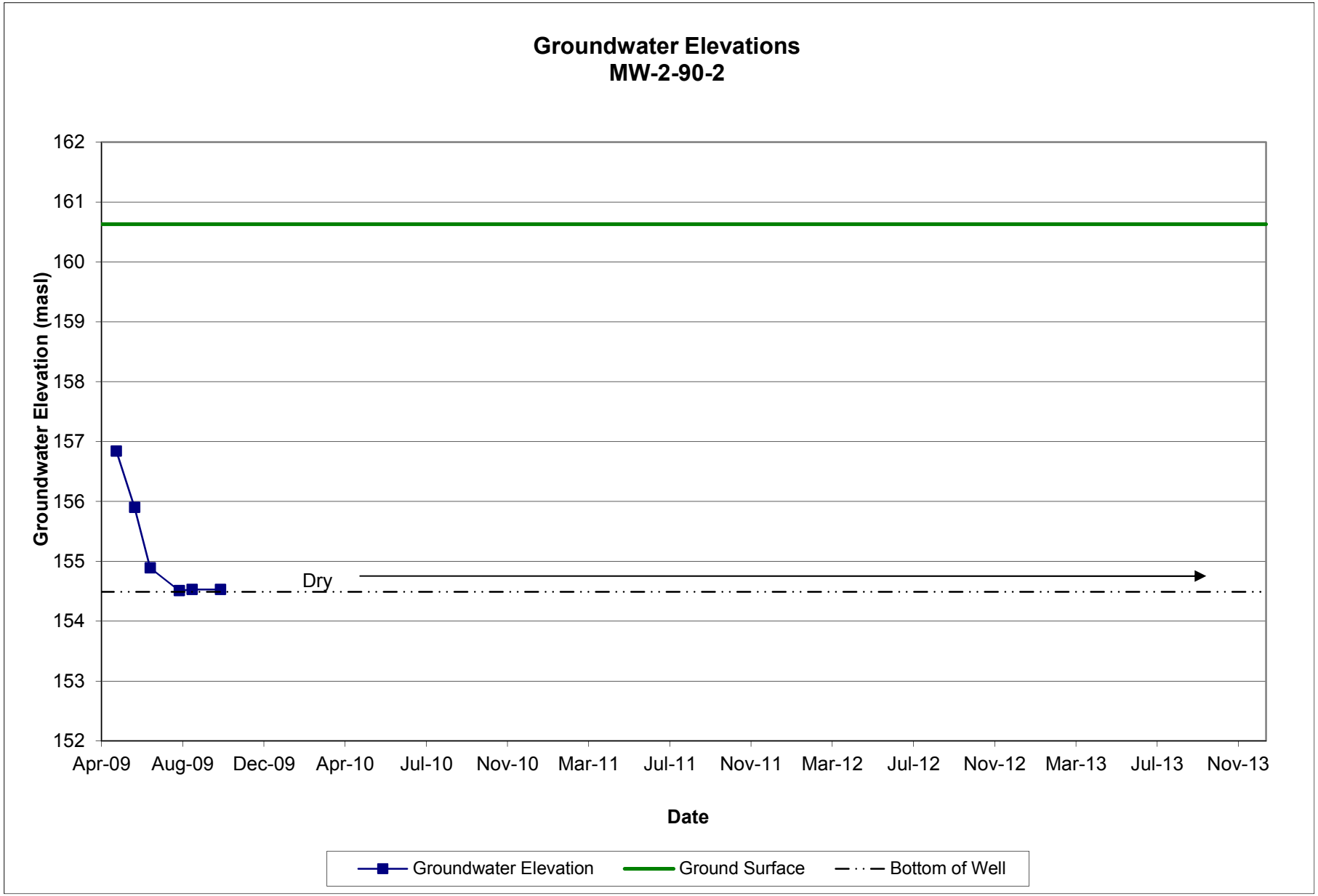

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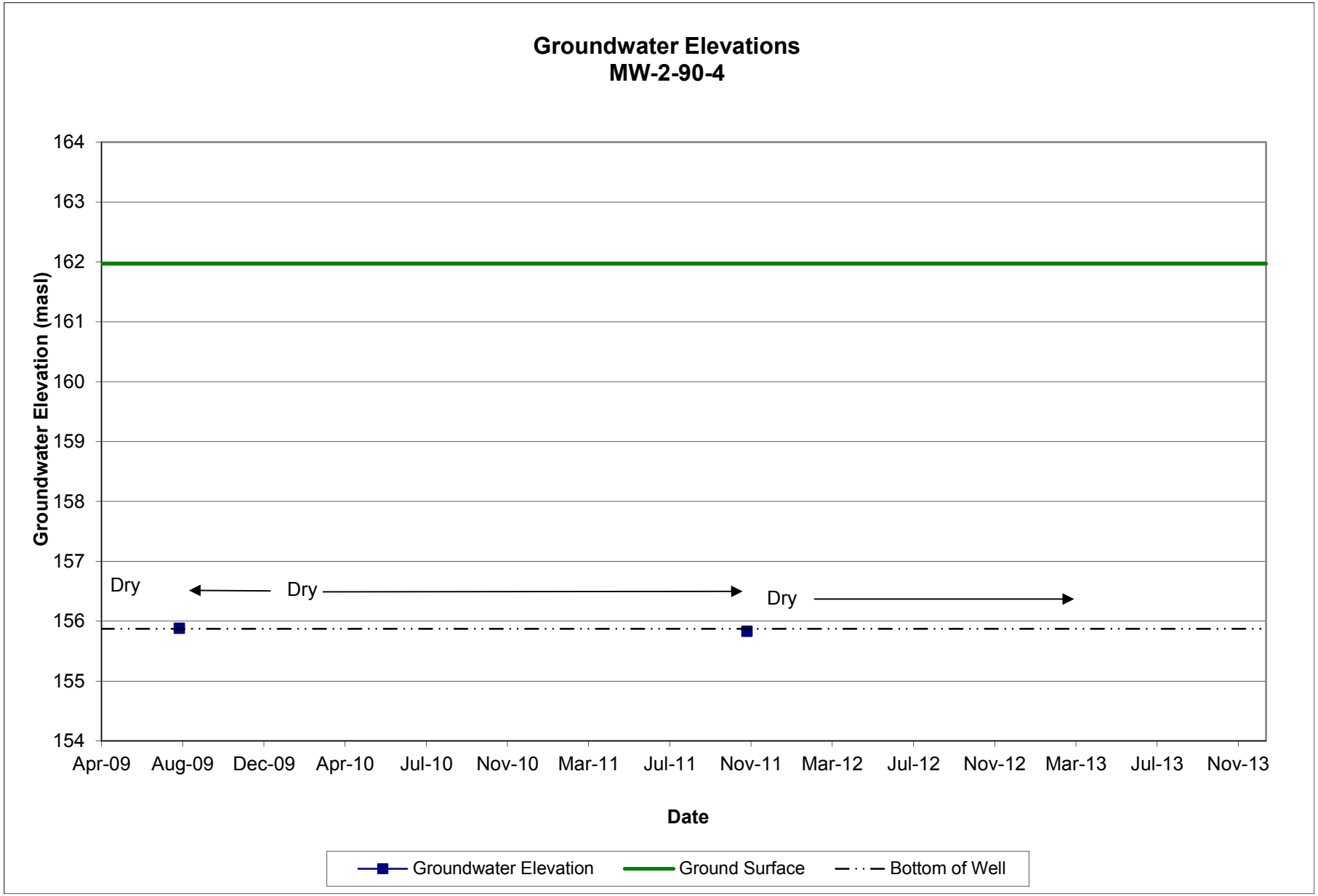
Figure N19-C17



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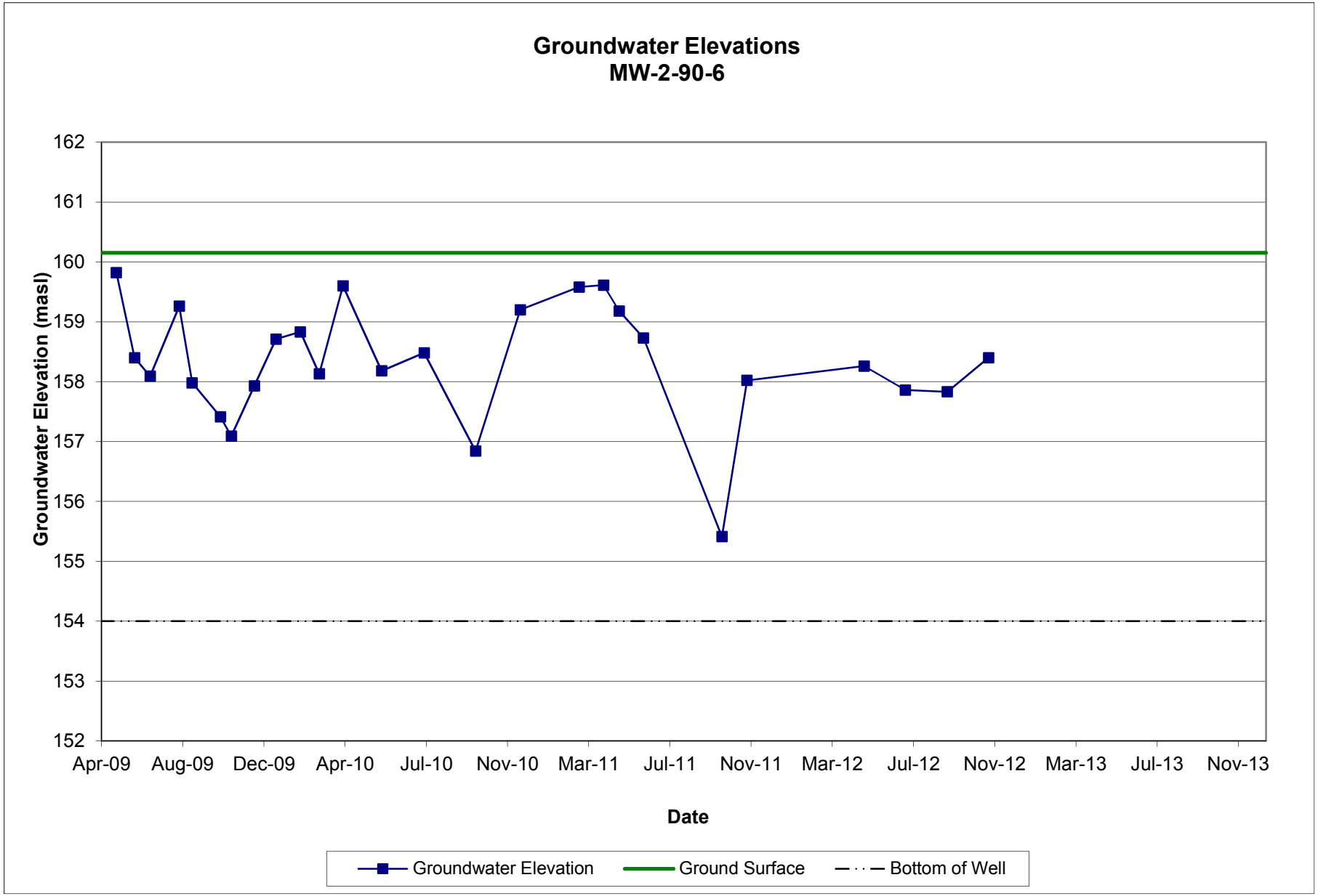

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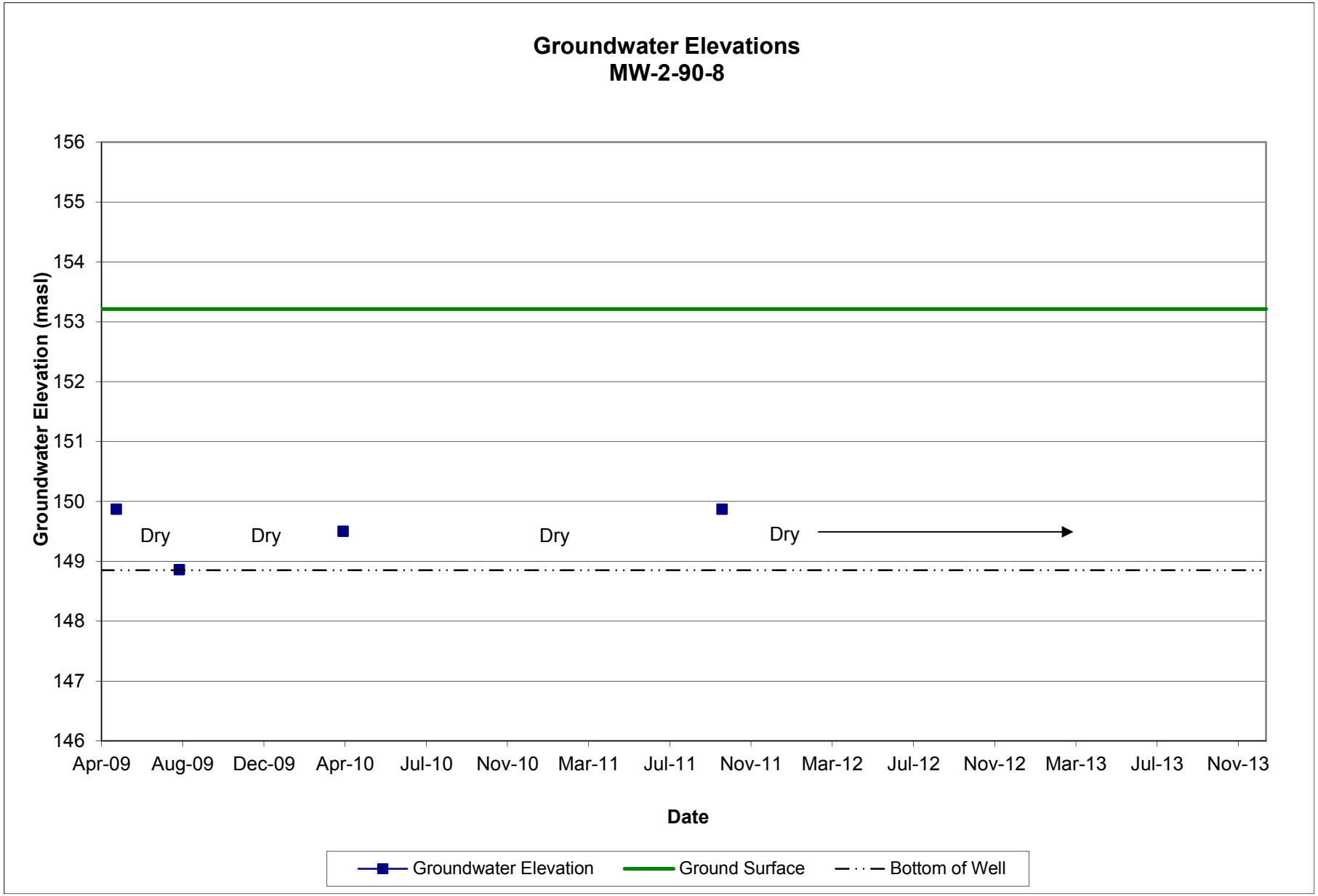
Figure N19-C19



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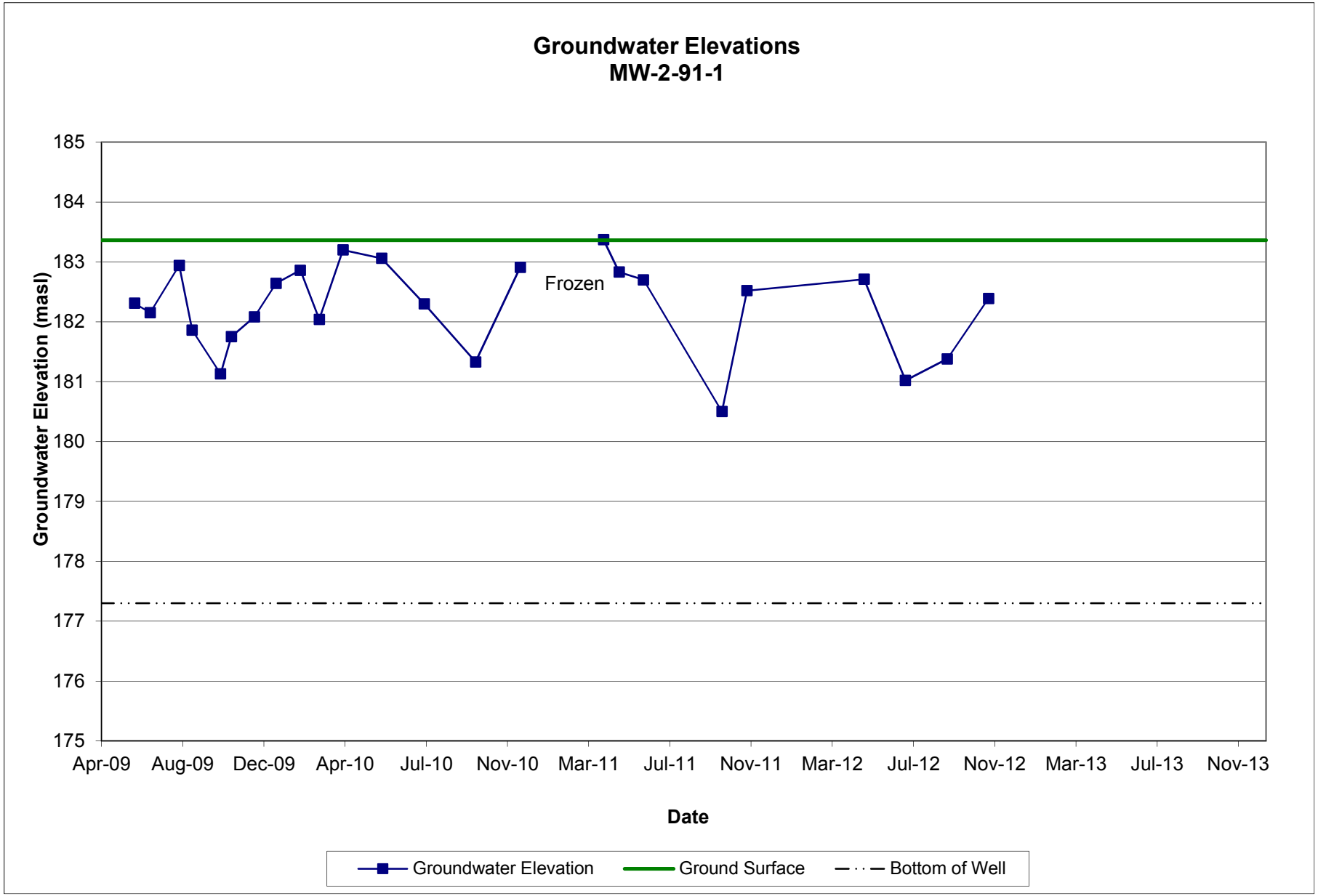

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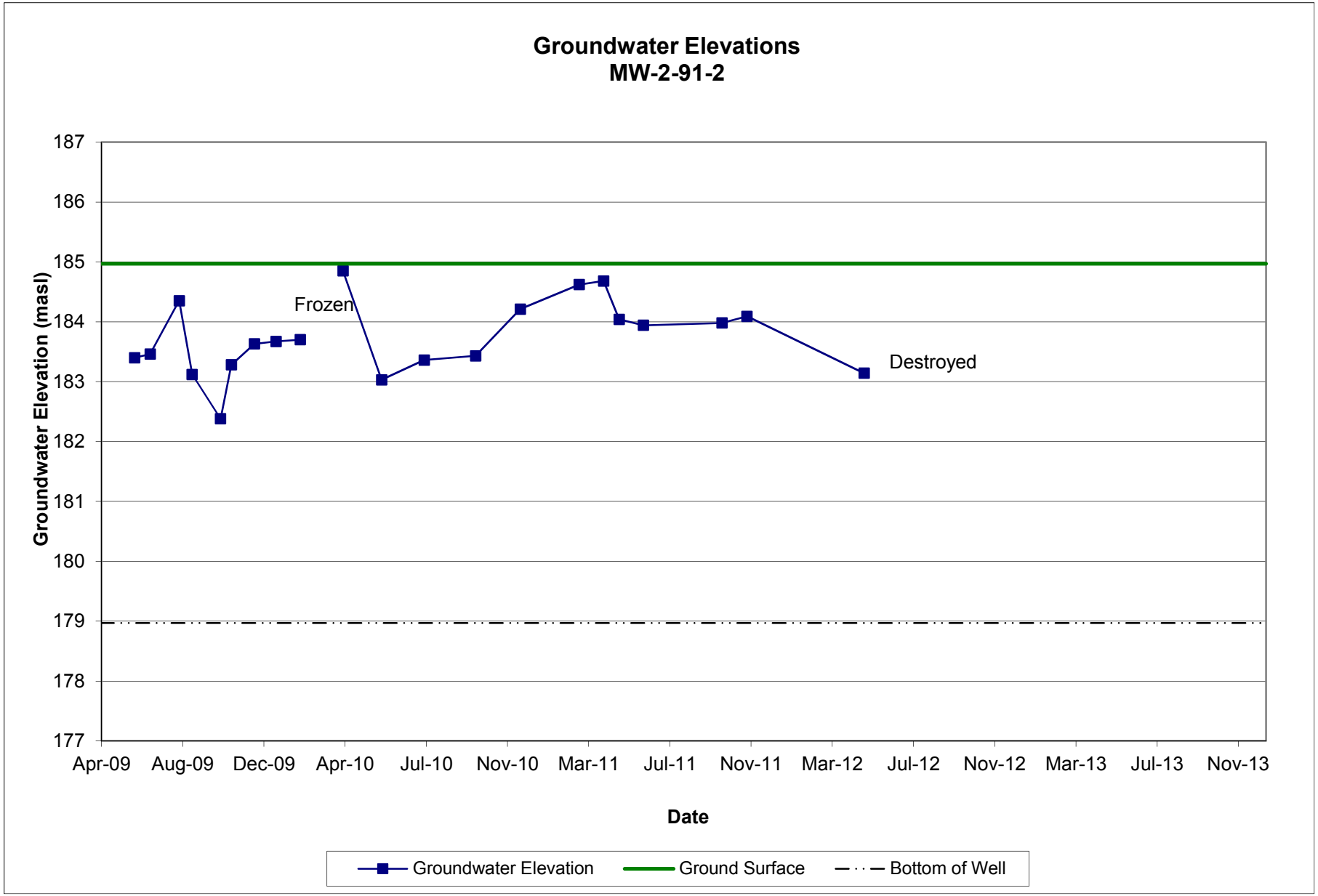

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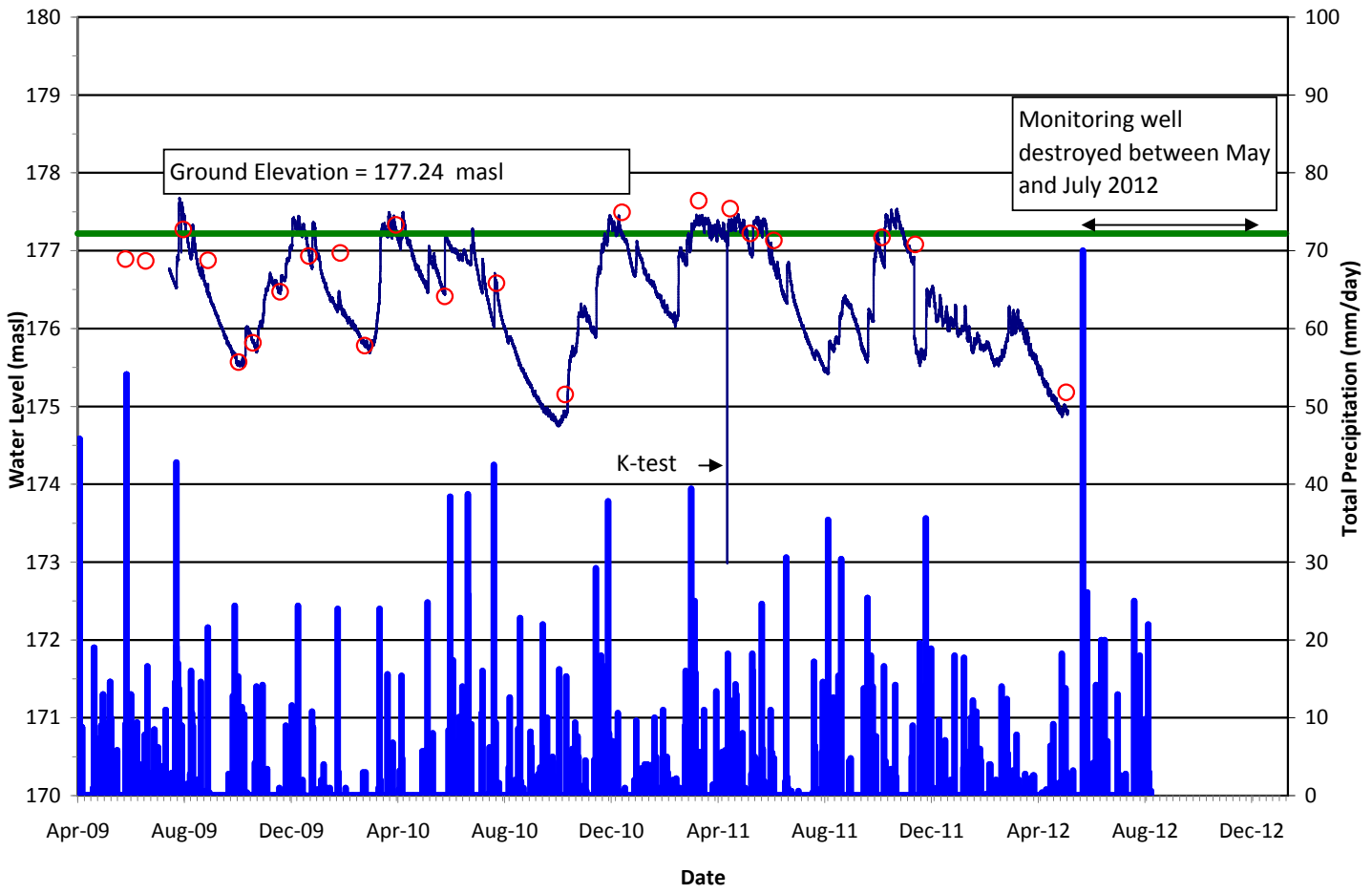
Figure N19-C22



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MW 2-91-3 Automated Measurements
Manual Measurements
Ground Elevation
Daily Total Precipitation

MW-2-91-3

GROUNDWATER LEVEL HYDROGRAPH
Seaton N19 NFSSR
April 2009 to December 2012
Figure N19-C23

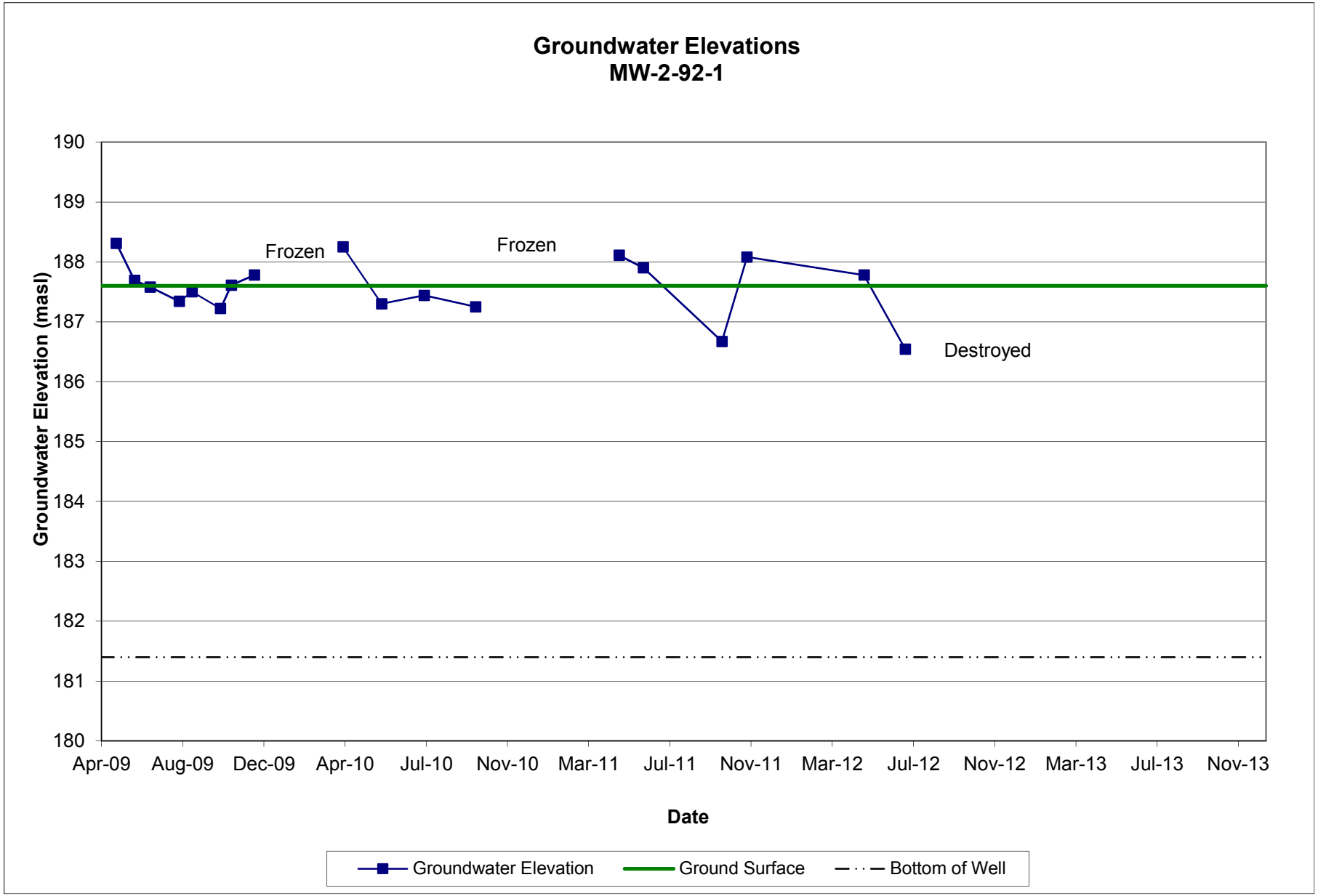

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Figure N19-C24

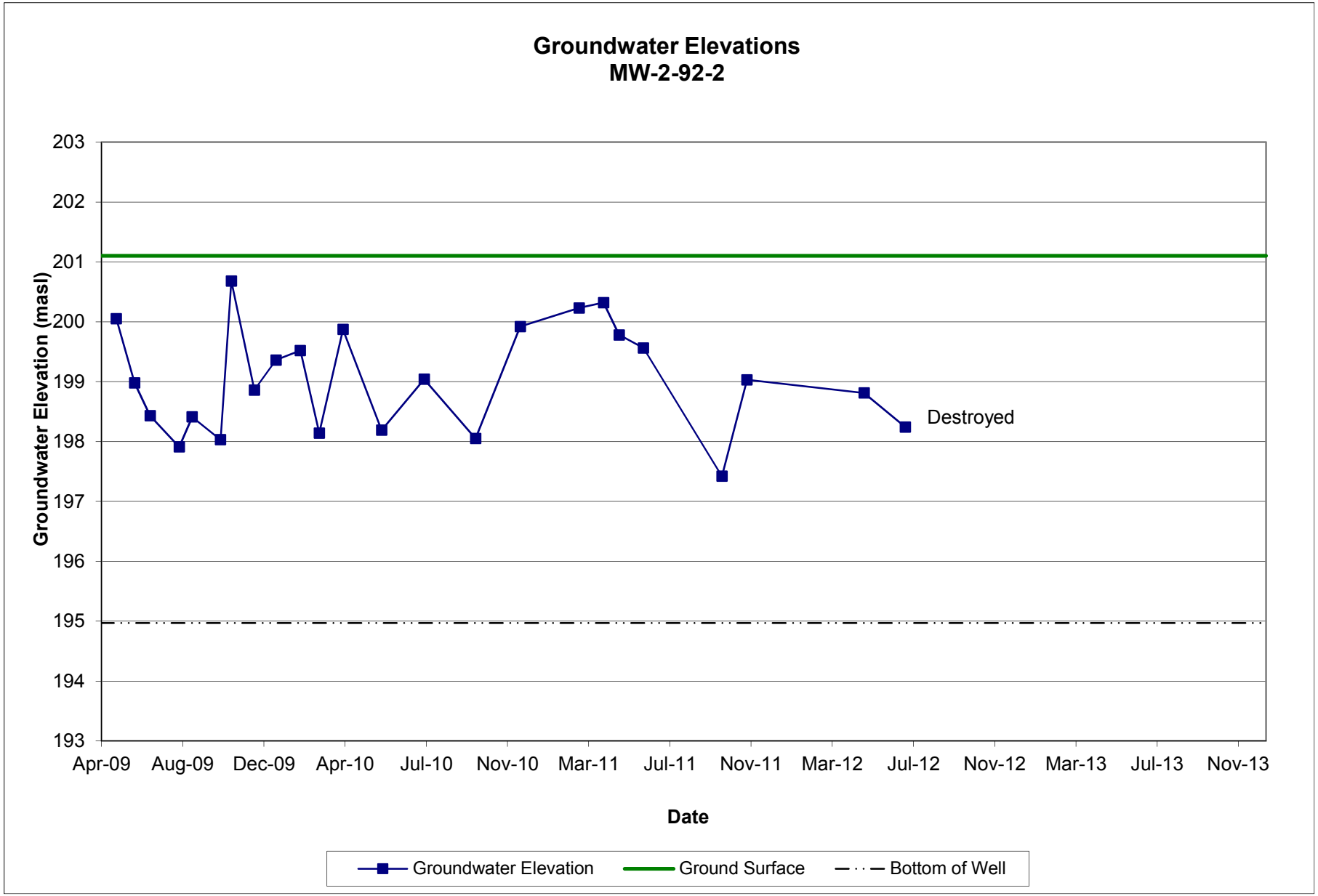

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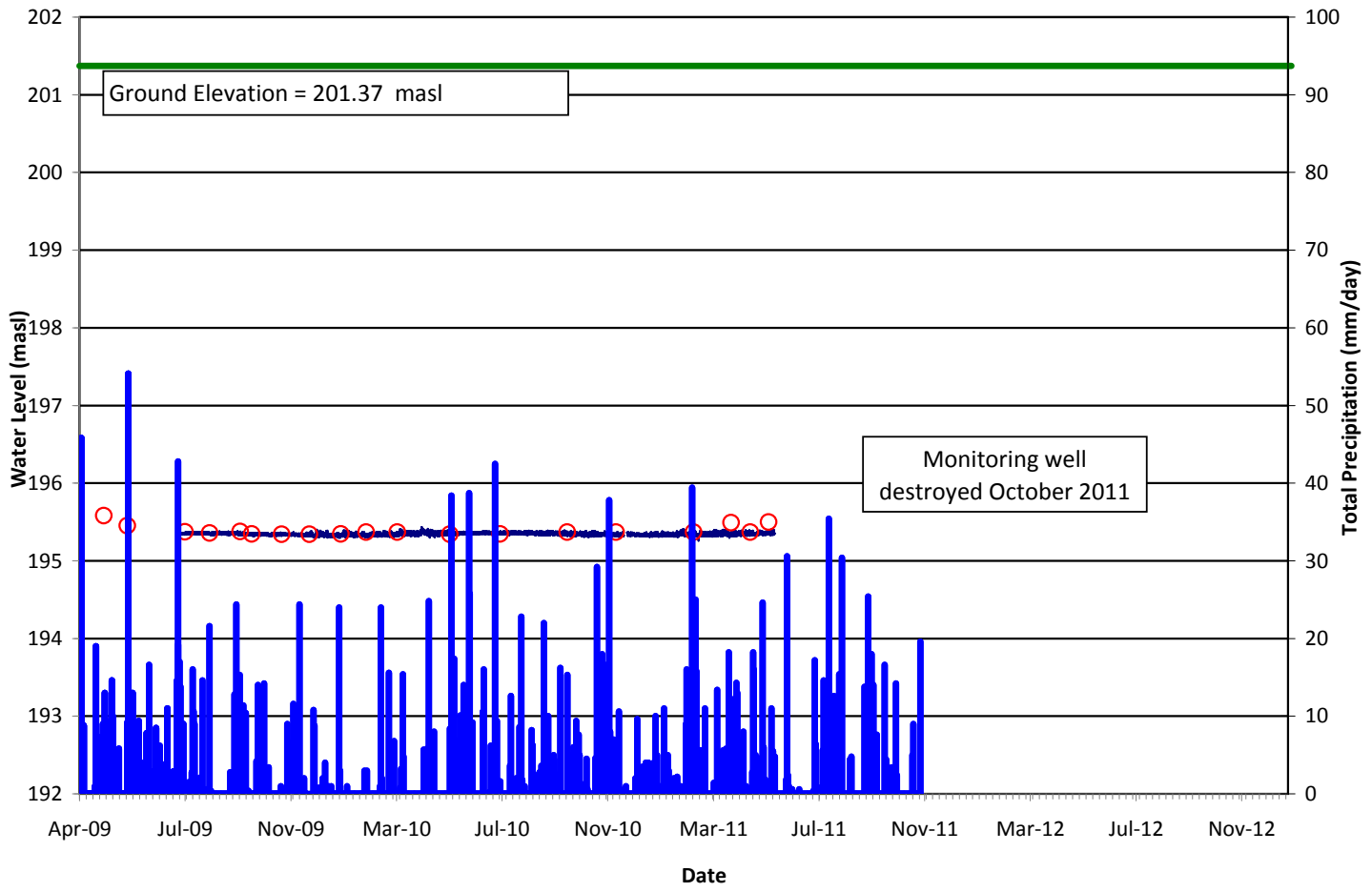
Figure N19-C25



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MW 2-92-4 Automated Measurements
Manual Measurements
Ground Elevation
Daily Total Precipitation

MW-2-92-4

GROUNDWATER LEVEL HYDROGRAPH
Seaton N19 NFSSR
April 2009 to December 2012
Figure N19-C26

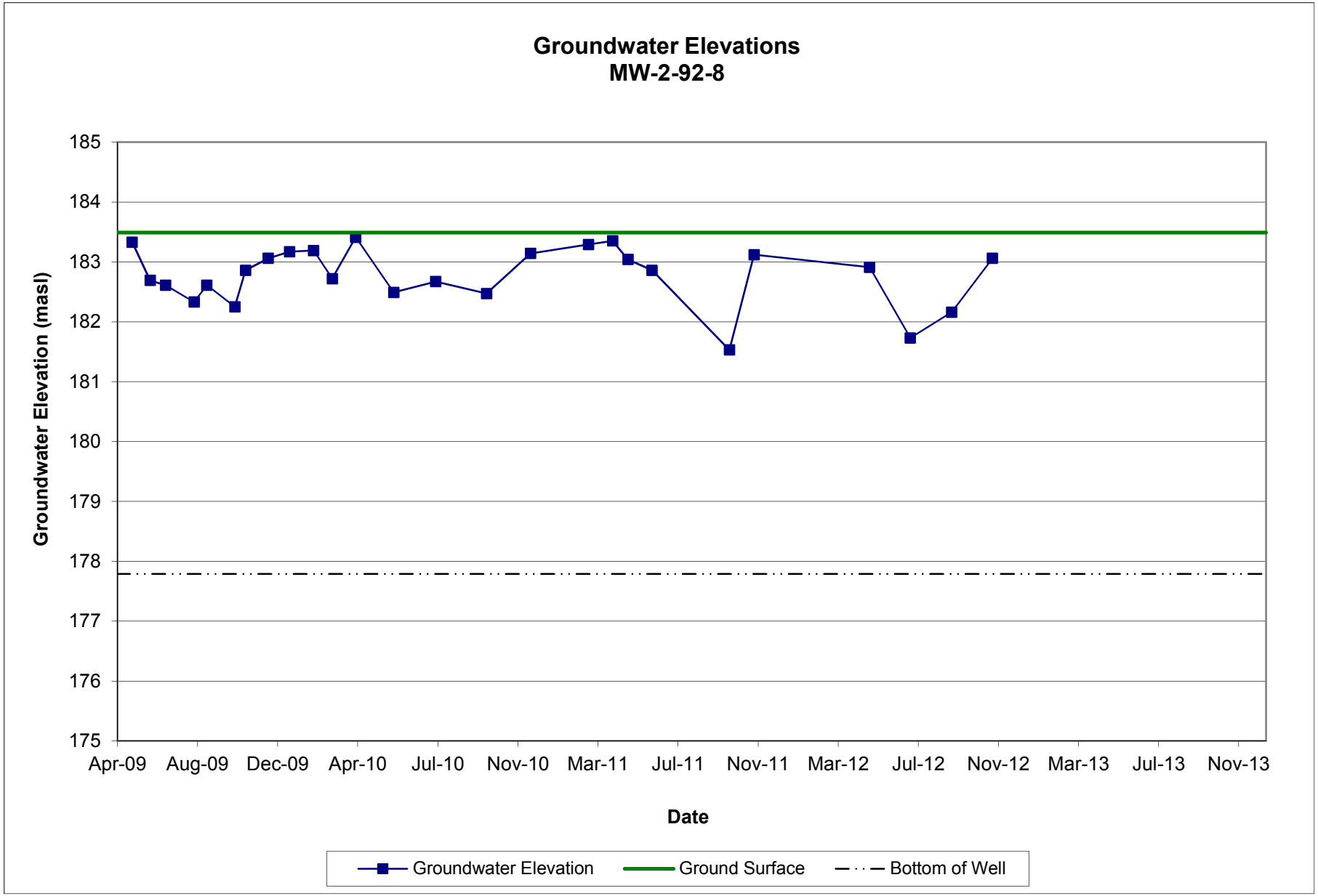

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Figure N19-C27

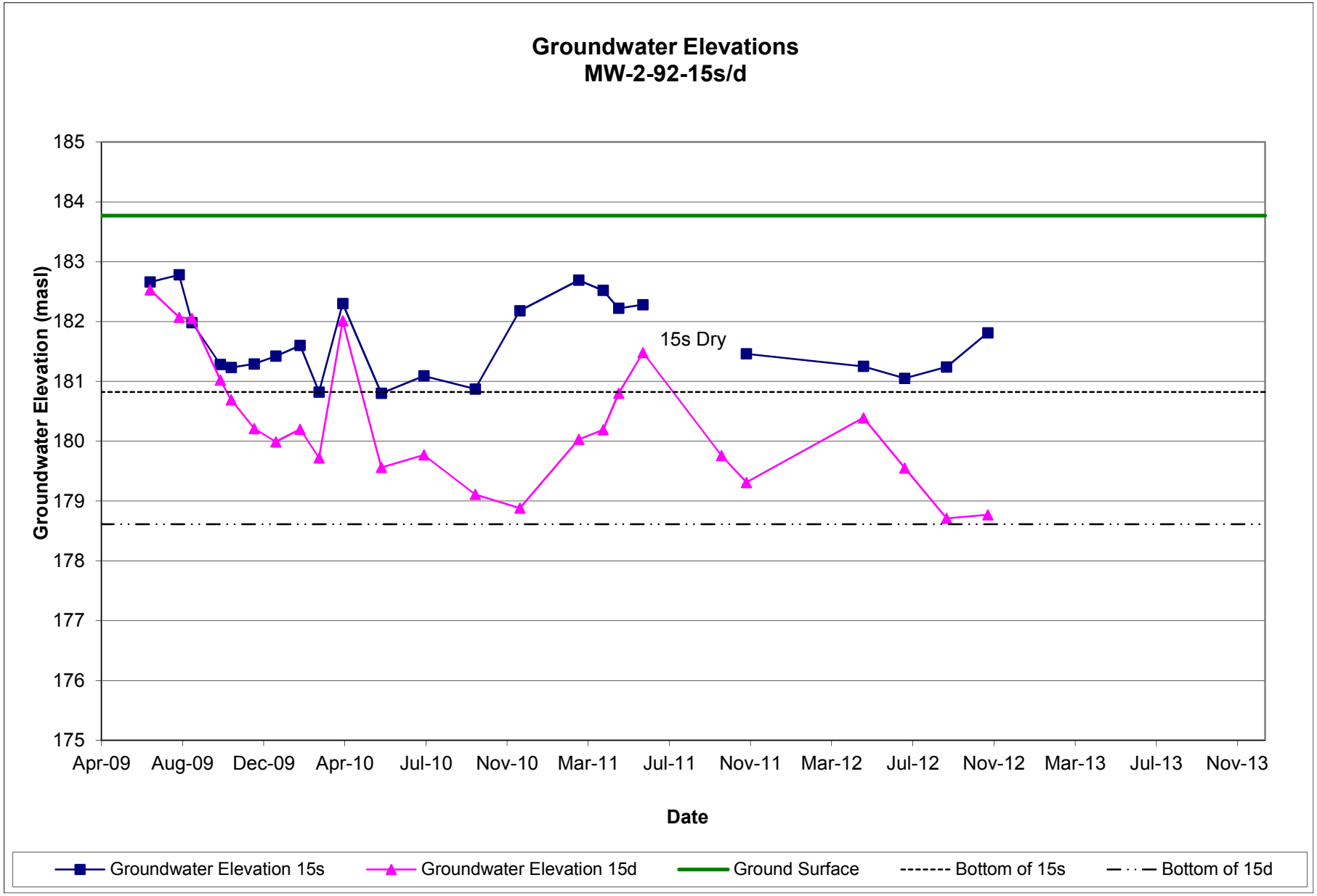

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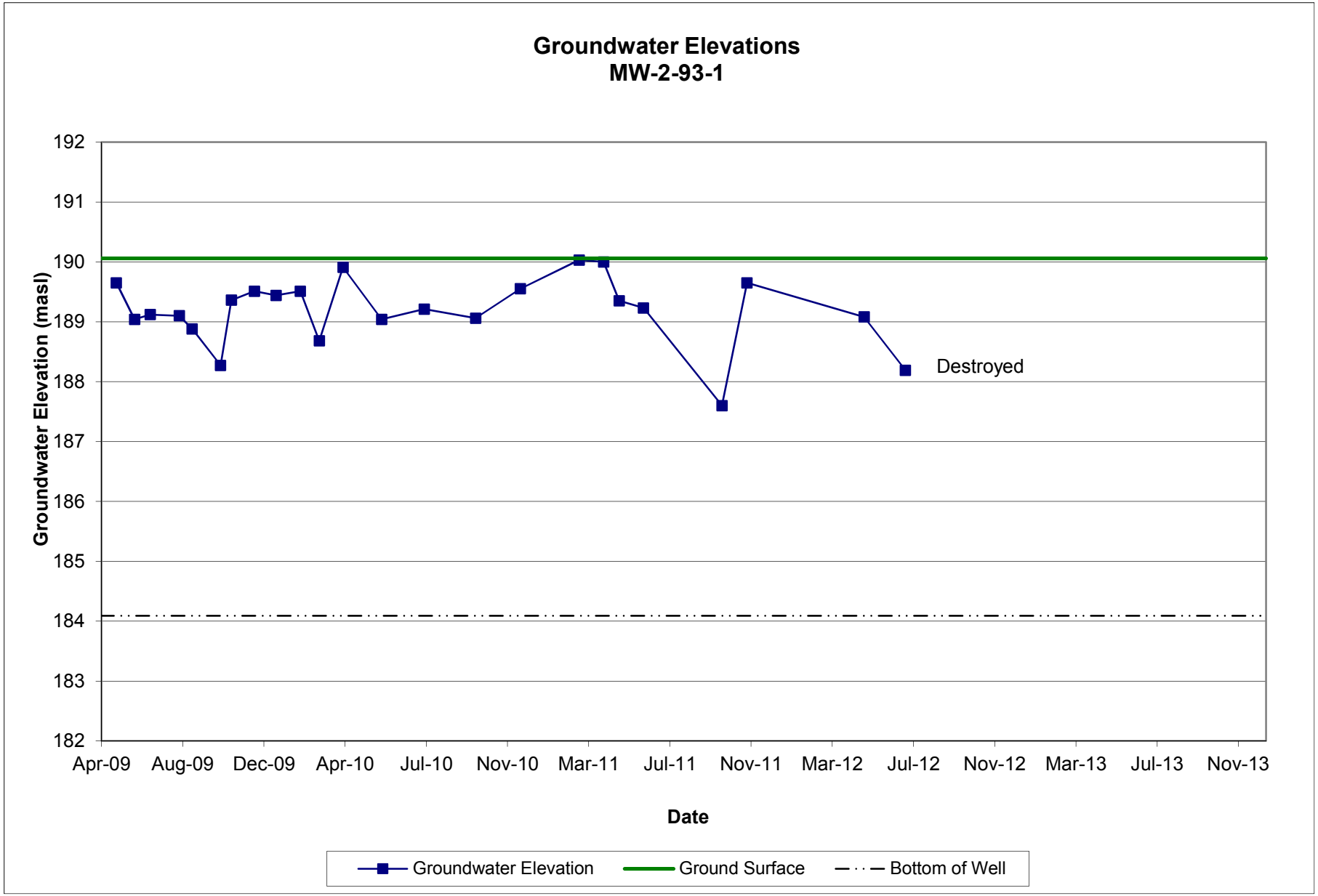
Figure N19-C28



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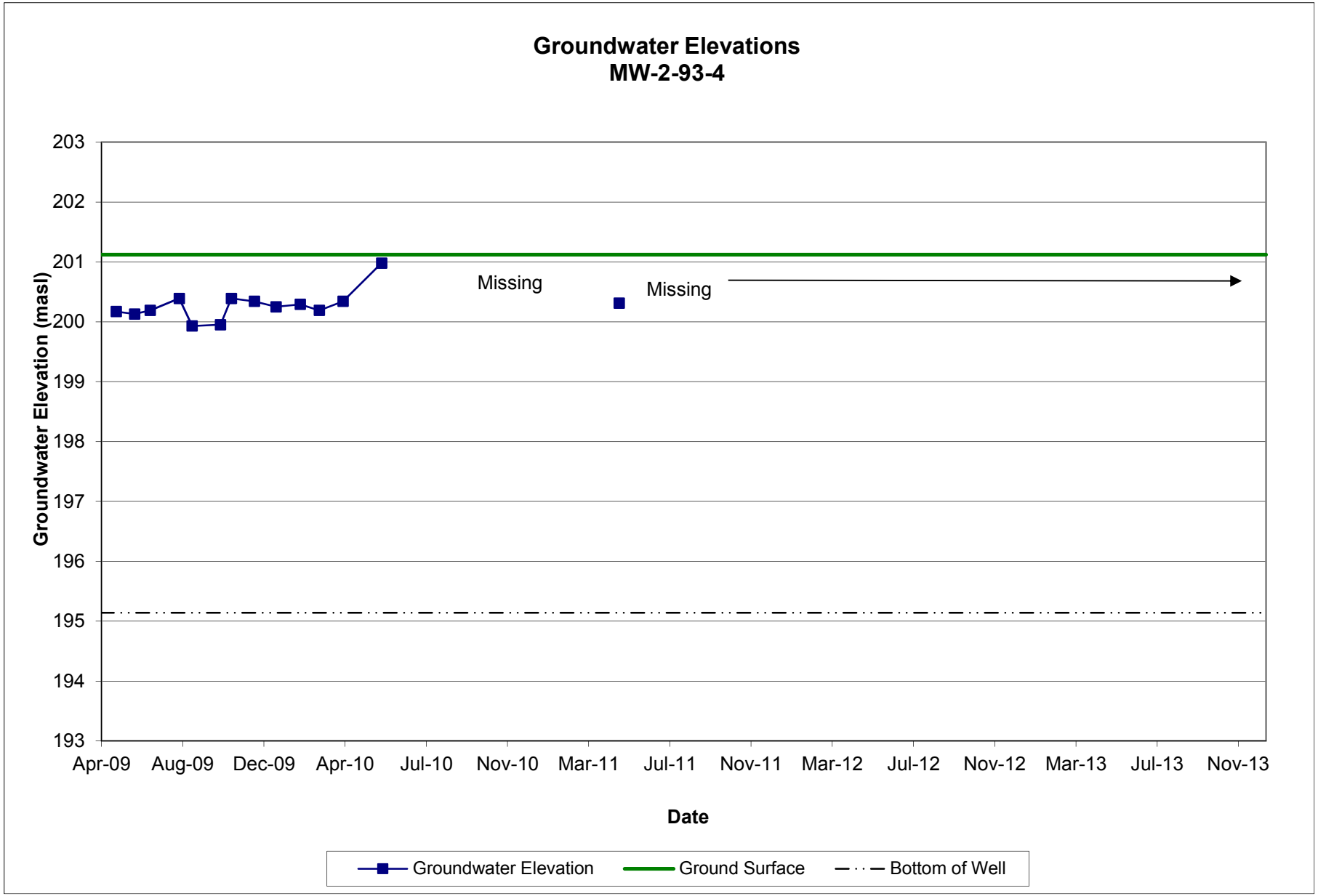

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Figure N19-C30

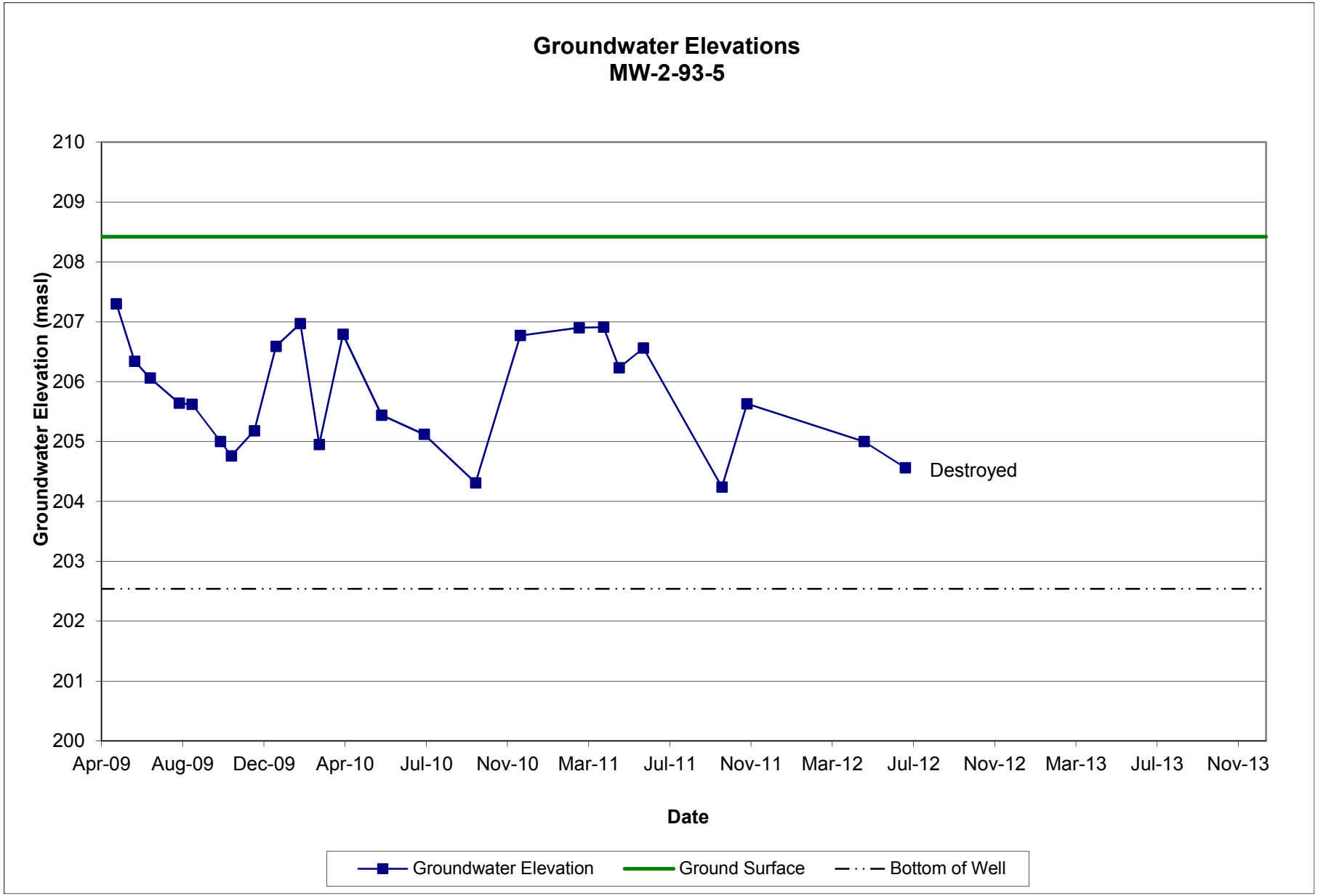

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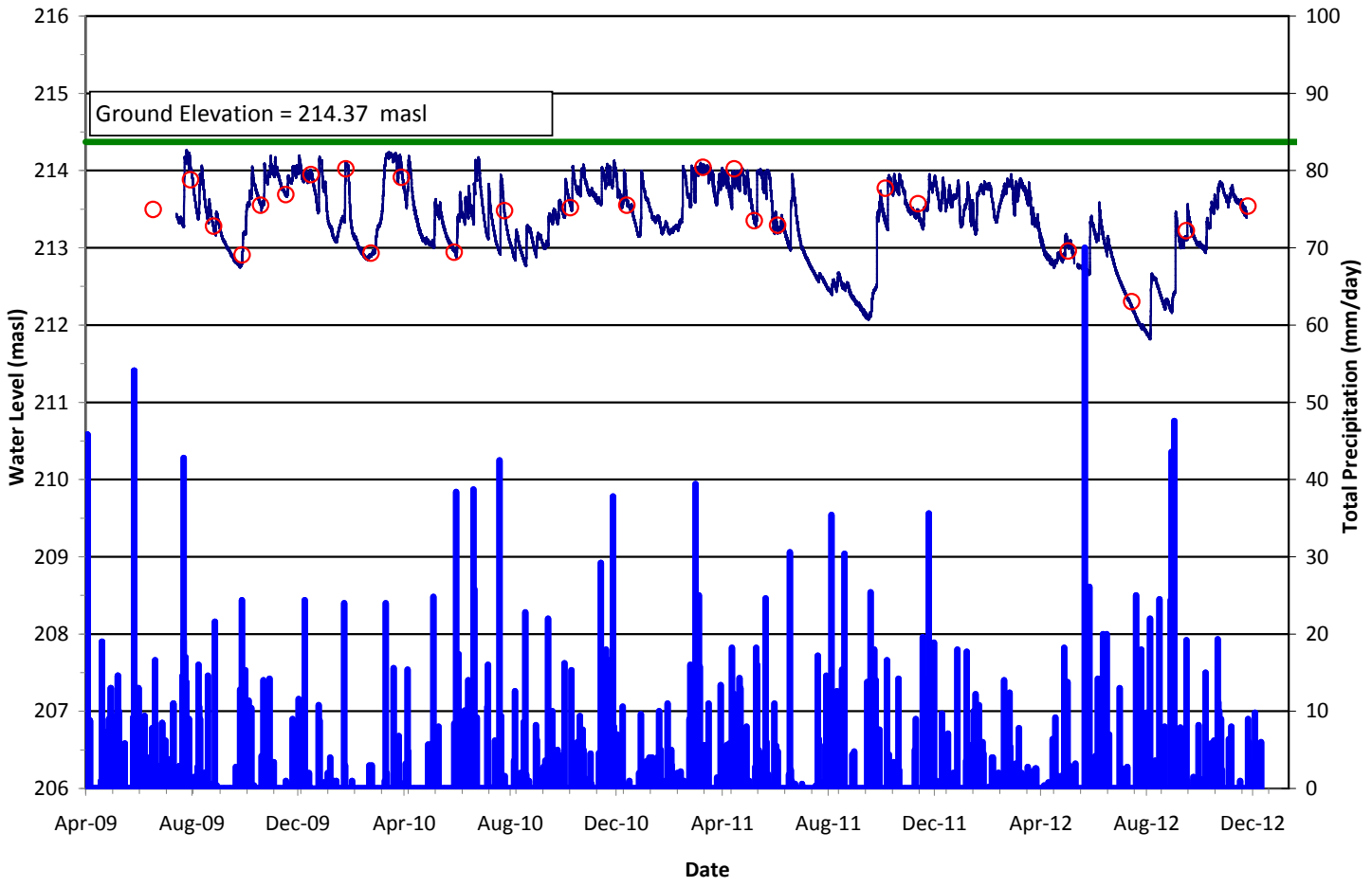
Figure N19-C31



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MW 3-10-8 Automated Measurements
Manual Measurements
Ground Elevation
Daily Total Precipitation

MW-3-10-8

GROUNDWATER LEVEL HYDROGRAPH
Seaton N19 NFSSR
April 2009 to December 2012
Figure N19-C32

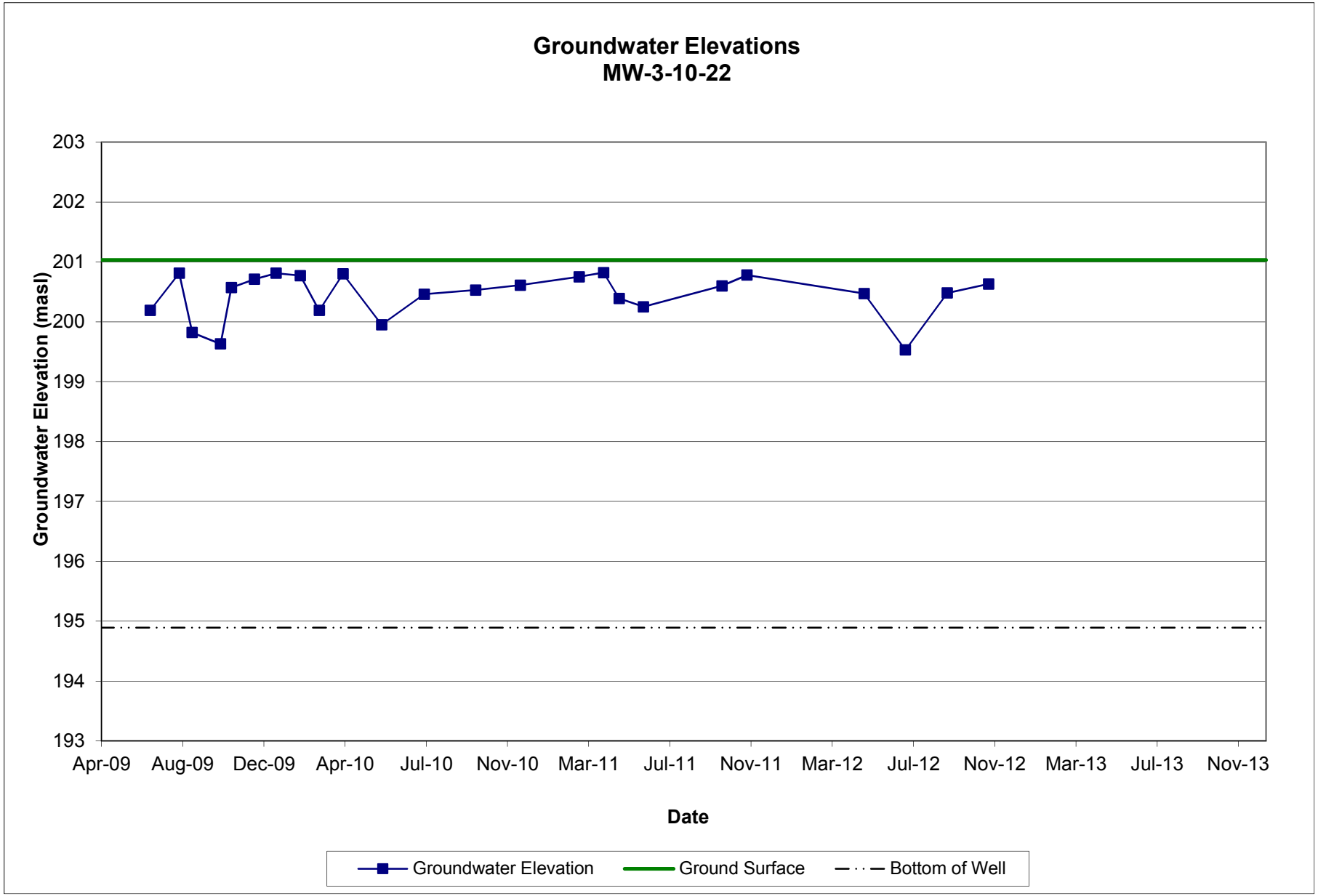

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Figure N19-C33

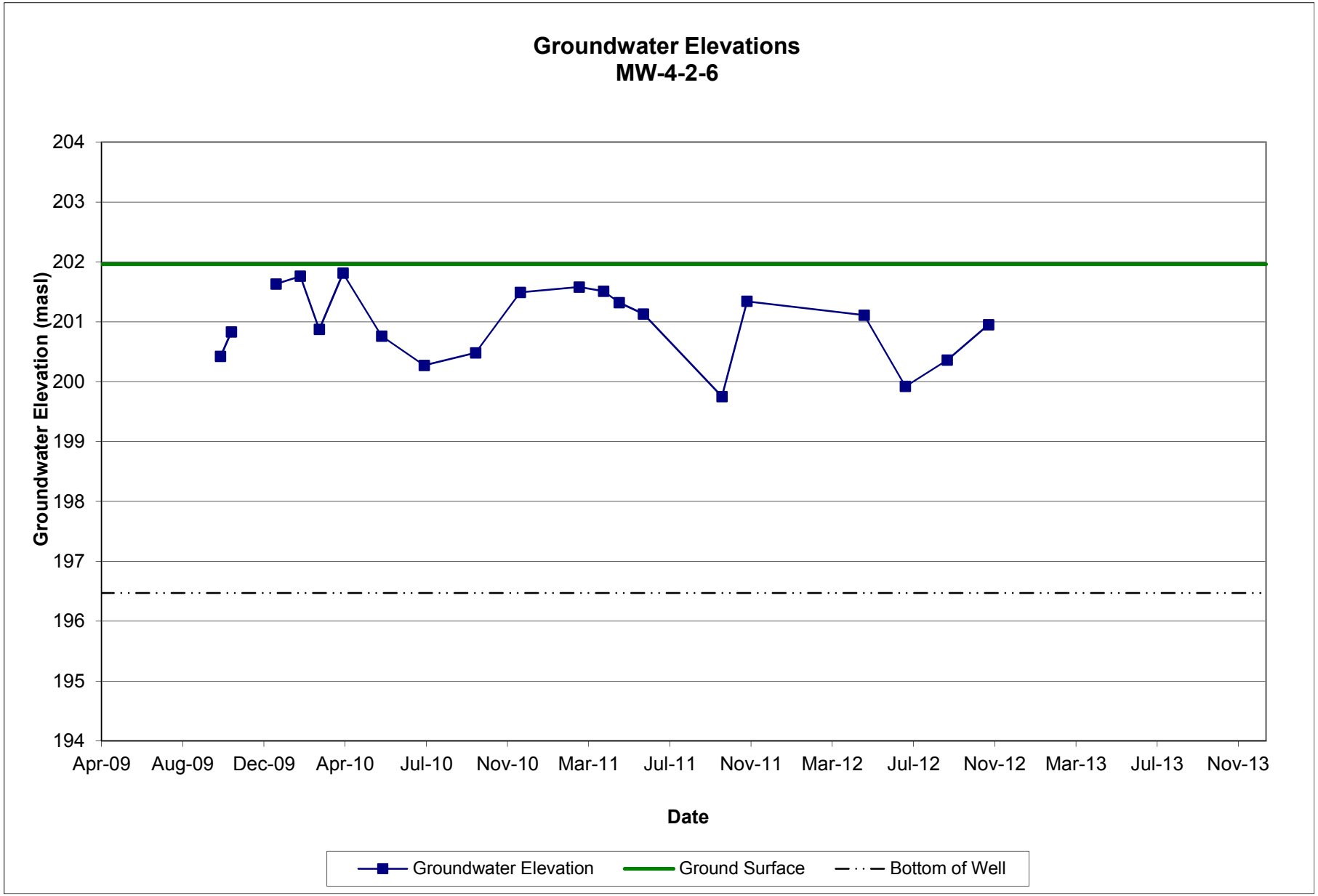

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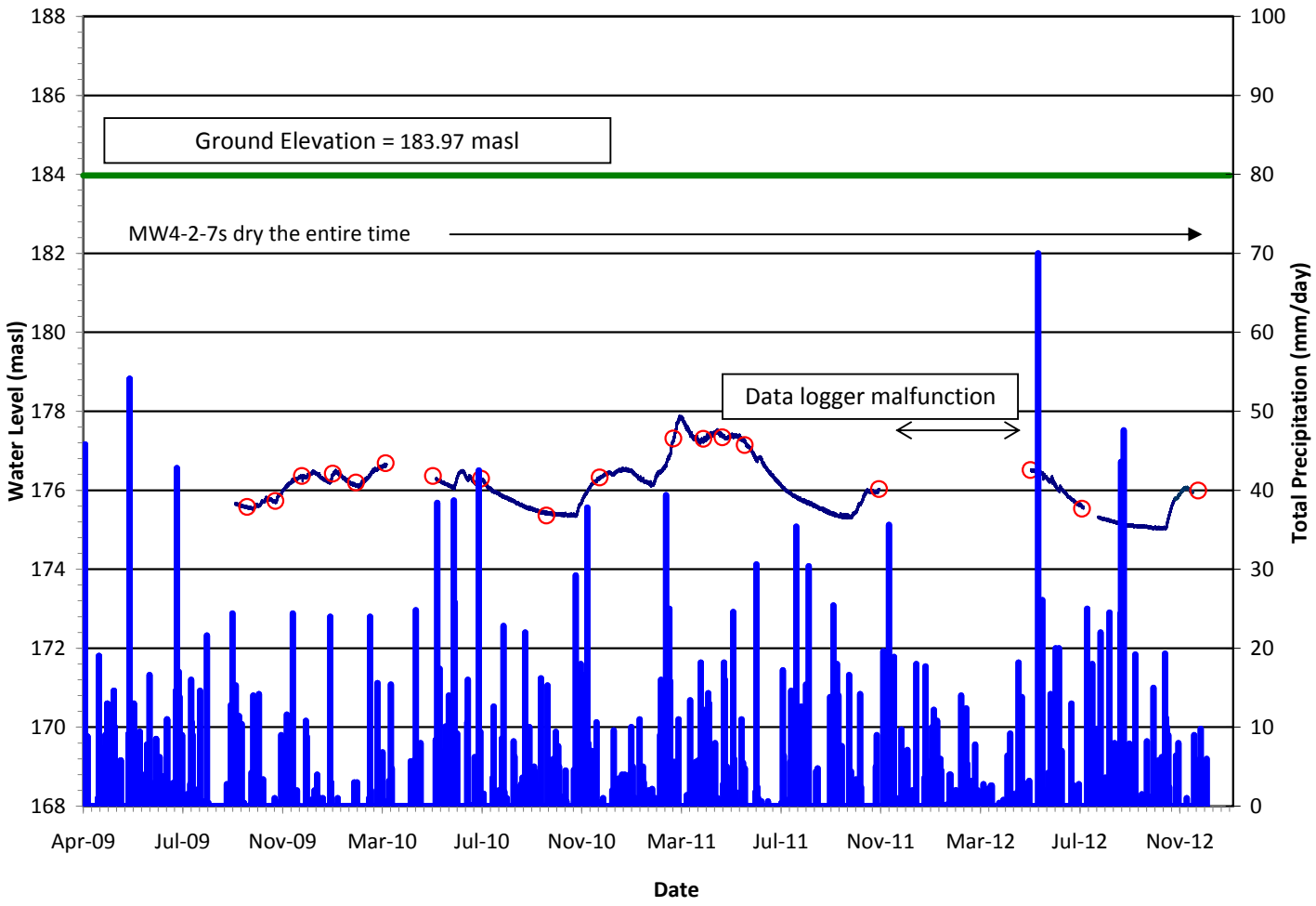
Figure N19-C34



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MW4-2-7d Automated Measurements
MW4-2-7d Manual Measurements
Ground Elevation
Daily Total Precipitation

MW-4-2-7s/d

GROUNDWATER LEVEL HYDROGRAPH
Seaton N19 NFSSR
April 2009 to December 2012
Figure N19-C35

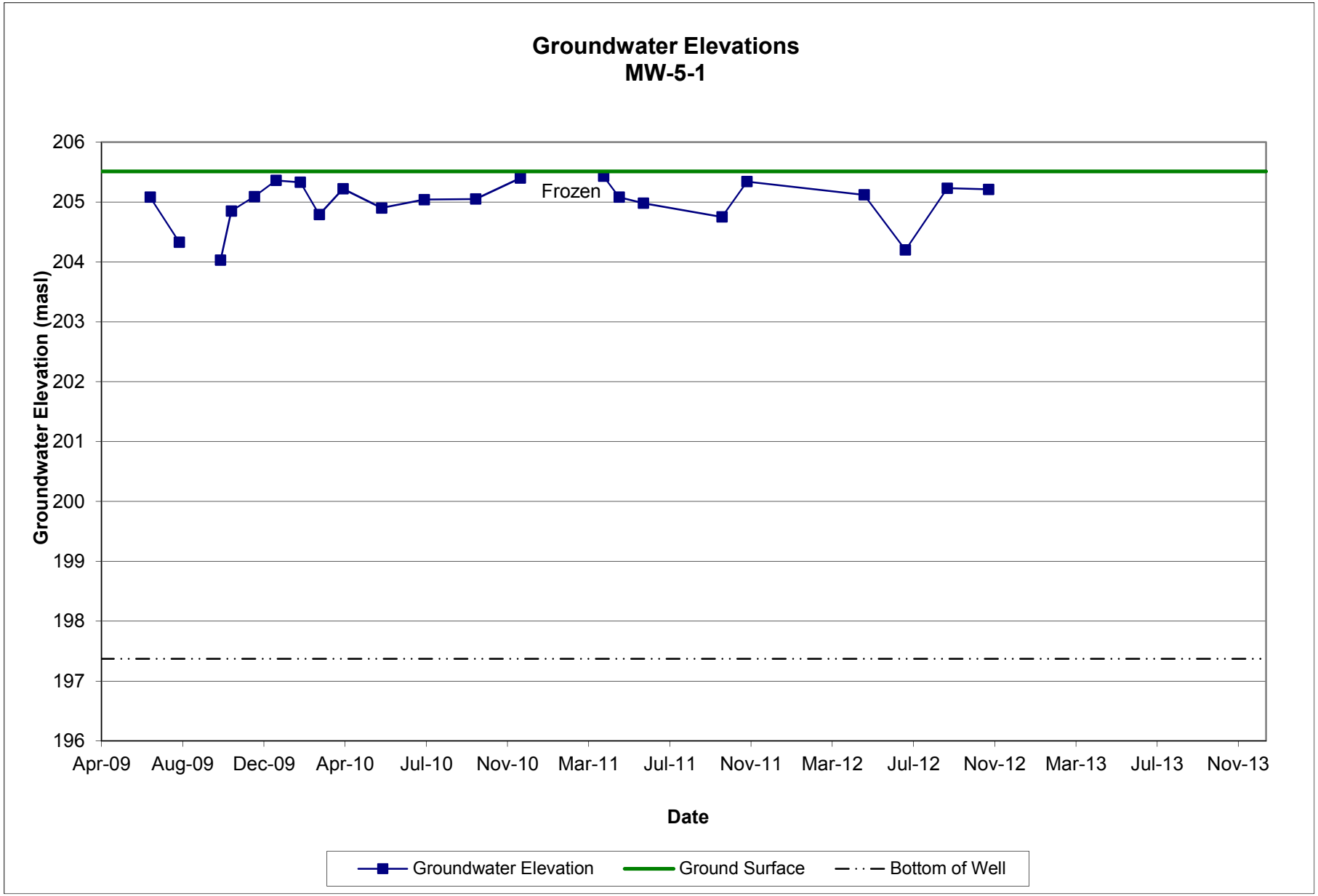

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Figure N19-C36

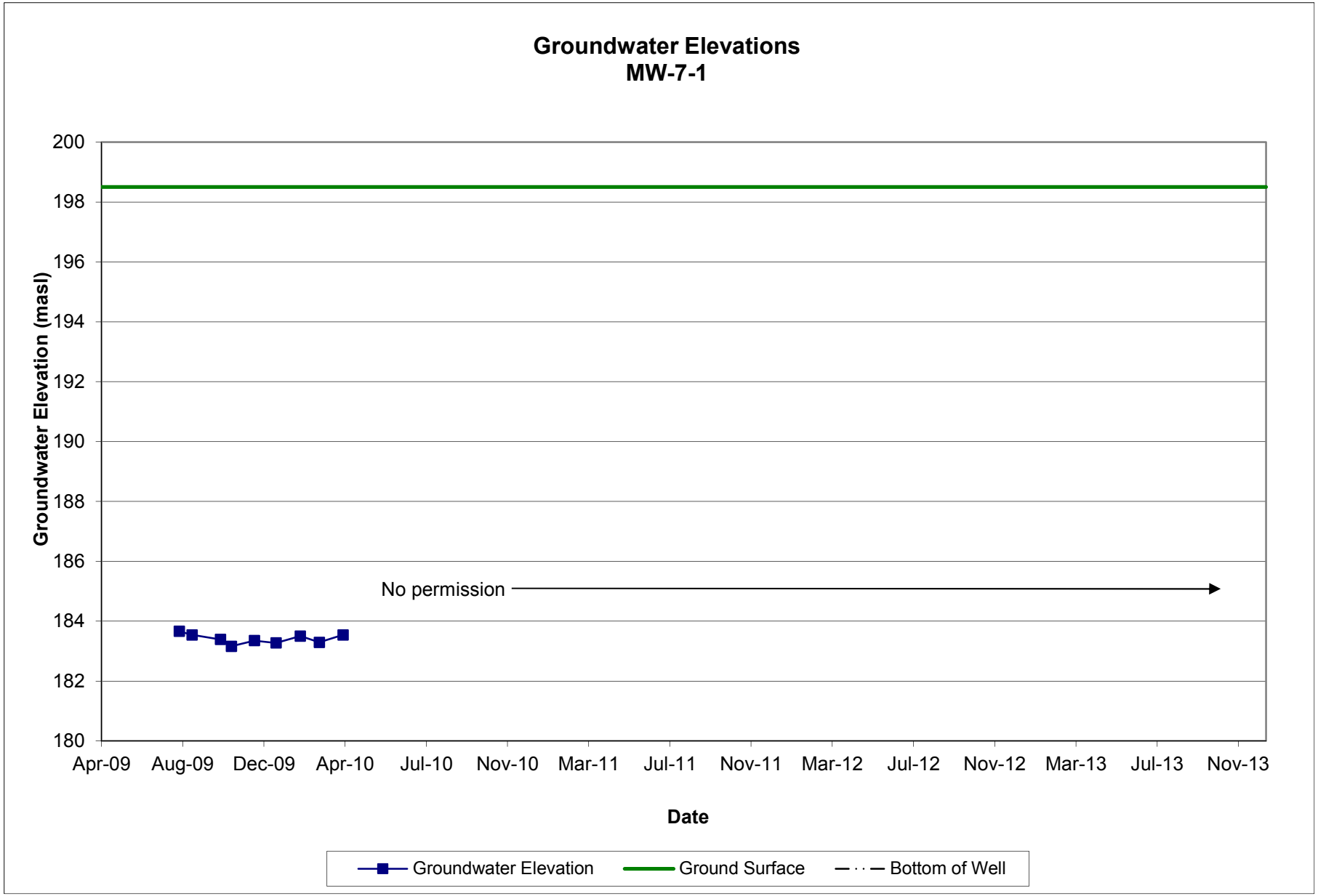

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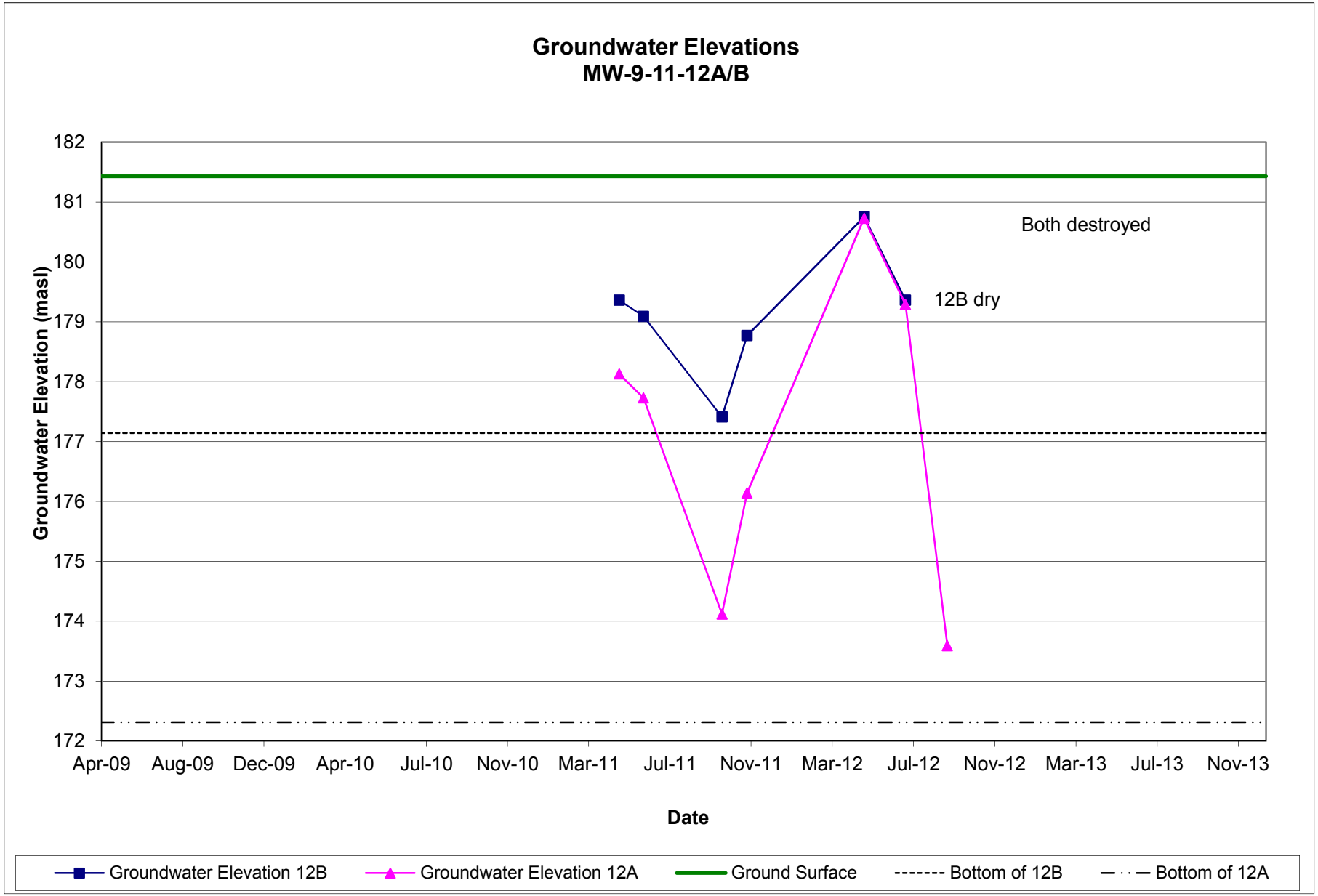
Figure N19-C37



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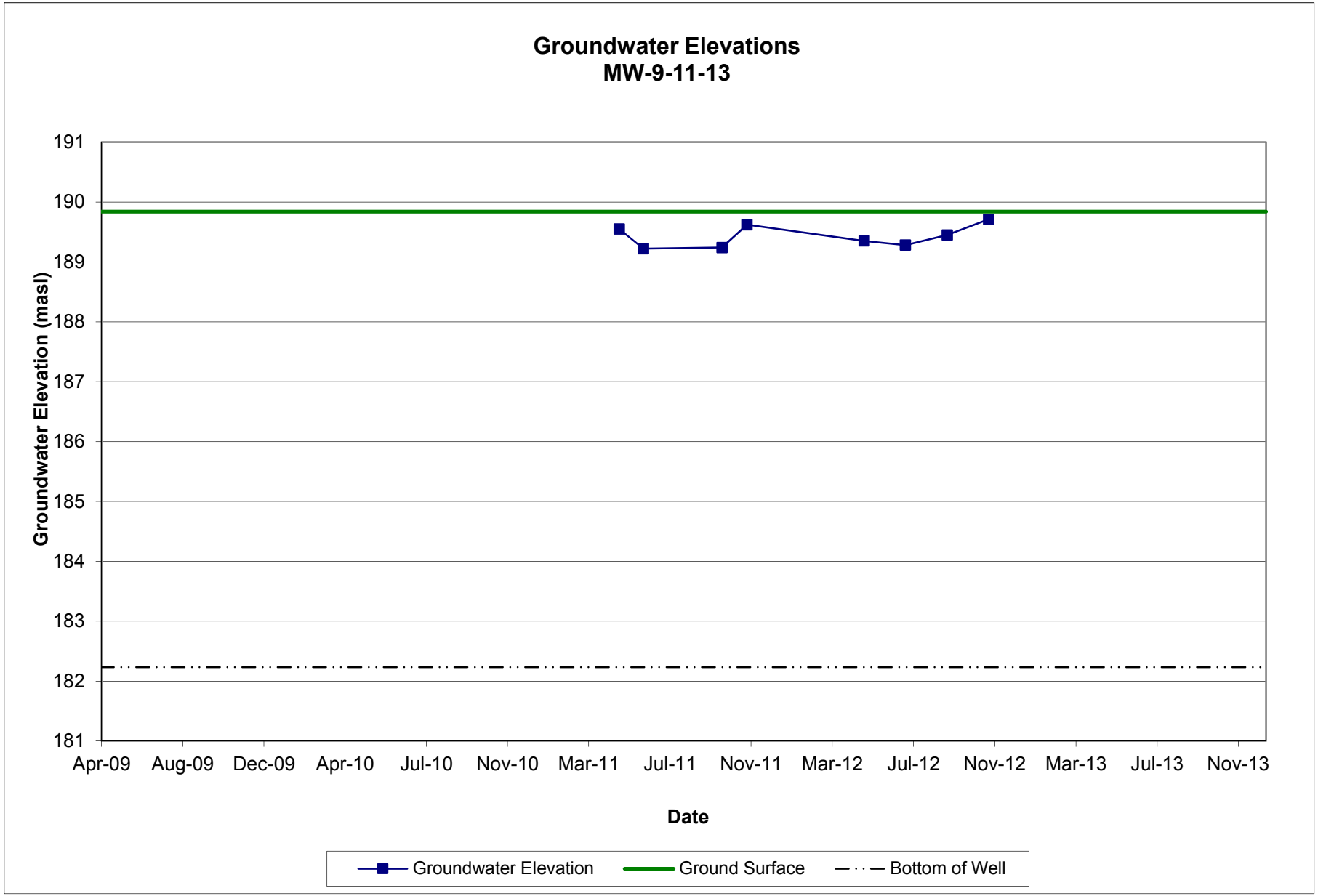
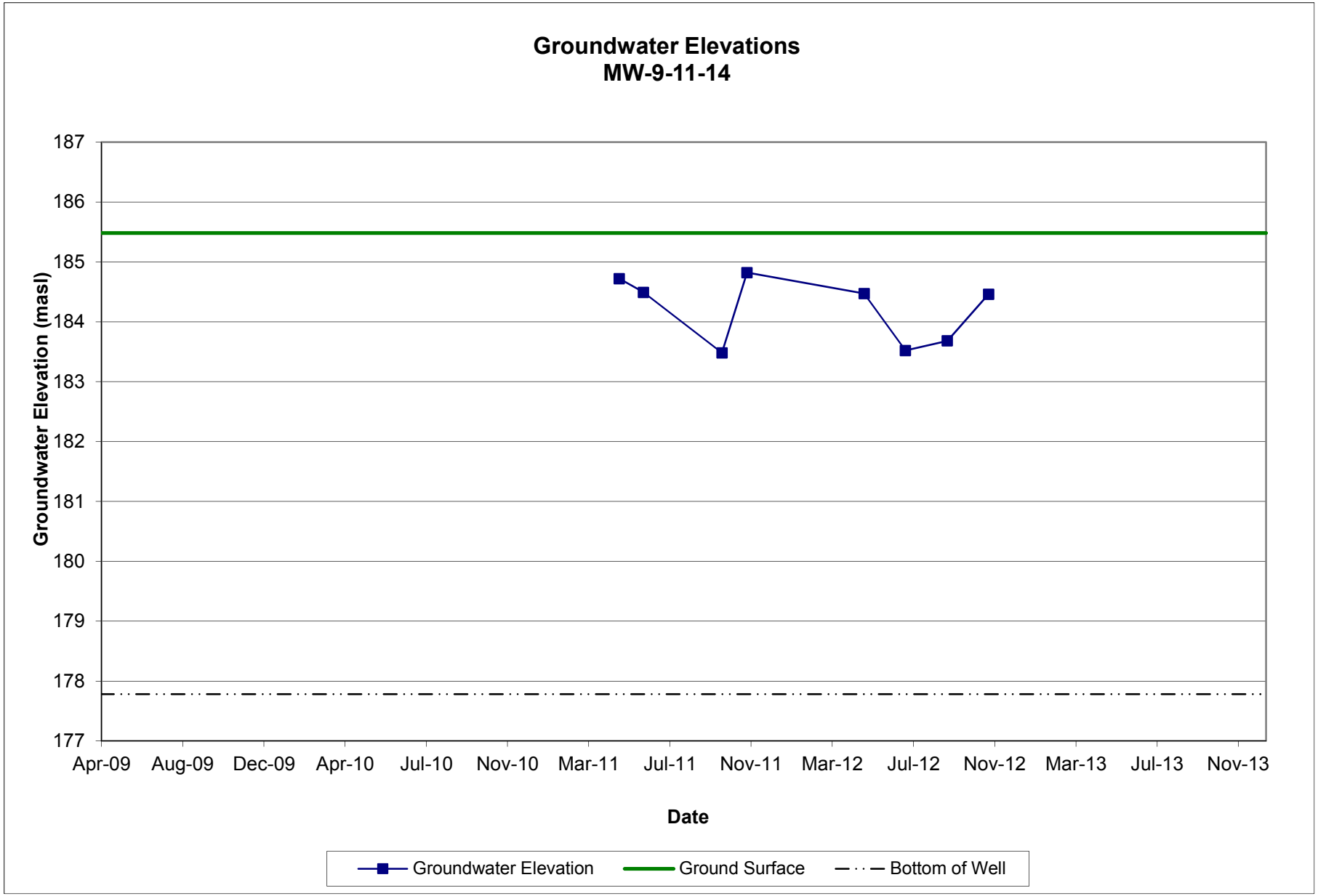


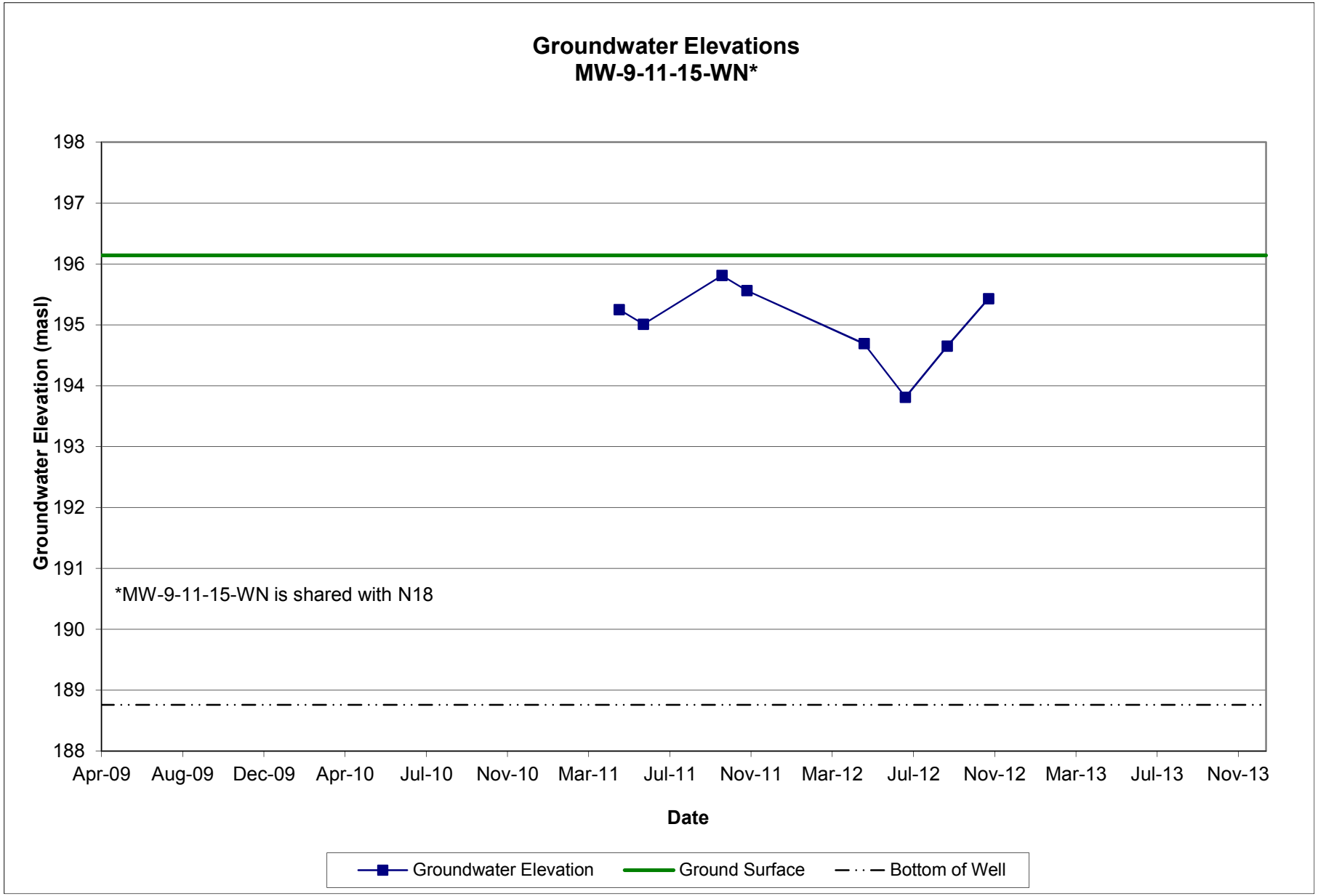
PEB019877

Figure N19-C39



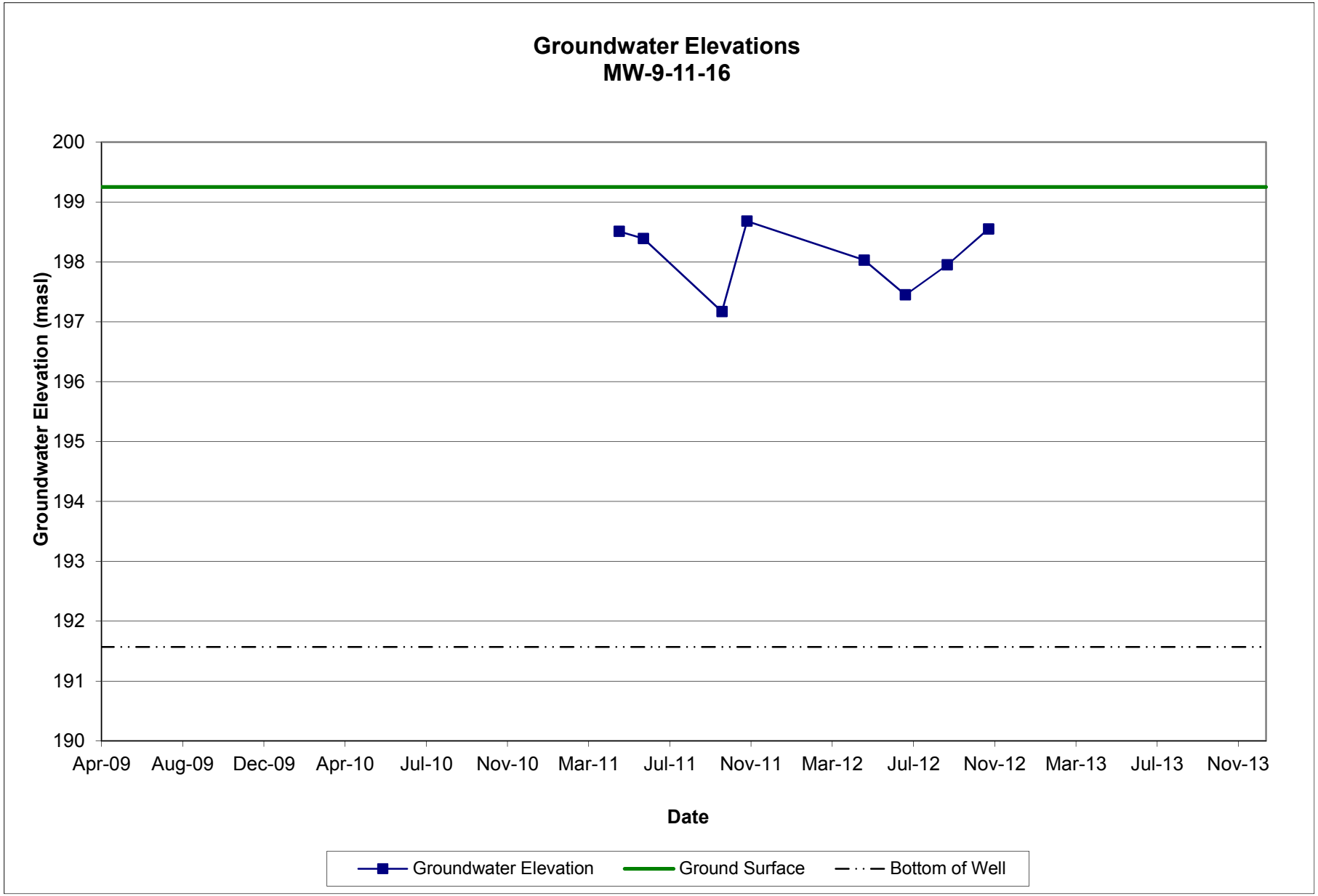
PEB019877

Figure N19-C40



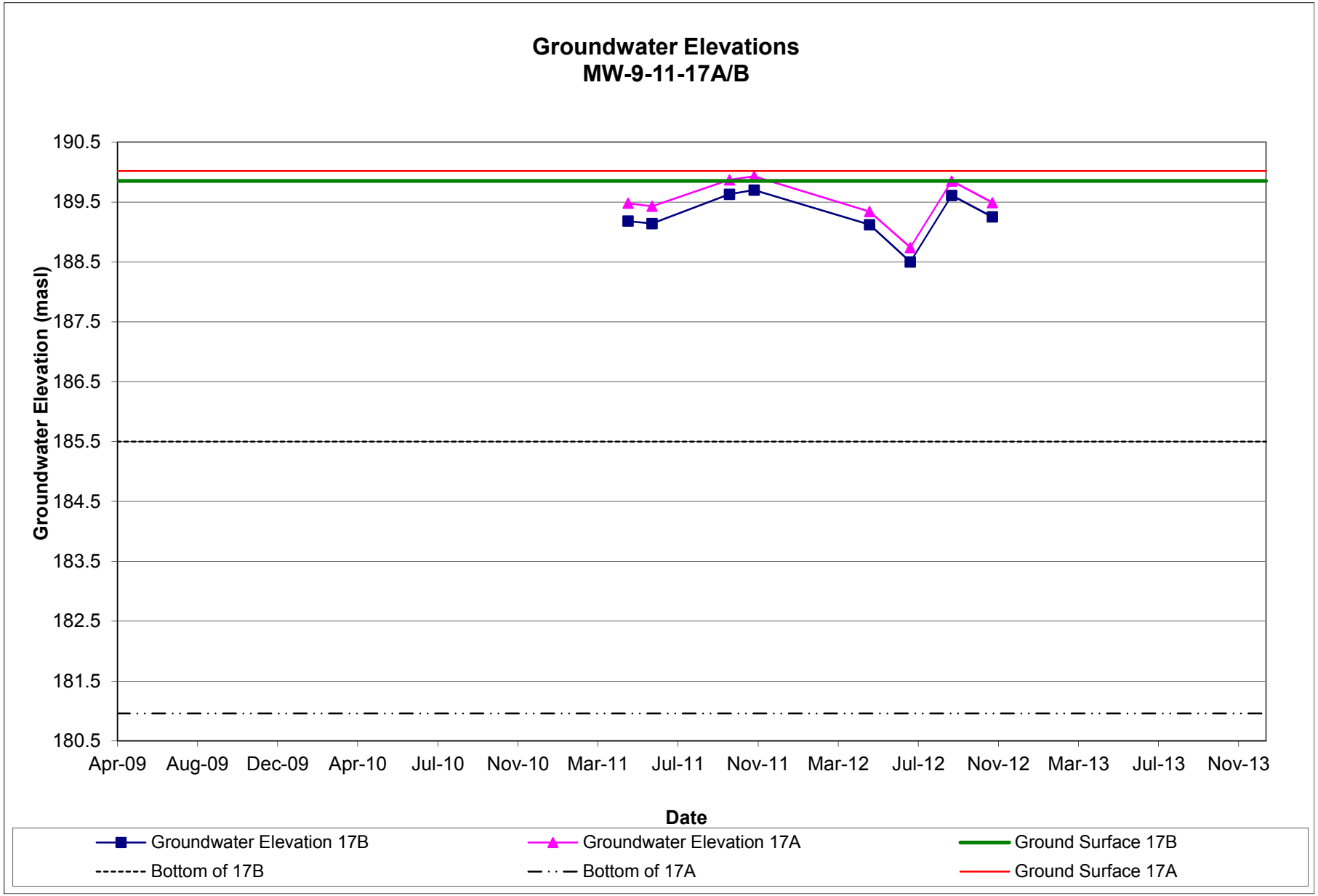
PEB019877

Figure N19-C41



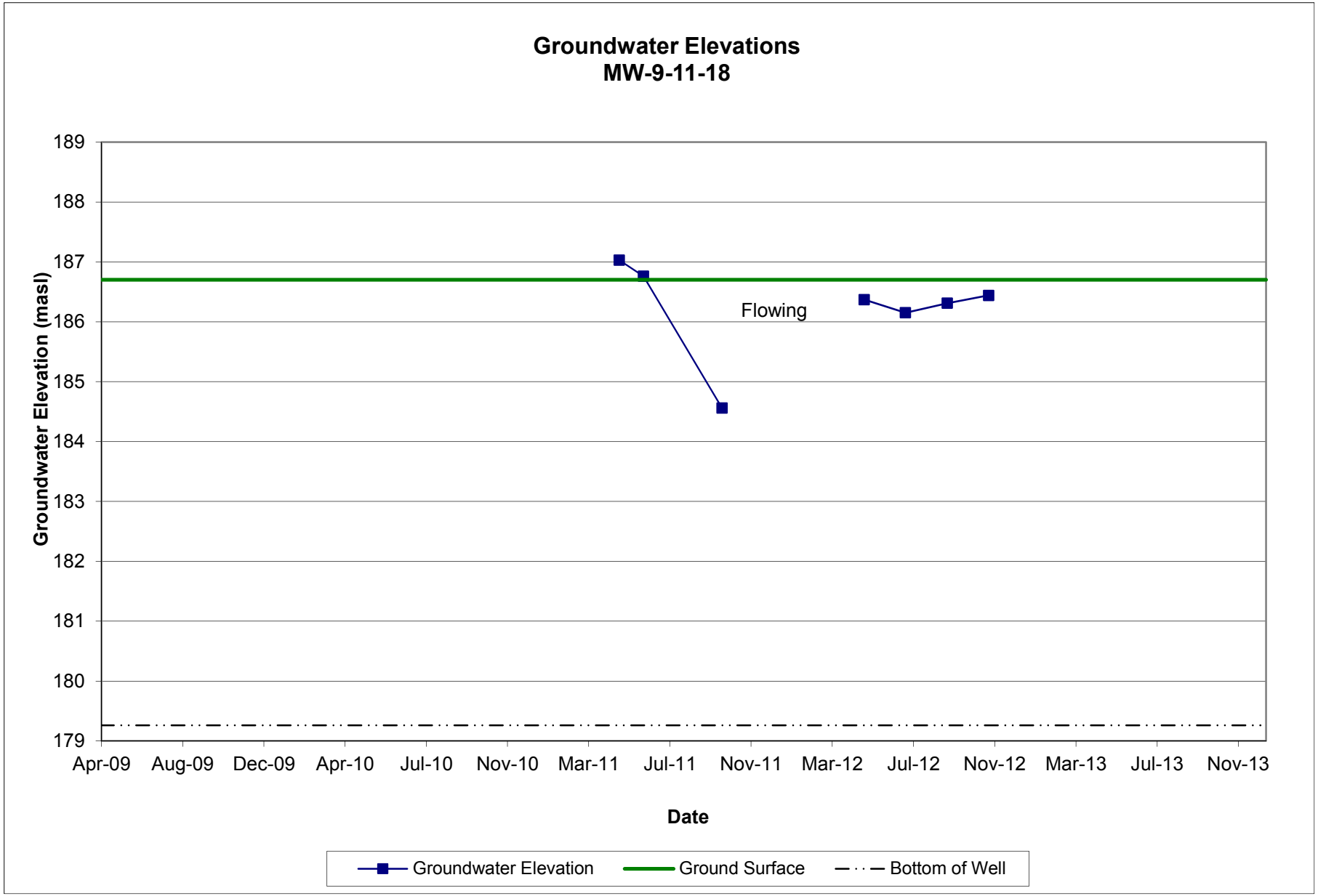
PEB019877

Figure N19-C42



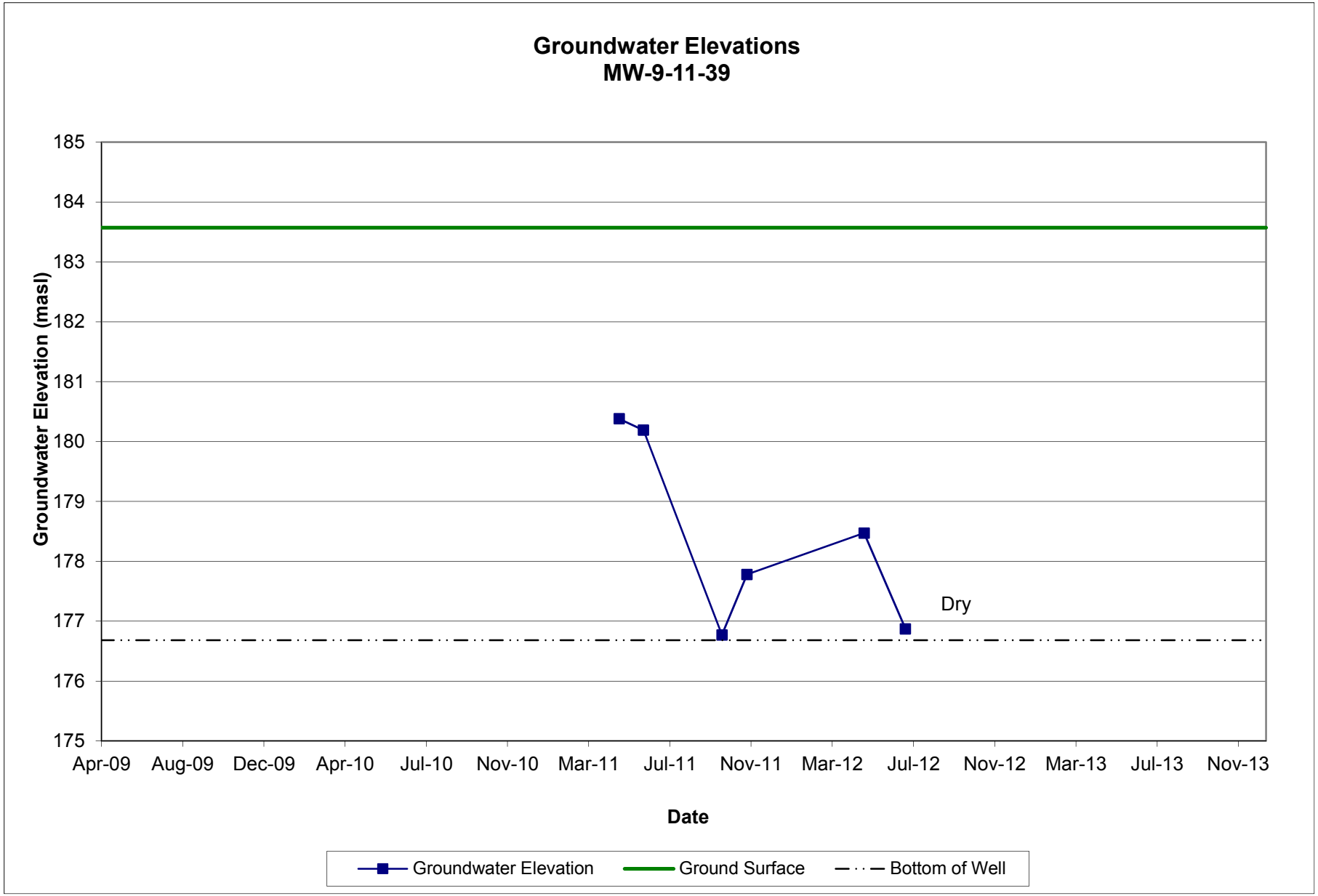
PEB019877

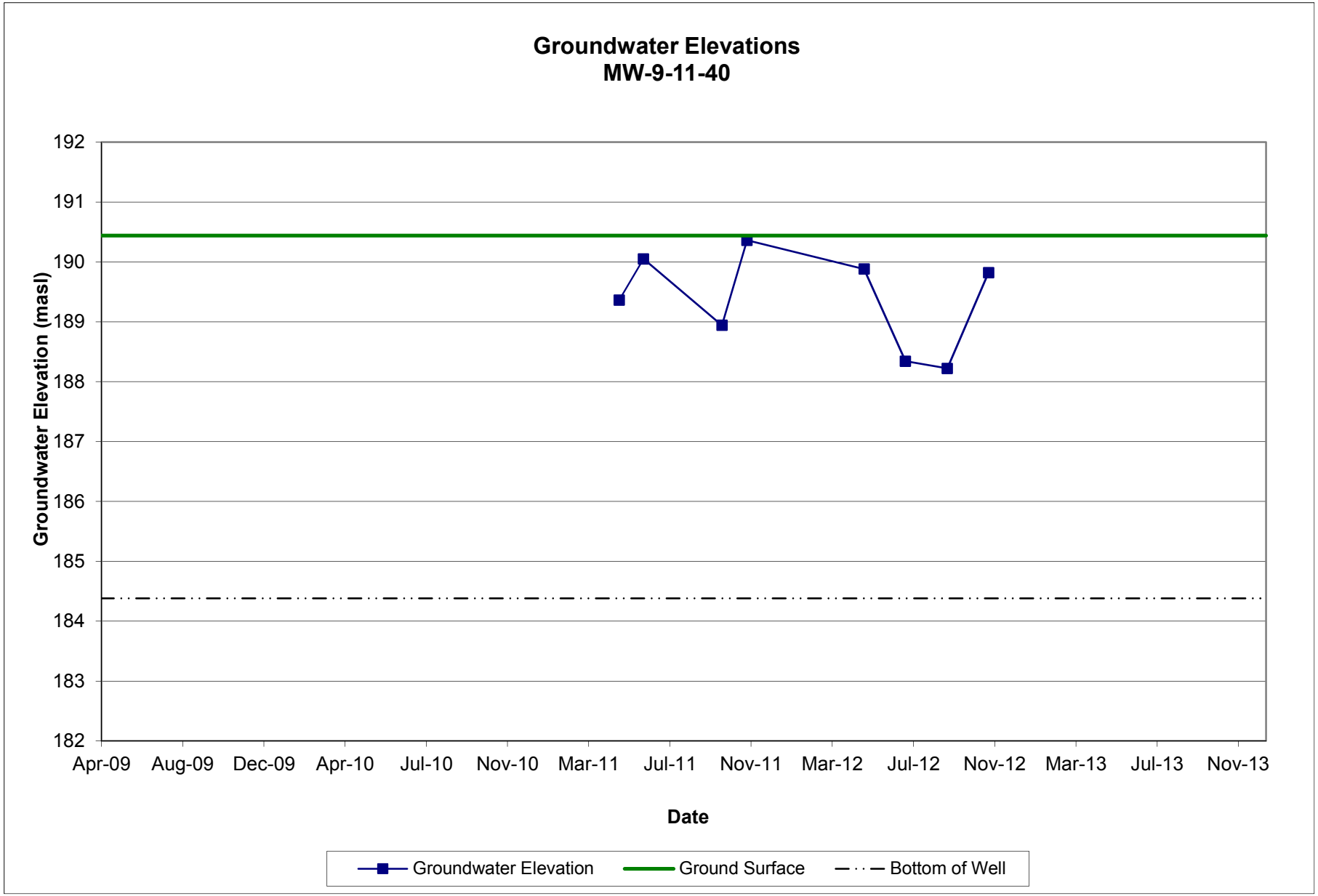
Figure N19-C43



PEB019877

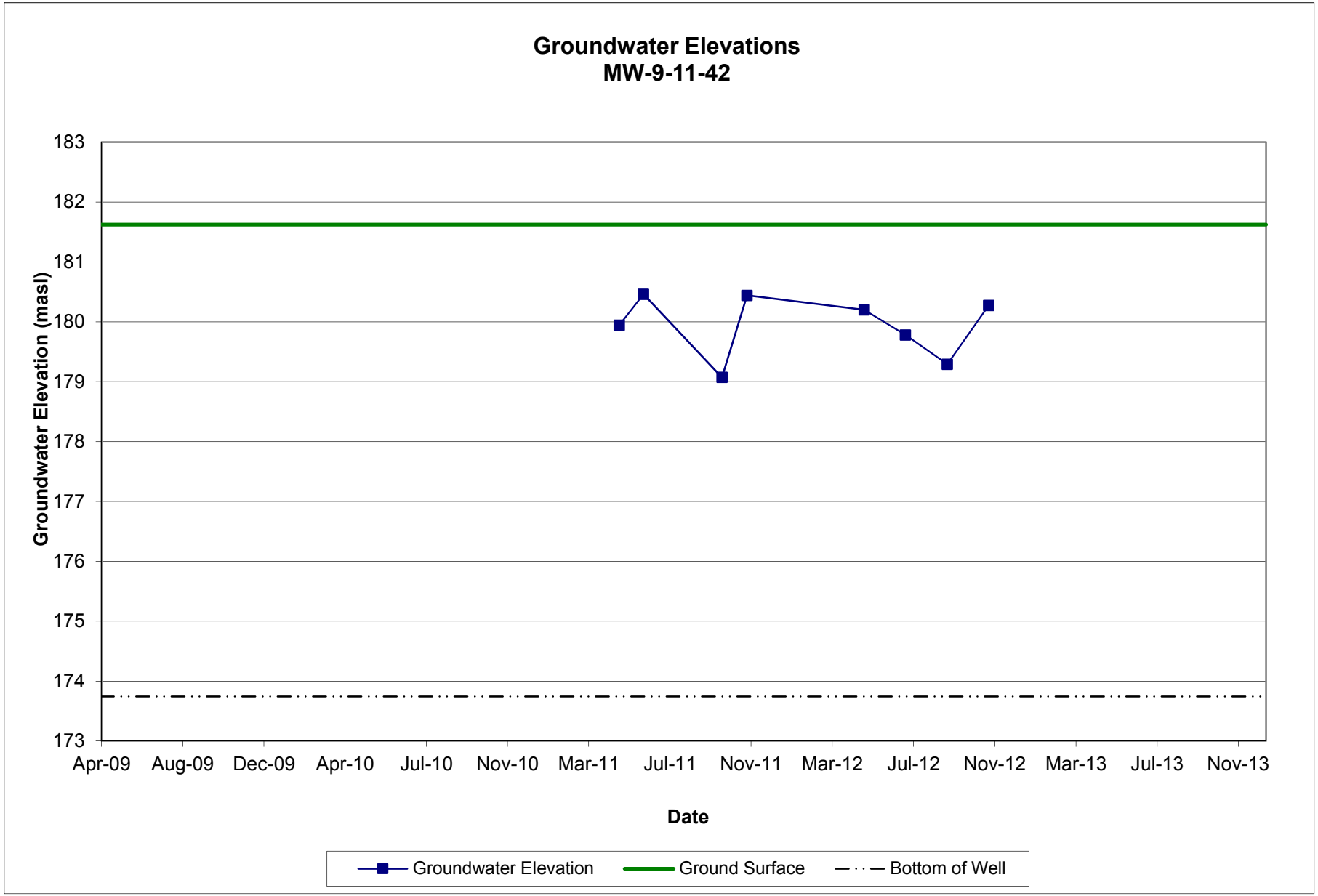
Figure N19-C44


Groundwater Elevations
MW-9-11-39
Groundwater Elevation (masl)
185
184
183
182
181
180
179
178
177
176
175
Dry
Apr-09
Aug-09
Dec-09
Apr-10
Jul-10
Nov-10
Mar-11
Jul-11
Nov-11
Mar-12
Jul-12
Nov-12
Mar-13
Jul-13
Nov-13
Date
Groundwater Elevation
Ground Surface
Bottom of Well



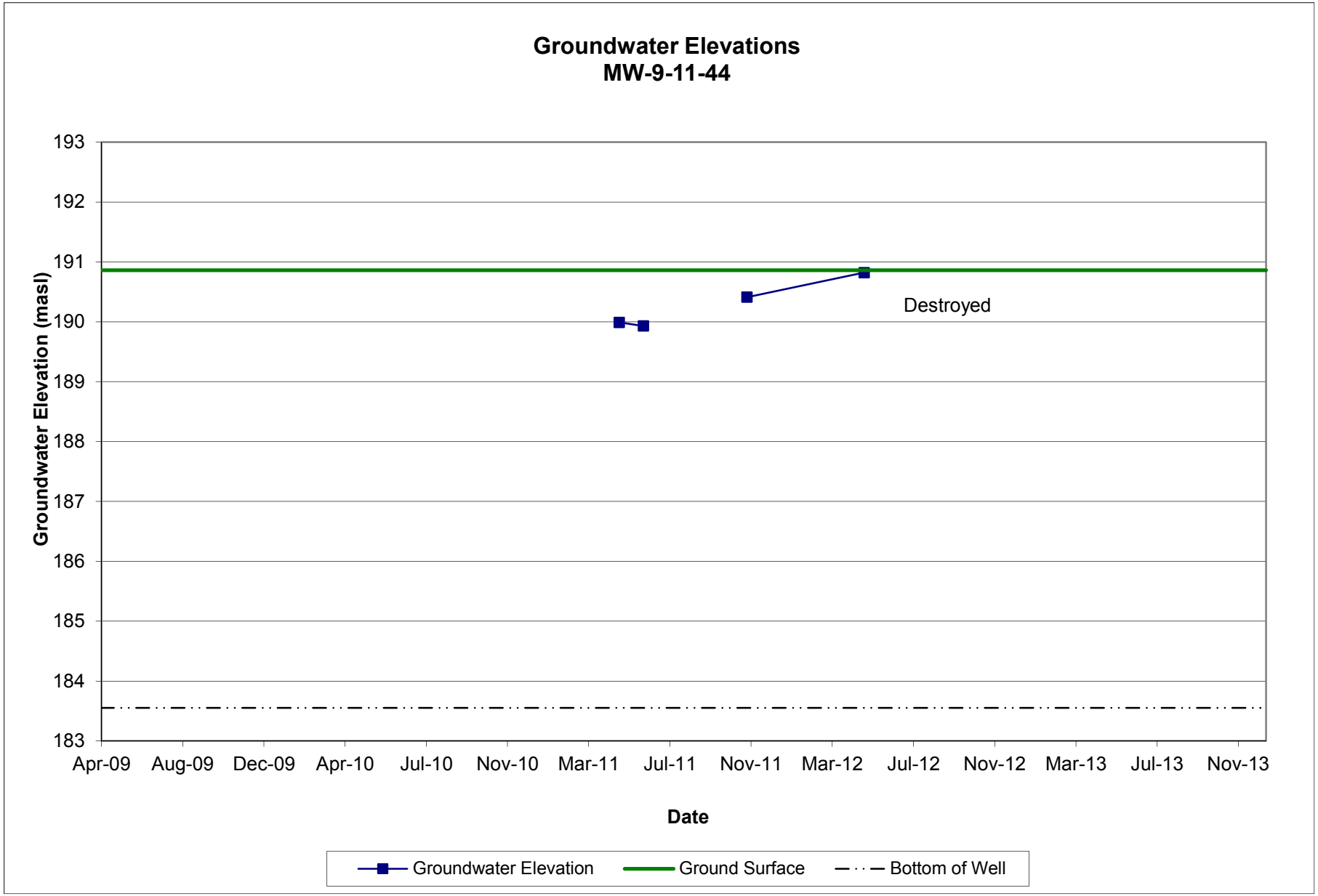
PEB019877

Figure N19-C46



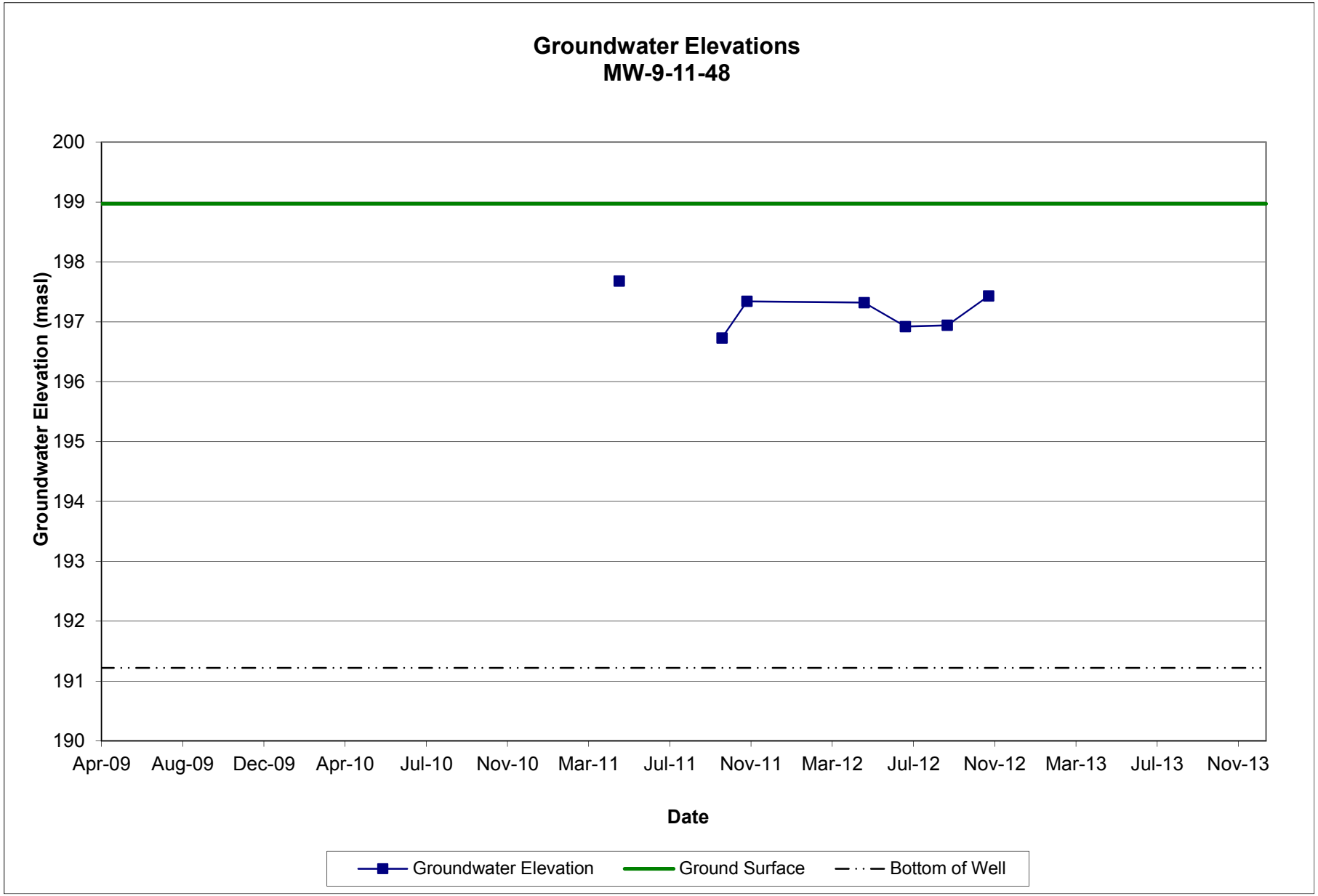
PEB019877

Figure N19-C47



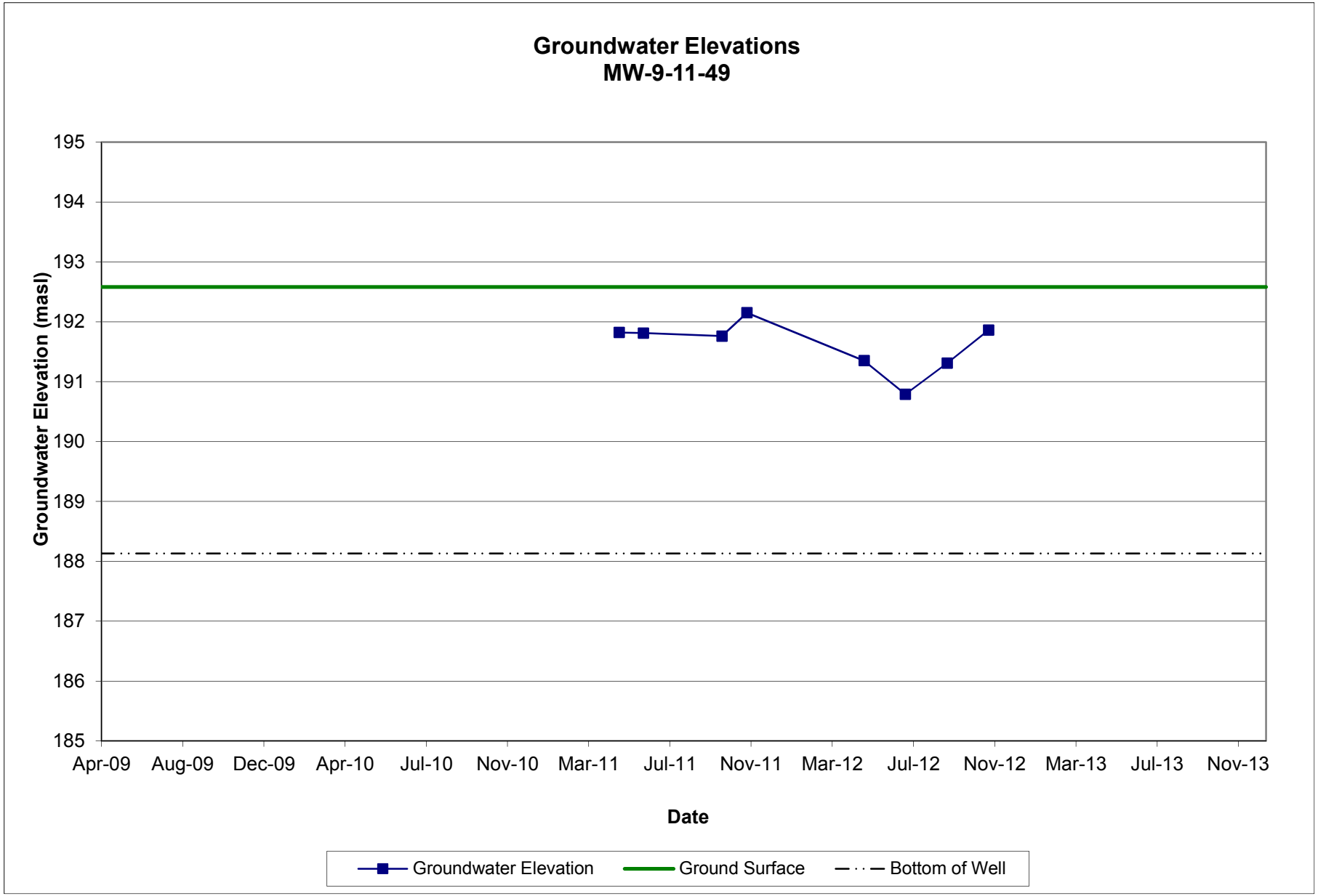
PEB019877

Figure N19-C48



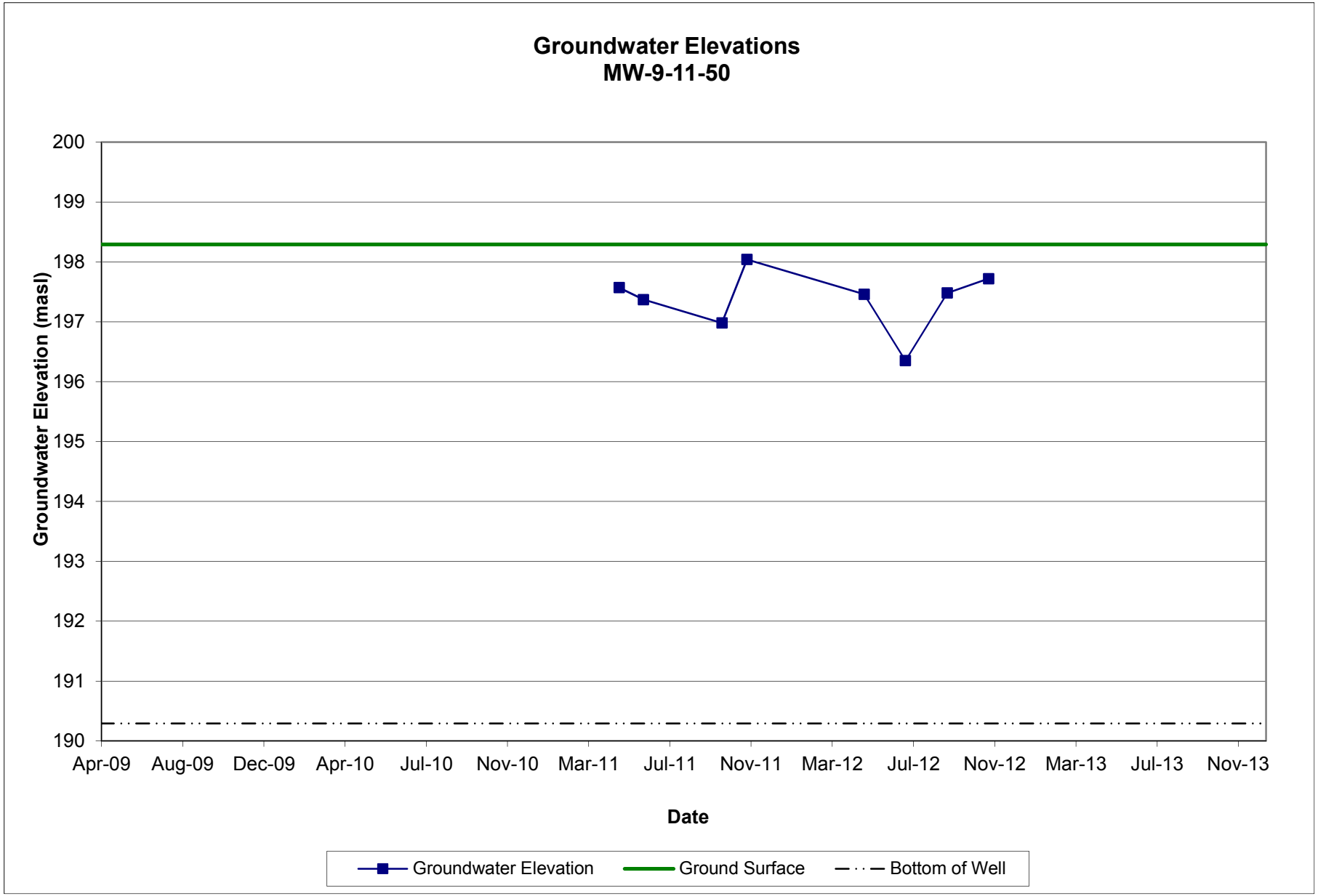
PEB019877

Figure N19-C49



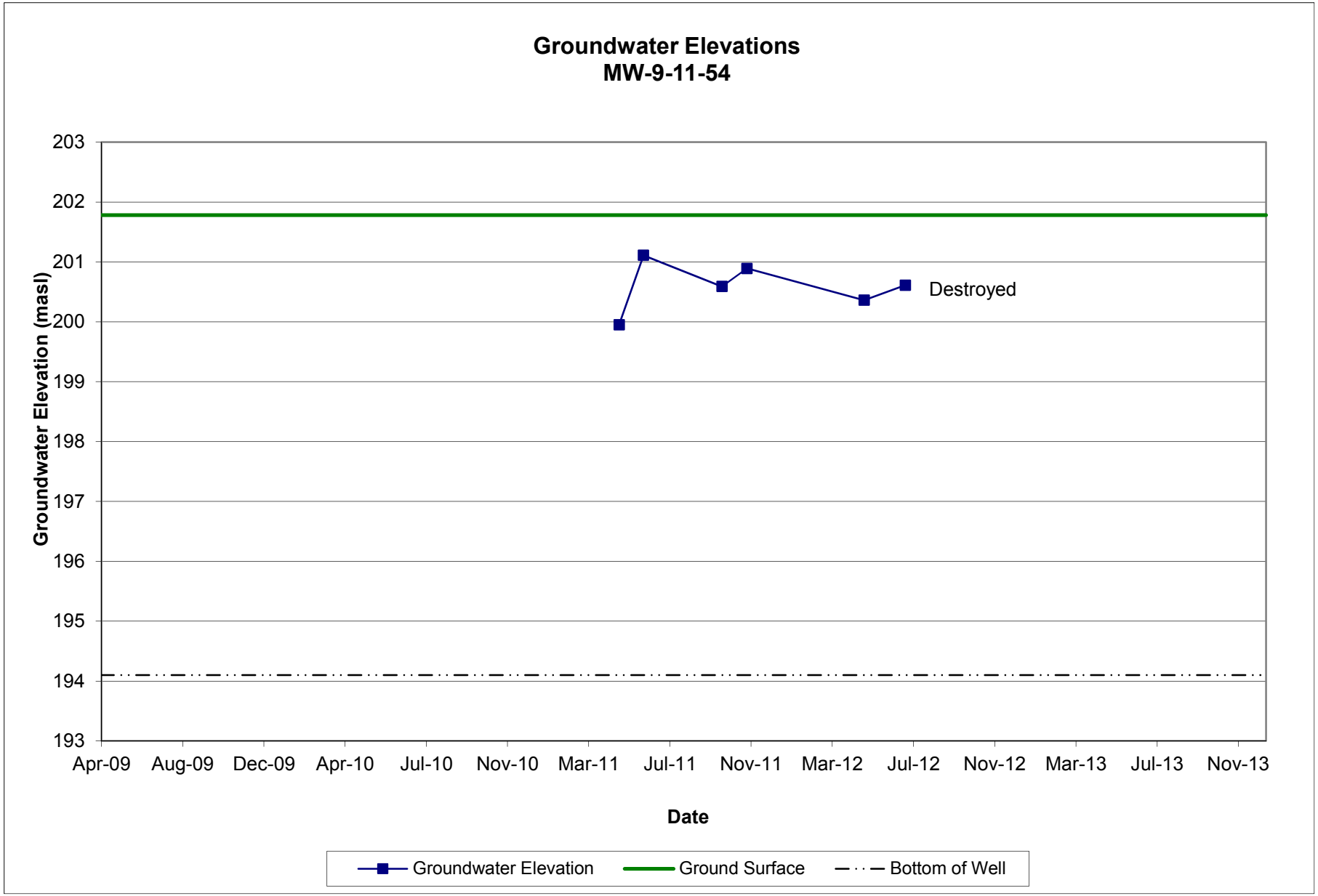
PEB019877

Figure N19-C50



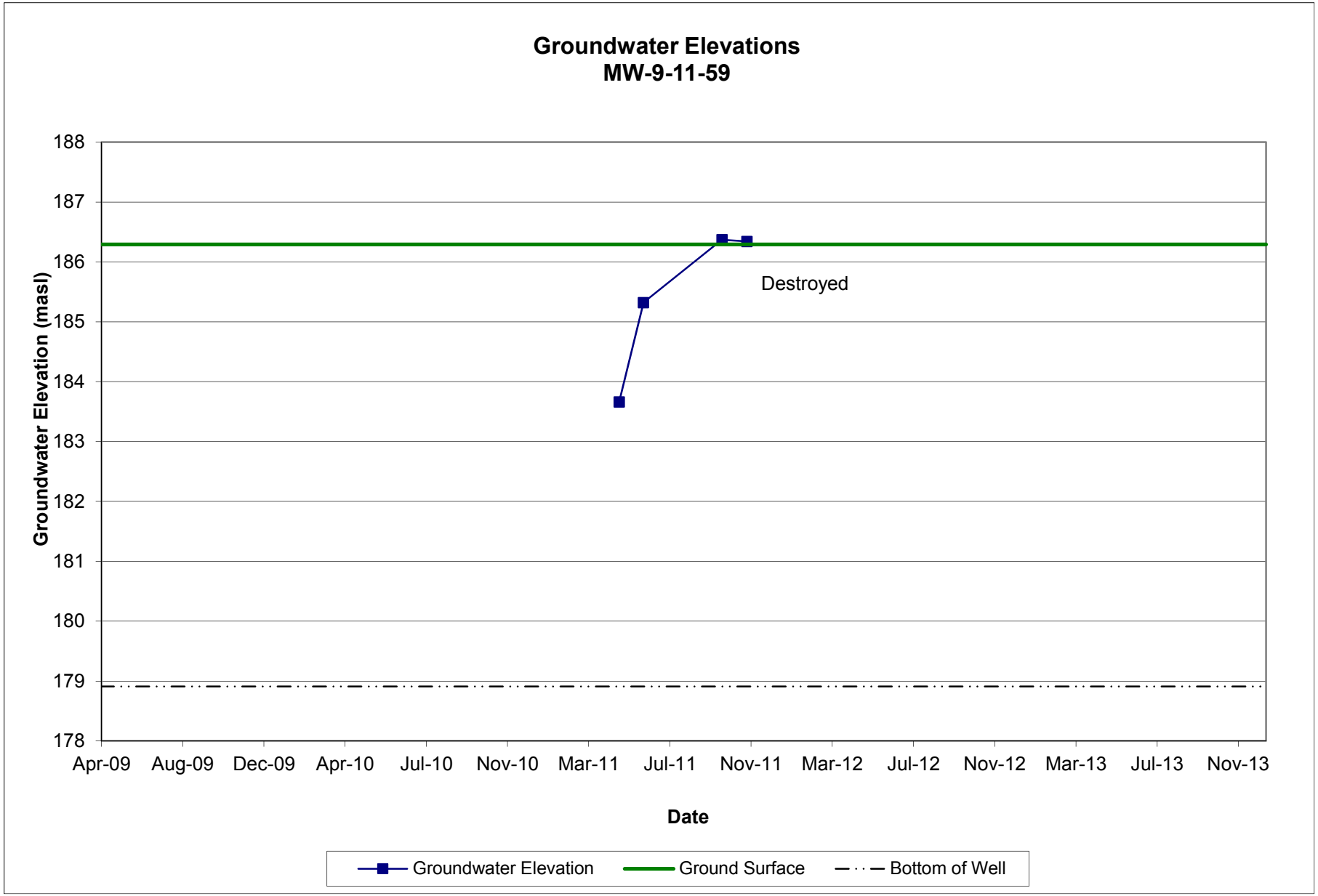
PEB019877

Figure N19-C51



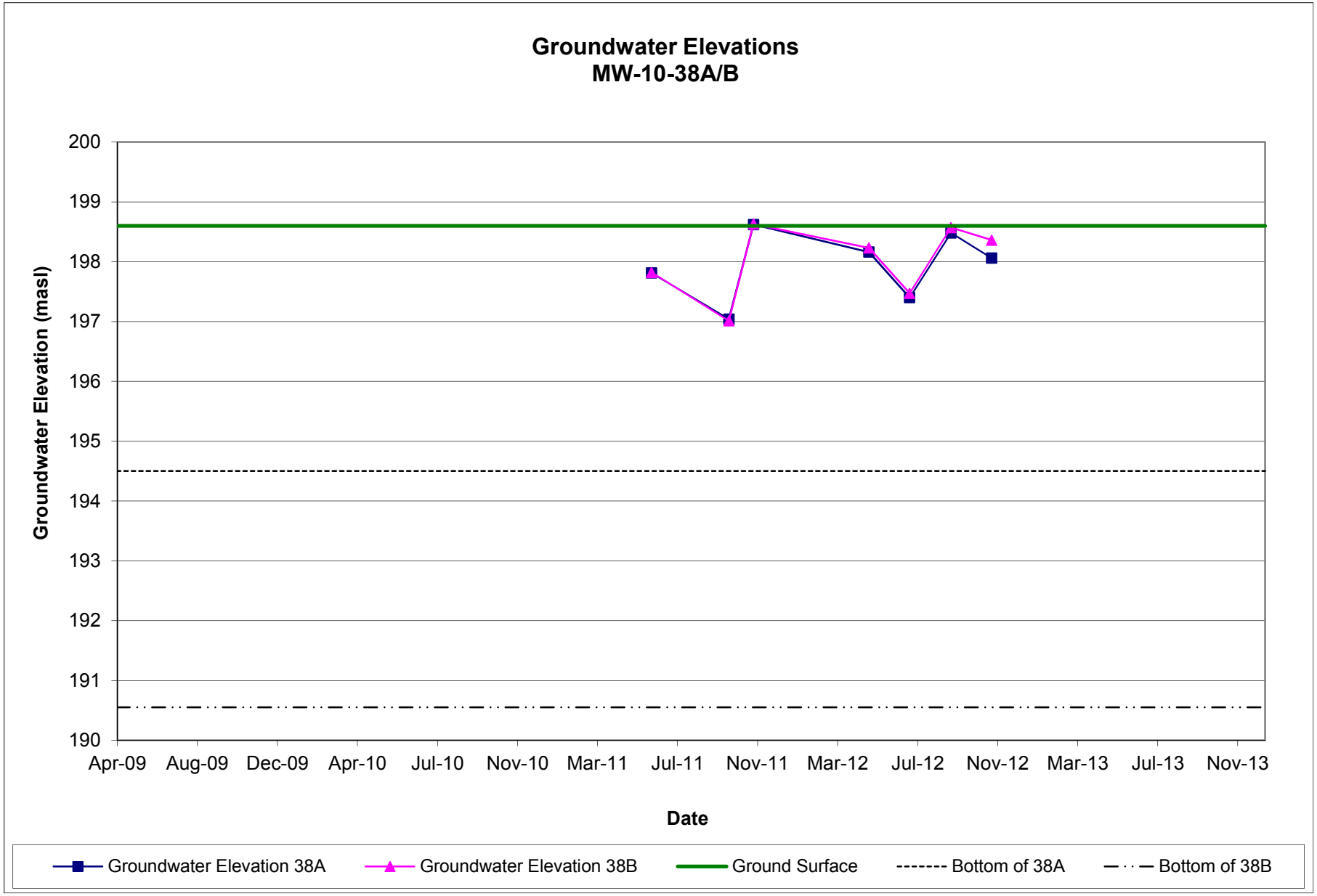
PEB019877

Figure N19-C52



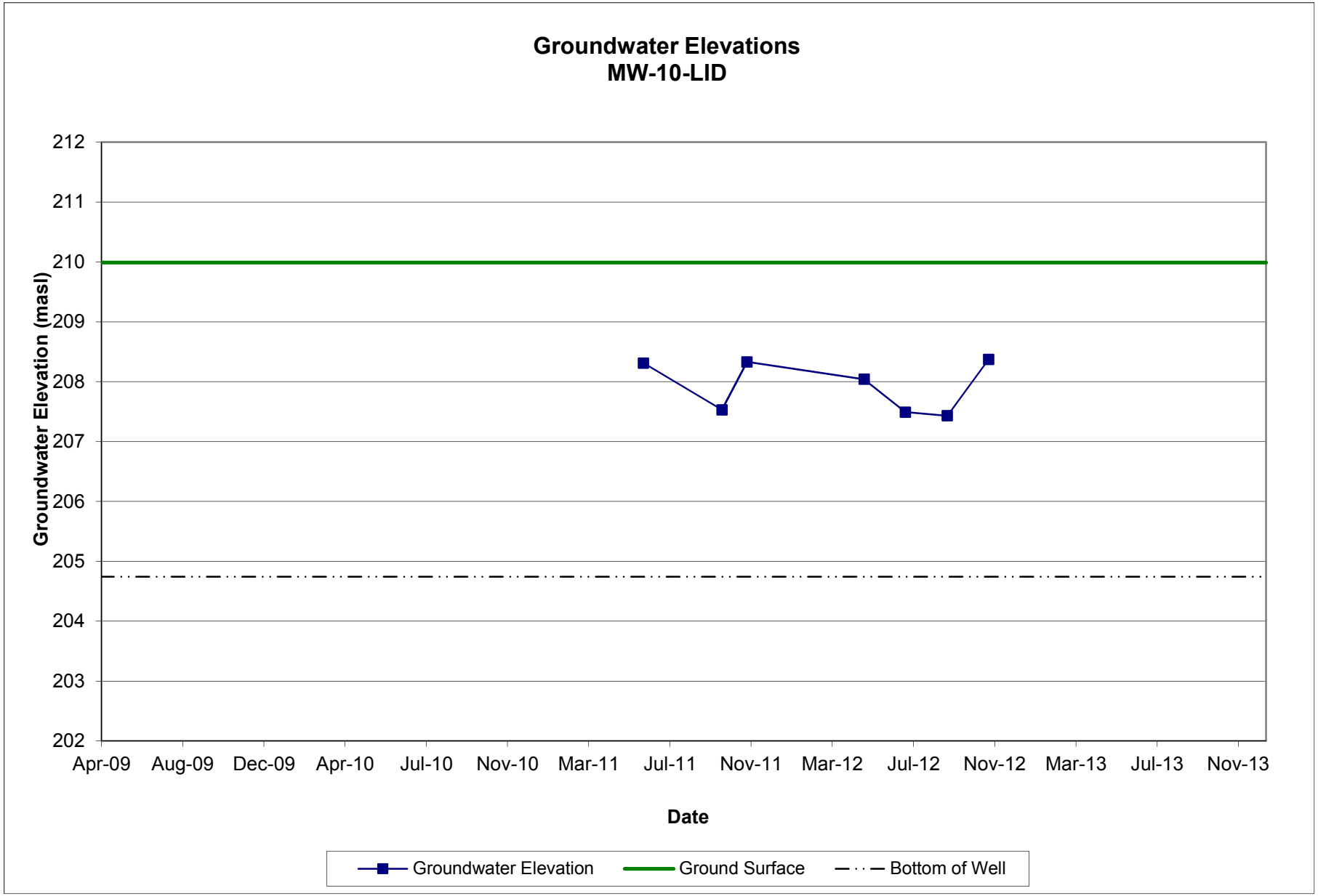
PEB019877

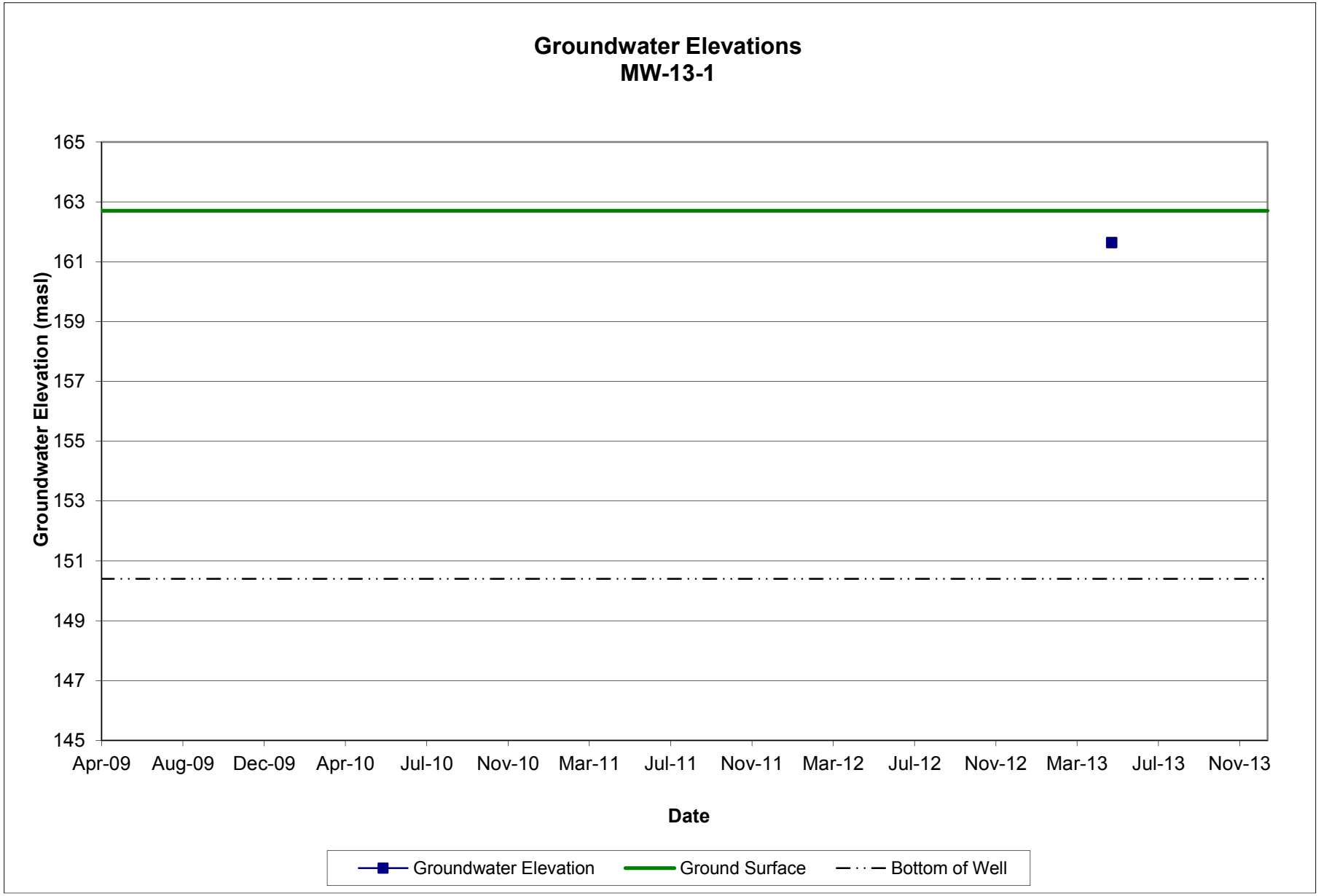
Figure N19-C53



PEB019877

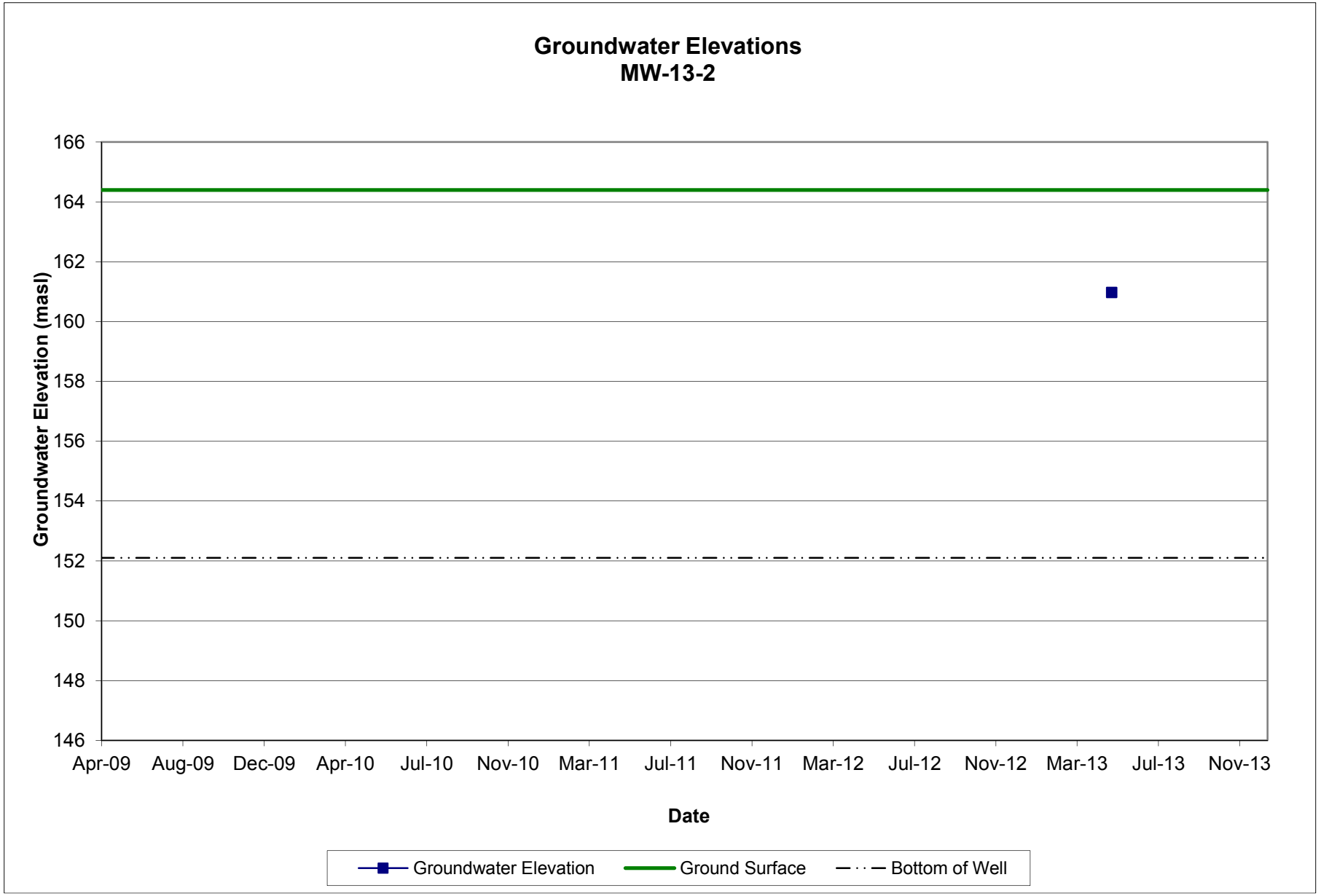
Figure N19-C54


Groundwater Elevations
MW-10-LID
Groundwater Elevation (masl)
212
211
210
209
208
207
206
205
204
203
202
Apr-09
Aug-09
Dec-09
Apr-10
Jul-10
Nov-10
Mar-11
Jul-11
Nov-11
Mar-12
Jul-12
Nov-12
Mar-13
Jul-13
Nov-13
Date
Groundwater Elevation
Ground Surface
Bottom of Well



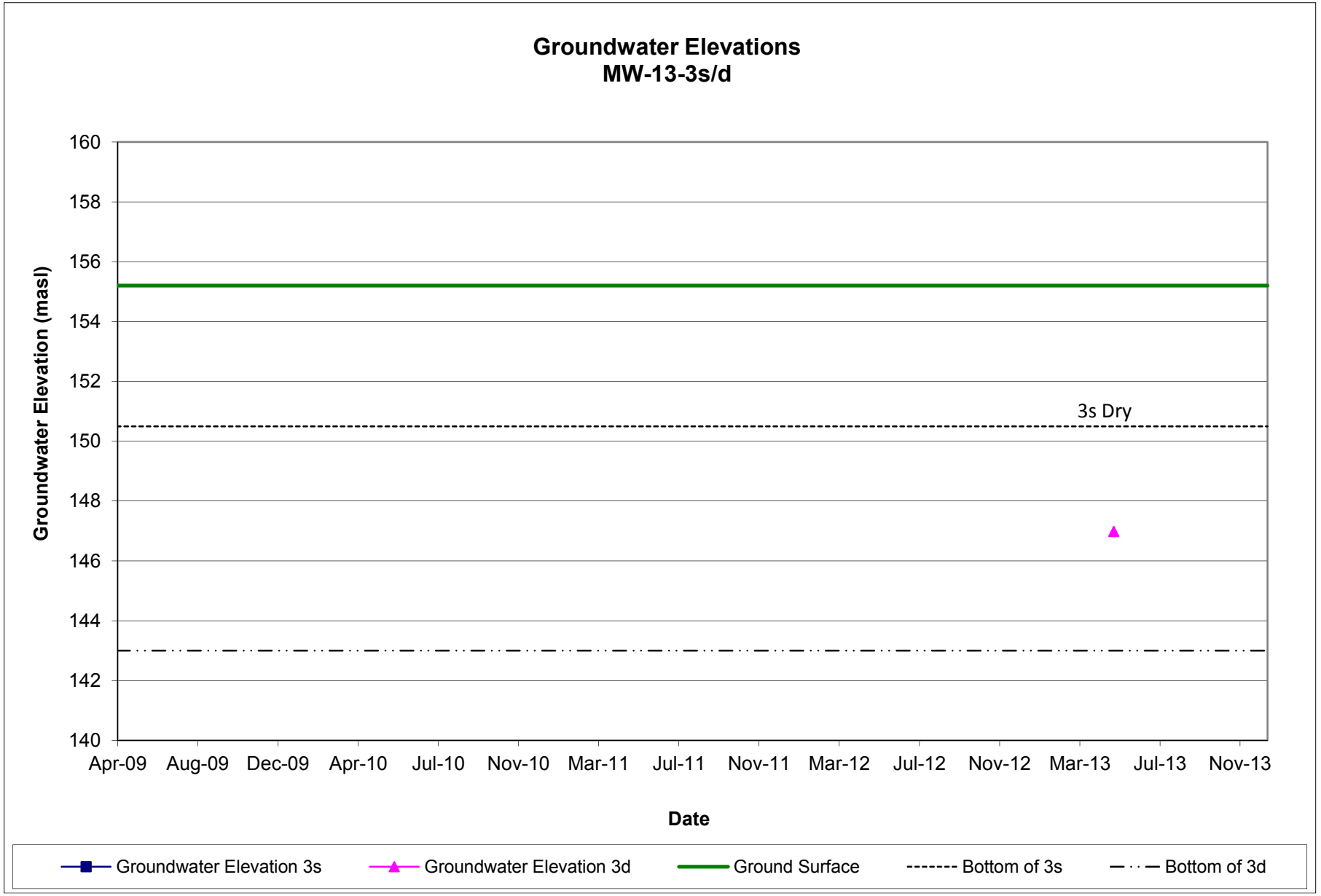
PEB019877

Figure N19-C56



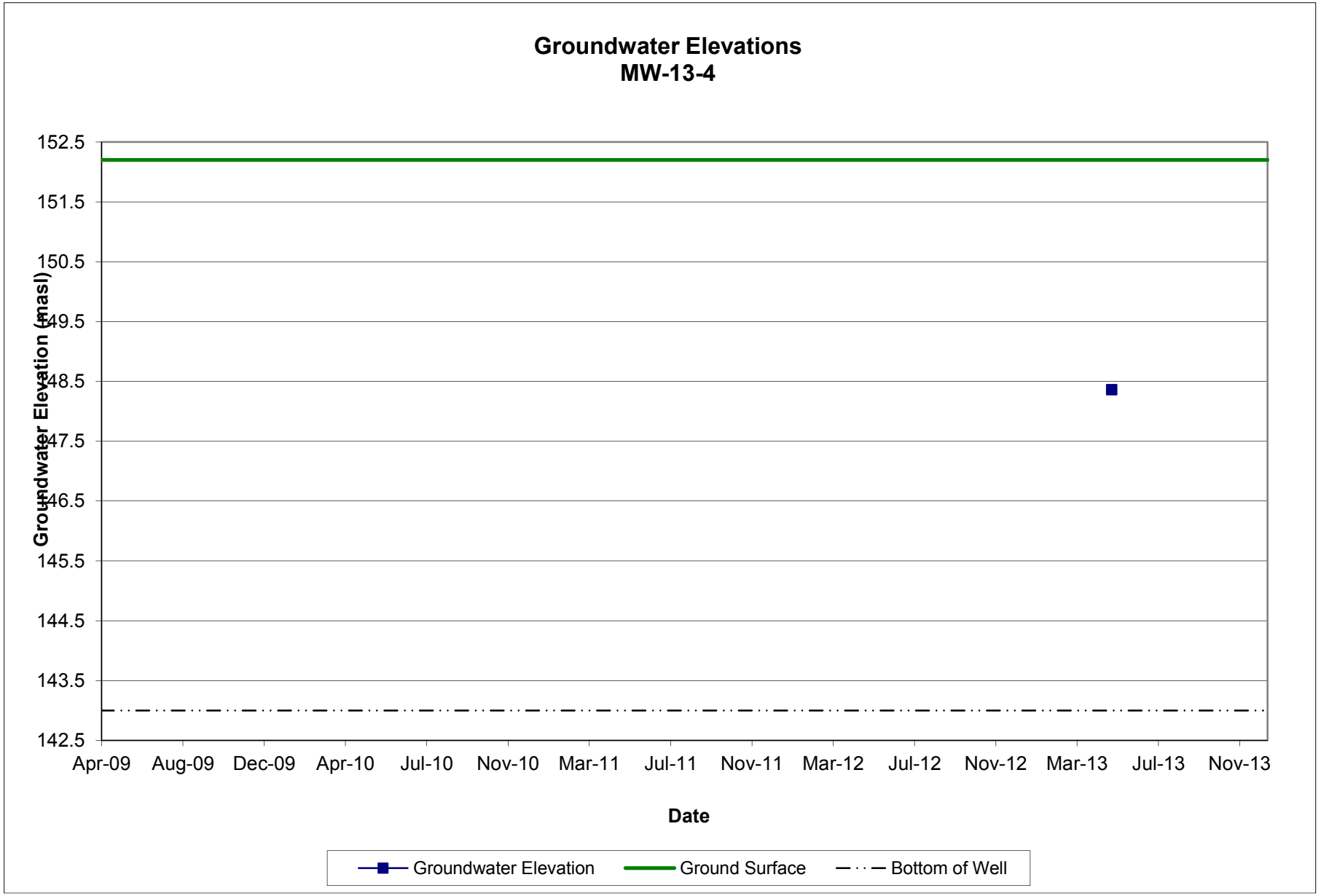
PEB019877

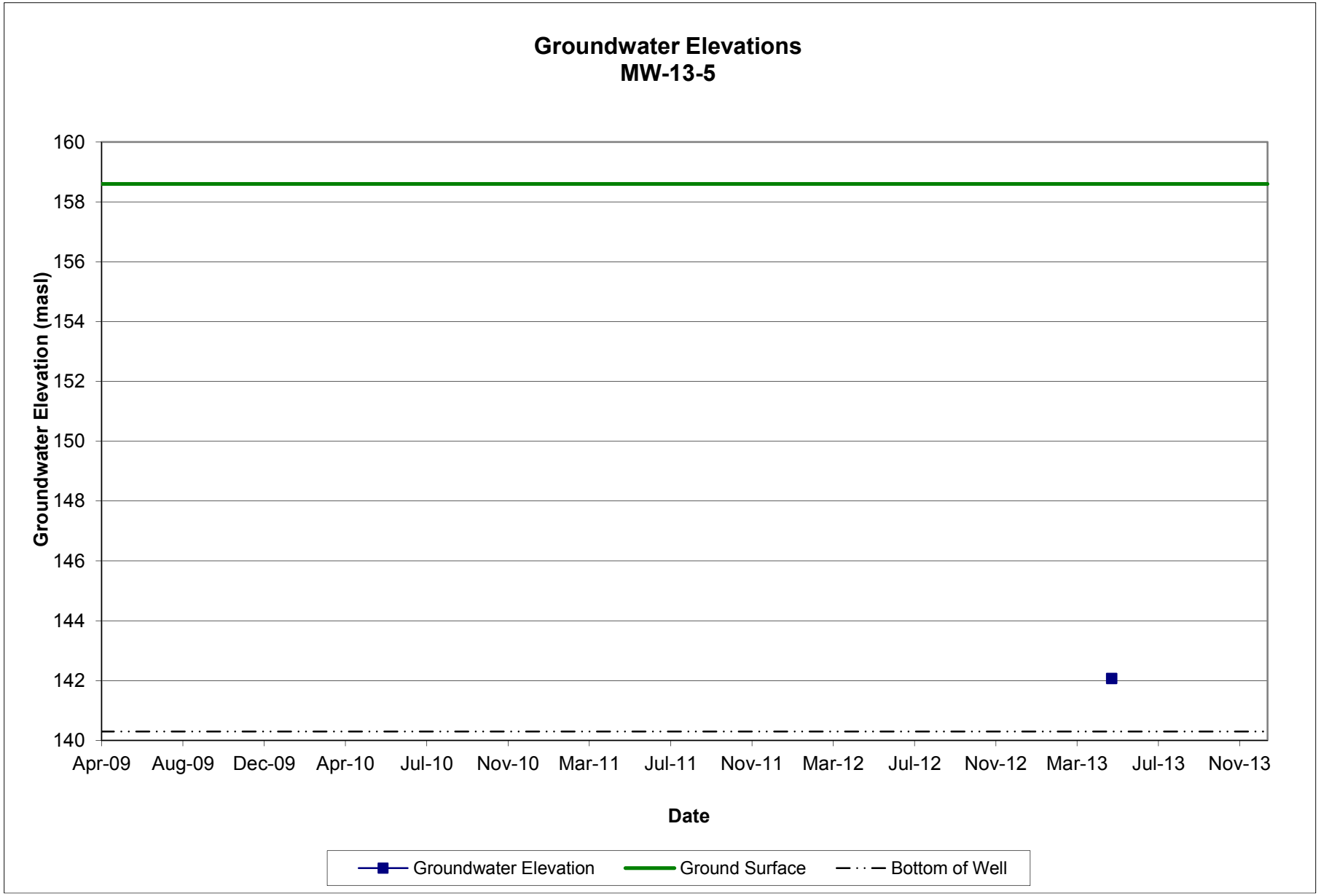
Figure N19-C57



PEB019877

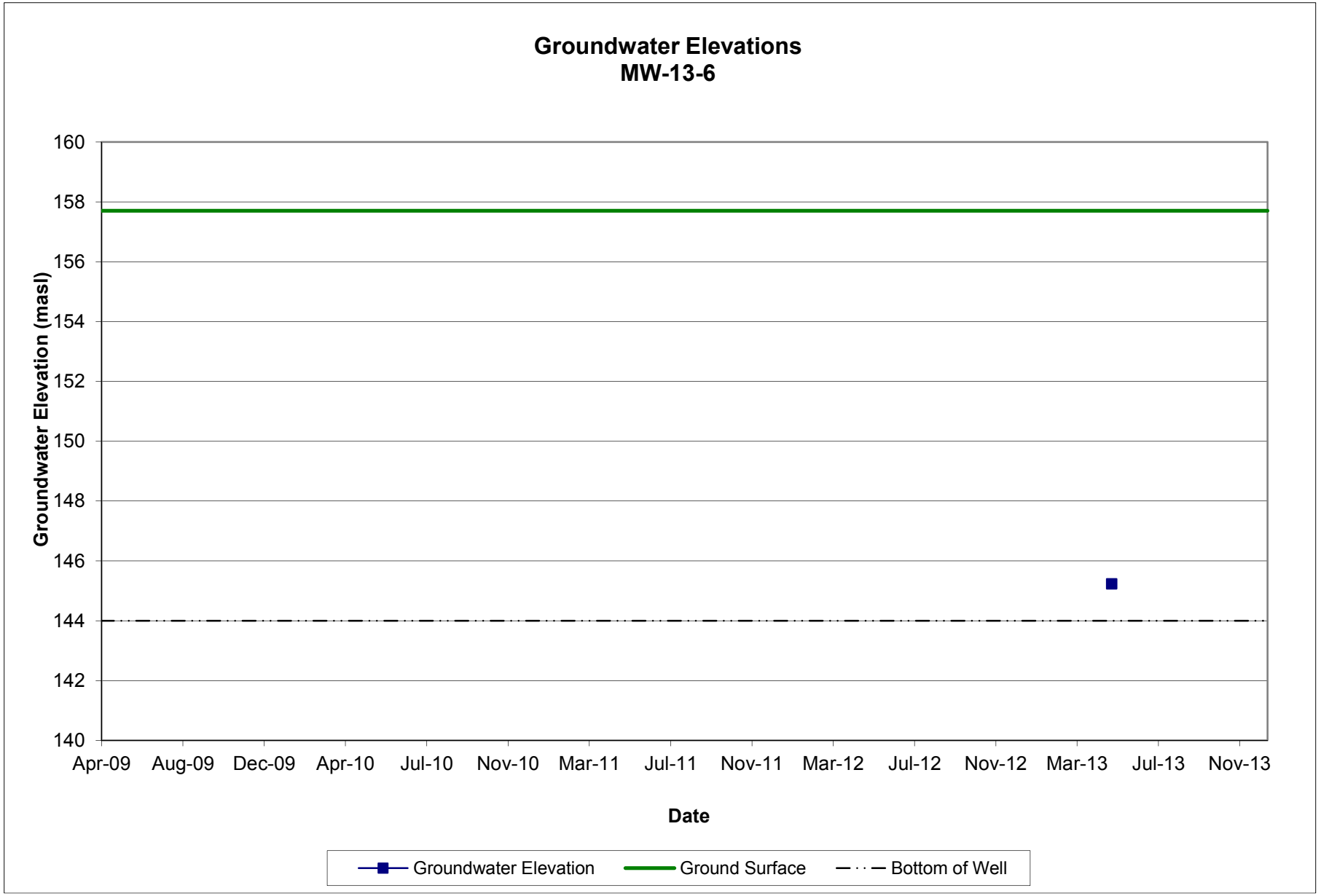
Figure N19-C58


Groundwater Elevations
MW-13-4
Groundwater Elevation (masl)
152.5
151.5
150.5
149.5
148.5
147.5
146.5
145.5
144.5
143.5
142.5
Apr-09
Aug-09
Dec-09
Apr-10
Jul-10
Nov-10
Mar-11
Jul-11
Nov-11
Mar-12
Jul-12
Nov-12
Mar-13
Jul-13
Nov-13
Date
Groundwater Elevation
Ground Surface
Bottom of Well



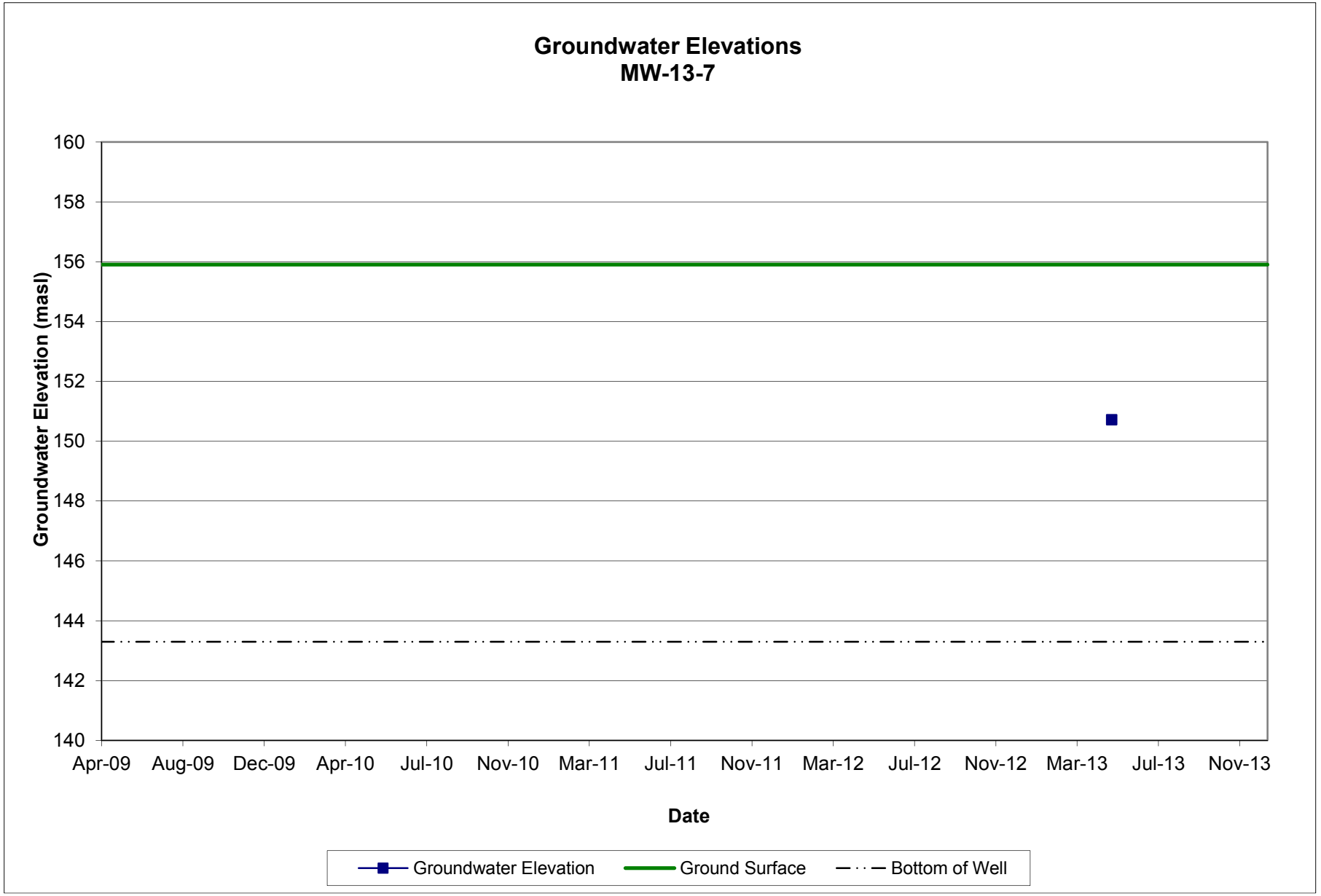
PEB019877

Figure N19-C60



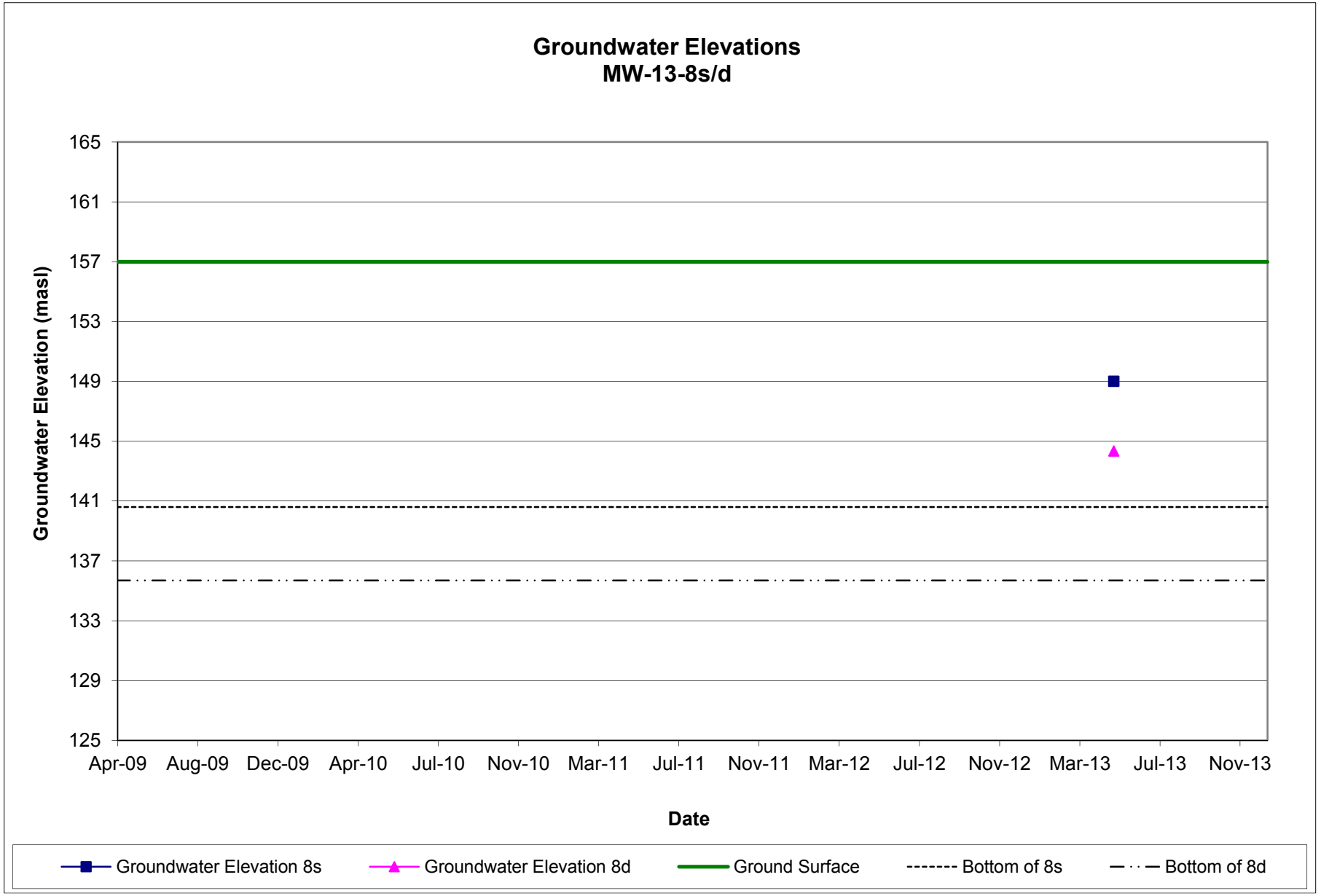
PEB019877

Figure N19-C61



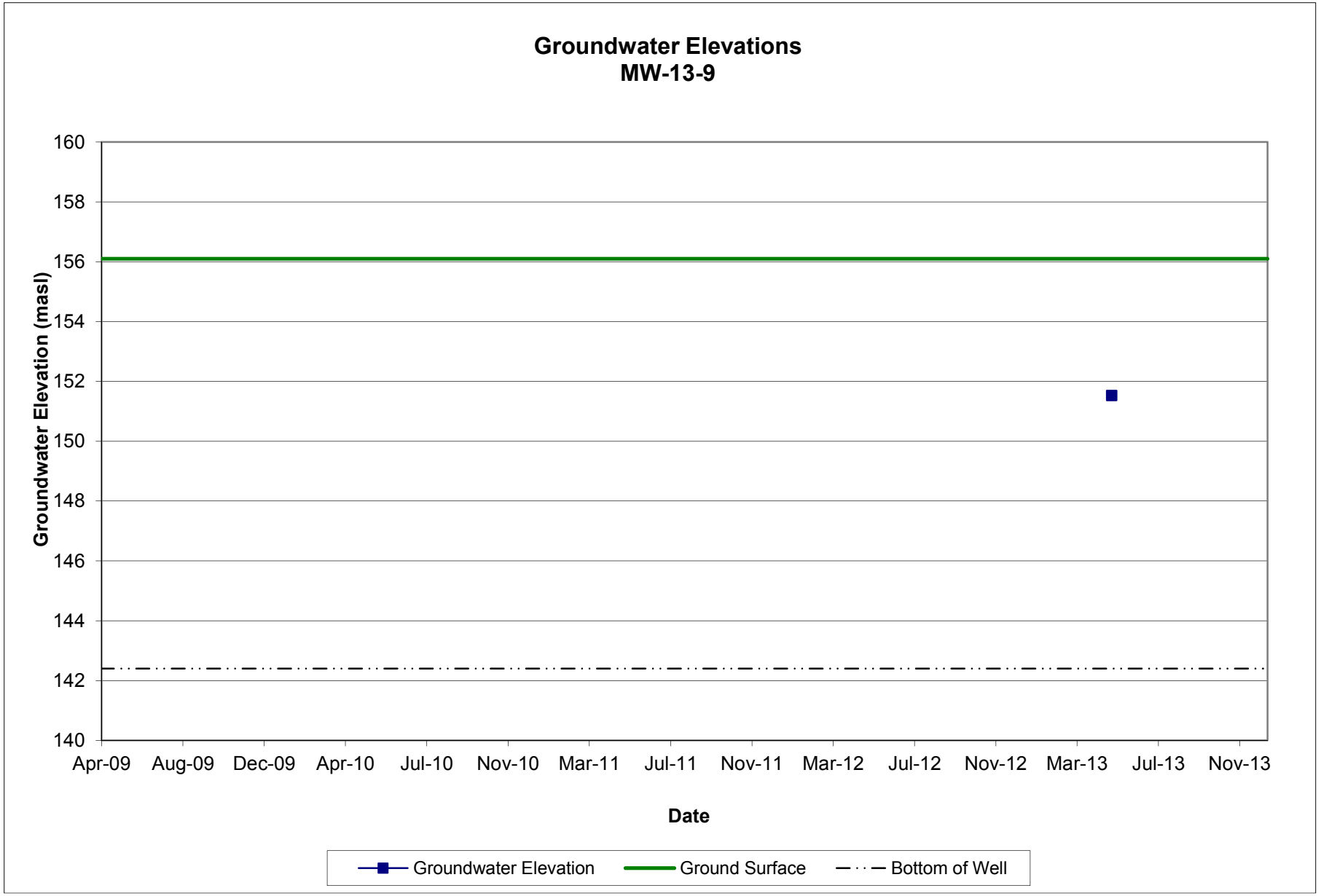
PEB019877

Figure N19-C62



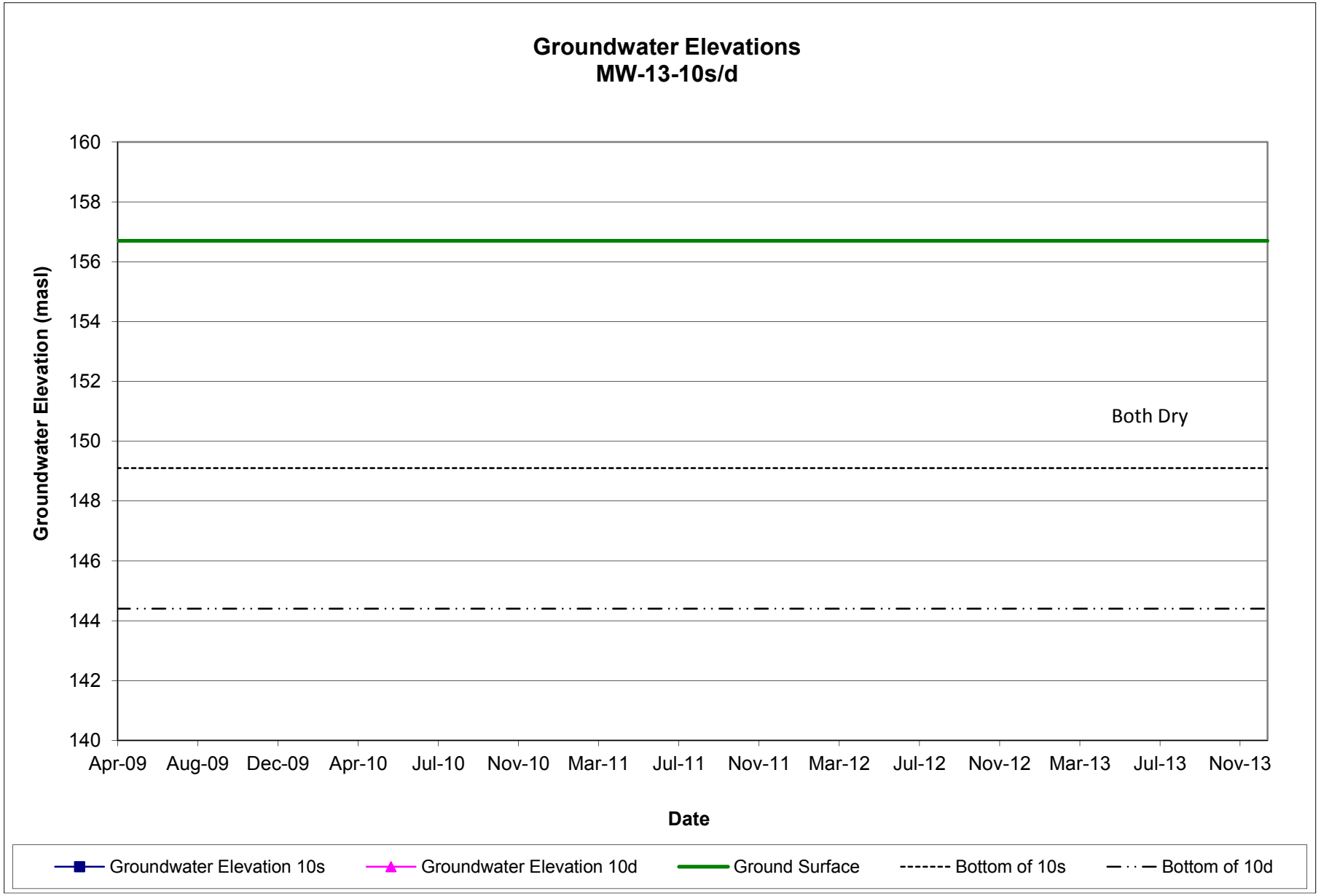
PEB019877

Figure N19-C63



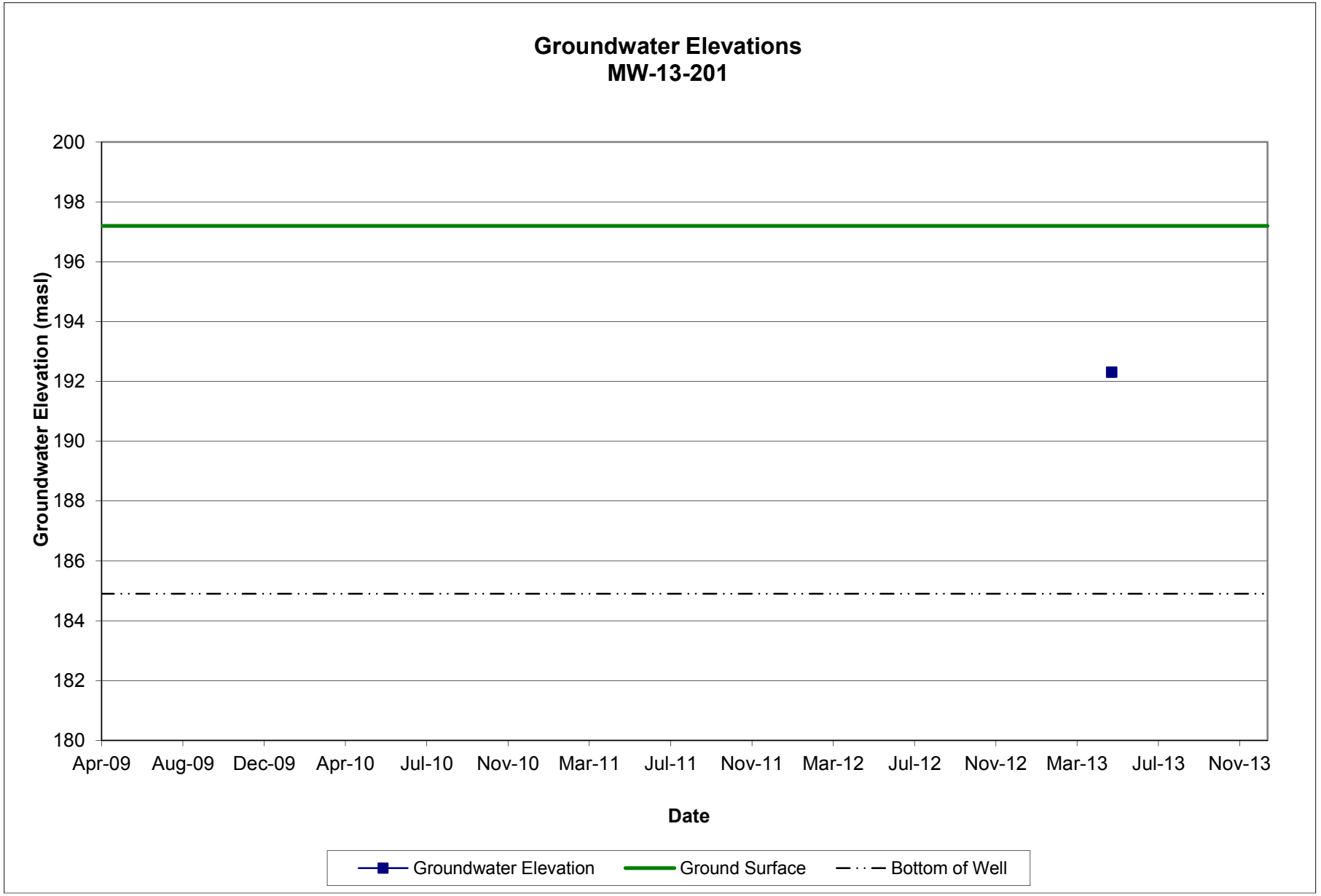
PEB019877

Figure N19-C64



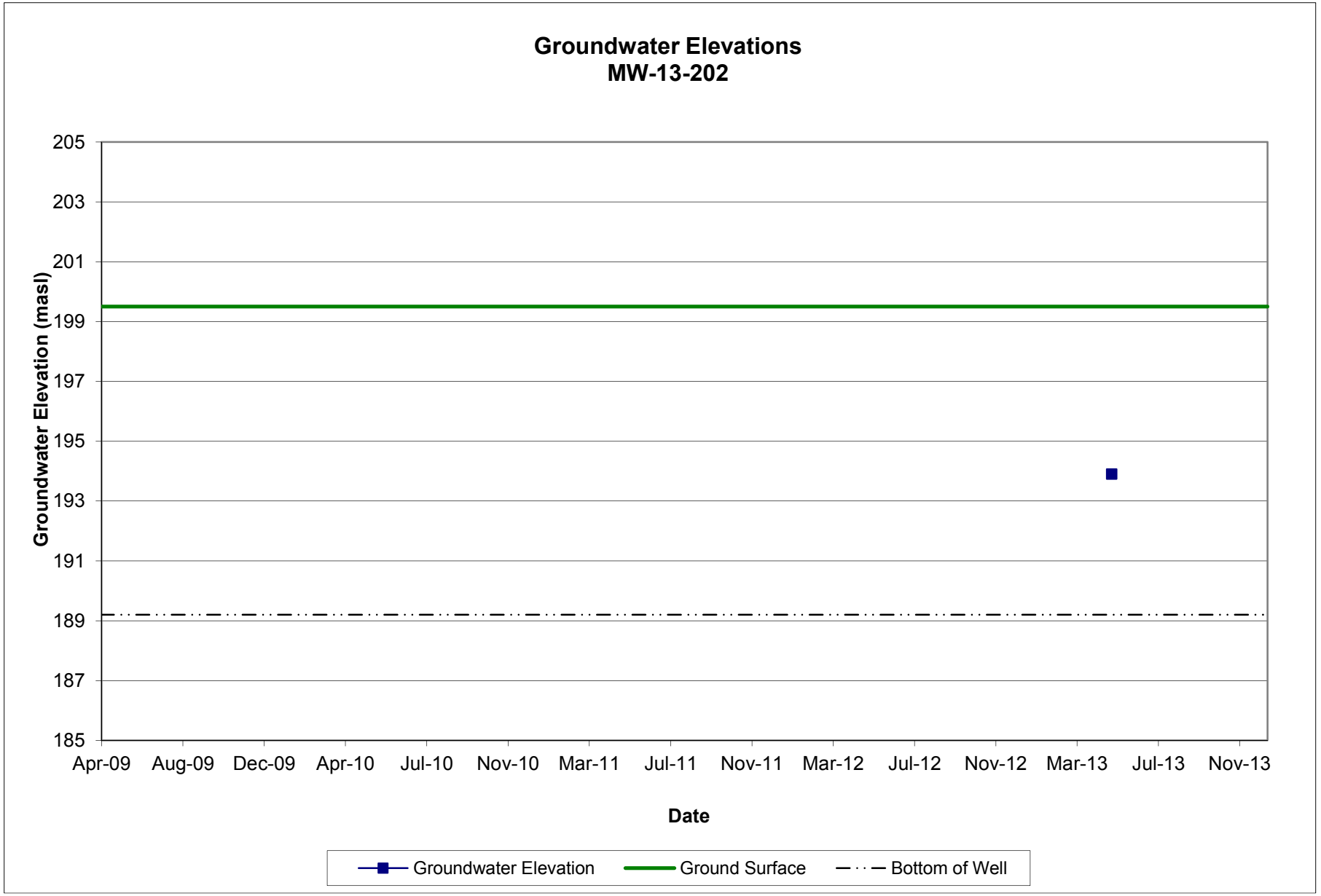
PEB019877

Figure N19-C65



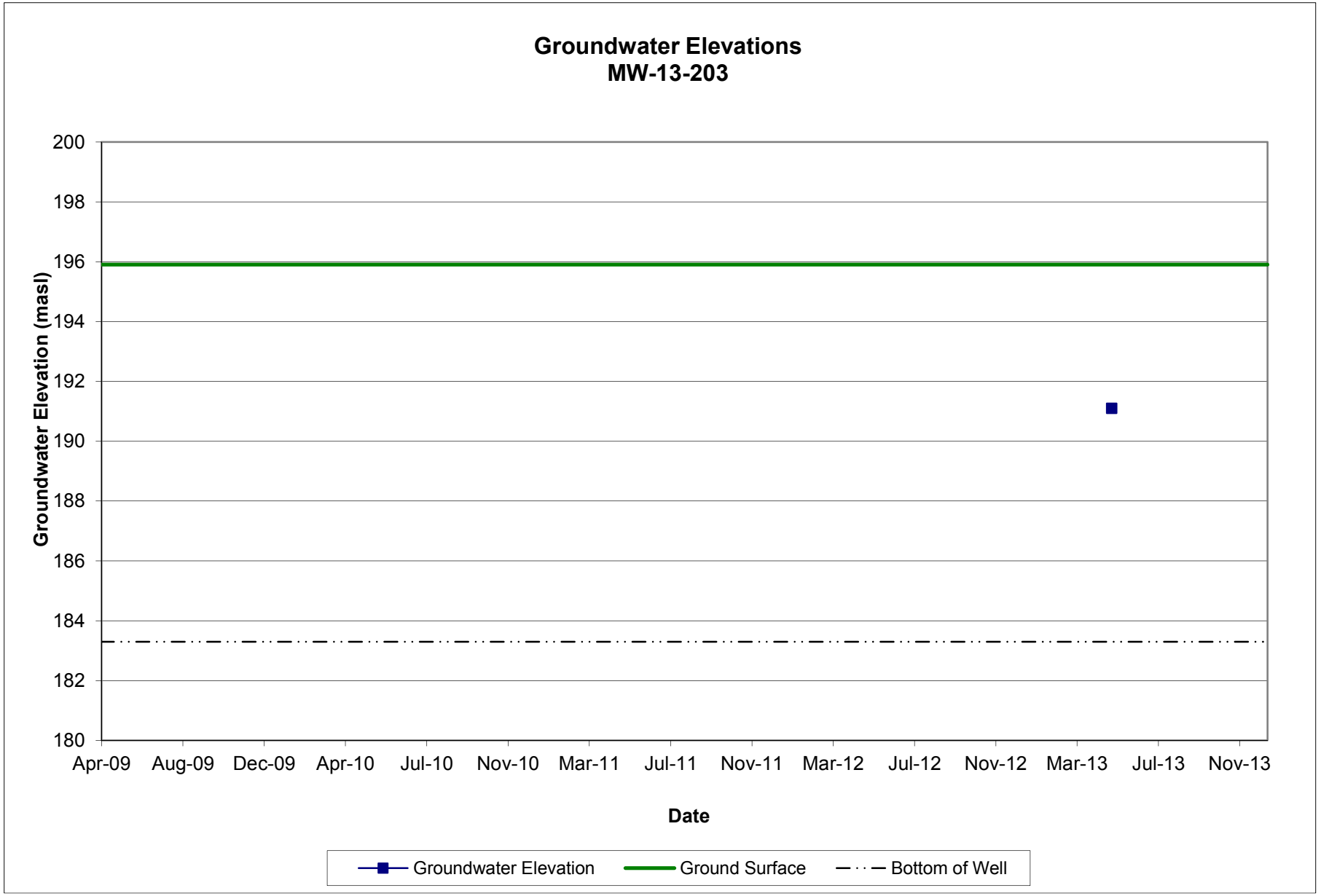
PEB019877

Figure N19-C66



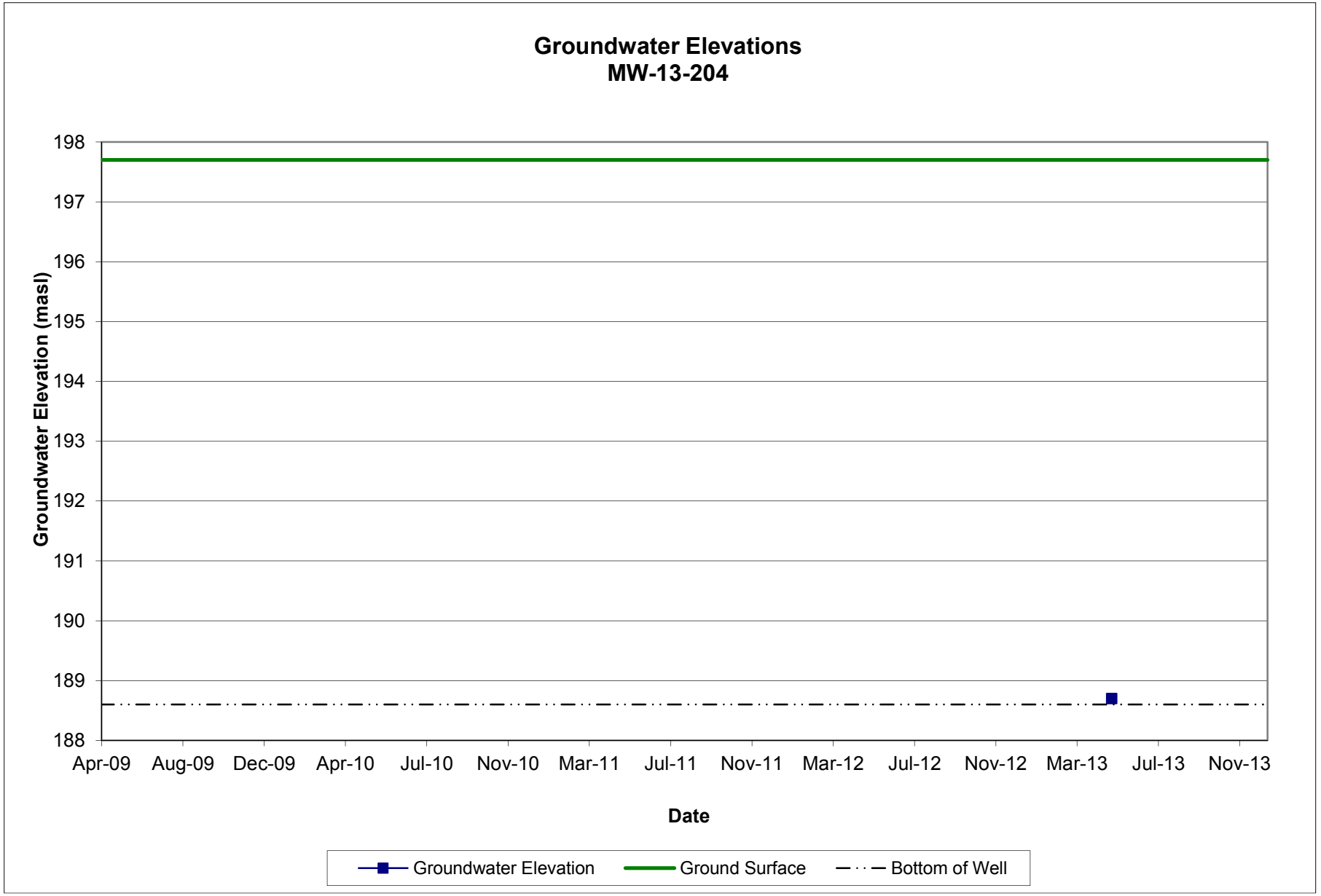
PEB019877

Figure N19-C67



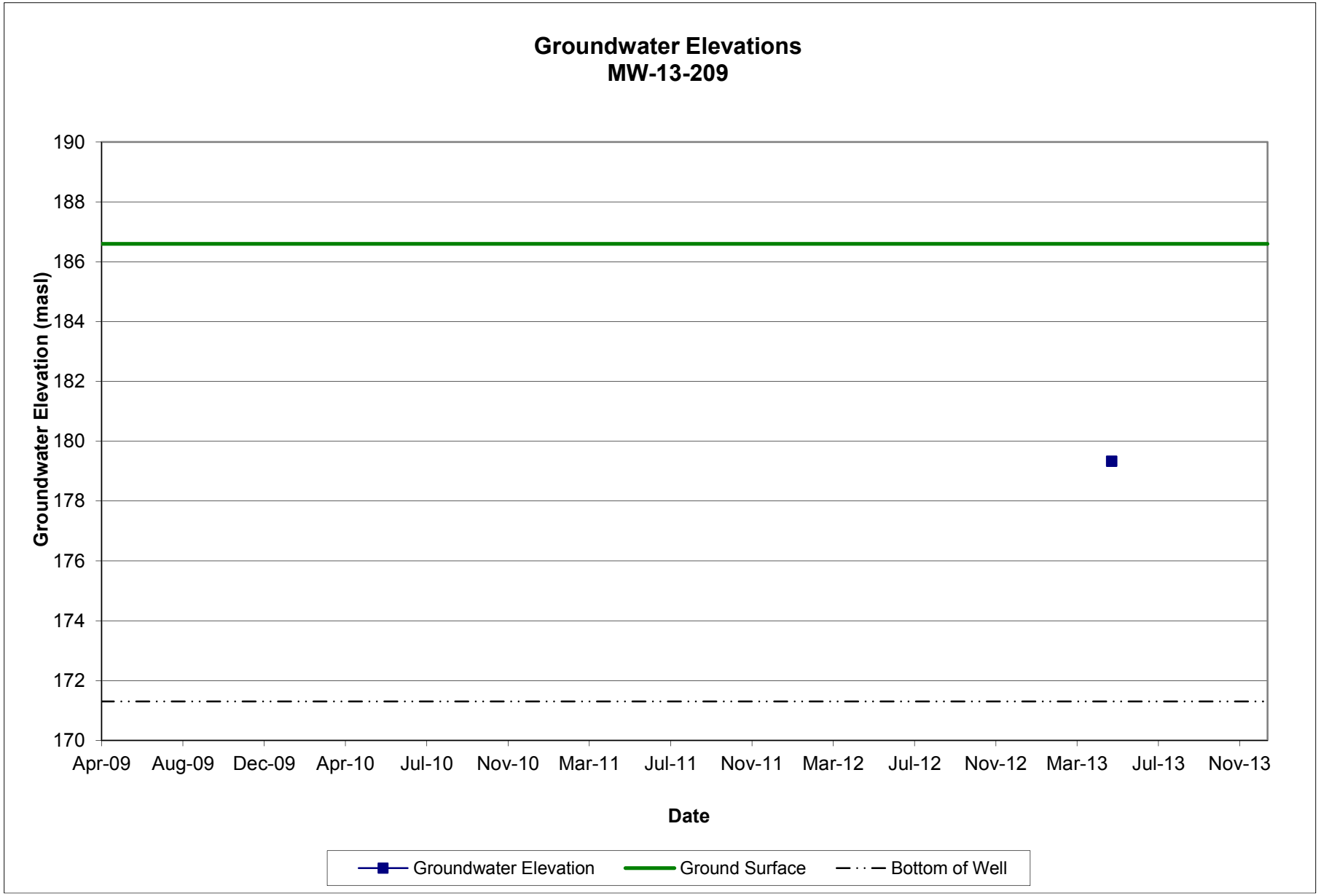
PEB019877

Figure N19-C68



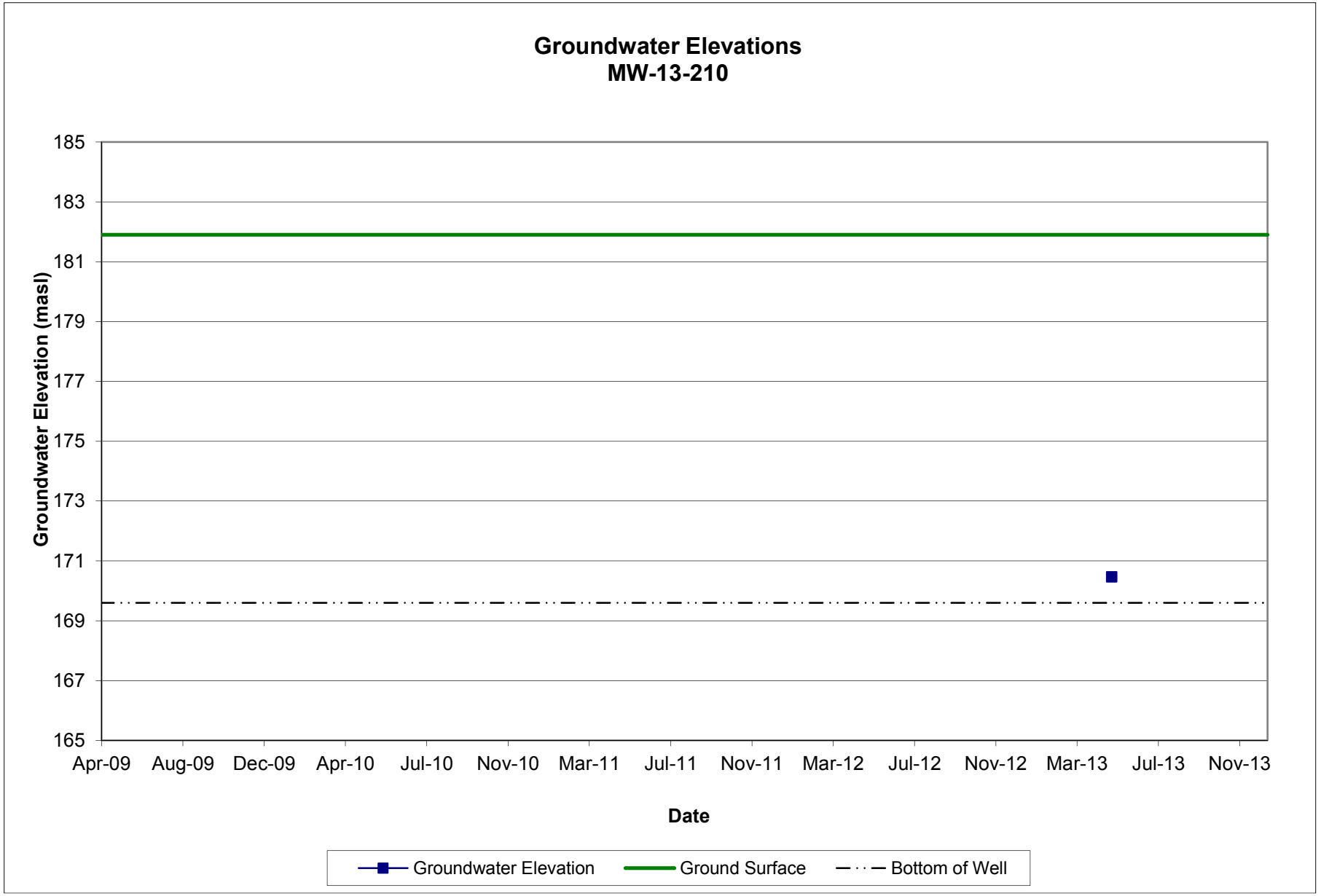
PEB019877

Figure N19-C69



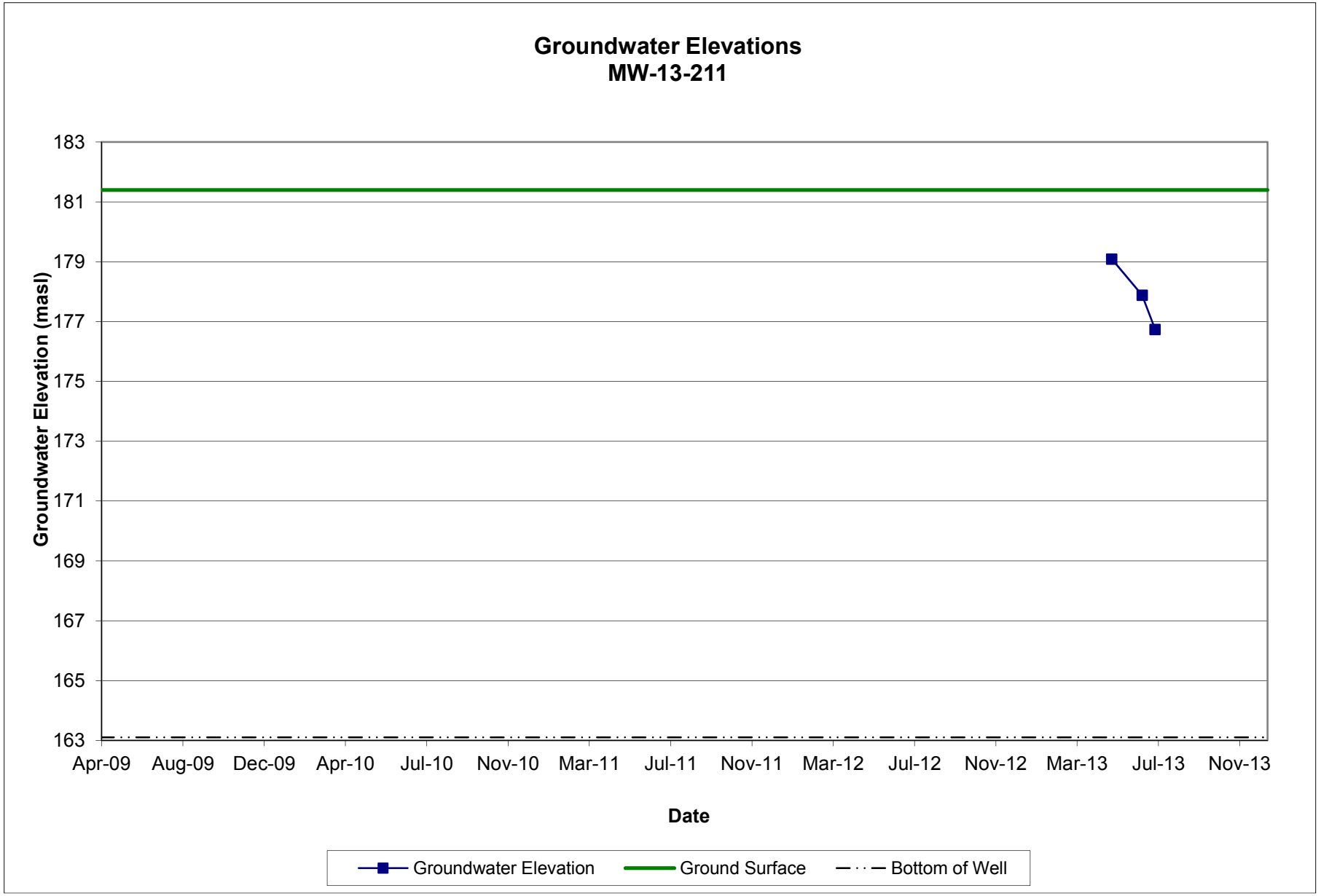
PEB019877

Figure N19-C70



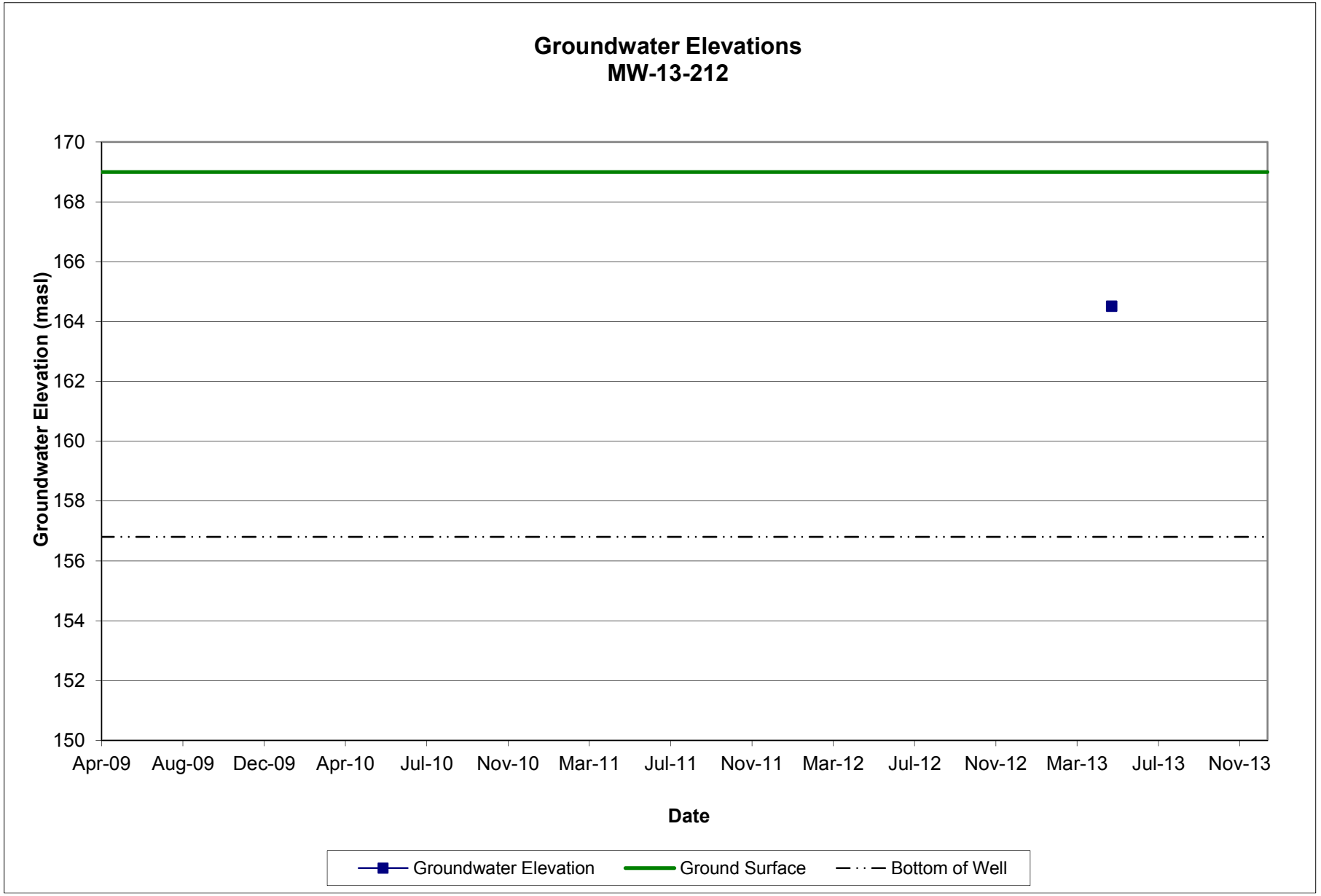
PEB019877

Figure N19-C71



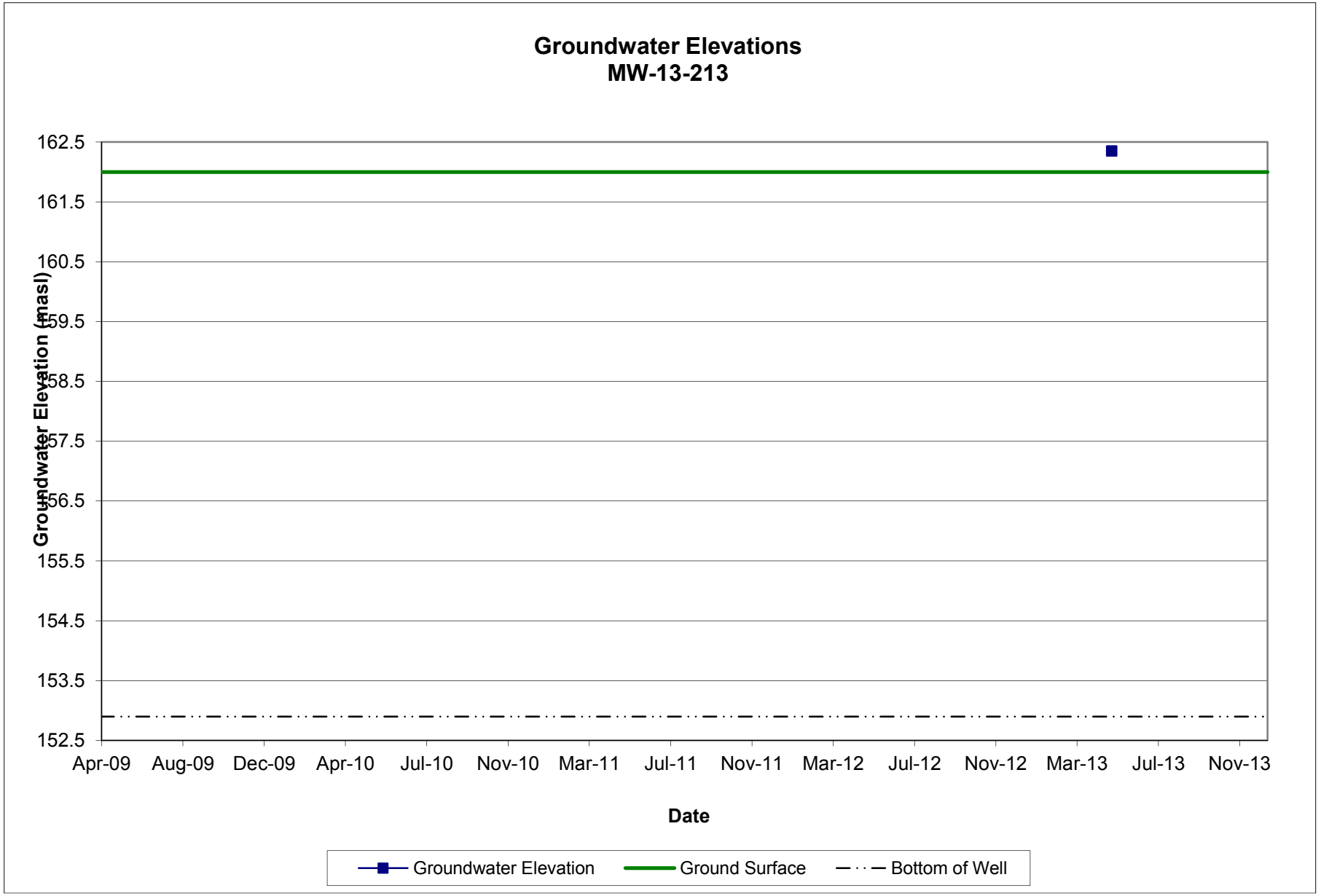
PEB019877

Figure N19-C72



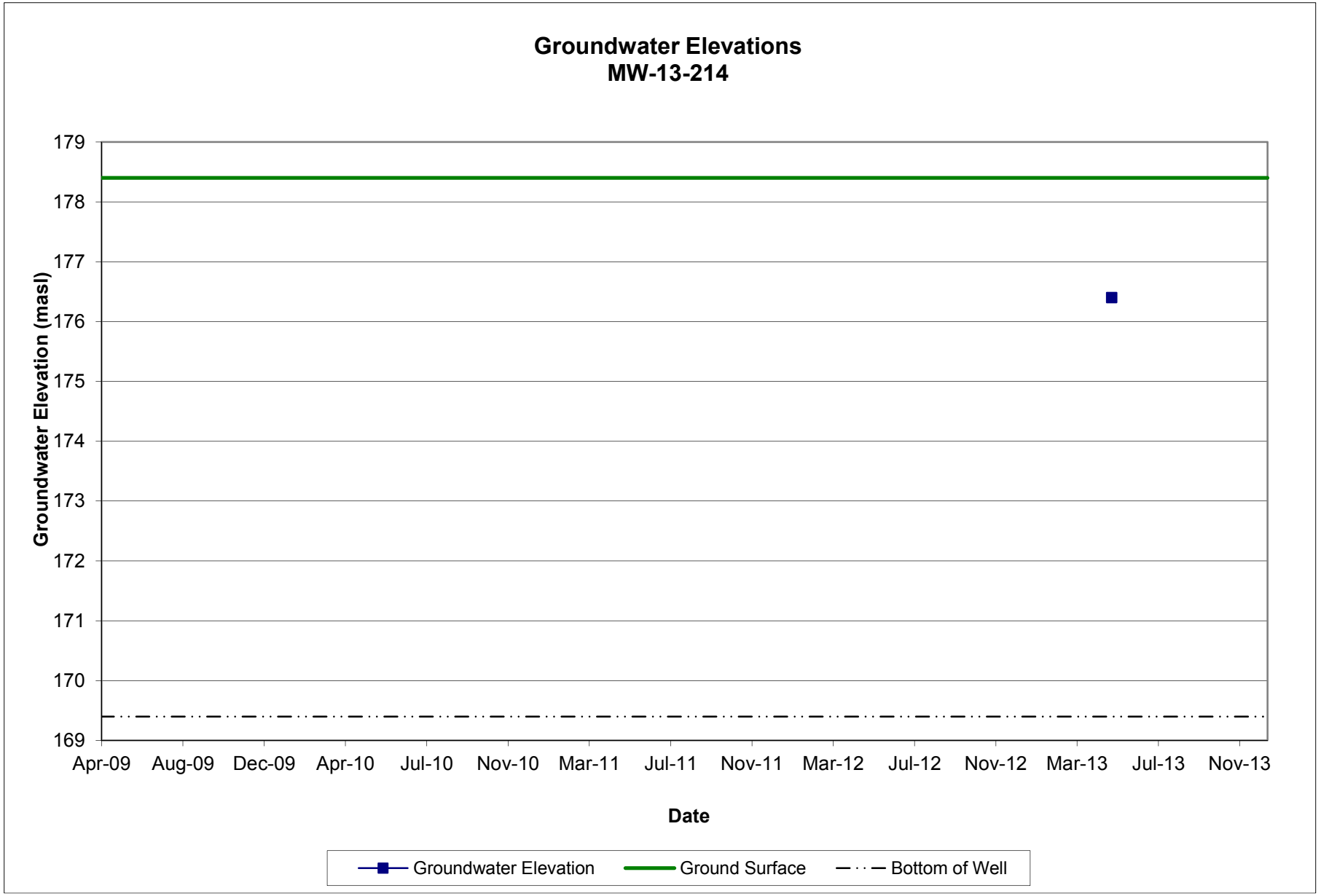
PEB019877

Figure N19-C73



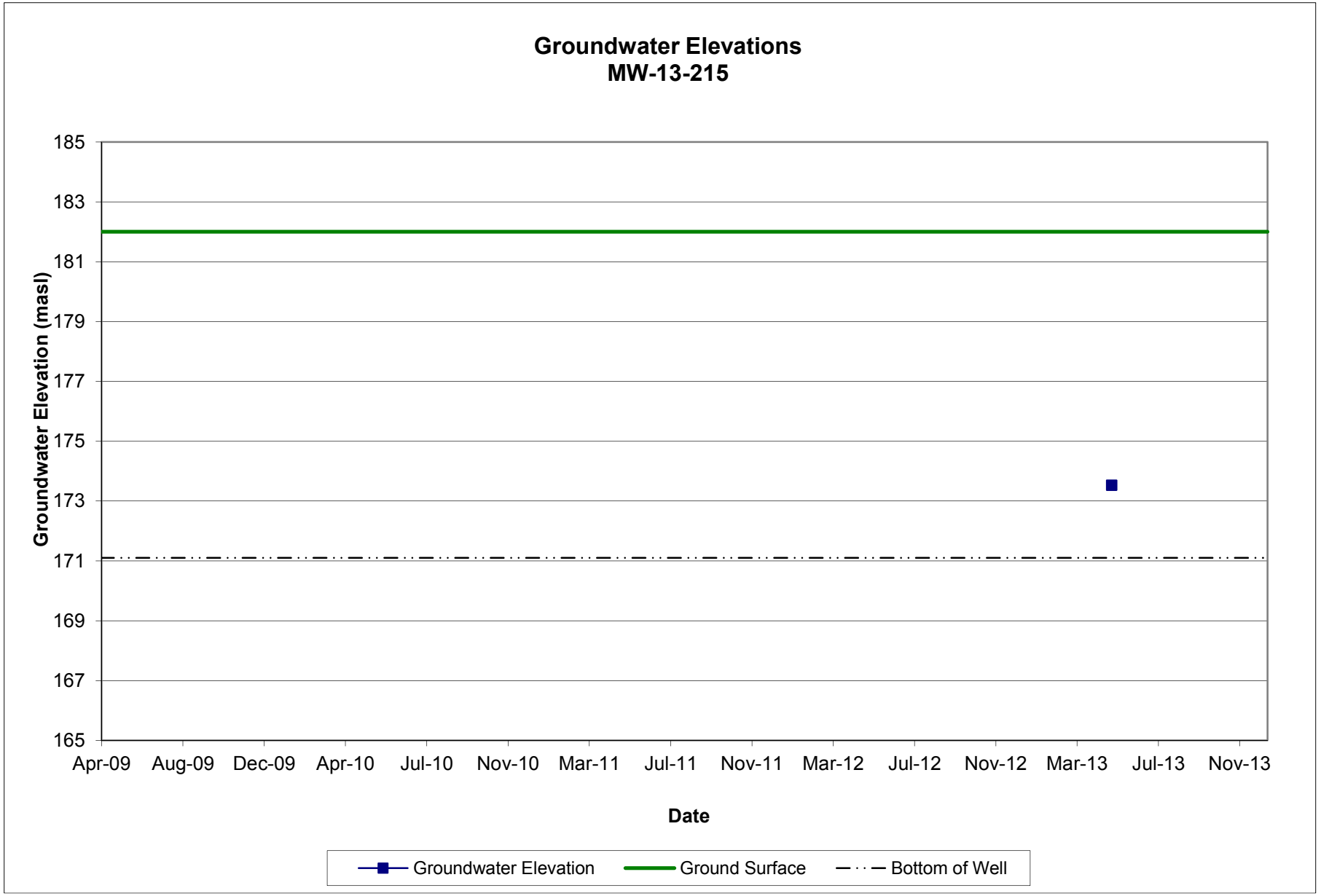
PEB019877

Figure N19-C74



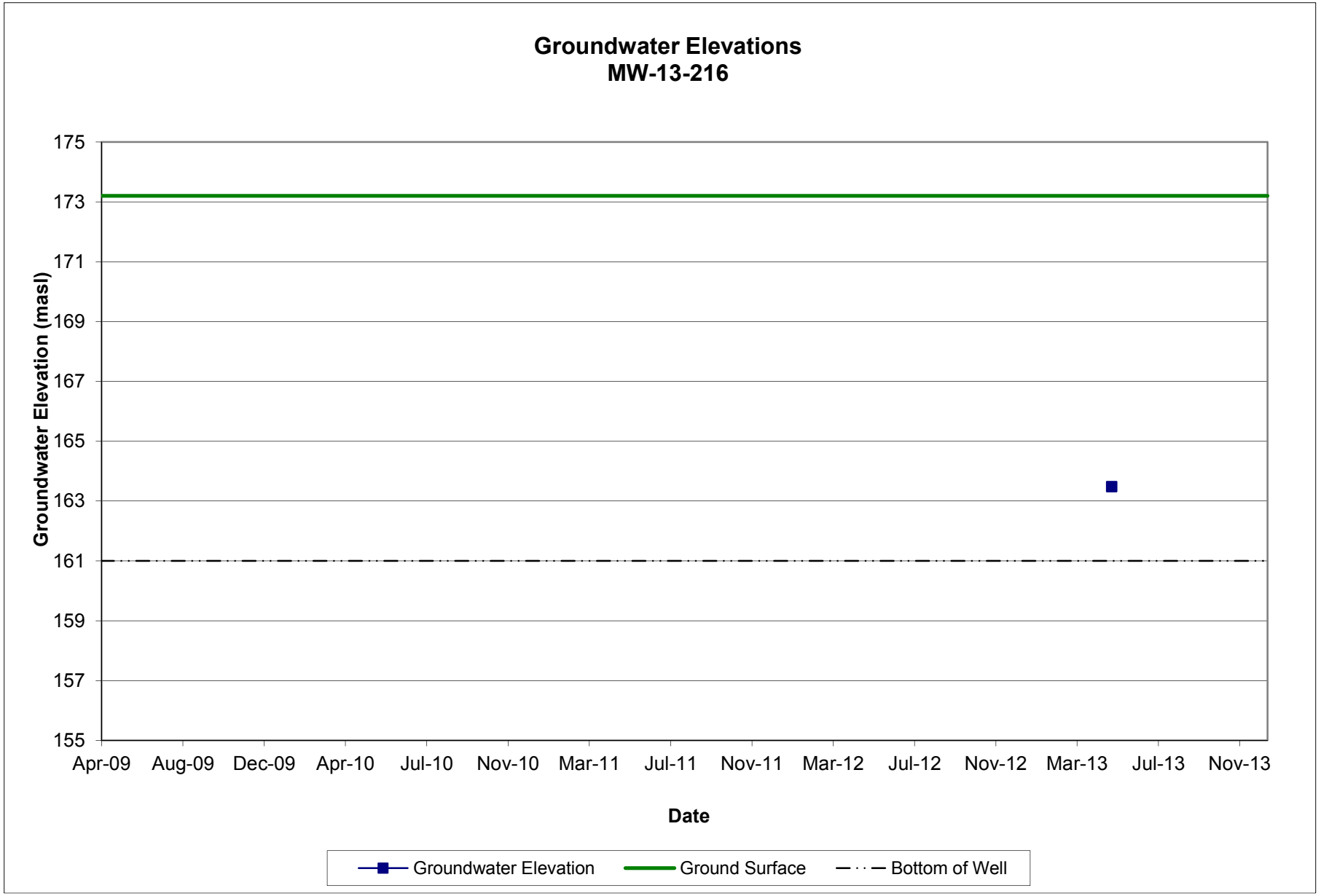
PEB019877

Figure N19-C75



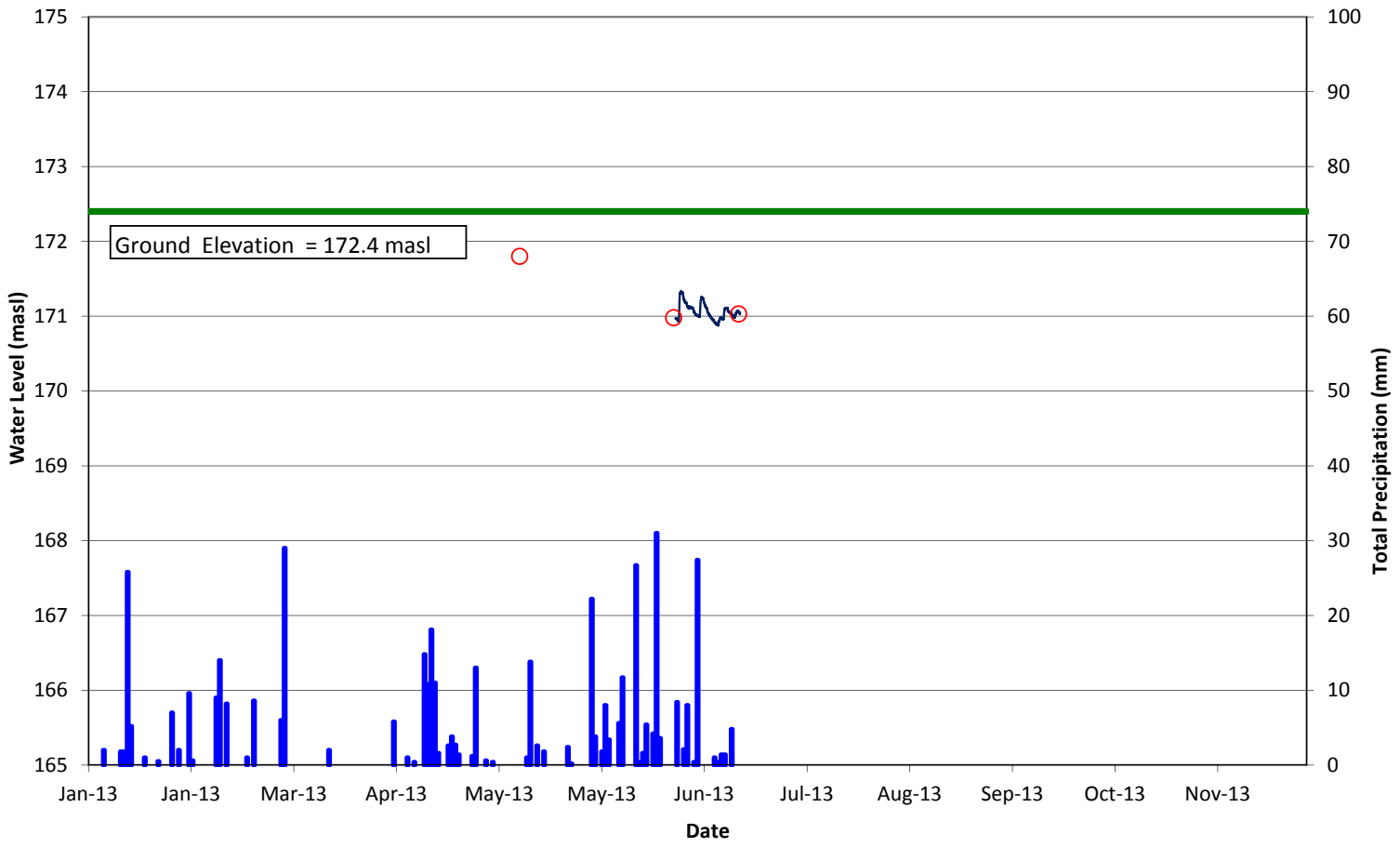
PEB019877

Figure N19-C76



PEB019877

Figure N19-C77



MW-13-217

MW-13-217 Automated Measurements

Manual Measurements

Ground Elevation

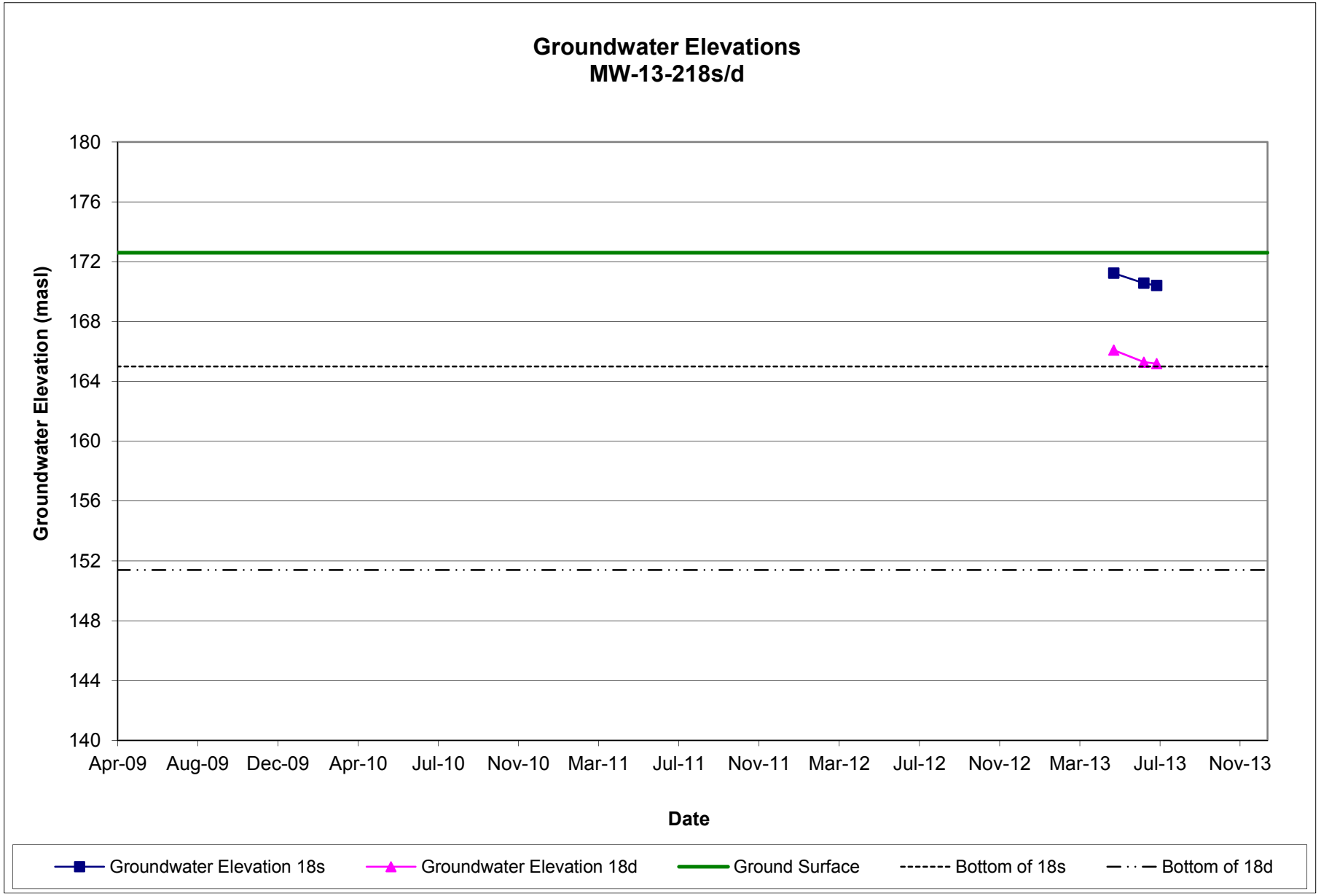
Daily Total Precipitation

GROUNDWATER LEVEL HYDROGRAPH

Seaton N19 NFSSR

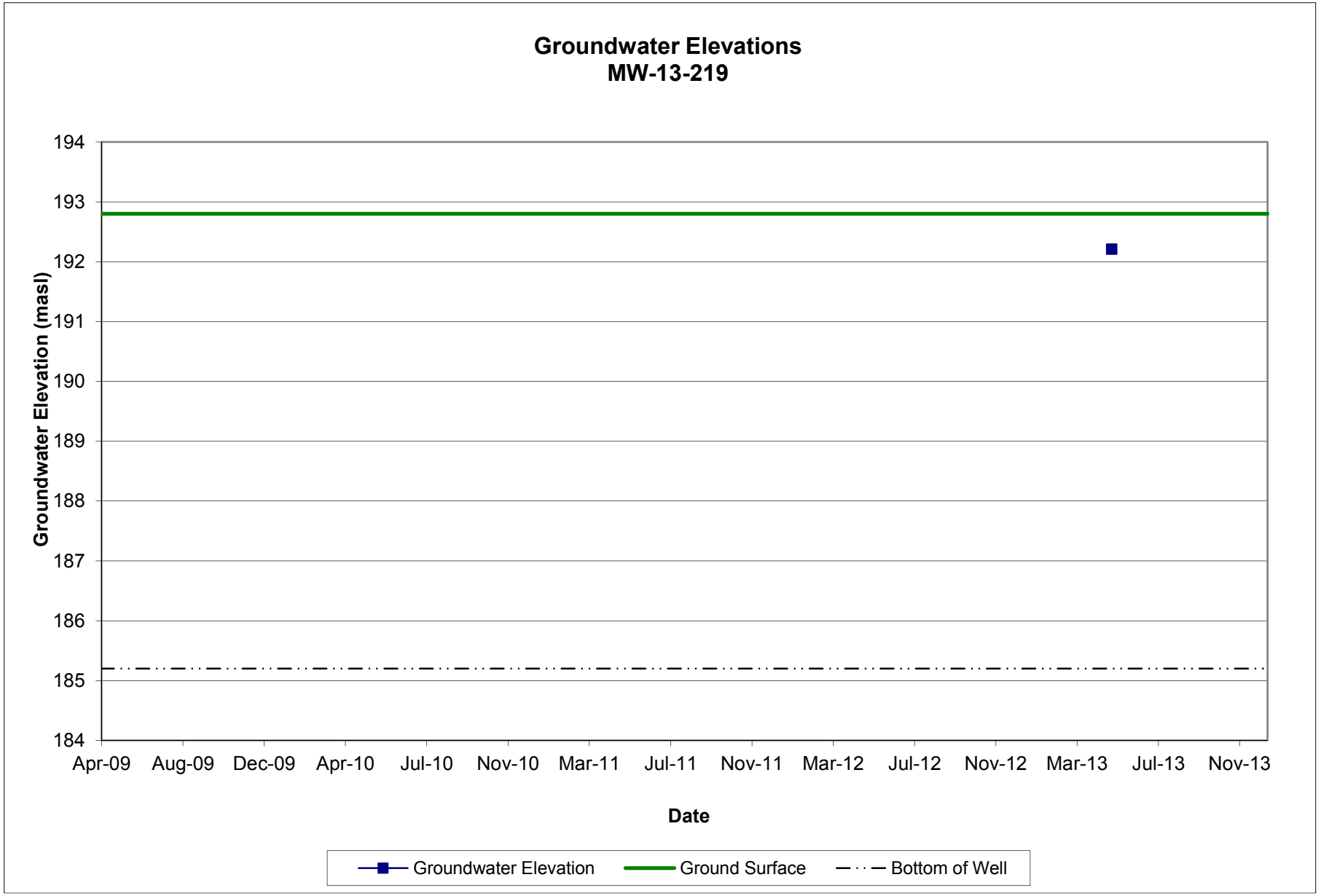
January 2013 to December 2013

Figure N19-C78



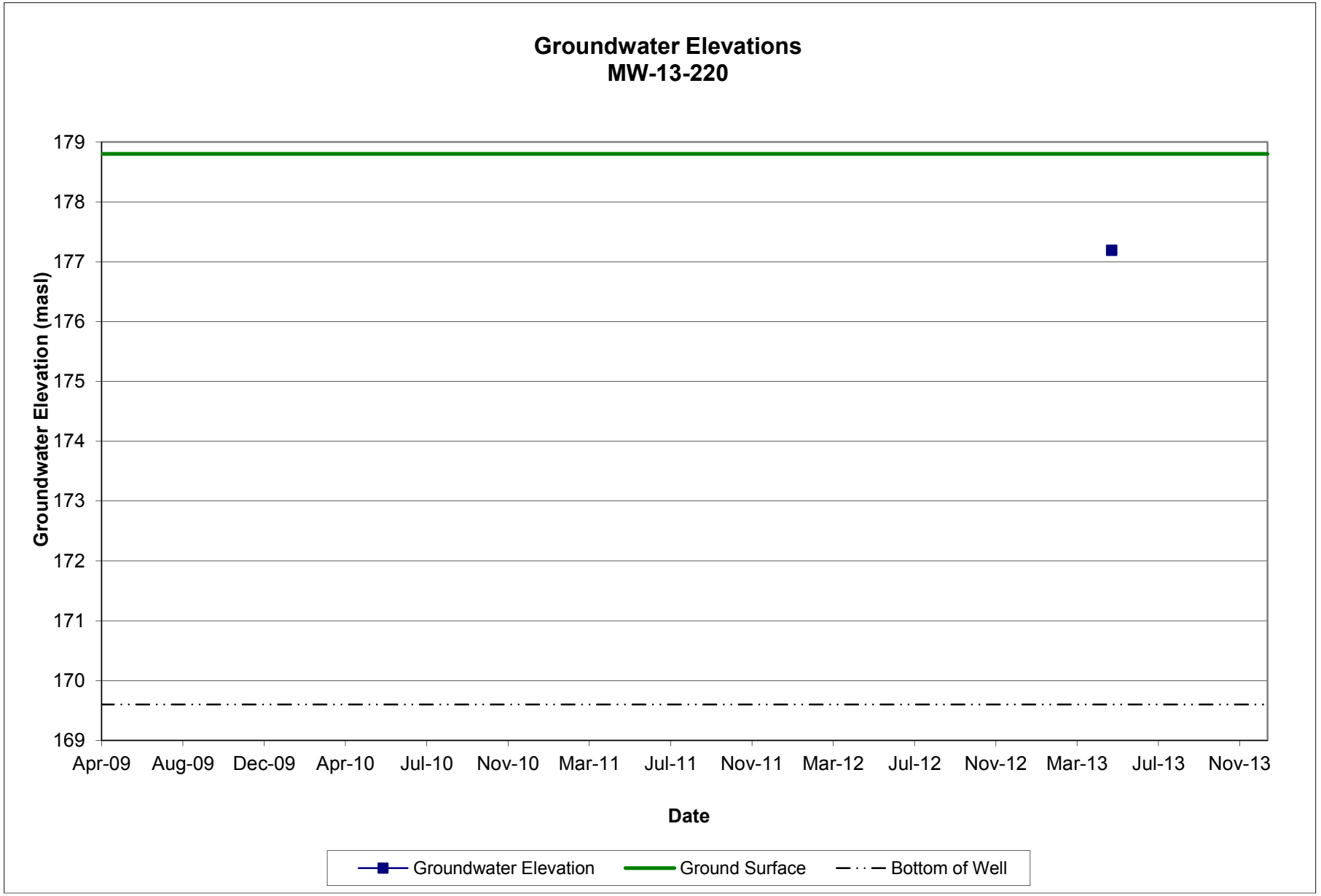
PEB019877

Figure N19-C79



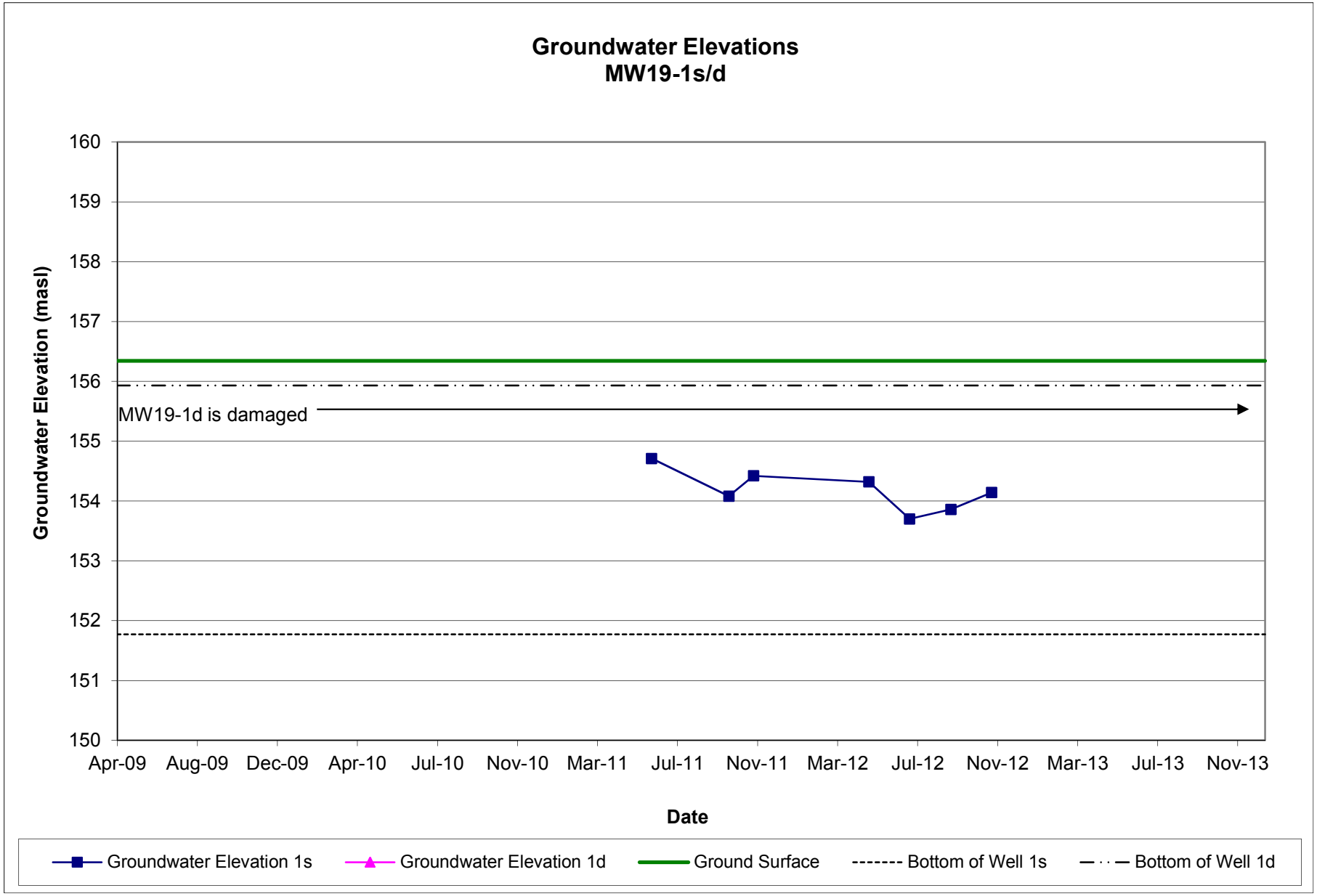
PEB019877

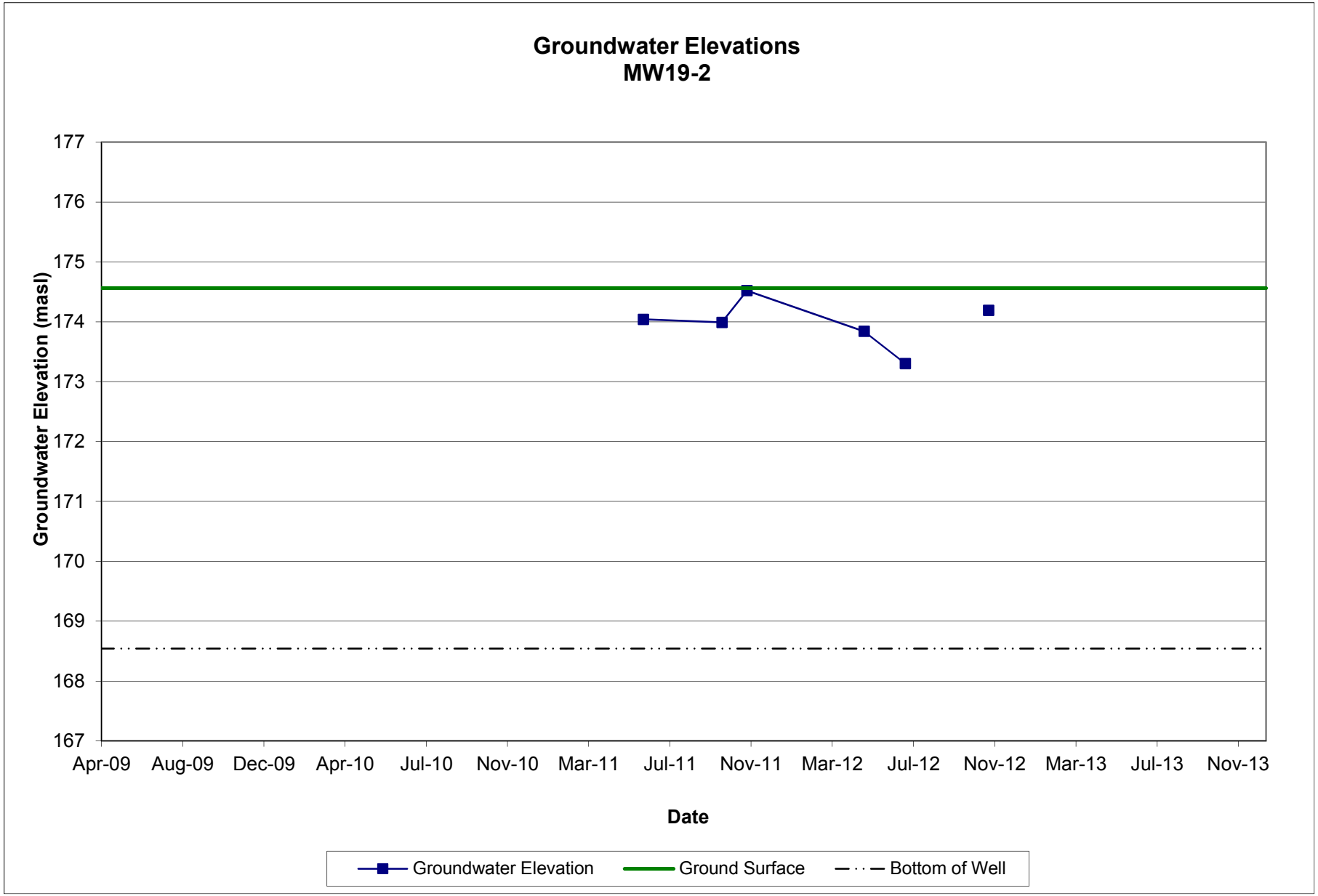
Figure N19-C80



PEB019877

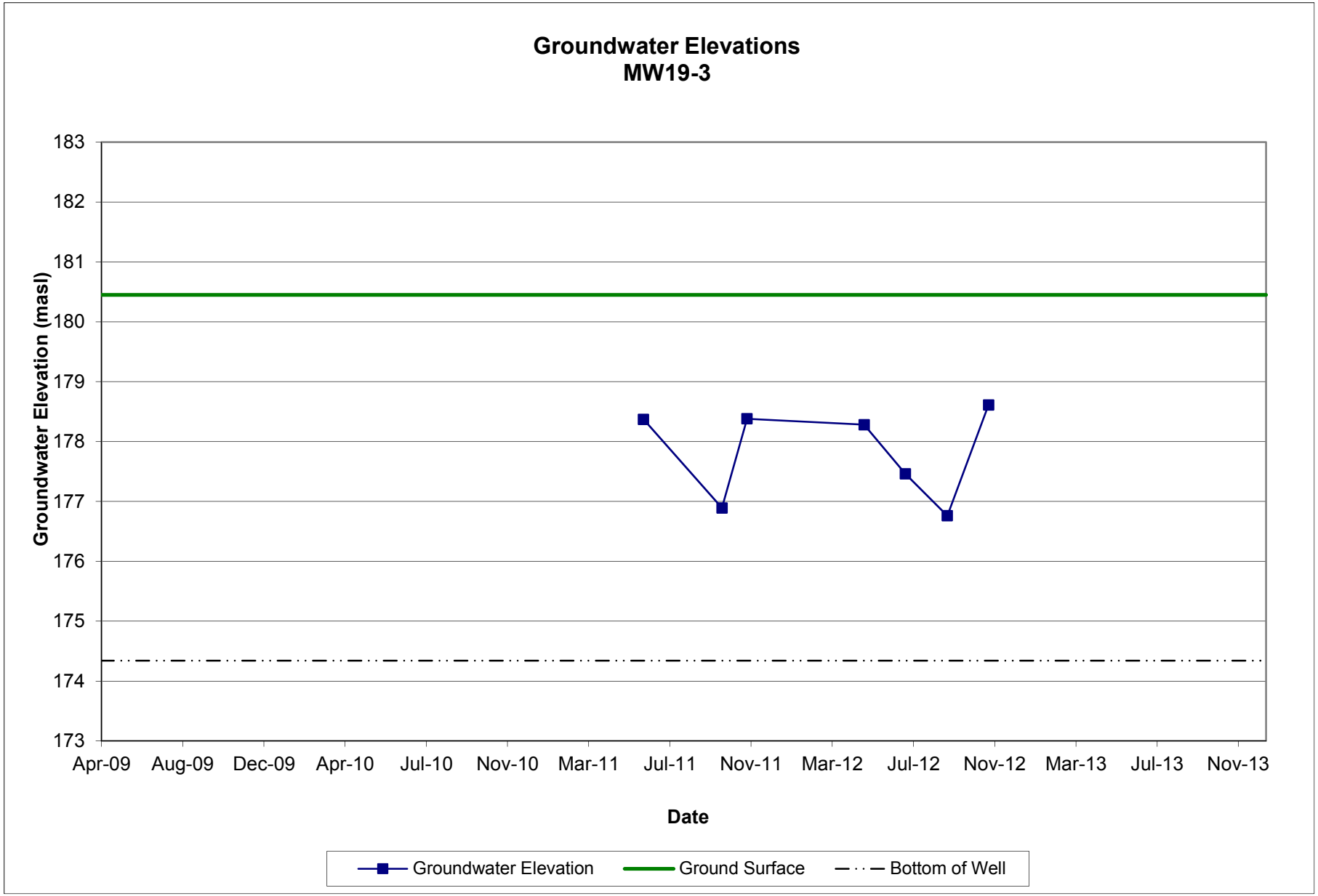
Figure N19-C81


Groundwater Elevations
MW19-1s/d
Groundwater Elevation (masl)
160
159
158
157
156
155
154
153
152
151
150
MW19-1d is damaged
Apr-09
Aug-09
Dec-09
Apr-10
Jul-10
Nov-10
Mar-11
Jul-11
Nov-11
Mar-12
Jul-12
Nov-12
Mar-13
Jul-13
Nov-13
Date
Groundwater Elevation 1s
Groundwater Elevation 1d
Ground Surface
Bottom of Well 1s
Bottom of Well 1d



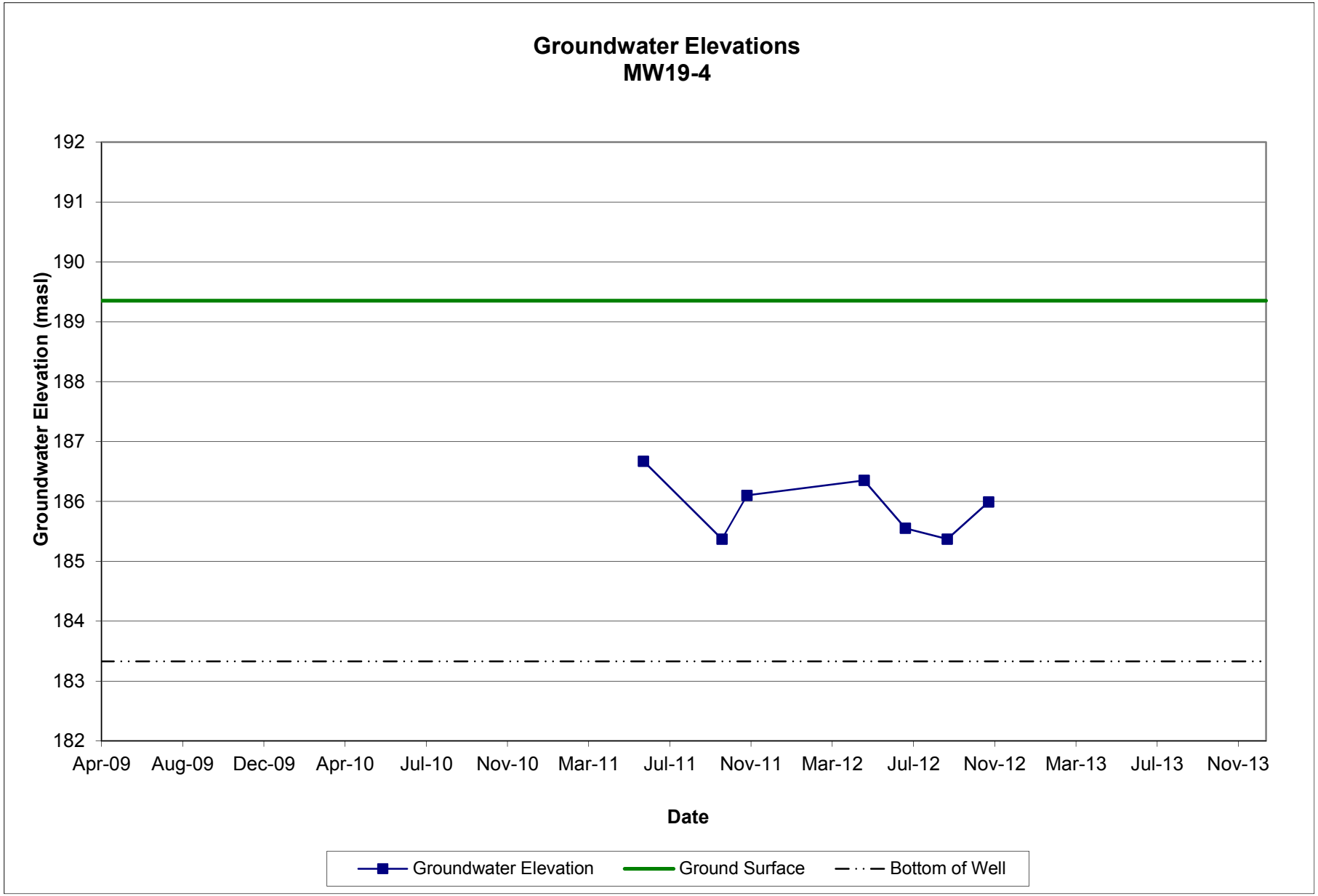
PEB019877

Figure N19-C83



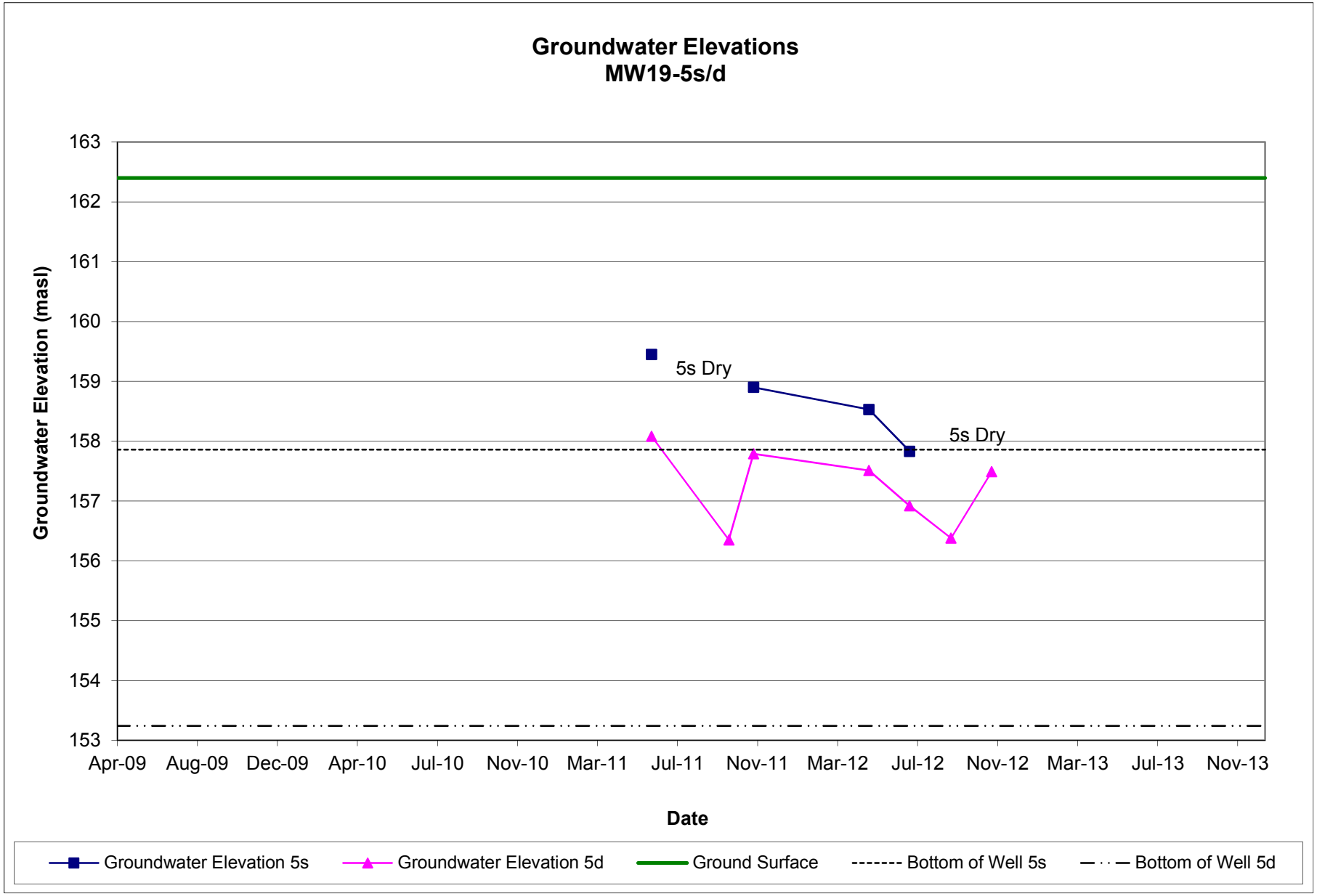
PEB019877

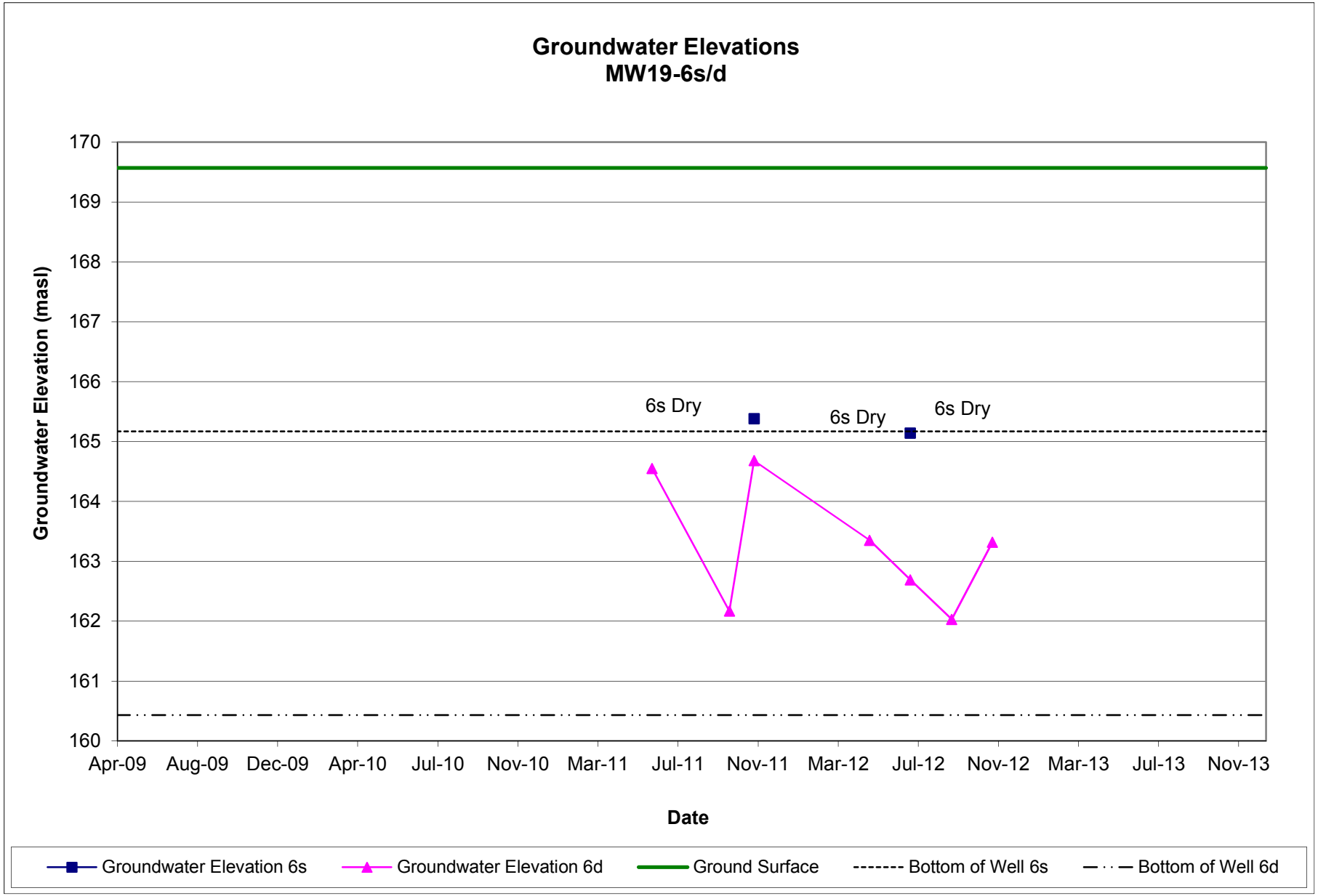
Figure N19-C84



PEB019877

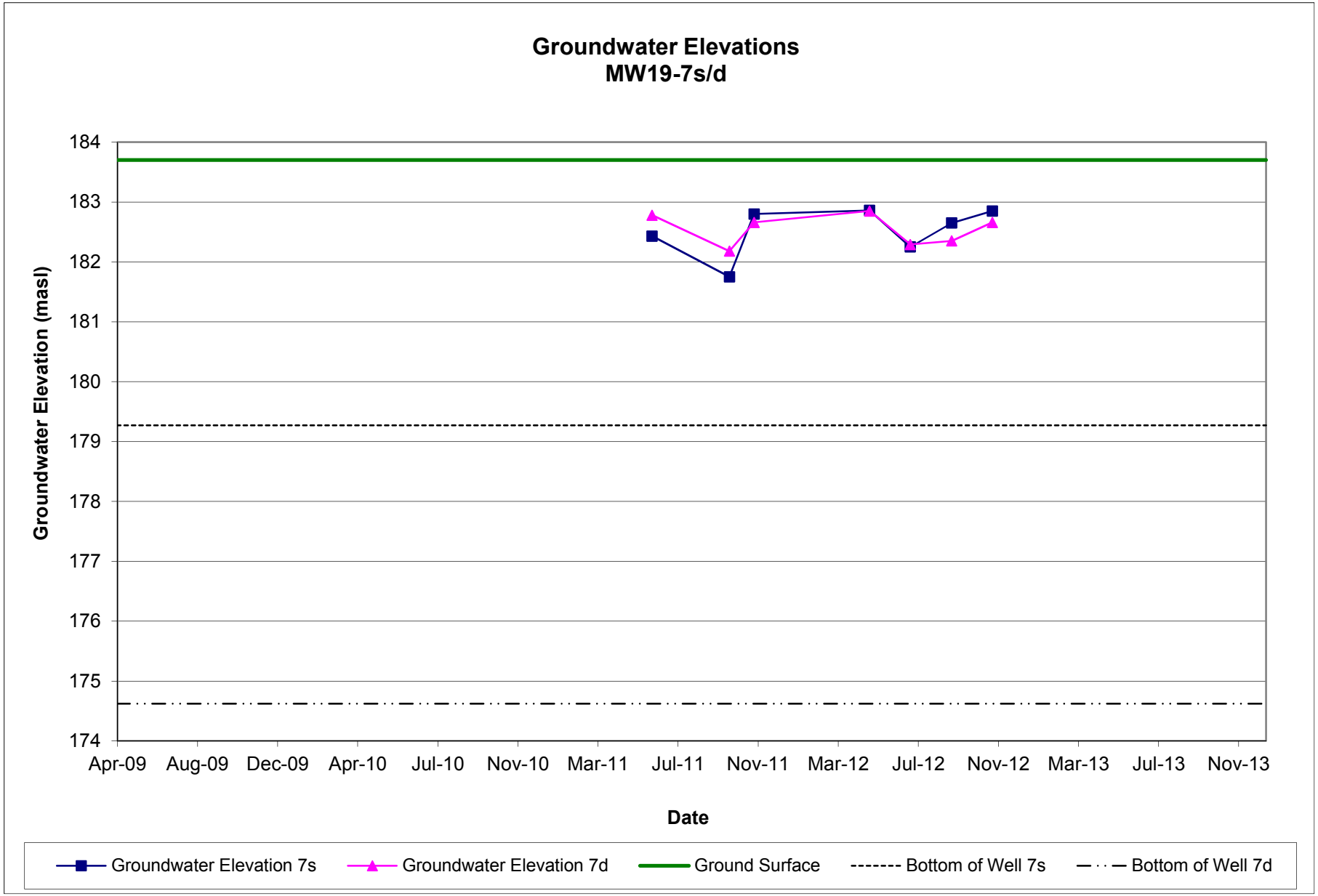
Figure N19-C85


Groundwater Elevations
MW19-5s/d
Groundwater Elevation (masl)
163
162
161
160
159
158
157
156
155
154
153
5s Dry
5s Dry
Apr-09
Aug-09
Dec-09
Apr-10
Jul-10
Nov-10
Mar-11
Jul-11
Nov-11
Mar-12
Jul-12
Nov-12
Mar-13
Jul-13
Nov-13
Date
Groundwater Elevation 5s
Groundwater Elevation 5d
Ground Surface
Bottom of Well 5s
Bottom of Well 5d



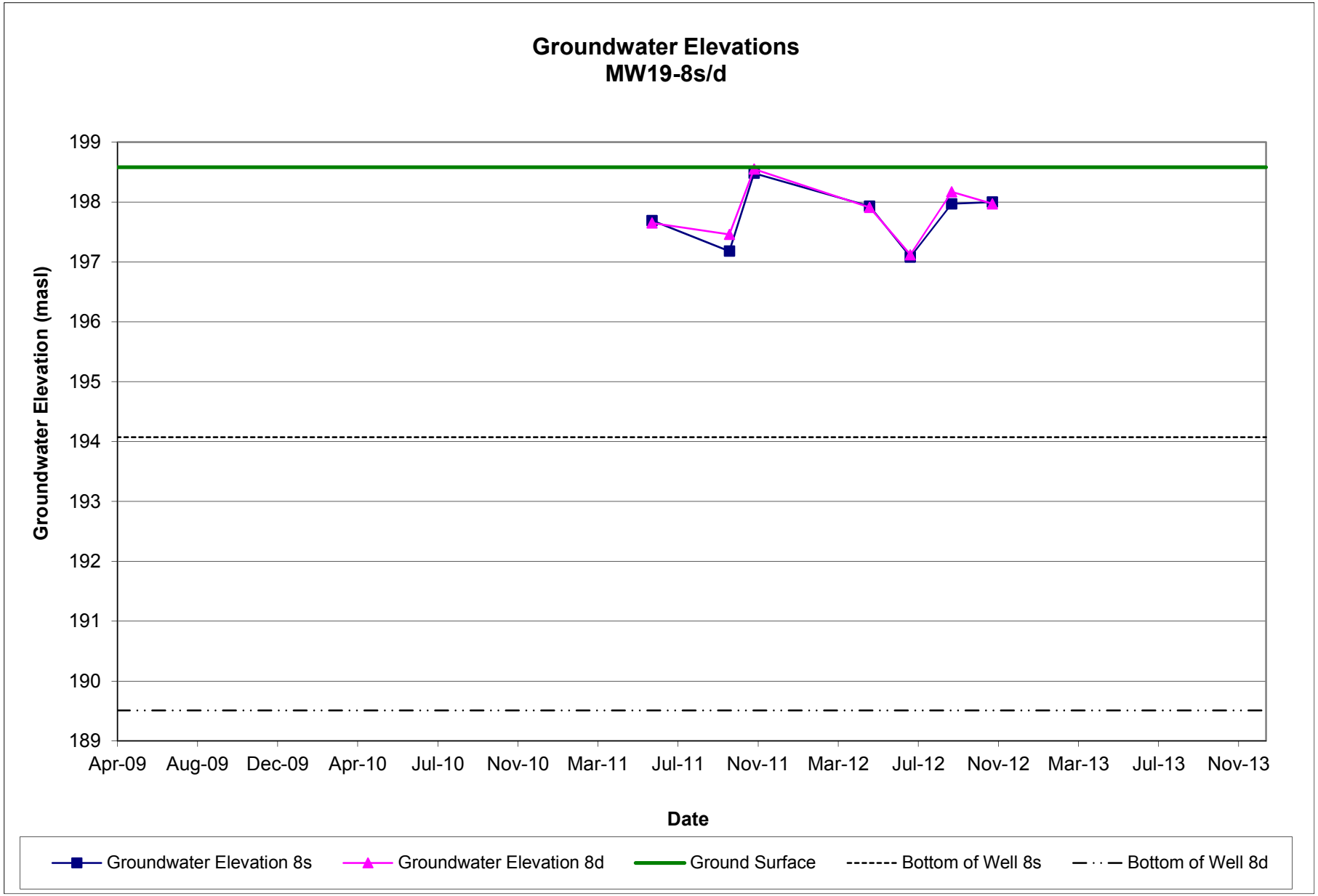
PEB019877

Figure N19-C87



PEB019877

Figure N19-C88



PEB019877

Figure N19-C89

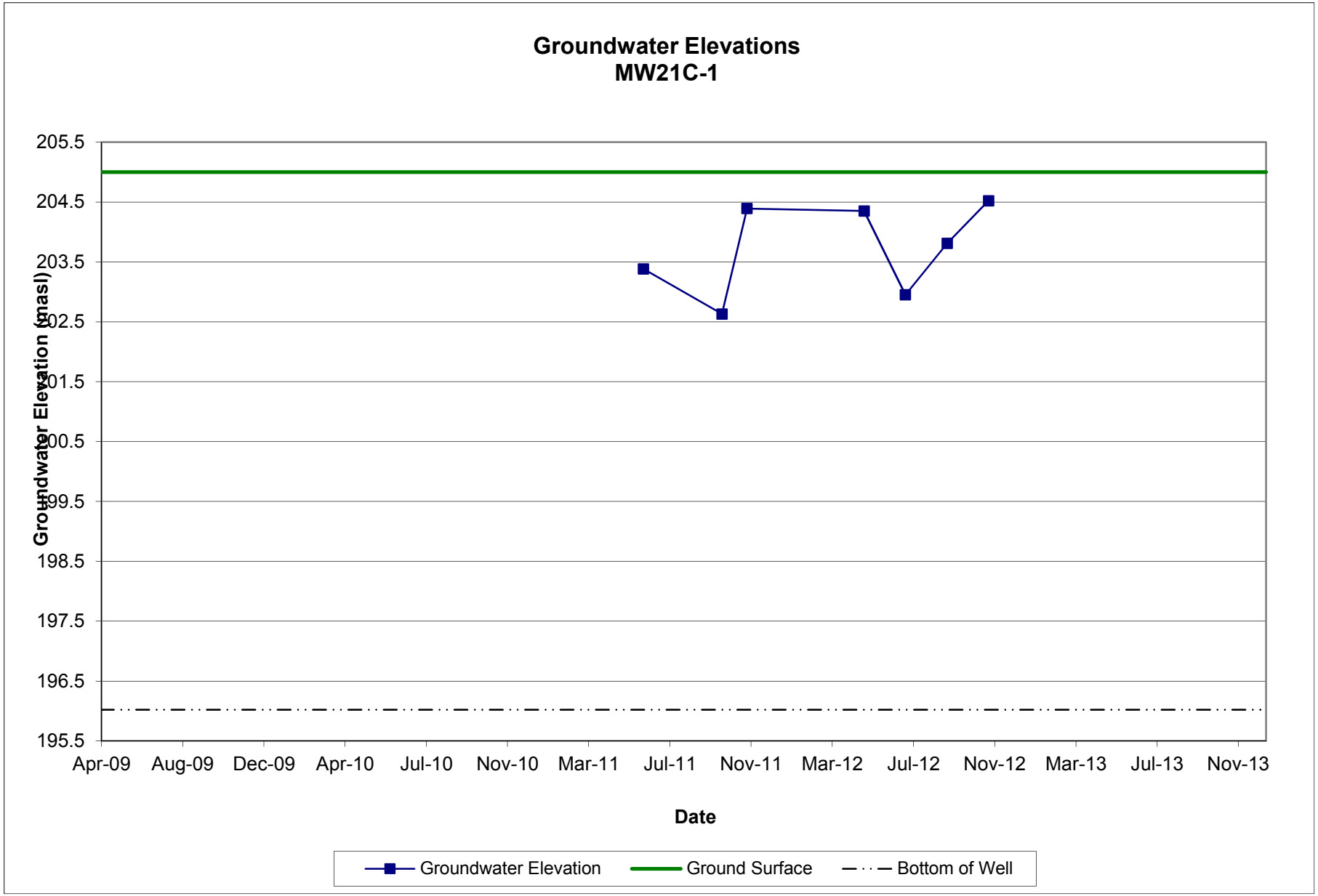


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Figure N19-C90

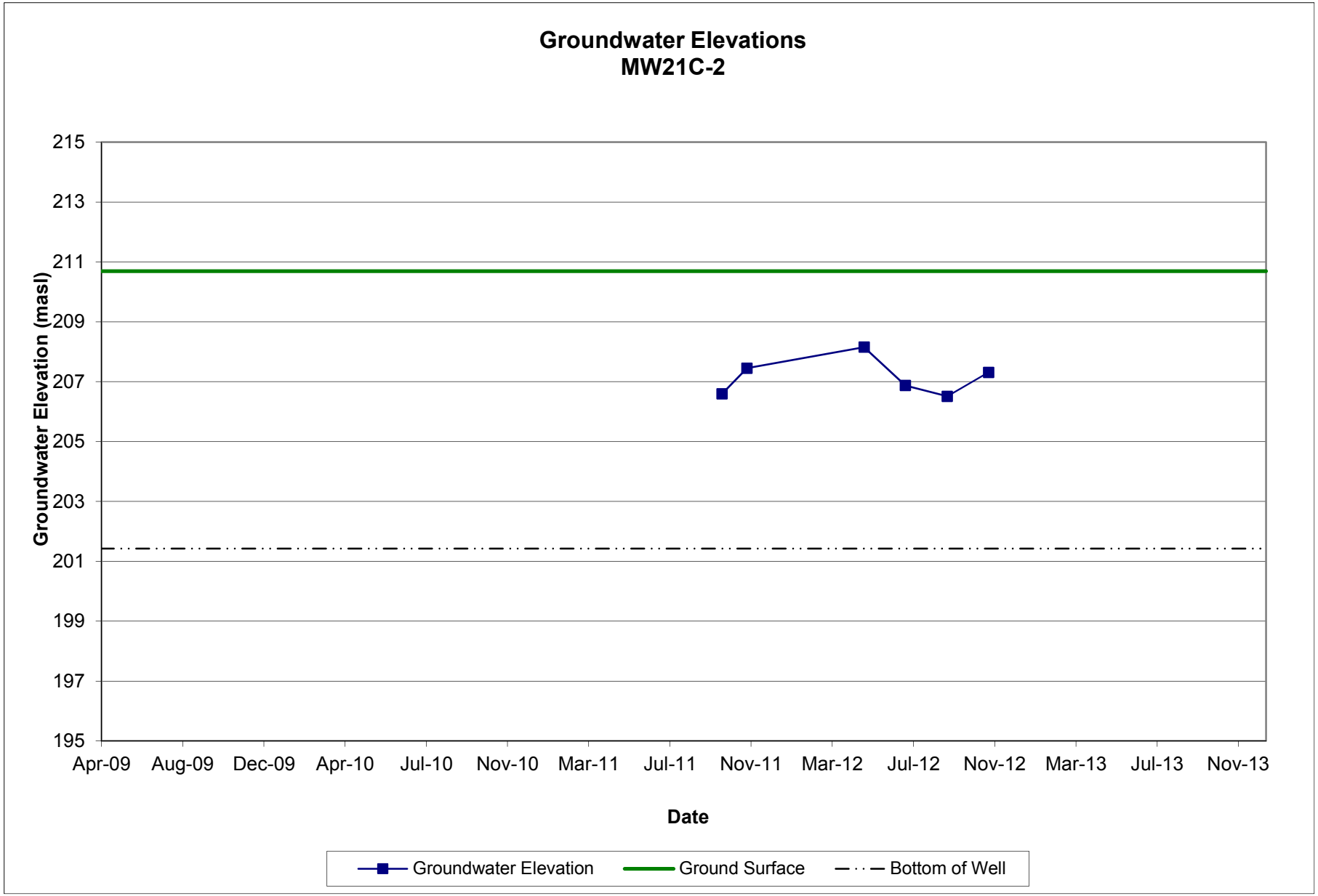

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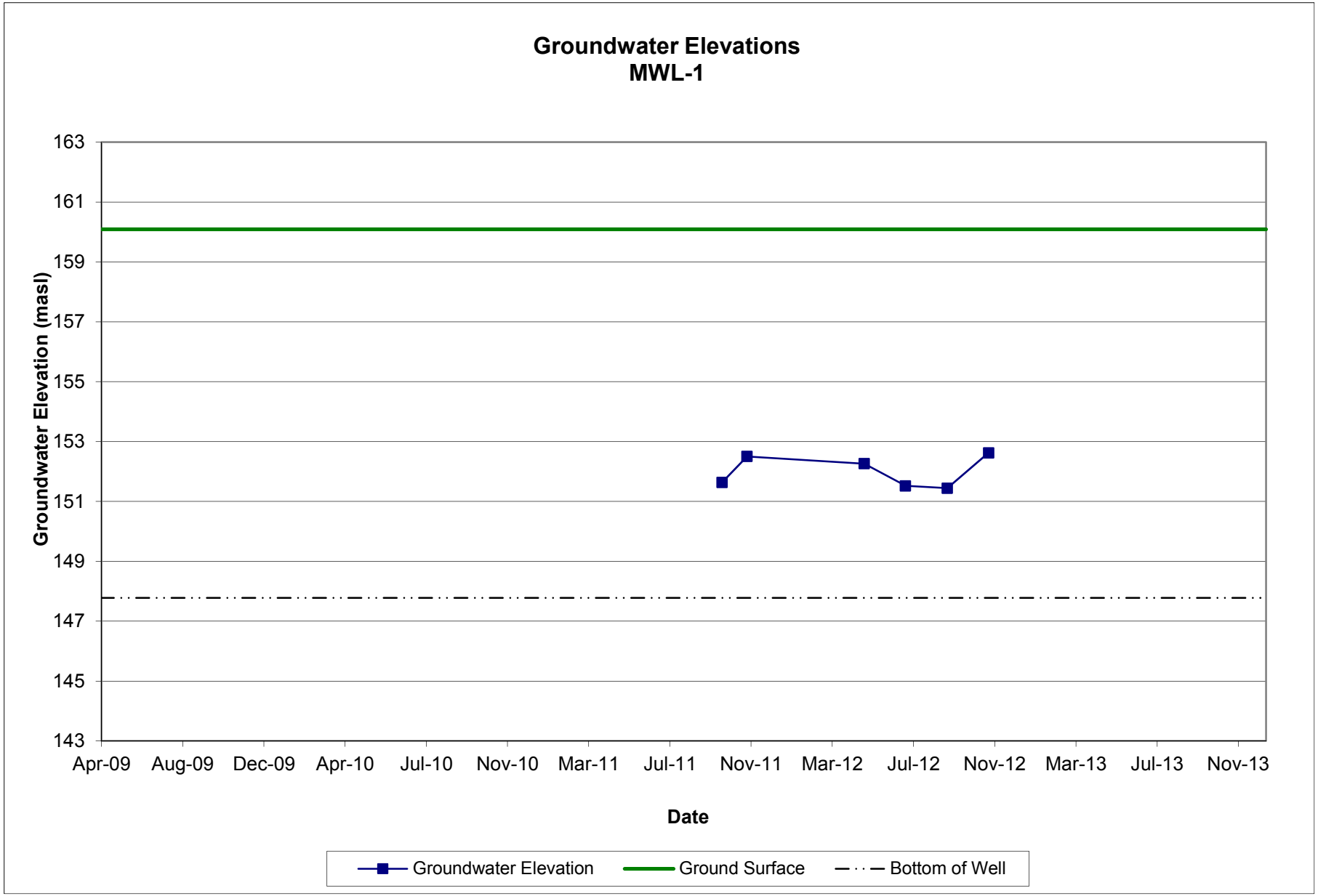
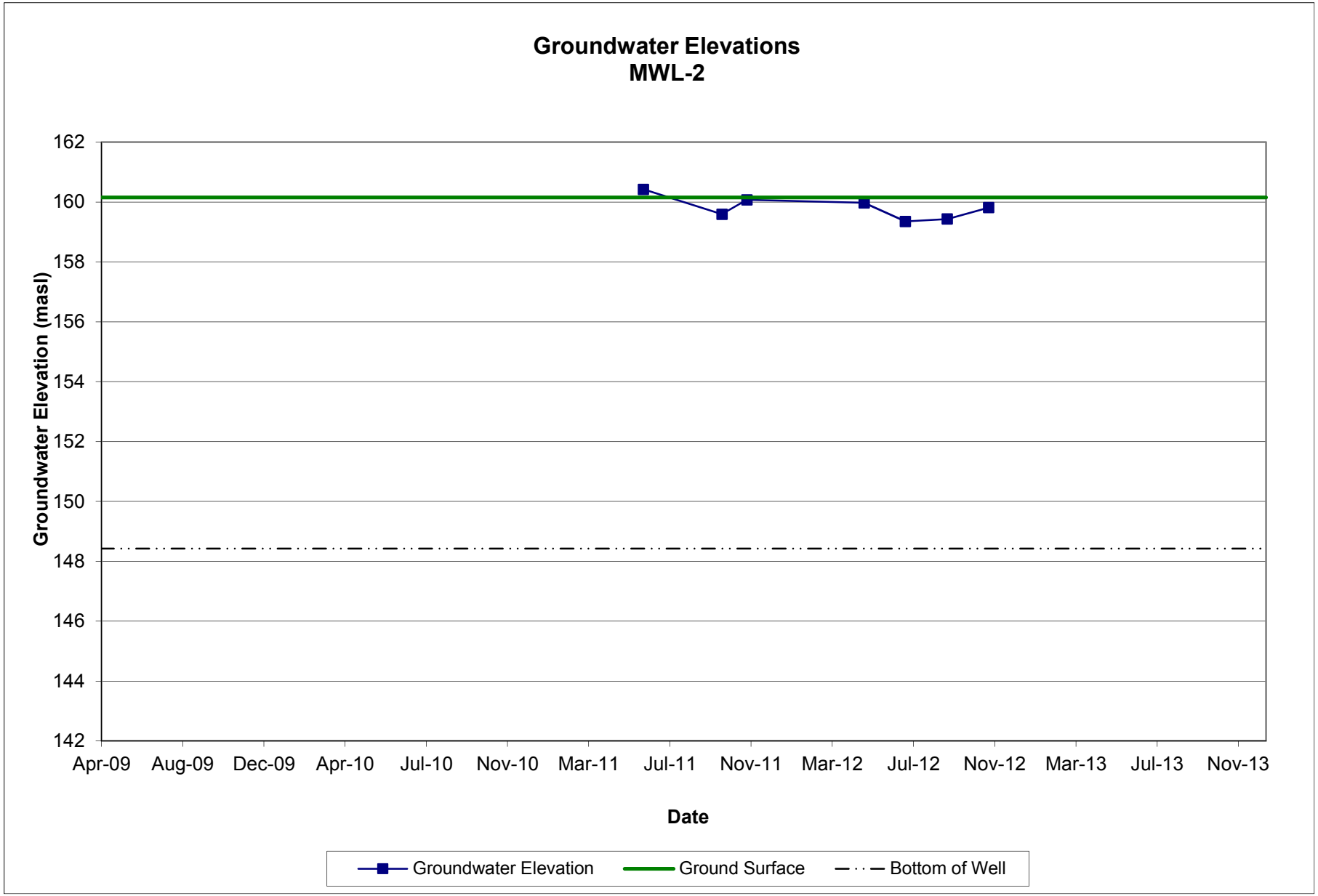
Figure N19-C91


Groundwater Elevations
MWL-1
Groundwater Elevation (masl)
163
161
159
157
155
153
151
149
147
145
143
Apr-09
Aug-09
Dec-09
Apr-10
Jul-10
Nov-10
Mar-11
Jul-11
Nov-11
Mar-12
Jul-12
Nov-12
Mar-13
Jul-13
Nov-13
Date
Groundwater Elevation
Ground Surface
Bottom of Well



PEB019877

Figure N19-C93

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Appendix N19-D
Stream Monitoring

TABLE N19-D1
Stream Piezometer Groundwater Elevations

SPZ-G-07*		
PZ Depth (mbgl)	0.95	
Stickup (m)	0.89	
Measuring Point Elevation (masl)	215.61	
	Water Level (mbmp)	**Elevation (masl)**
Jan-09	0.92	214.69
Feb-09	0.91	214.70
Mar-09	0.97	214.64
Apr-09	0.87	214.74
May-09	0.95	214.66
Jun-09	0.93	214.68
Jul-09	0.82	214.79
Aug-09	1.00	214.61
Sep-09	1.13	214.48
Oct-09	1.18	214.43
Nov-09	1.05	214.56
Dec-09	0.89	214.72
May-10	1.11	214.50
Jul-10	1.21	214.40
Oct-10	1.15	214.46
Dec-10	0.94	214.67
Mar-11	0.79	214.82
May-11	0.83	214.78
Jun-11	0.93	214.68
Sep-11	1.57	214.04
Nov-11	1.03	214.58
May-12	1.14	214.47
Jul-12	1.34	214.27
Sep-12	1.46	214.15
Dec-12	1.01	214.60

'*' denotes an instrument which is shared by more than one Neighbourhood
mbgl - meters below ground level
masl - meters above sea level
mbmp - meters below measuring point

TABLE N19-D2
Stream Surface Water Elevations

	SS-G-02*		SS-G-05		SS-G-07*	
Measuring Point Elevation (masl)	147.12		196.875		215.12	
	Water Level (mbmp)	**Elevation (masl)**	**Water Level (mbmp)**	**Elevation (masl)**	**Water Level (mbmp)**	**Elevation (masl)**
Sep-08	0.90	146.23	0.92	195.96	0.89	214.24
Oct-08	0.76	146.37	-	-	0.96	214.16
Nov-08	0.80	146.33	-	-	-	-
Jan-09	0.79	146.33	0.86	196.02	0.95	214.17
Feb-09	0.85	146.27	0.84	196.04	0.92	214.20
Mar-09	0.77	146.35	0.84	196.04	0.89	214.23
Apr-09	0.70	146.42	-	-	0.89	214.23
May-09	0.81	146.31	0.79	196.09	0.97	214.15
Jun-09	0.78	146.35	0.82	196.06	0.94	214.18
Jul-09	0.70	146.43	0.79	196.08	0.81	214.31
Aug-09	0.79	146.33	0.94	195.93	dry	dry
Sep-09	0.76	146.37	0.88	196.00	dry	dry
Oct-09	0.77	146.36	0.93	195.94	dry	dry
Nov-09	0.76	146.36	0.92	195.96	0.96	214.17
Dec-09	0.74	146.39	0.86	196.02	0.88	214.24
May-10	0.83	146.29	0.82	196.06	dry	dry
Jul-10	0.87	146.25	0.83	196.05	dry	dry
Oct-10	0.84	146.28	0.89	195.99	dry	dry
Dec-10	0.63	146.49	0.99	195.88	0.91	214.22
Mar-11	0.36	146.76	0.57	196.31	0.74	214.38
May-11	0.68	146.44	0.70	196.18	0.89	214.24
Jun-11	0.75	146.37	0.81	196.07	0.94	214.18
Sep-11	0.79	146.33	0.91	195.97	dry	dry
Nov-11	0.68	146.44	0.88	196.00	0.92	214.20
May-12	0.82	146.30	0.80	196.08	0.96	214.16
Jul-12	0.83	146.29	0.88	196.00	dry	dry
Sep-12	0.84	146.28	0.92	195.96	dry	dry
Dec-12	0.72	146.40	0.85	196.03	0.90	214.22

'*' denotes an instrument which is shared by more than one Neighbourhood
masl - meters above sea level
mbmp - meters below measuring point
'-' denotes data that are unavailable

TABLE N19-D3
Surface Water Flows

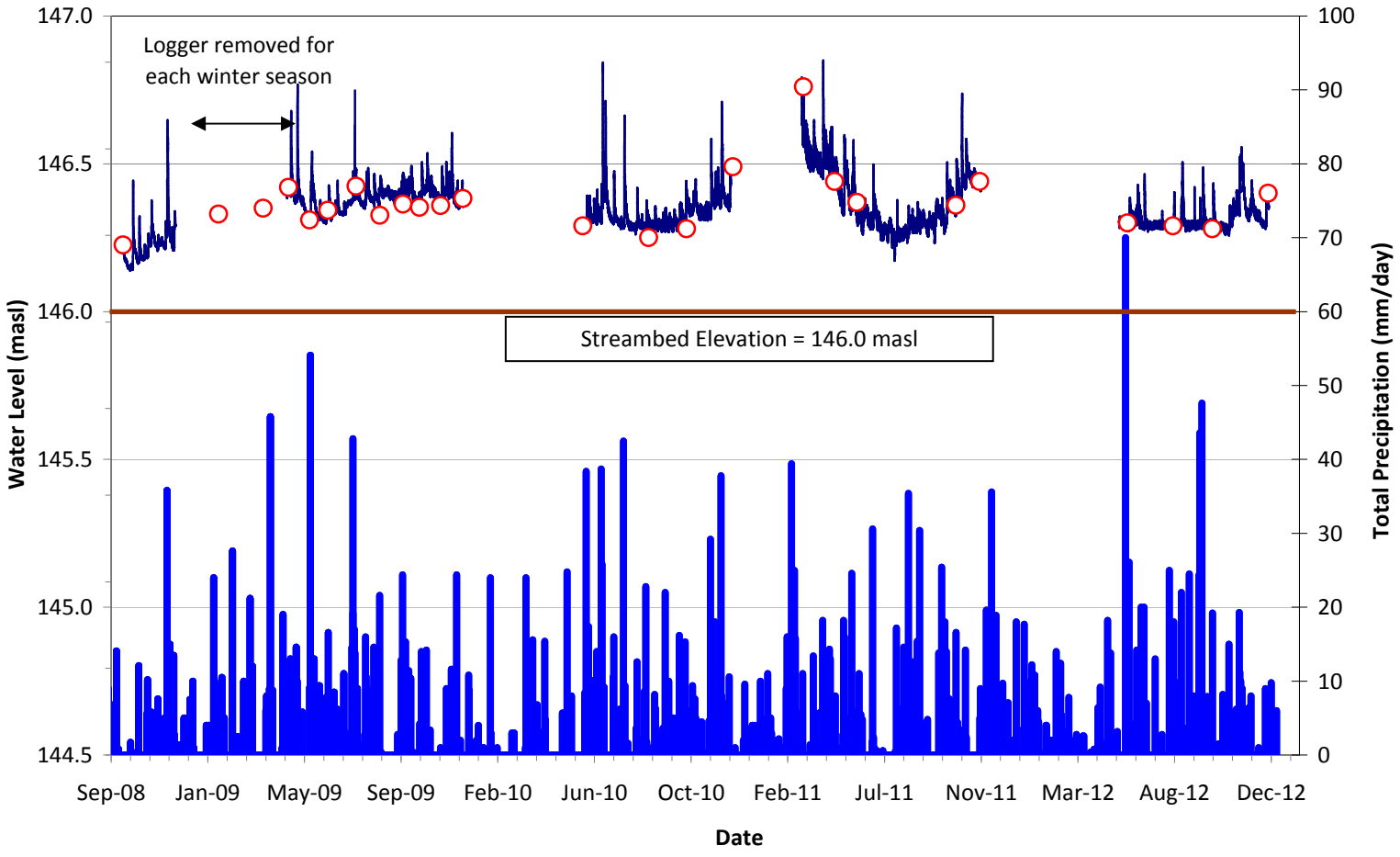
Flow Rate (L/s)				
	Surface Water Station			
Date	**SS-G-02***	**SS-G-05**	**SS-G-07***	**WSS-G-12**
Sep-08	-	2.9	-	-
Oct-08	-	-	1.7	-
Jan-09	31	8.2	2.2	-
Feb-09	78	Ice	Ice	-
Mar-09	95	19	13	-
Apr-09	55	-	-	-
May-09	11	1.0	1.1	-
Jun-09	40	12	2.5	-
Jul-09	93	34	30	-
Aug-09	7.1	standing water	dry	-
Sep-09	23	6.1	dry	-
Oct-09	6.1	1.0	dry	-
Nov-09	5.8	4.4	0.04	-
Dec-09	42	11	3.8	-
May-10	1.0	1.4	dry	-
Jul-10	12	2.1	dry	-
Oct-10	25	6.9	3.8	-
Dec-10	35	9.4	5.4	-
Mar-11	193	61	40	-
May-11	41	13	11	2.0
Jun-11	14	4.1	1.6	4.0
Sep-11	8.3	1.5	dry	dry
Nov-11	11	4.8	2.8	0.59
May-12	4.0	1.1	0.25	2.1
Jul-12	2.0	1.2	dry	dry
Sep-12	2.8	1.3	dry	dry
Dec-12	13	4.7	3.0	1.7

'*' denotes a station which is shared by more than one Neighbourhood
All field equipment calibrated daily
'-' denotes data that are unavailable

TABLE N19-D4
Stream Field Chemistry

Surface Water Station	Flow	Turbidity (NTU)	Temperature (°C)	Dissolved Oxygen (mg/L)	pH	Conductivity (µS/cm)
SS-G-02*						
22-Jan-09	flow	2.67	0.5	13.79	-	400
25-Feb-09	flow	-	0.2	14.10	8.20	equip fail
27-Mar-09	high flow	2.10	5.0	12.97	8.30	650
23-Apr-09	flow	0.52	7.0	12.10	8.40	630
27-Aug-09	flow	0.55	14.4	6.56	8.20	640
18-Dec-09	flow	1.21	0.0	2.31	8.90	830
SS-G-05						
22-Jan-09	flow	2.56	0.6	13.09	-	400
24-Mar-09	high flow	0.98	1.2	11.20	8.40	440
24-Apr-09	flow	0.40	9.4	11.95	8.30	550
26-Aug-09	ponded	8.91	20.5	0.96	8.50	810
17-Dec-09	flow	1.77	0.0	12.26	8.96	730
SS-G-07*						
22-Jan-09	flow	2.92	0.5	12.38	-	300
27-Mar-09	high flow	1.72	5.4	14.20	8.10	570
24-Apr-09	flow	0.54	14.6	11.95	8.30	590
26-Aug-09	dry	-	-	-	-	-
17-Dec-09	flow	1.01	0.1	10.40	8.68	790

Comments:
'*' denotes a station which is shared by more than one Neighbourhood
All field equipment calibrated daily
High flow constitutes double or more the average flow
'-' denotes data that are unavailable
'equip fail' refers to an error with equipment or instrumentation



SPL Beatty
A Division of SPL Consultants Limited

SS-G-02 — SS-G-02

SS-G-02 Manual Measurements

Streambed Elevation

SS-G-02

STREAM LEVEL HYDROGRAPH

Seaton N19 NFSSR

Sept 2008 to December 2012

Figure N19-D1

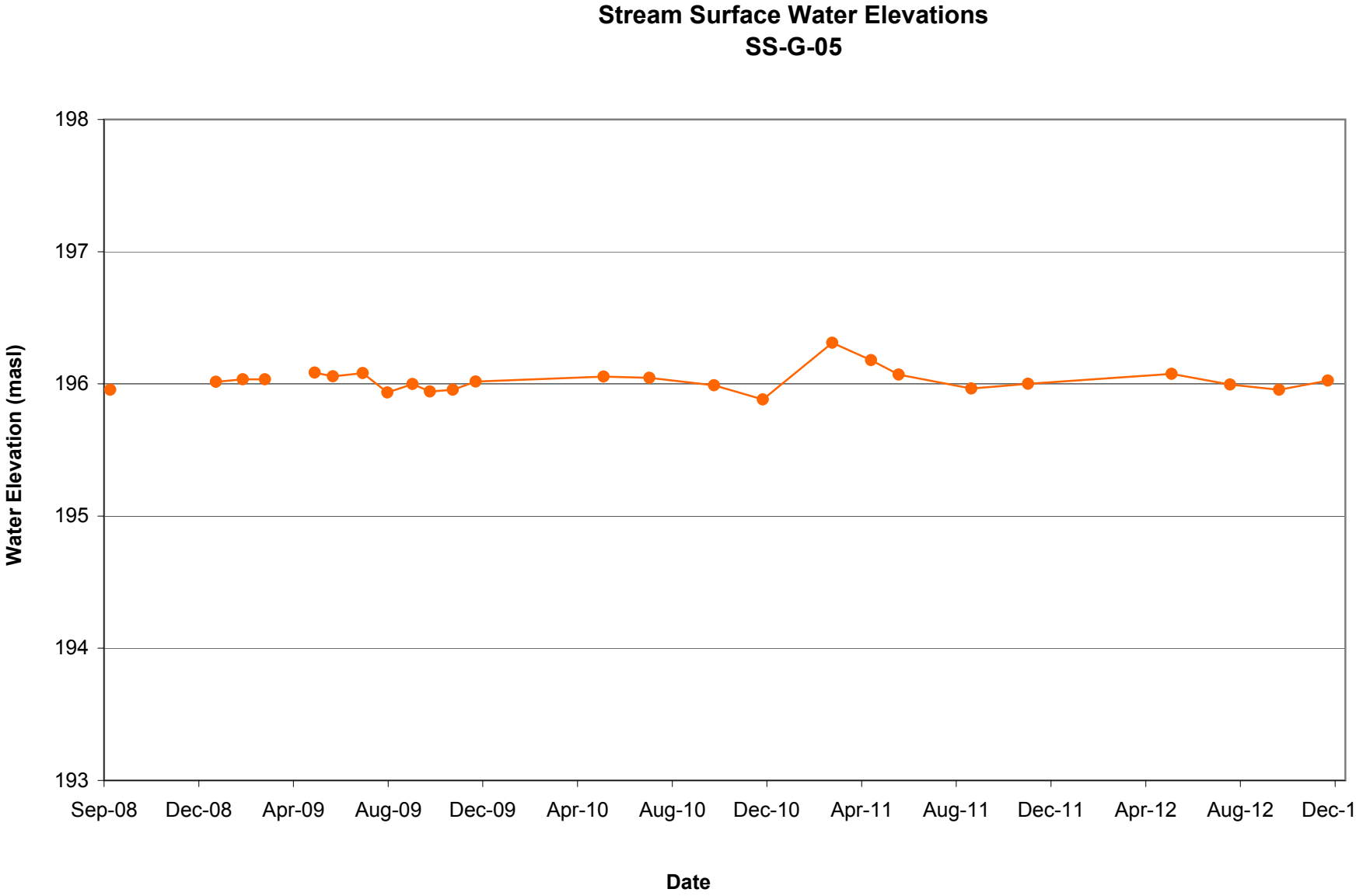


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Figure N19-D2

Stream Water Elevations
SS-G-07* and SPZ-G-07*

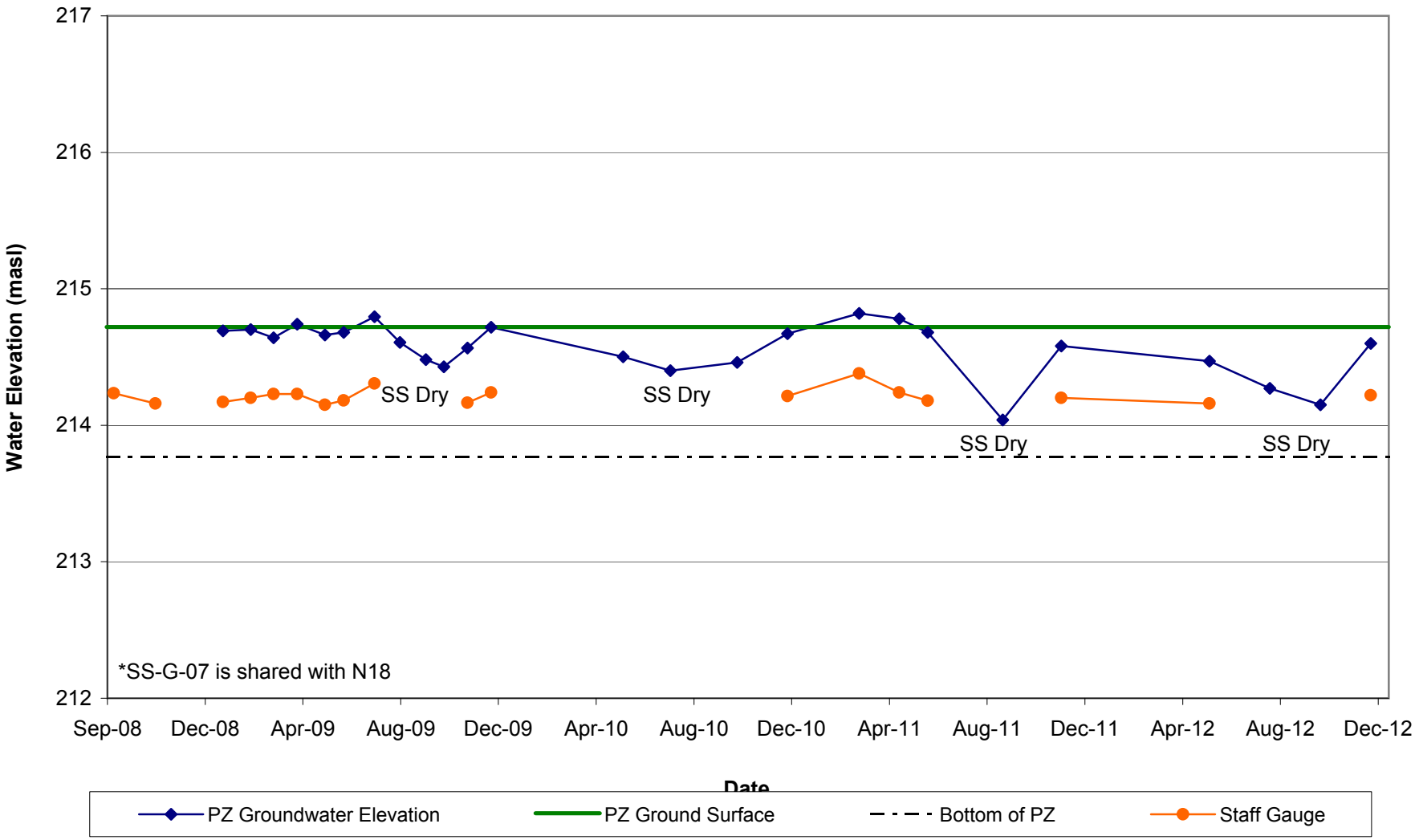

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Figure N19-D3

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Appendix N19-E
Wetland Monitoring

TABLE N19-E1
Wetland Piezometer Groundwater Elevations

	WPZ-G-12s		WPZ-G-12d		WPZ-U-02As		WPZ-U-02Ad		WPZ-U-02Bs		WPZ-U-02Bd		WPZ-U-08s*		WPZ-U-08d*	
PZ Depth (mbgl)	0.91		1.27		1.26		1.70		1.14		1.99		1.25		1.80	
Stickup (m)	0.83		0.78		0.68		1.05		0.70		1.04		0.66		0.60	
Measuring Point Elevation (masl)	198.83		198.78		141.68		142.05		140.70		141.04		191.66		191.60	
	Water Level (mbmp)	**Elevation (masl)**	**Water Level (mbmp)**	**Elevation (masl)**	**Water Level (mbmp)**	**Elevation (masl)**	**Water Level (mbmp)**	**Elevation (masl)**	**Water Level (mbmp)**	**Elevation (masl)**	**Water Level (mbmp)**	**Elevation (masl)**	**Water Level (mbmp)**	**Elevation (masl)**	**Water Level (mbmp)**	**Elevation (masl)**
May-11	1.26	197.57	1.28	197.50	0.66	141.02	1.09	140.96	0.92	139.78	2.64	138.40	0.65	191.01	0.48	191.12
Jun-11	0.89	197.94	0.83	197.95	0.68	141.00	1.13	140.92	0.95	139.75	1.01	140.03	0.51	191.15	0.16	191.44
Sep-11	1.39	197.44	1.34	197.44	1.66	140.02	1.92	140.13	1.42	139.28	1.81	139.23	0.52	191.14	0.22	191.38
Nov-11	1.09	197.74	1.11	197.67	1.07	140.61	1.41	140.64	1.13	139.57	1.38	139.66	0.53	191.13	0.28	191.32
May-12	1.10	197.73	1.14	197.64	0.83	140.85	1.13	140.92	1.08	139.62	1.29	139.75	0.55	191.11	0.18	191.42
Jul-12	1.32	197.51	1.20	197.58	0.79	140.89	Destroyed		1.06	139.64	1.48	139.56	0.56	191.10	0.23	191.37
Sep-12	1.21	197.62	1.31	197.47	0.56	141.12			0.99	139.71	1.57	139.47	0.62	191.04	0.30	191.30
Dec-12	0.93	197.90	0.98	197.80	0.52	141.16			0.92	139.78	1.30	139.74	0.58	191.08	0.22	191.38

'*' denotes an instrument which is shared by more than one neighbourhood
mbgl - meters below ground level
masl - meters above sea level
mbmp - meters below measuring point

TABLE N19-E2
Wetland Surface Water Elevations

	WSS-G-12	
Measuring Point Elevation (masl)	199.02	
	Water Level (mbmp)	**Elevation (masl)**
May-11	0.90	198.12
Jun-11	0.87	198.15
Oct-11	dry	dry
Nov-11	0.96	198.06
May-12	0.95	198.07
Jul-12	dry	dry
Sep-12	dry	dry
Dec-12	0.88	198.14

masl - meters above sea level
mbmp - meters below measuring point

Wetland Water Elevations
WPZ-G-12s/d and WSS-G-12

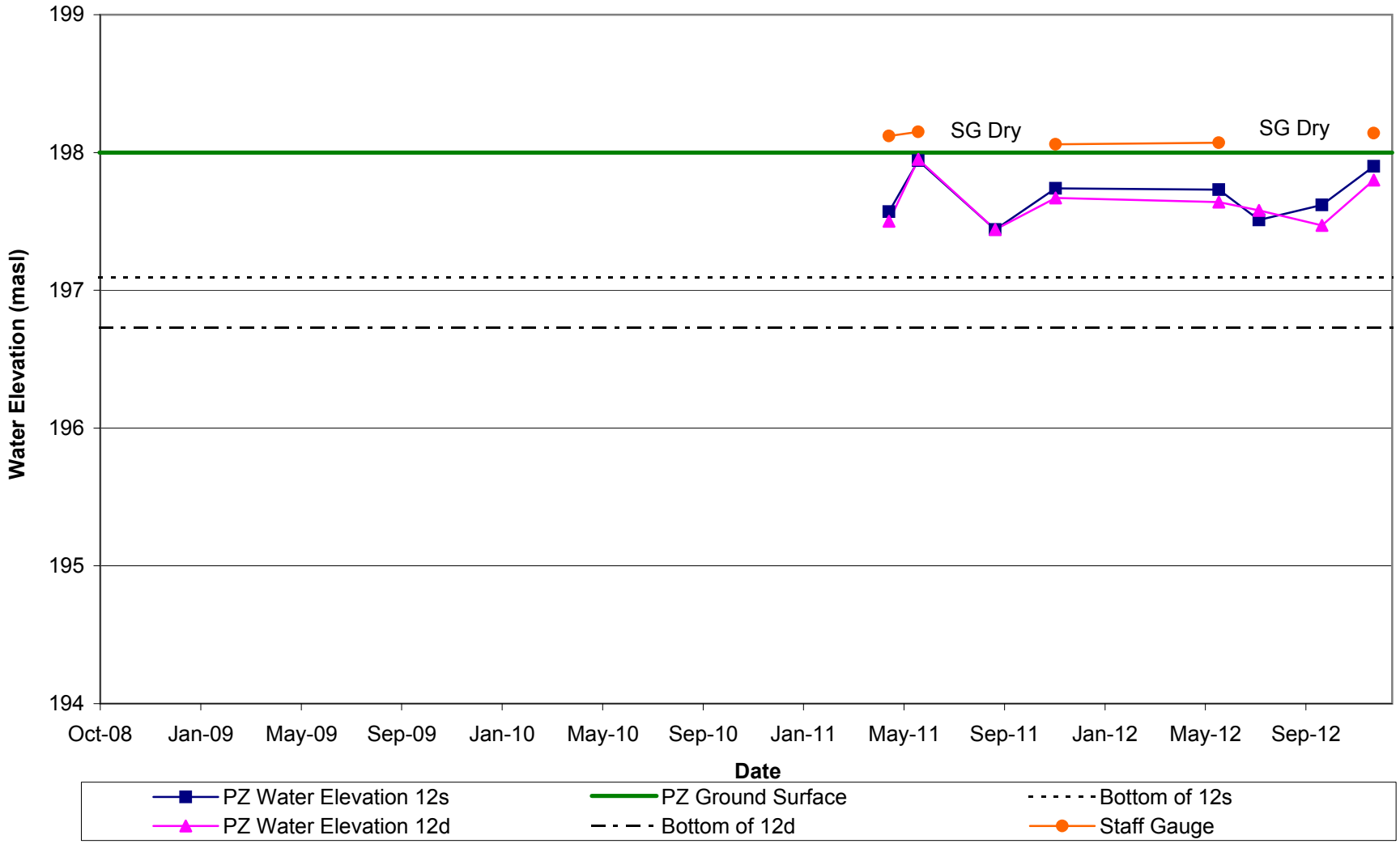

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Figure N19-E1

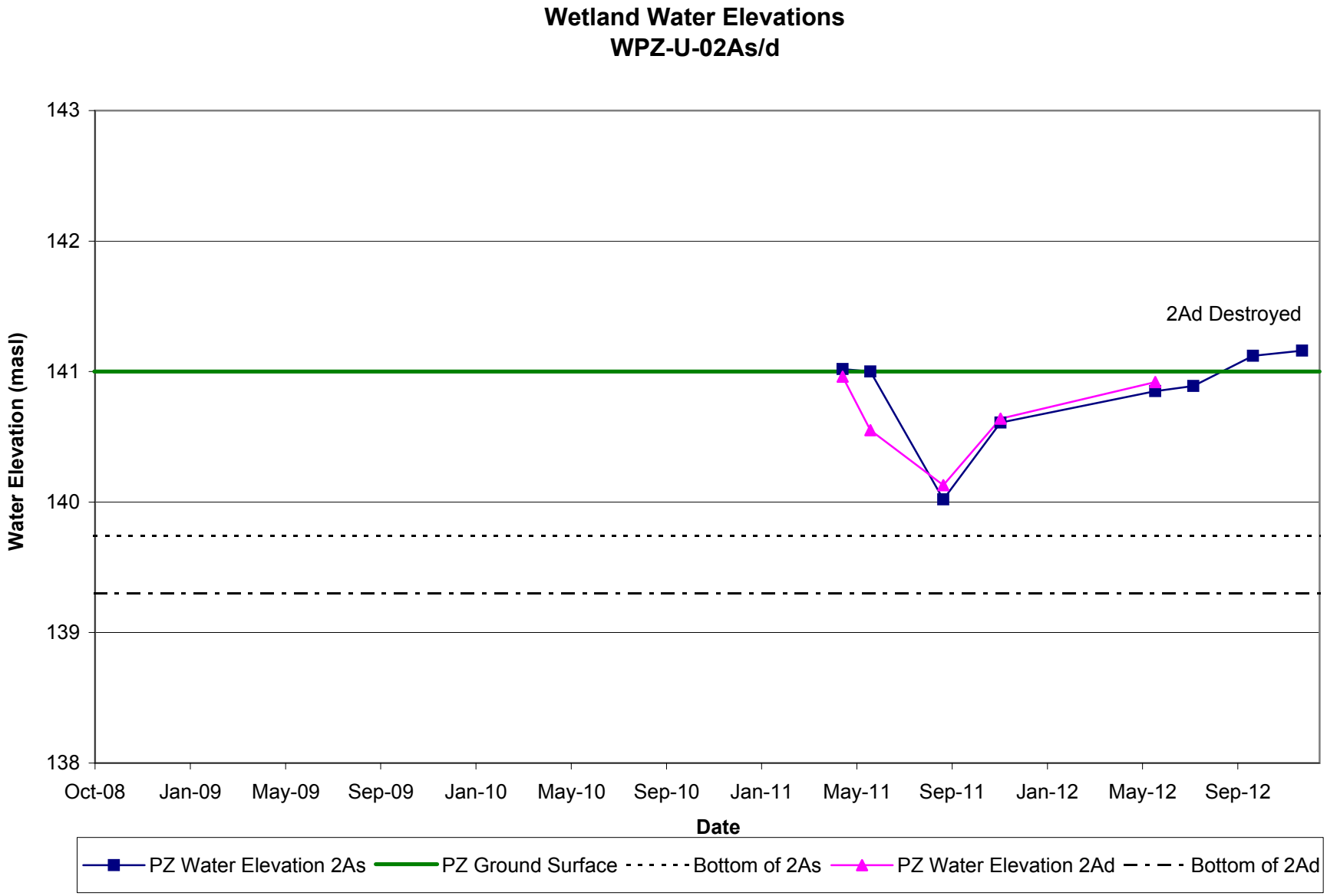

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Figure N19-E2

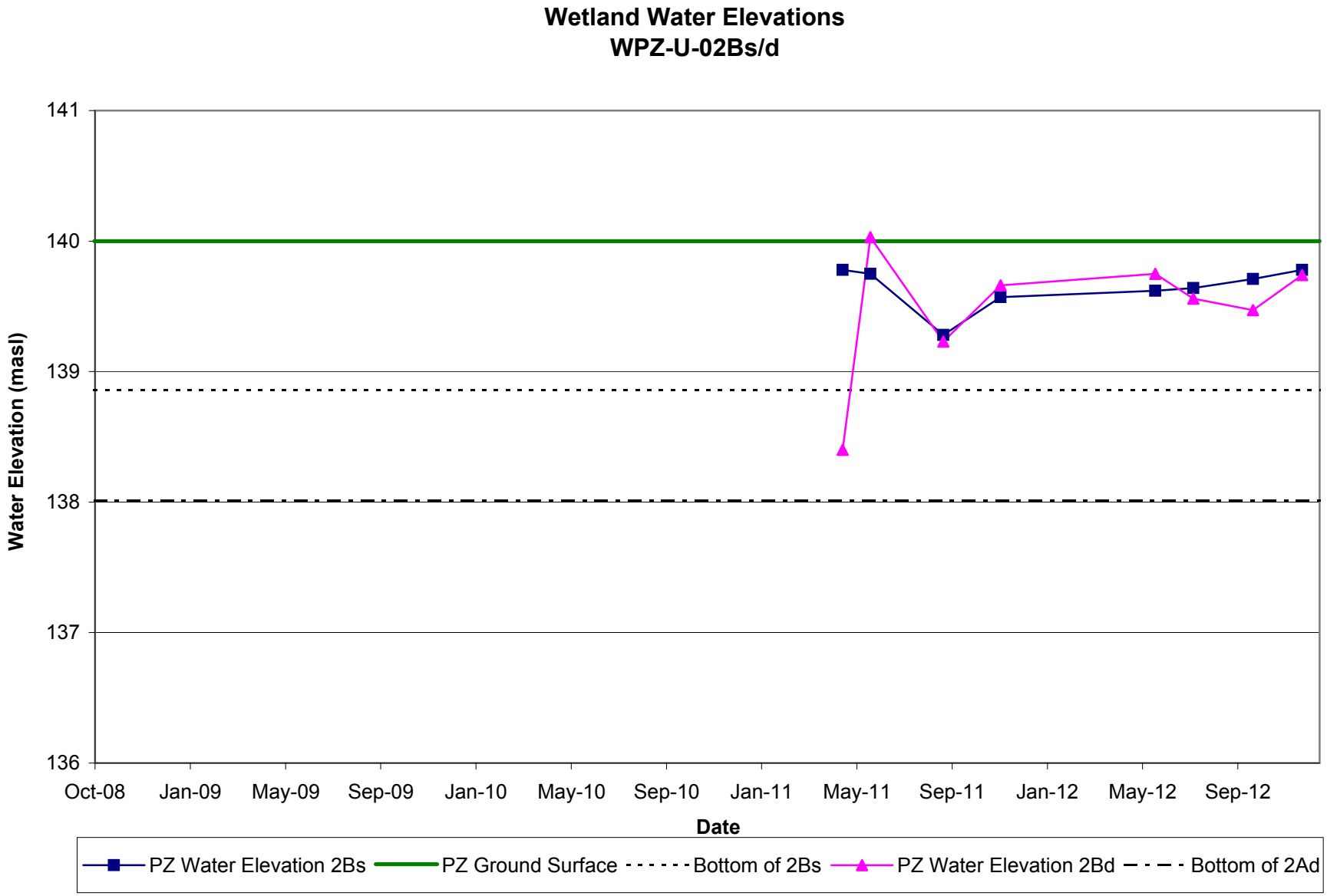

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Figure N19-E3

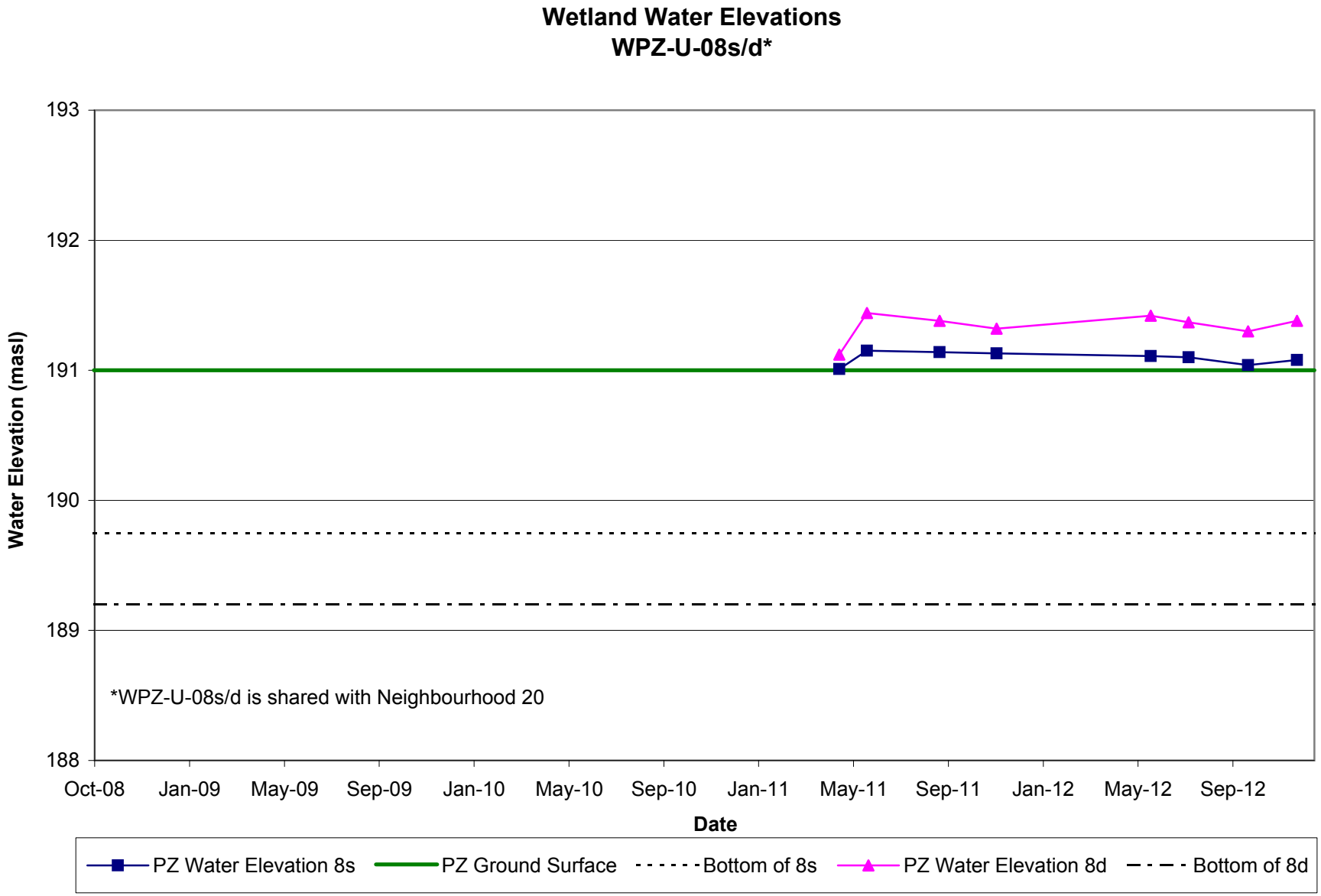

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Figure N19-E4

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Appendix N19-F
Hydraulic Conductivity and Soil Infiltration Tests

TABLE N19-F1
Summary of Infiltration Test Results

Infiltration Test Number*	Test Date	Notes	Interpreted Infiltration Rate (mm/hr)
N19-IF1	18-Apr-11	- Removed layer of topsoil ~ 0.20m deep to underlying clayey silt till - Test not successful as water rapidly filled hole	-
N19-IF2	19-Apr-11	- Removed layer of topsoil 0.18m deep to underlying sandy silt - Test not successful as water rapidly filled hole	-
N19-IF2	26-Jun-11	- Removed layer of topsoil 0.37m deep to underlying sandy till - Test not successful as water rapidly filled hole	-
N19-IF3	19-Apr-11	- Removed layer of topsoil 0.23m deep to underlying silty sand til - Test not successful as water rapidly filled hole	-
N19-IF4	18-Apr-11	- Successful test completed in clayey silt till layer - No observed infiltration during the 15min test period - Results not graphed	-
N19-IF5	18-Apr-11	- Successful test completed in clayey silt till layer - No observed infiltration during the 15min test period - Results not graphed	-
N19-IF5	26-Jun-11	- Successful test completed - Test results provided in Figure N19-F2	670
N19-IF6	19-Apr-11	- Removed layer of topsoil 0.30m deep to underlying sandy silt - Test not successful as water rapidly filled hole	-
N19-IF7	15-Apr-11	- Successful test completed - Test results provided in Figure N19-F3	39

* Test locations shown on Figure N19-F1

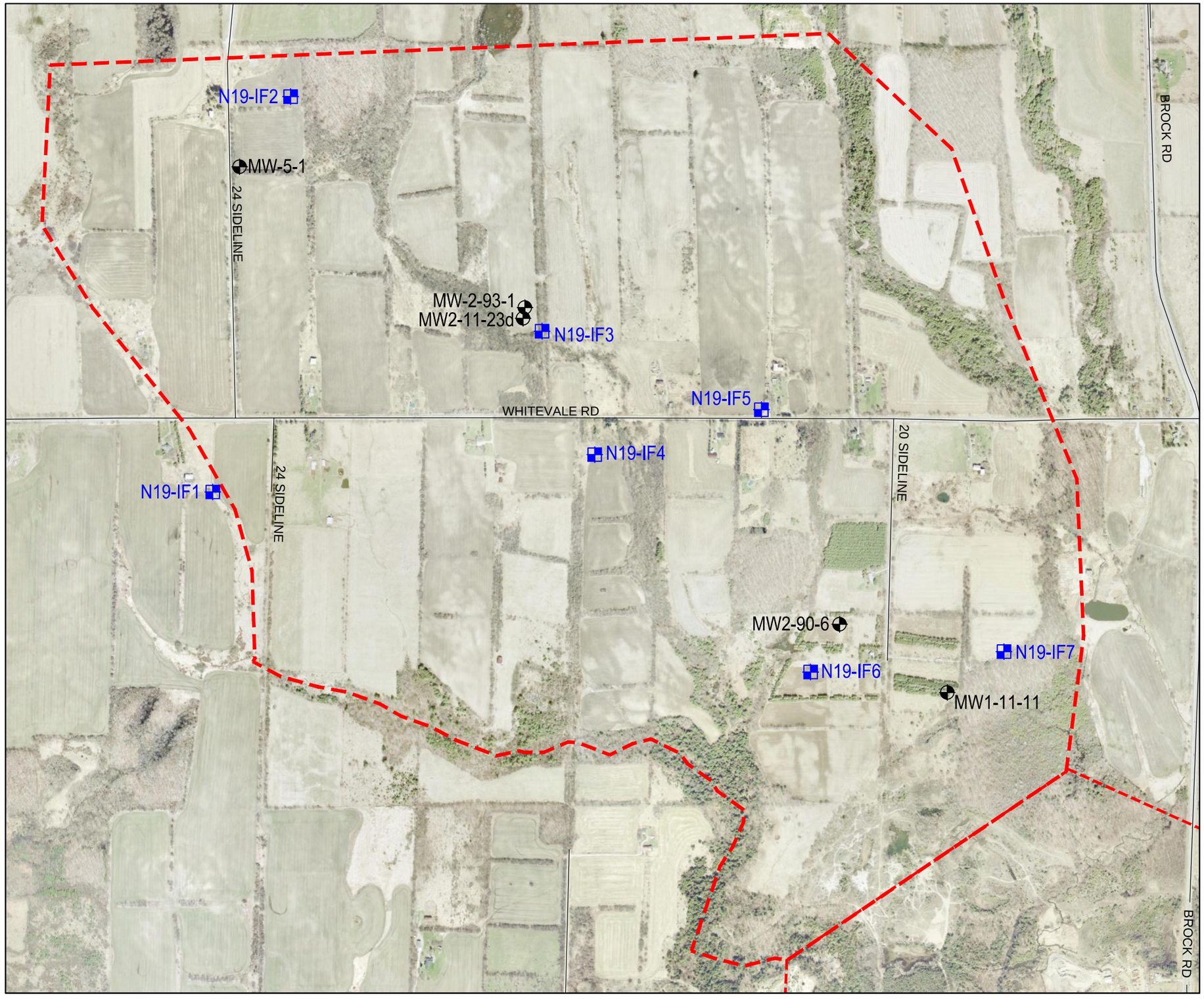

FIGURE N19-F1

SEATON NEIGHBOURHOOD 19
REGION OF DURHAM
HYDROGEOLOGICAL STUDY

INFILTRATION AND HYDRAULIC CONDUCTIVITY TEST LOCATIONS

LEGEND

- NEIGHBOURHOOD 19 BOUNDARY
- INFILTRATION TEST LOCATION
- HYDRAULIC CONDUCTIVITY TEST LOCATION (Burnside)

N

0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8

Kilometres

February 2013
Project Number: PEB019877.0000

Projection: UTM Zone 17
Datum: NAD83

Prepared by: S. Ker

Verified by: J. Thompson

BURNSIDE

019877 HG STUDY I & K TESTS

Plot Time: Feb 07, 2013 - 2:04pm

Infiltration Rate at N19-IF5

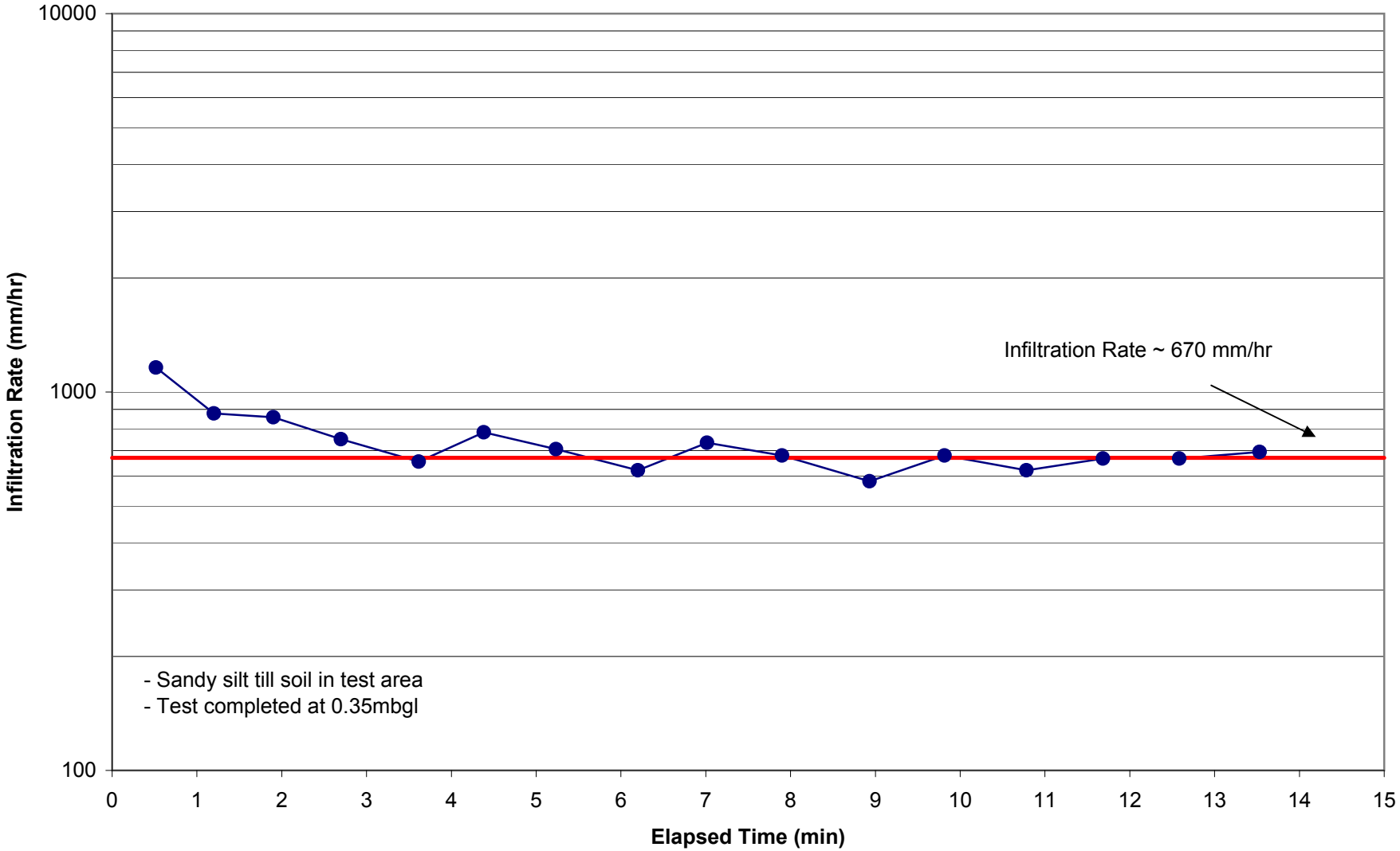

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Figure N19-F2

Infiltration Rate at N19-IF7

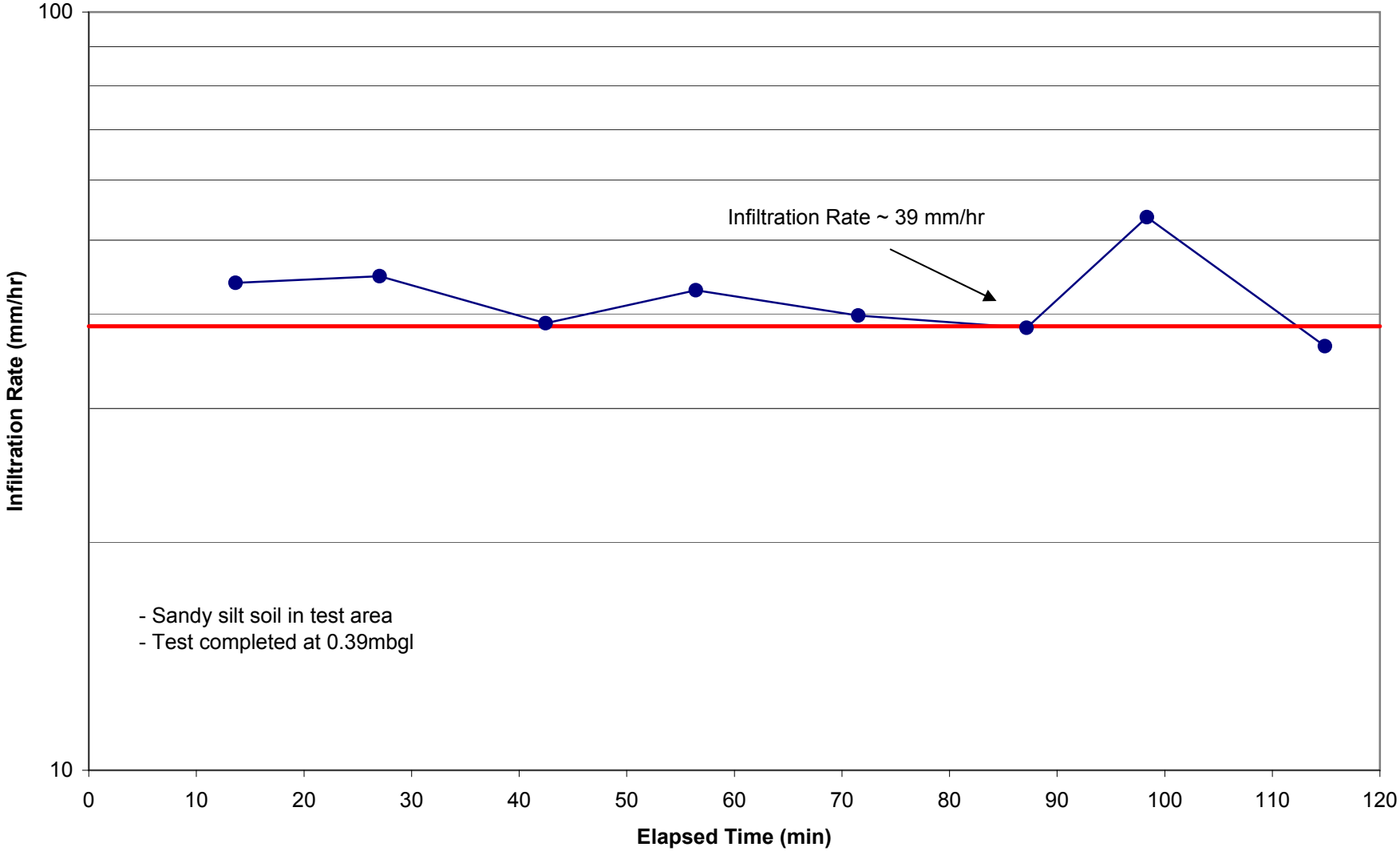

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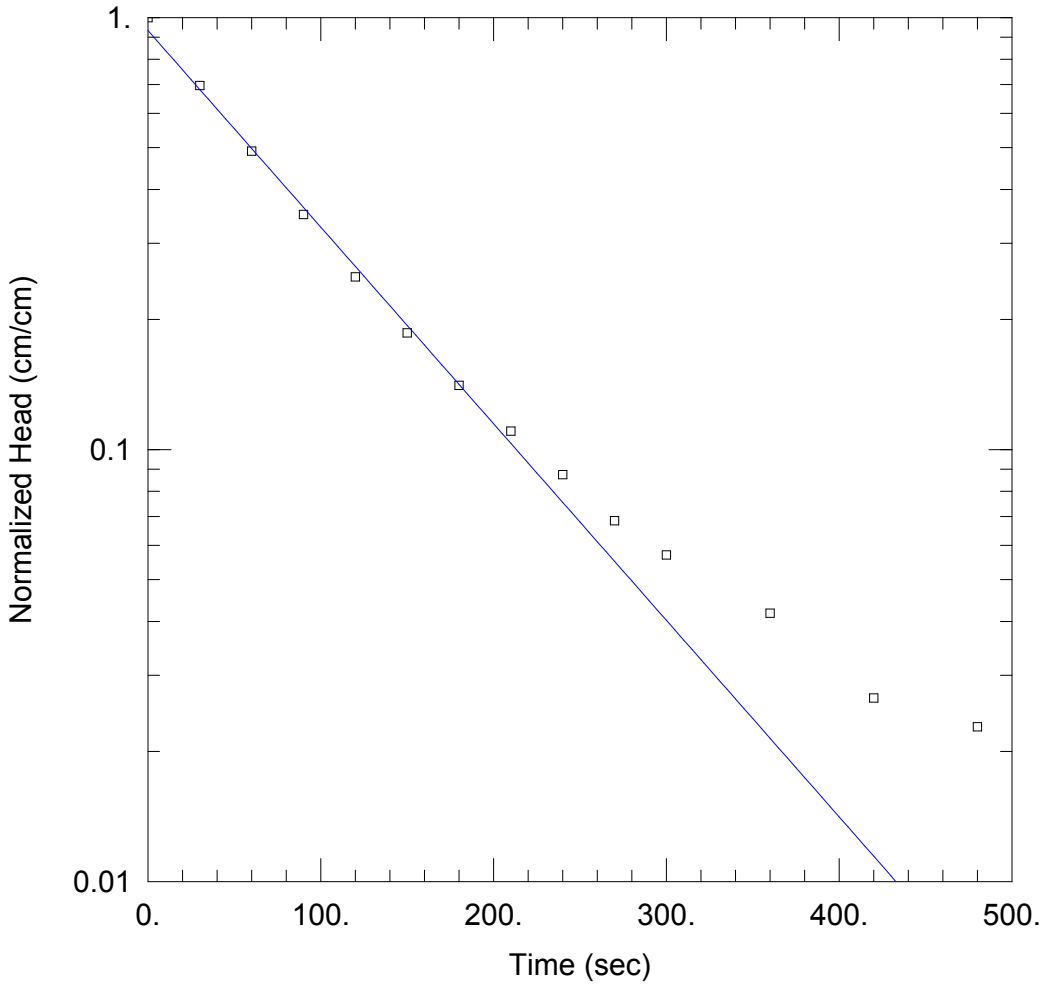
Figure N19-F3



HYDRAULIC CONDUCTIVITY TEST AT MW-1-11-11

PROJECT INFORMATION

Project: PEB019877 N19
Location: North Pickering
Test Well: MW-1-11-11
Test Date: April 15, 2011

AQUIFER DATA

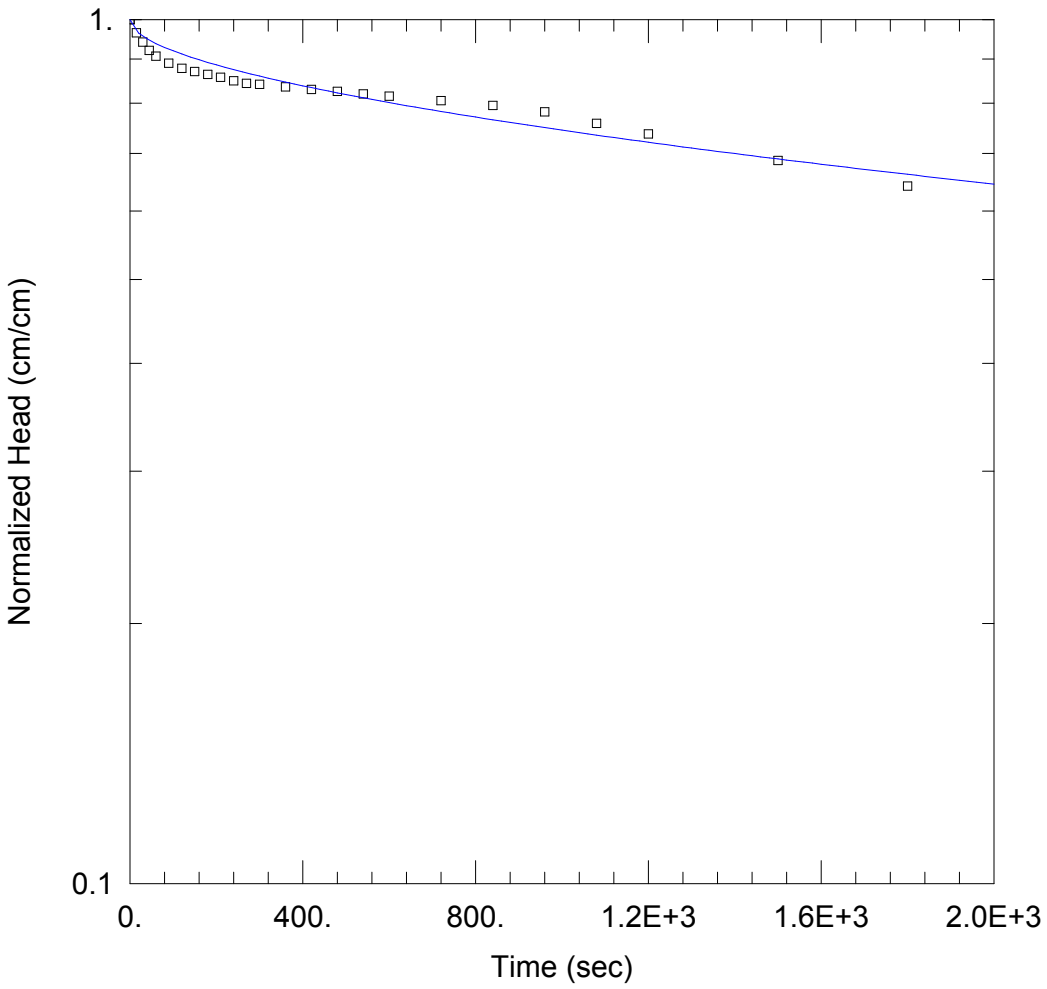
Saturated Thickness: 514.5 cm
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-1-11-11)

Initial Displacement: 131.5 cm
Total Well Penetration Depth: 514.5 cm
Casing Radius: 2.54 cm
Static Water Column Height: 514.5 cm
Screen Length: 150. cm
Well Radius: 7.62 cm

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.0006532 cm/sec
y0 = 122.7 cm



HYDRAULIC CONDUCTIVITY TEST AT MW-2-11-23D

PROJECT INFORMATION

Project: PEB019877 N19
Location: North Pickering
Test Well: MW-2-11-23d
Test Date: May 3, 2011

AQUIFER DATA

Saturated Thickness: 867. cm

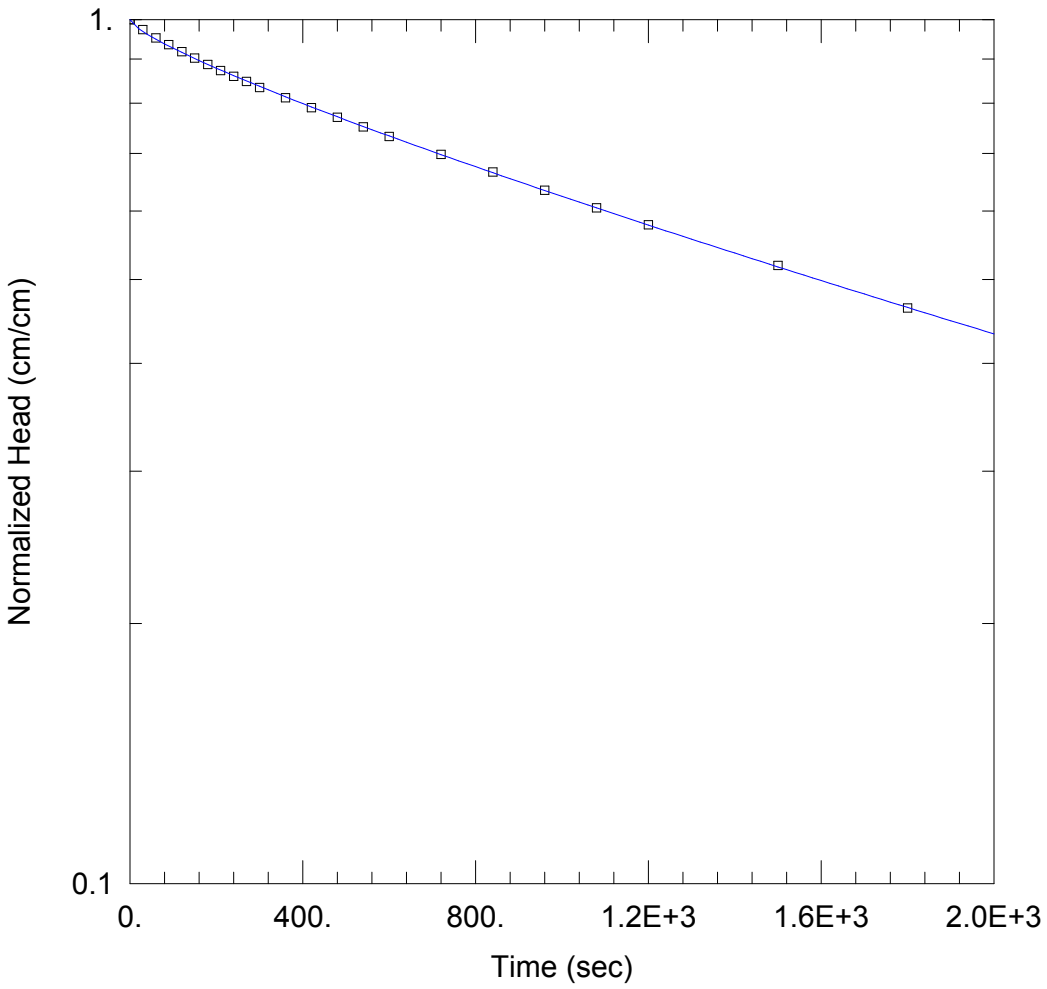
WELL DATA (MW-2-11-23D)

Initial Displacement: 517.5 cm
Total Well Penetration Depth: 867. cm
Casing Radius: 2.54 cm
Static Water Column Height: 867. cm
Screen Length: 150. cm
Well Radius: 7.62 cm

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 3.252E-6 cm/sec
Kz/Kr = 1.
Ss = 0.0001153 cm^{-1}



HYDRAULIC CONDUCTIVITY TEST AT MW2-90-6

PROJECT INFORMATION

Project: PEB019877 N19
Location: North Pickering
Test Well: MW2-90-6
Test Date: April 19, 2011

AQUIFER DATA

Saturated Thickness: 555.5 cm

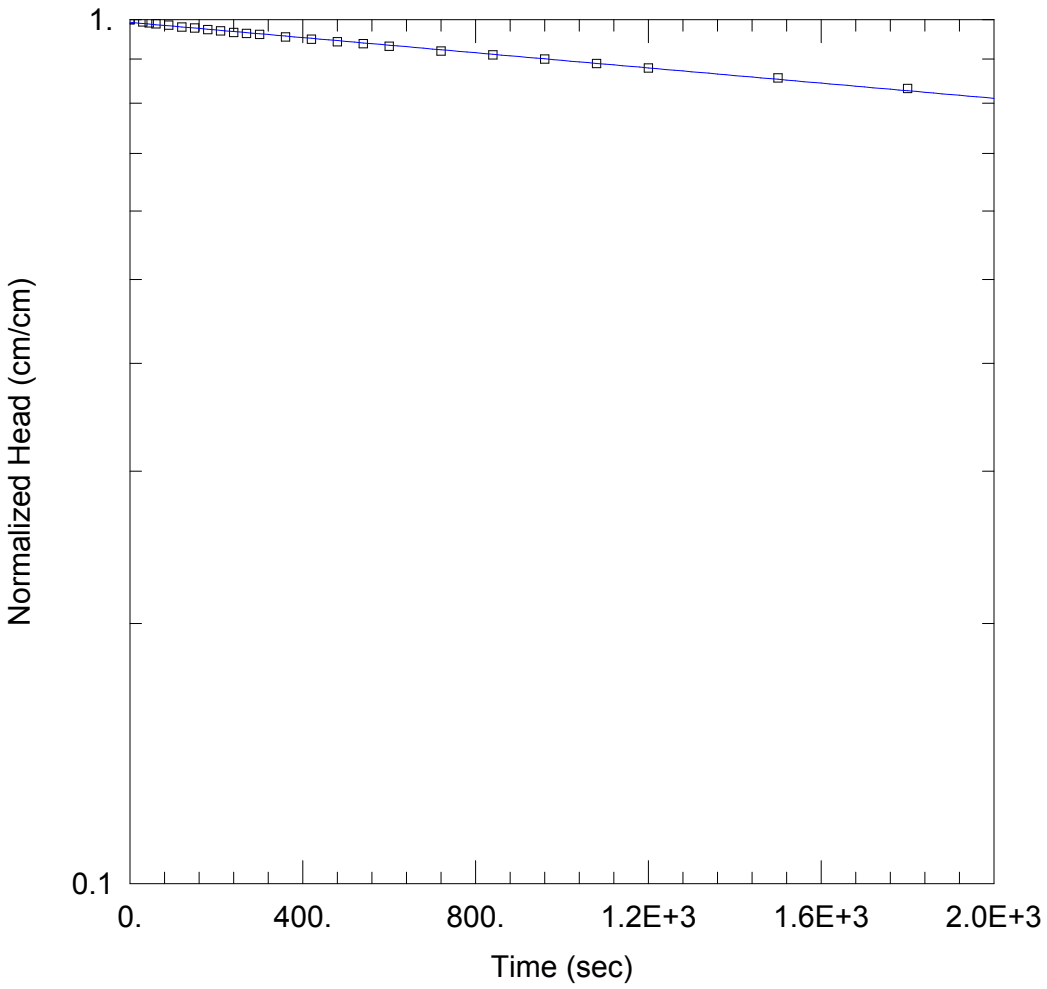
WELL DATA (MW2-90-6)

Initial Displacement: 377.5 cm
Total Well Penetration Depth: 555.5 cm
Casing Radius: 2.54 cm
Static Water Column Height: 555.5 cm
Screen Length: 150. cm
Well Radius: 7.62 cm

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 2.456E-5 cm/sec
Kz/Kr = 1.
Ss = 2.655E-6 cm^{-1}



HYDRAULIC CONDUCTIVITY TEST AT MW2-93-1

PROJECT INFORMATION

Project: PEB019877 N19
Location: North Pickering
Test Well: MW2-93-1
Test Date: April 19, 2011

AQUIFER DATA

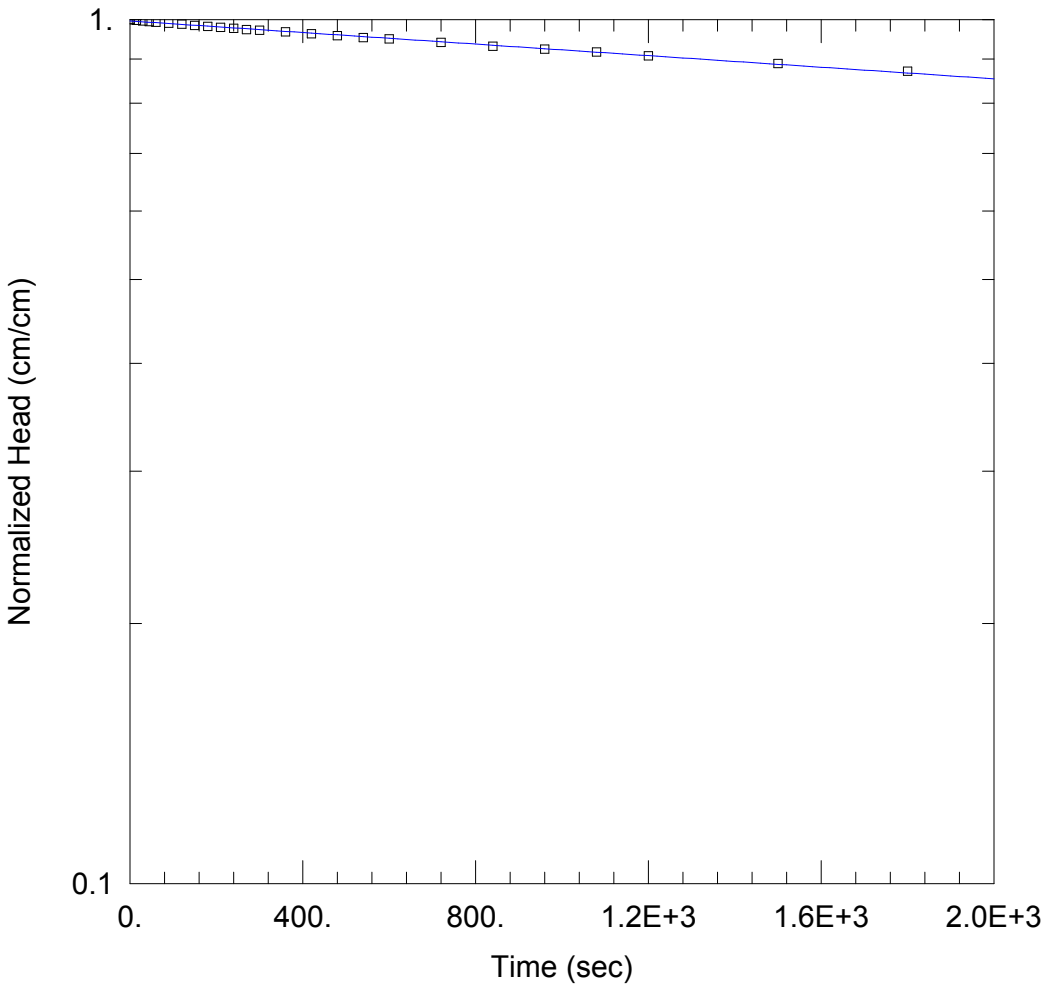
Saturated Thickness: 562. cm
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW2-93-1)

Initial Displacement: 399. cm
Total Well Penetration Depth: 562. cm
Casing Radius: 2.54 cm
Static Water Column Height: 562. cm
Screen Length: 150. cm
Well Radius: 7.62 cm

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 6.41E-6 cm/sec
y0 = 396. cm



HYDRAULIC CONDUCTIVITY TEST AT MW5-1

PROJECT INFORMATION

Project: PEB019877 N19
Location: North Pickering
Test Well: MW5-1
Test Date: April 19, 2011

AQUIFER DATA

Saturated Thickness: 801. cm
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW5-1)

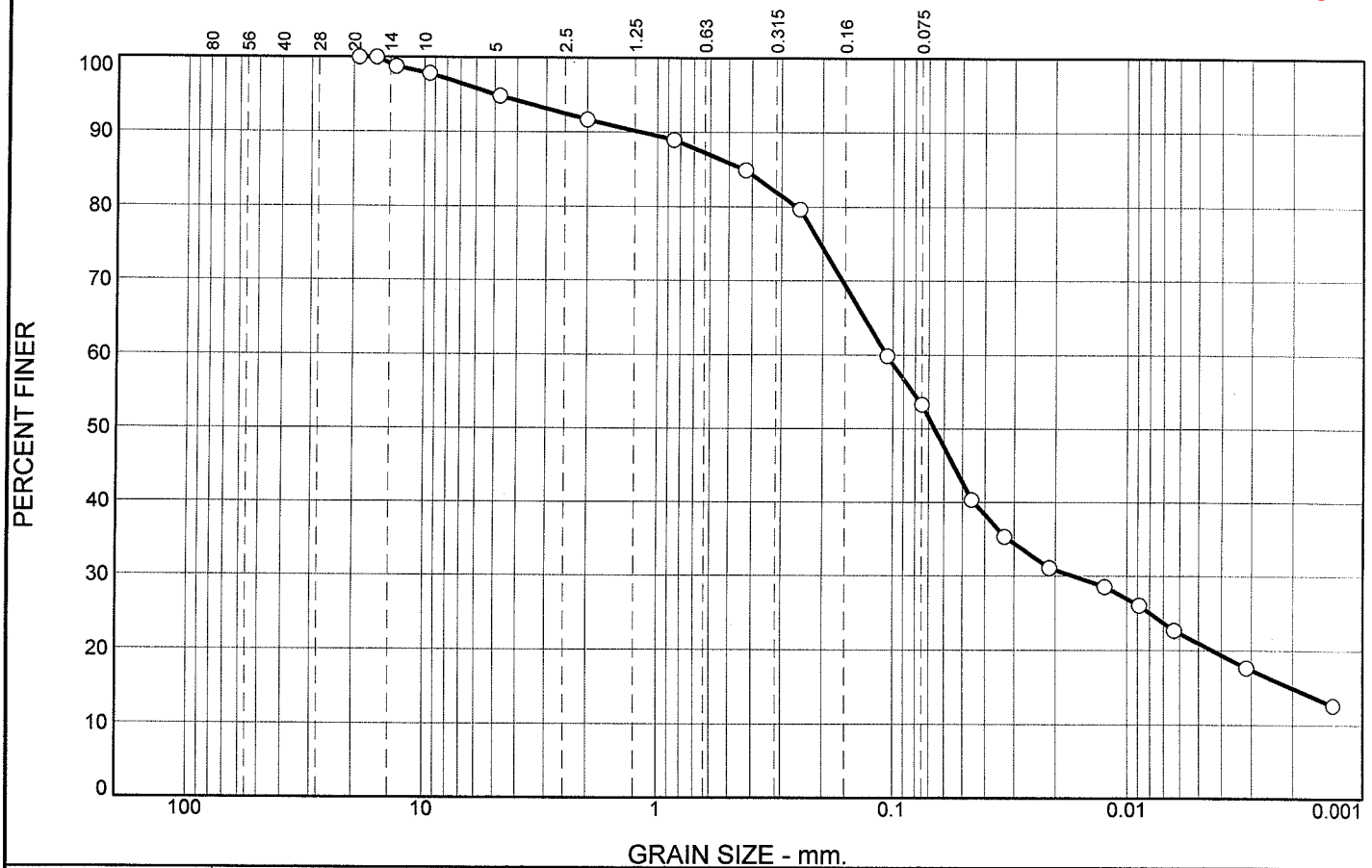
Initial Displacement: 555. cm
Total Well Penetration Depth: 801. cm
Casing Radius: 2.54 cm
Static Water Column Height: 801. cm
Screen Length: 150. cm
Well Radius: 7.62 cm

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 5.177E-6 cm/sec
y0 = 552.9 cm

Particle Size Distribution Report

MW1-11-02



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	5.2	3.1	6.8	31.6	38.3	15.0

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
19 mm	100.0		
16 mm	100.0		
13.2 mm	98.7		
9.5 mm	97.8		
4.75 mm	94.8		
2.00 mm	91.7		
0.850 mm	89.0		
0.425 mm	84.9		
0.250 mm	79.7		
0.106 mm	59.8		
0.075 mm	53.3		
0.0457 mm.	40.3		
0.0330 mm.	35.3		
0.0213 mm.	31.1		
0.0124 mm.	28.6		
0.0089 mm.	26.0		
0.0063 mm.	22.7		
0.0032 mm.	17.6		
0.0013 mm.	12.6		

* (no specification provided)

Soil Description

Brown Silty Sand with some Clay, trace Gravel

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 1.1719 D_{85}= 0.4297 D_{60}= 0.1067
D_{50}= 0.0661 D_{30}= 0.0168 D_{15}= 0.0020
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

K<1.0x10^-6 cm/sec

Location: BH11-2 SS4, Sampled on March 24, 2011
Sample Number: E7270

Date:

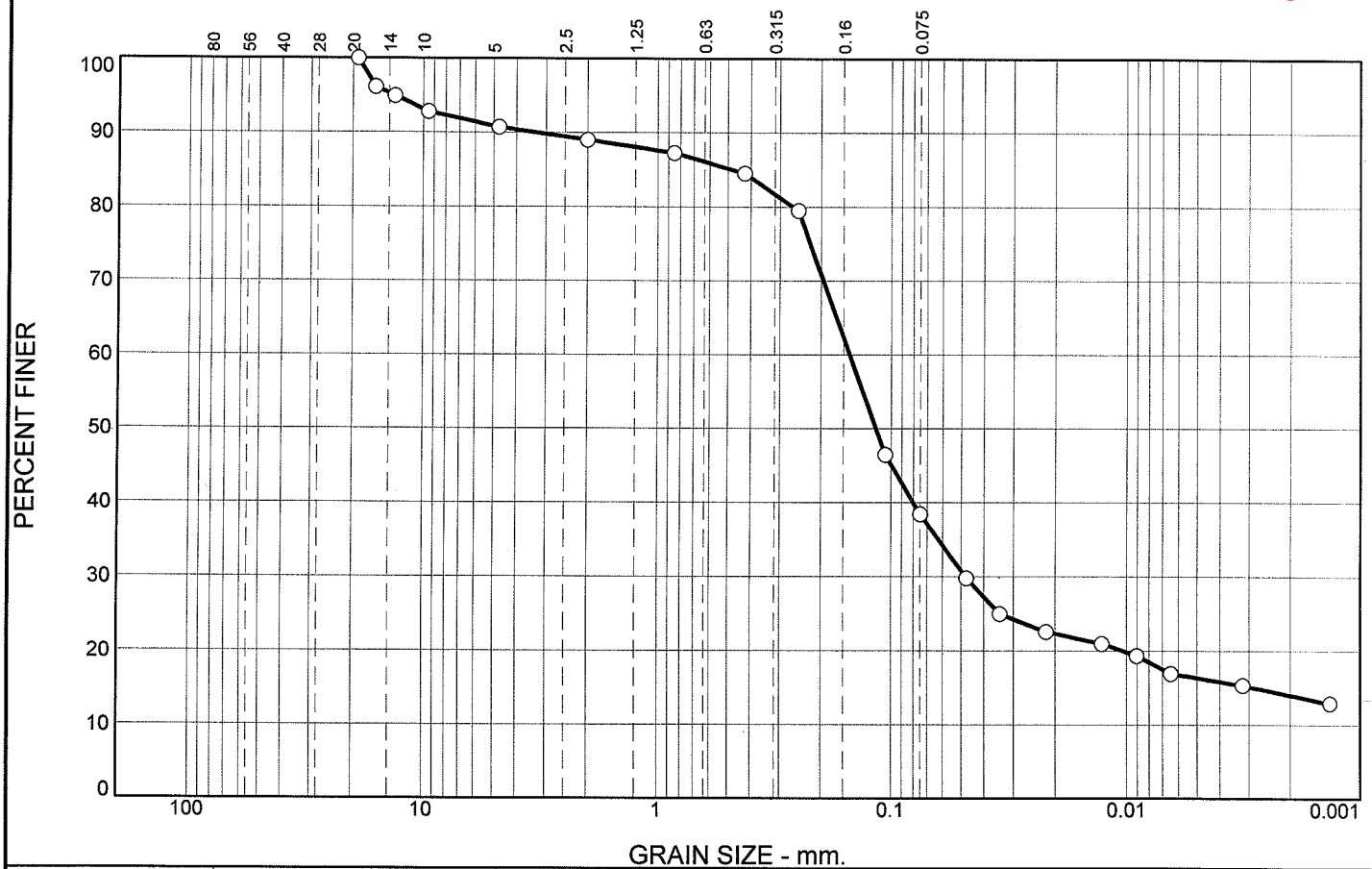
AME Materials Engineering

Client: Mattamy Homes
Project: Mulberry Lane (South of Whitevale Road), Pickering

Project No: 40840.290 **Figure**

Particle Size Distribution Report

MW1-11-02



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	9.3	1.7	4.5	46.1	24.4	14.0

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
19 mm	100.0		
16 mm	96.1		
13.2 mm	94.9		
9.5 mm	92.8		
4.75 mm	90.7		
2.00 mm	89.0		
0.850 mm	87.3		
0.425 mm	84.5		
0.250 mm	79.5		
0.106 mm	46.4		
0.075 mm	38.4		
0.0475 mm.	29.8		
0.0343 mm.	25.0		
0.0219 mm.	22.6		
0.0127 mm.	20.9		
0.0091 mm.	19.3		
0.0065 mm.	16.9		
0.0032 mm.	15.3		
0.0014 mm.	12.9		

* (no specification provided)

Soil Description

Brown Silty Sand with some Clay, trace Gravel

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 3.2780 D_{85}= 0.4777 D_{60}= 0.1507
D_{50}= 0.1162 D_{30}= 0.0480 D_{15}= 0.0029
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

K<1.0x10^-6 cm/sec

Location: BH11-2 SS7, Sampled on March 24, 2011
Sample Number: E7270

Date:

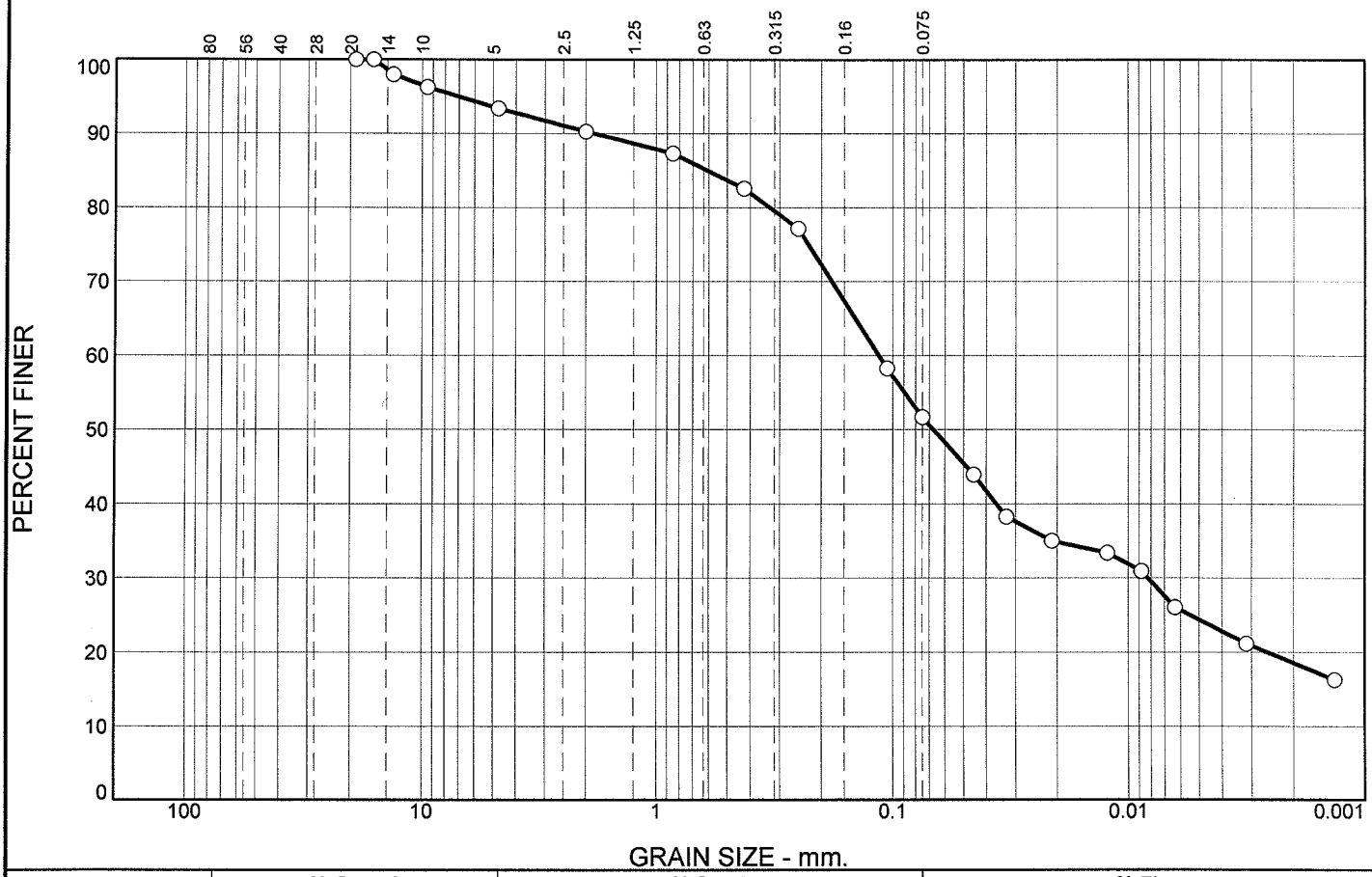
AMC Materials Engineering

Client: Mattamy Homes
Project: Mulberry Lane (South of Whitevale Road), Pickering

Project No: 40840.290 **Figure**

Particle Size Distribution Report

MW1-11-10



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	6.6	3.1	7.7	30.9	33.1	18.6

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
19 mm	100.0		
16 mm	100.0		
13.2 mm	98.0		
9.5 mm	96.3		
4.75 mm	93.4		
2.00 mm	90.3		
0.850 mm	87.3		
0.425 mm	82.6		
0.250 mm	77.1		
0.106 mm	58.2		
0.075 mm	51.7		
0.0452 mm.	43.9		
0.0328 mm.	38.2		
0.0211 mm.	35.0		
0.0123 mm.	33.4		
0.0088 mm.	30.9		
0.0063 mm.	26.0		
0.0032 mm.	21.2		
0.0013 mm.	16.3		

* (no specification provided)

Soil Description

Silty Sand with some Clay, trace Gravel

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 1.8430 D_{85}= 0.6057 D_{60}= 0.1148
D_{50}= 0.0673 D_{30}= 0.0082 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

K<1.0x10^-6 cm/sec

Location: BH11- 10 SS3, Sampled on March 28, 2011
Sample Number: E7270

Date:

AME Materials Engineering

Client: Mattamy Homes
Project: Mulberry Lane (South of Whitevale Road), Pickering

Project No: 40840.290 **Figure**

Particle Size Distribution Report

MW1-11-10

% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	8.5	3.6	7.4	27.2	36.4	16.9

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
19 mm	100.0		
16 mm	100.0		
13.2 mm	96.6		
9.5 mm	95.9		
4.75 mm	91.5		
2.00 mm	87.9		
0.850 mm	84.6		
0.425 mm	80.5		
0.250 mm	75.5		
0.106 mm	58.8		
0.075 mm	53.3		
0.0444 mm.	46.0		
0.0322 mm.	40.5		
0.0208 mm.	36.5		
0.0122 mm.	33.3		
0.0087 mm.	30.2		
0.0063 mm.	25.4		
0.0032 mm.	19.8		
0.0013 mm.	14.3		

* (no specification provided)

Soil Description

Silty Sand with some Clay, trace Gravel

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 3.3044 D_{85}= 0.9415 D_{60}= 0.1128
D_{50}= 0.0591 D_{30}= 0.0086 D_{15}= 0.0015
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

K<1.0x10^-6 cm/sec

Location: BH11- 10 SS5, Sampled on March 28, 2011
Sample Number: E7270

Date:

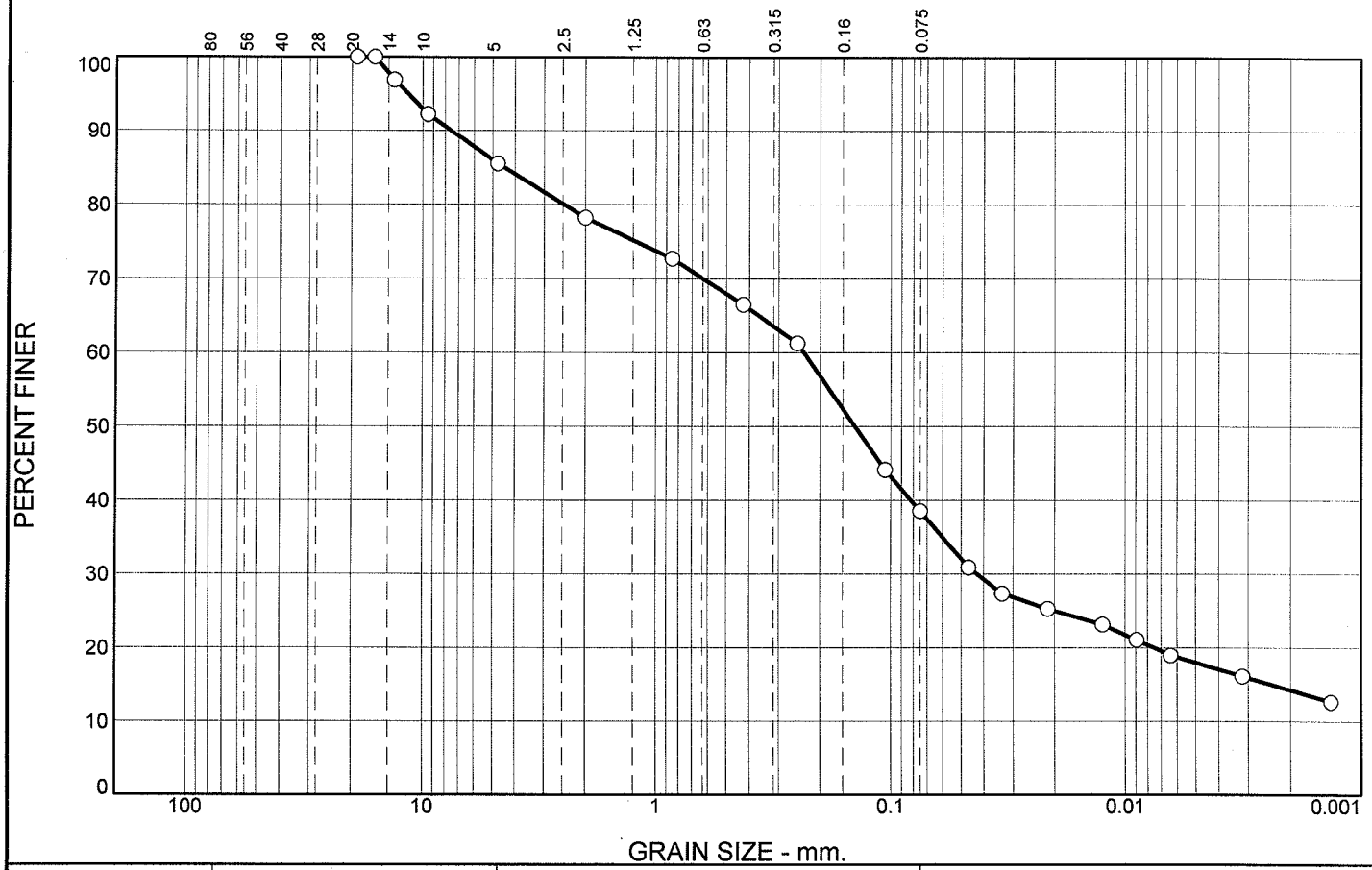
AME Materials Engineering

Client: Mattamy Homes
Project: Mulberry Lane (South of Whitevale Road), Pickering

Project No: 40840.290 **Figure**

Particle Size Distribution Report

MW1-11-10



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	14.4	7.4	11.7	28.0	24.3	14.2

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
19 mm	100.0		
16 mm	100.0		
13.2 mm	96.9		
9.5 mm	92.2		
4.75 mm	85.6		
2.00 mm	78.2		
0.850 mm	72.7		
0.425 mm	66.5		
0.250 mm	61.3		
0.106 mm	44.1		
0.075 mm	38.5		
0.0465 mm.	30.9		
0.0335 mm.	27.4		
0.0214 mm.	25.3		
0.0125 mm.	23.1		
0.0089 mm.	21.0		
0.0064 mm.	18.9		
0.0032 mm.	16.1		
0.0013 mm.	12.6		

* (no specification provided)

Soil Description

Silty Sand with some Clay and some Gravel

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 7.5402 D_{85}= 4.4342 D_{60}= 0.2347
D_{50}= 0.1422 D_{30}= 0.0429 D_{15}= 0.0024
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

K≈1.0x10^-6 cm/sec

Location: BH11- 10 SS7, Sampled on March 28, 2011
Sample Number: E7270

Date:

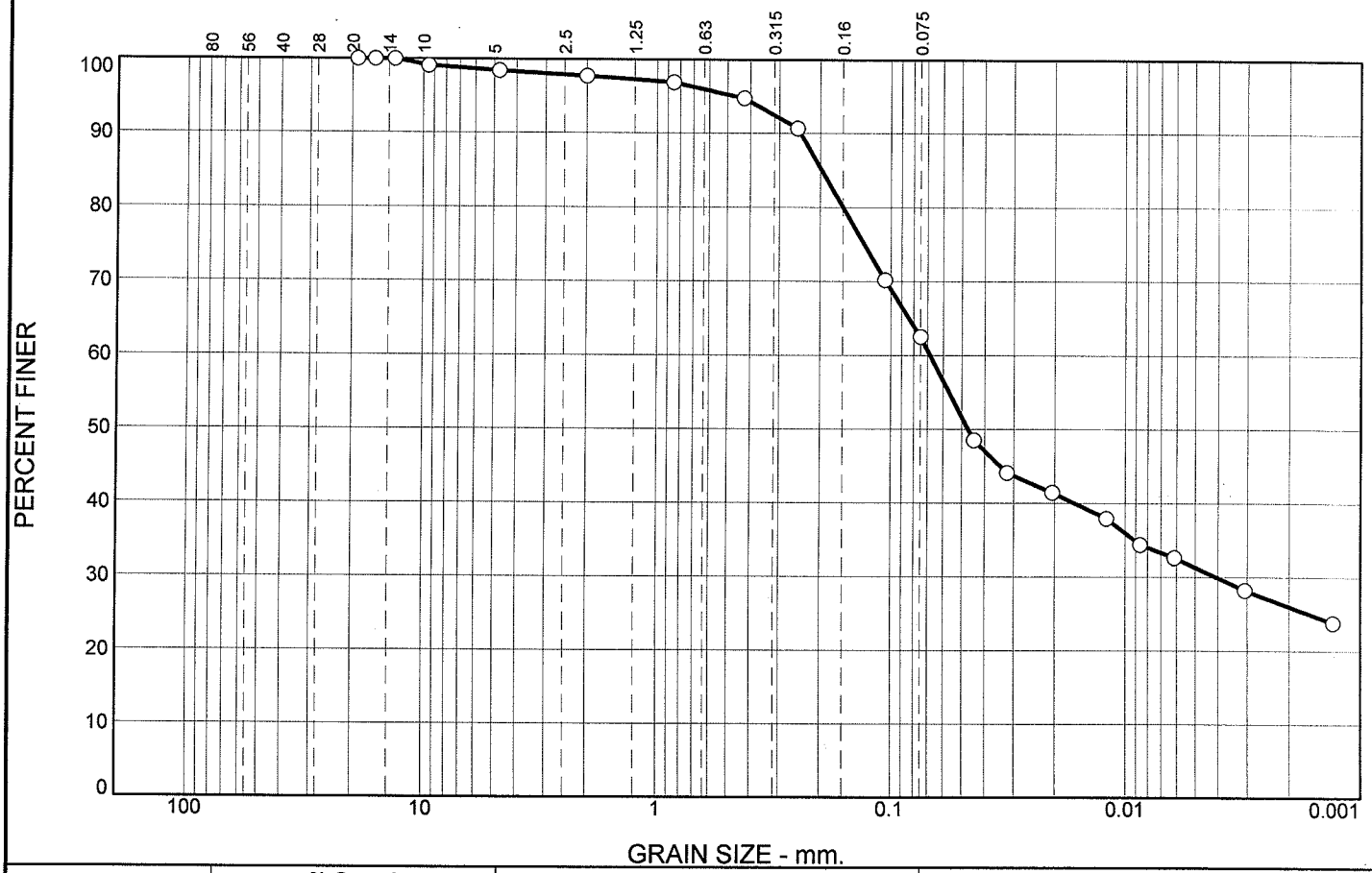
AME Materials Engineering

Client: Mattamy Homes
Project: Mulberry Lane (South of Whitevale Road), Pickering

Project No: 40840.290 **Figure**

Particle Size Distribution Report

MW1-11-11



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	1.6	0.7	3.0	32.2	36.5	26.0

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
19 mm	100.0		
16 mm	100.0		
13.2 mm	100.0		
9.5 mm	99.1		
4.75 mm	98.4		
2.00 mm	97.7		
0.850 mm	96.9		
0.425 mm	94.7		
0.250 mm	90.7		
0.106 mm	70.2		
0.075 mm	62.5		
0.0445 mm.	48.5		
0.0321 mm.	44.1		
0.0205 mm.	41.4		
0.0120 mm.	37.9		
0.0086 mm.	34.4		
0.0061 mm.	32.6		
0.0031 mm.	28.2		
0.0013 mm.	23.8		

* (no specification provided)

Soil Description

Brown Sandy Silt with Clay, trace Gravel

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.2429 D_{85}= 0.1970 D_{60}= 0.0683
D_{50}= 0.0471 D_{30}= 0.0041 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

K<1.0x10^-6 cm/sec

Location: BH11- 11 SS4, Sampled on March 28, 2011
Sample Number: E7270

Date:

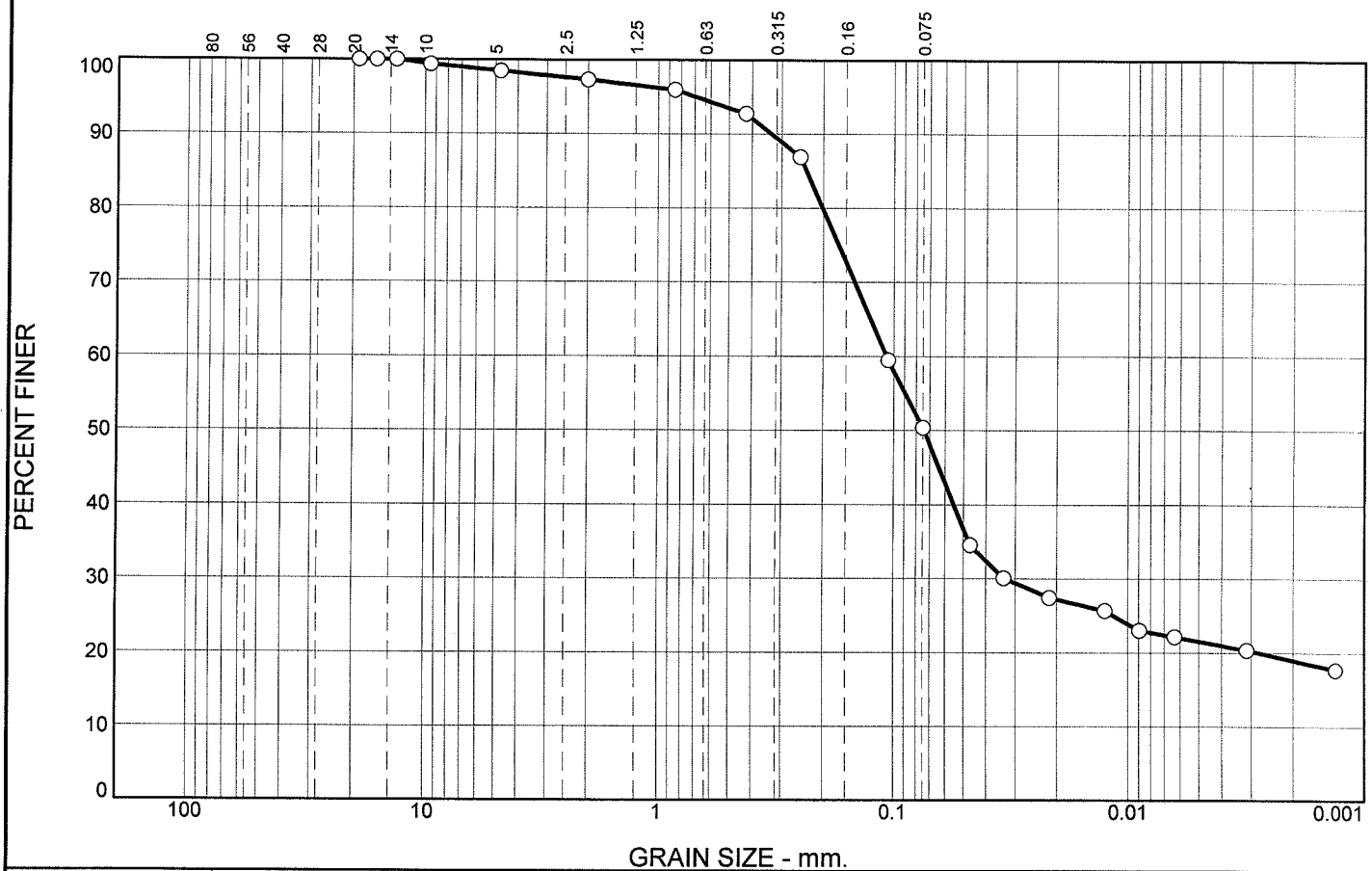
AME Materials Engineering

Client: Mattamy Homes
Project: Mulberry Lane (South of Whitevale Road), Pickering

Project No: 40840.290 **Figure**

Particle Size Distribution Report

MW1-11-11



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	1.5	1.2	4.6	42.3	31.4	19.0

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
19 mm	100.0		
16 mm	100.0		
13.2 mm	100.0		
9.5 mm	99.4		
4.75 mm	98.5		
2.00 mm	97.3		
0.850 mm	95.9		
0.425 mm	92.7		
0.250 mm	86.9		
0.106 mm	59.5		
0.075 mm	50.4		
0.0468 mm.	34.5		
0.0337 mm.	30.1		
0.0215 mm.	27.4		
0.0125 mm.	25.7		
0.0089 mm.	23.0		
0.0063 mm.	22.1		
0.0031 mm.	20.4		
0.0013 mm.	17.7		

* (no specification provided)

Soil Description

Brown Silty Sand with some Clay, trace Gravel

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.3307 D_{85}= 0.2353 D_{60}= 0.1077
D_{50}= 0.0742 D_{30}= 0.0332 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

K<1.0x10^-6 cm/sec

Location: BH11- 11 SS6, Sampled on March 28, 2011
Sample Number: E7270

Date:

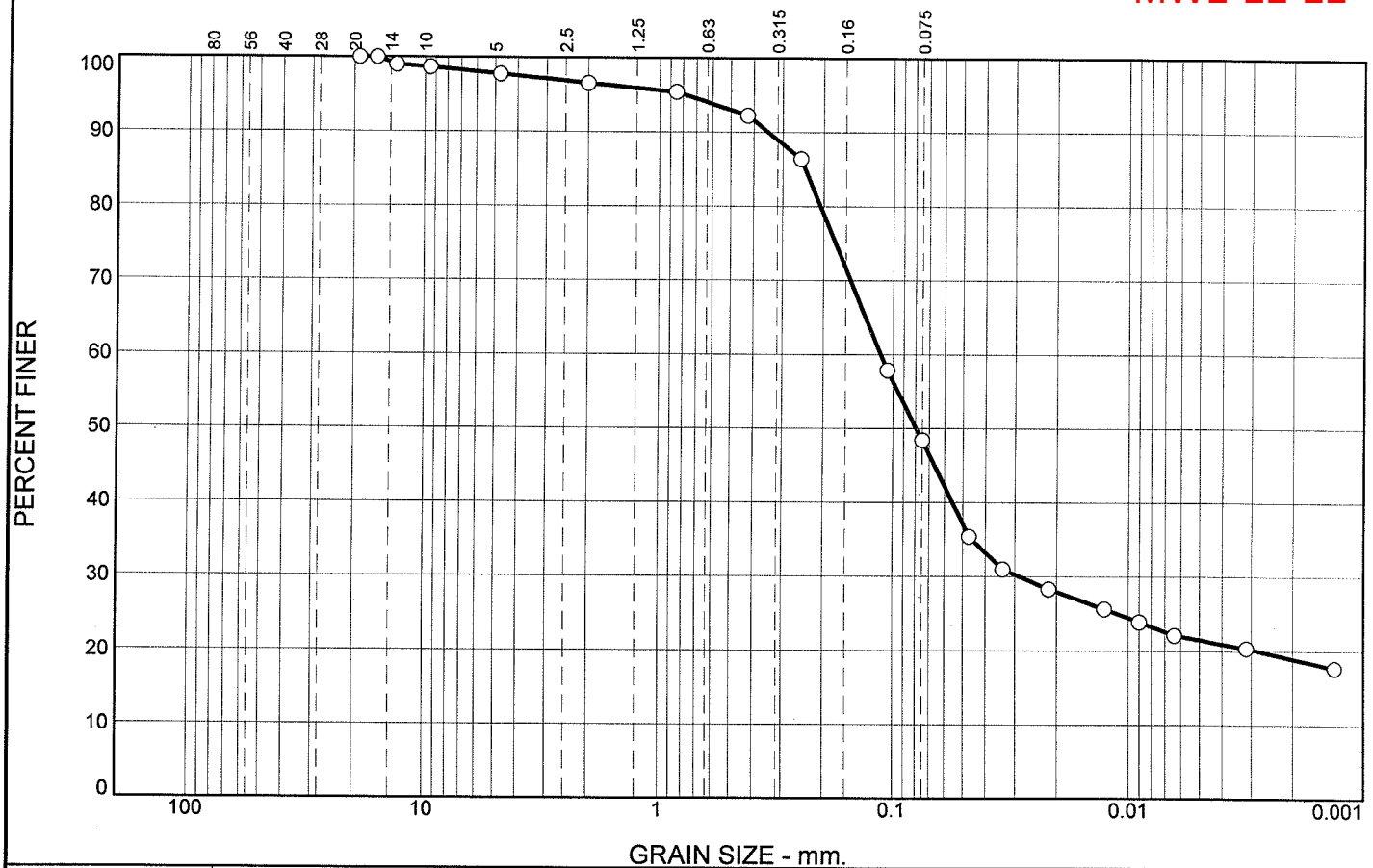
AME Materials Engineering

Client: Mattamy Homes
Project: Mulberry Lane (South of Whitevale Road), Pickering

Project No: 40840.290 **Figure**

Particle Size Distribution Report

MW1-11-11



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	2.2	1.2	4.3	43.9	29.5	18.9

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
19 mm	100.0		
16 mm	100.0		
13.2 mm	99.0		
9.5 mm	98.7		
4.75 mm	97.8		
2.00 mm	96.6		
0.850 mm	95.4		
0.425 mm	92.3		
0.250 mm	86.4		
0.106 mm	57.9		
0.075 mm	48.4		
0.0471 mm.	35.4		
0.0339 mm.	31.0		
0.0217 mm.	28.3		
0.0126 mm.	25.7		
0.0090 mm.	23.9		
0.0064 mm.	22.1		
0.0032 mm.	20.3		
0.0013 mm.	17.7		

* (no specification provided)

Soil Description

Brown Silty Sand with some Clay, trace Gravel

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.3456 D_{85}= 0.2395 D_{60}= 0.1131
D_{50}= 0.0795 D_{30}= 0.0288 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

K<1.0x10^-6 cm/sec

Location: BH11- 11 SS8, Sampled on March 28, 2011
Sample Number: E7270

Date:

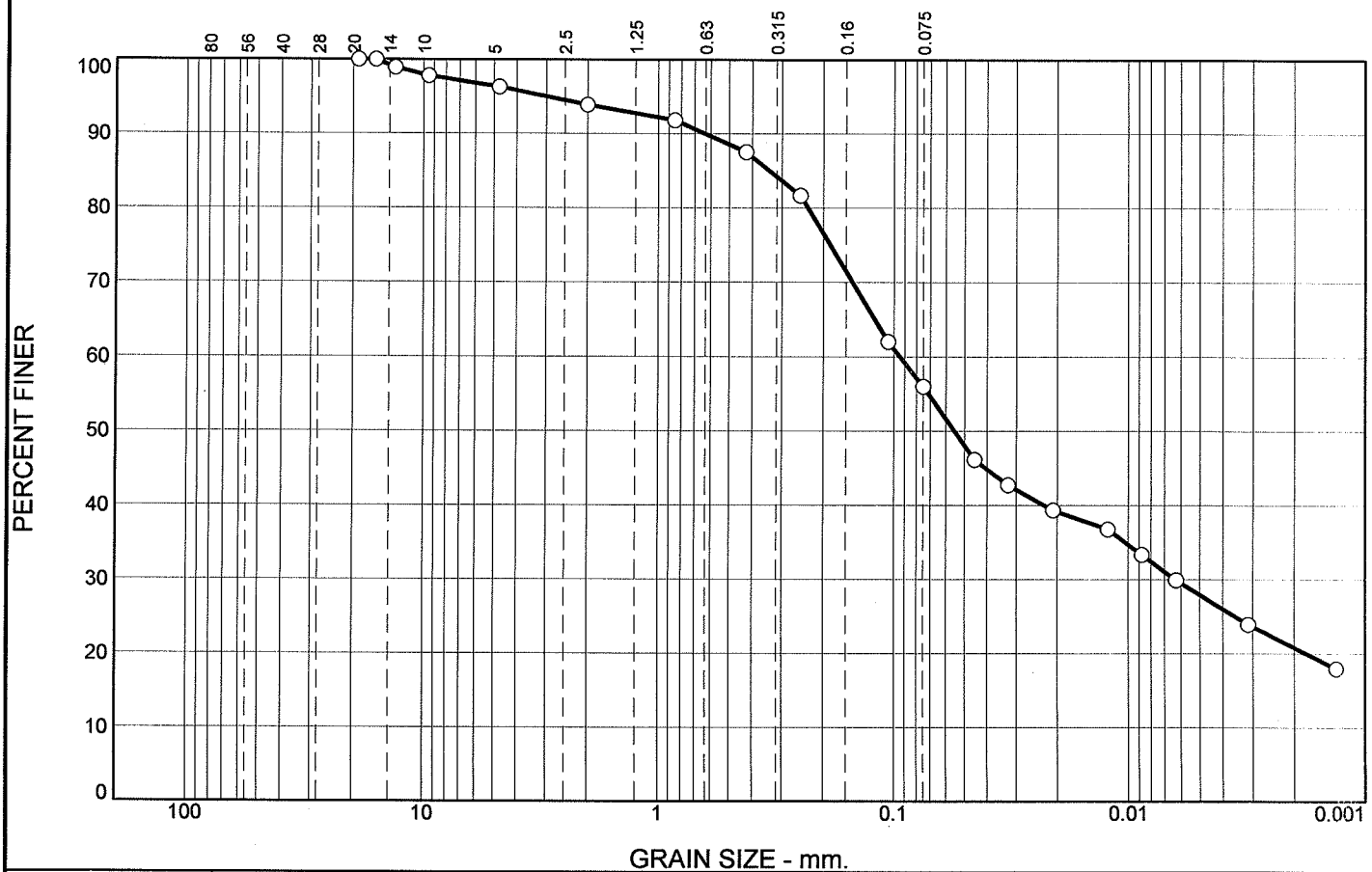
AMC Materials Engineering

Client: Mattamy Homes
Project: Mulberry Lane (South of Whitevale Road), Pickering

Project No: 40840.290 **Figure**

Particle Size Distribution Report

MW2-11-06



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	3.7	2.4	6.4	31.5	35.2	20.8

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
19 mm	100.0		
16 mm	100.0		
13.2 mm	98.9		
9.5 mm	97.8		
4.75 mm	96.3		
2.00 mm	93.9		
0.850 mm	91.8		
0.425 mm	87.5		
0.250 mm	81.6		
0.106 mm	62.0		
0.075 mm	56.0		
0.0454 mm.	46.1		
0.0326 mm.	42.7		
0.0209 mm.	39.3		
0.0122 mm.	36.7		
0.0088 mm.	33.3		
0.0063 mm.	29.9		
0.0031 mm.	23.9		
0.0013 mm.	17.9		

* (no specification provided)

Soil Description

Silty Sand with Clay, trace Gravel

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.6340 D_{85}= 0.3384 D_{60}= 0.0943
D_{50}= 0.0552 D_{30}= 0.0063 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

K<1.0x10^-6 cm/sec

Location: BH6 SS3, Sampled on March 30, 2011
Sample Number: E7271

Date:

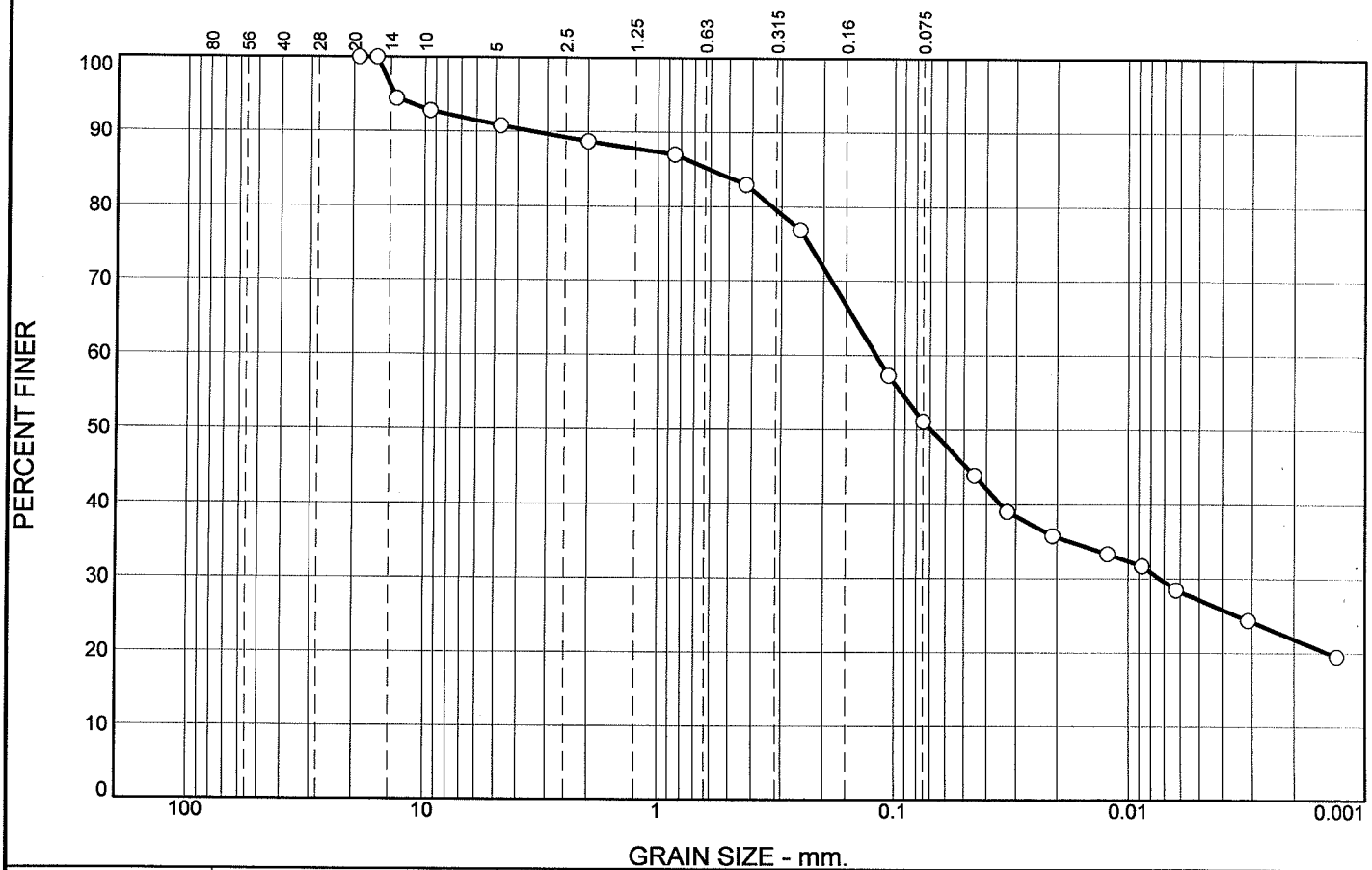
AME Materials Engineering

Client: Mattamy Homes
Project: North & South Sides of Whitevale Road, Pickering

Project No: 40840.292 **Figure**

Particle Size Distribution Report

MW2-11-06



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	9.2	2.1	5.7	31.9	29.2	21.9

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
19 mm	100.0		
16 mm	100.0		
13.2 mm	94.4		
9.5 mm	92.8		
4.75 mm	90.8		
2.00 mm	88.7		
0.850 mm	87.0		
0.425 mm	83.0		
0.250 mm	76.9		
0.106 mm	57.3		
0.075 mm	51.1		
0.0451 mm.	43.9		
0.0326 mm.	39.0		
0.0209 mm.	35.8		
0.0122 mm.	33.3		
0.0087 mm.	31.7		
0.0063 mm.	28.4		
0.0031 mm.	24.4		
0.0013 mm.	19.5		

* (no specification provided)

Soil Description

Silty Sand with Clay, trace Gravel

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 3.4100 D_{85}= 0.6021 D_{60}= 0.1194
D_{50}= 0.0692 D_{30}= 0.0073 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

K<1.0x10^-6 cm/sec

Location: BH6 SS5, Sampled on March 30, 2011
Sample Number: E7271

Date:

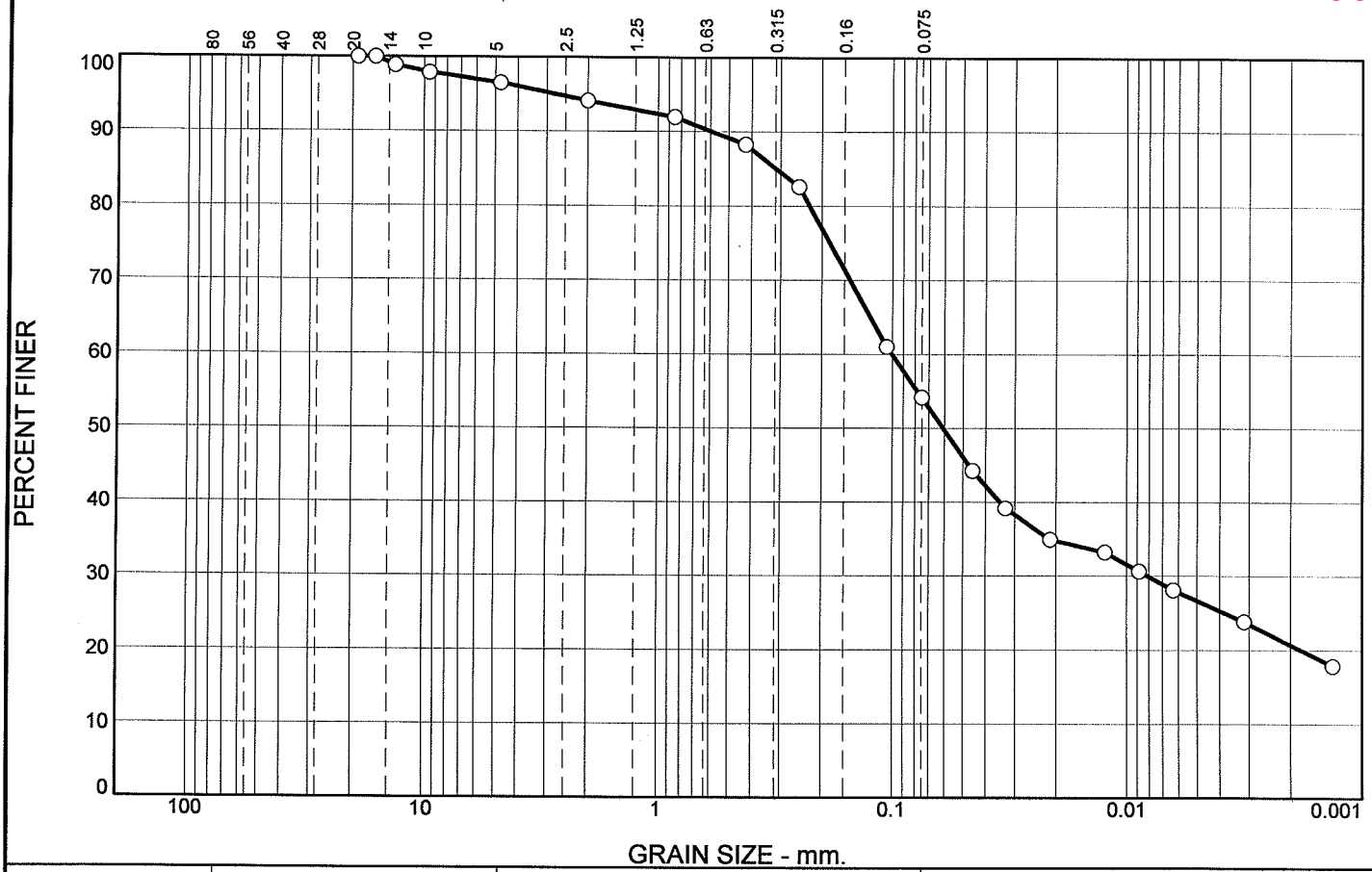
AME Materials Engineering

Client: Mattamy Homes
Project: North & South Sides of Whitevale Road, Pickering

Project No: 40840.292 **Figure**

Particle Size Distribution Report

MW2-11-06



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	3.5	2.4	5.8	34.2	33.4	20.7

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
19 mm	100.0		
16 mm	100.0		
13.2 mm	98.9		
9.5 mm	97.9		
4.75 mm	96.5		
2.00 mm	94.1		
0.850 mm	92.0		
0.425 mm	88.3		
0.250 mm	82.6		
0.106 mm	61.0		
0.075 mm	54.1		
0.0455 mm.	44.3		
0.0329 mm.	39.2		
0.0212 mm.	34.9		
0.0124 mm.	33.2		
0.0088 mm.	30.6		
0.0063 mm.	28.1		
0.0031 mm.	23.8		
0.0013 mm.	17.9		

* (no specification provided)

Soil Description

Silty Sand with Clay, trace Gravel

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.5887 D_{85}= 0.3128 D_{60}= 0.1006
D_{50}= 0.0608 D_{30}= 0.0081 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

K<1.0x10^-6 cm/sec

Location: BH6 SS8, Sampled on March 30, 2011
Sample Number: E7271

Date:

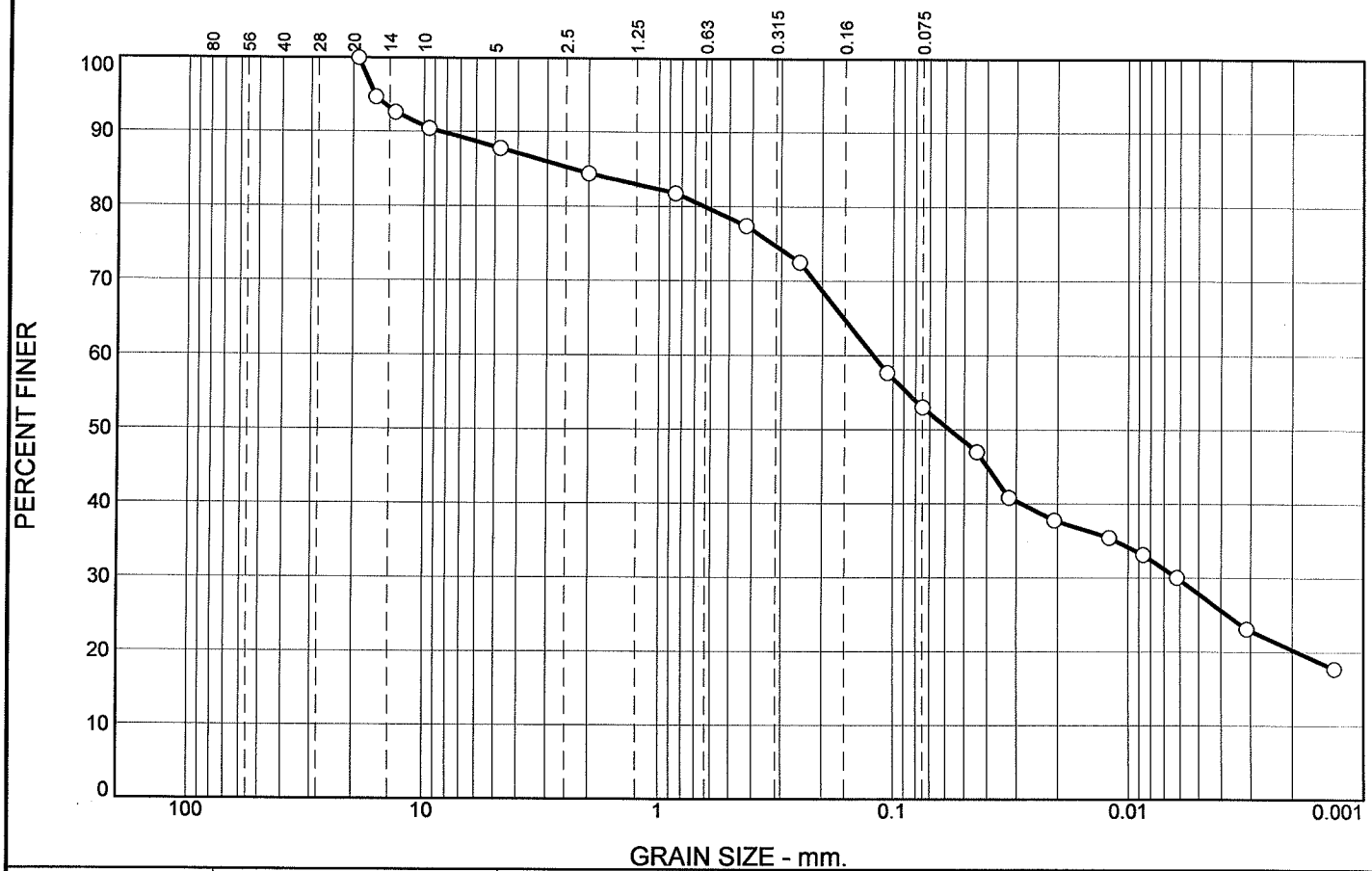
AME Materials Engineering

Client: Mattamy Homes
Project: North & South Sides of Whitevale Road, Pickering

Project No: 40840.292 **Figure**

Particle Size Distribution Report

BH2-11-7



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	12.2	3.4	7.0	24.4	32.7	20.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
19 mm	100.0		
16 mm	94.7		
13.2 mm	92.6		
9.5 mm	90.4		
4.75 mm	87.8		
2.00 mm	84.4		
0.850 mm	81.8		
0.425 mm	77.4		
0.250 mm	72.5		
0.106 mm	57.7		
0.075 mm	53.0		
0.0442 mm.	47.0		
0.0322 mm.	40.8		
0.0207 mm.	37.7		
0.0121 mm.	35.4		
0.0086 mm.	33.1		
0.0062 mm.	30.0		
0.0031 mm.	23.1		
0.0013 mm.	17.7		

* (no specification provided)

Soil Description

Silty Sand with Clay and some Gravel

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 8.4564 D_{85}= 2.3246 D_{60}= 0.1212
D_{50}= 0.0575 D_{30}= 0.0062 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

K<1.0x10^-6 cm/sec

Location: BH7 SS6, Sampled on March 30, 2011
Sample Number: E7271

Date:

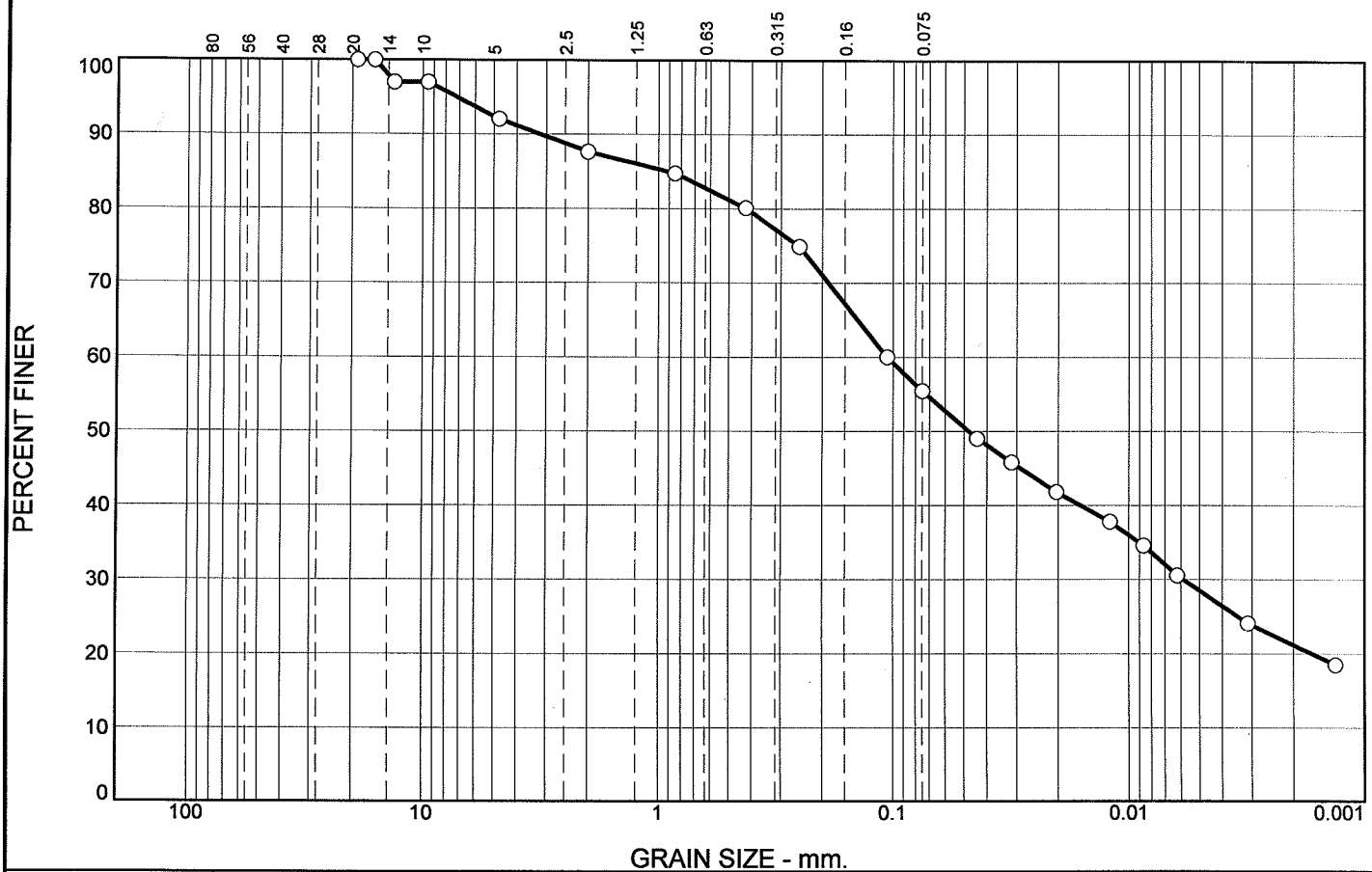
AME Materials Engineering

Client: Mattamy Homes
Project: North & South Sides of Whitevale Road, Pickering

Project No: 40840.292 **Figure**

Particle Size Distribution Report

BH2-11-8



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	8.0	4.3	7.6	24.6	34.3	21.2

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
19 mm	100.0		
16 mm	100.0		
13.2 mm	97.0		
9.5 mm	97.0		
4.75 mm	92.0		
2.00 mm	87.7		
0.850 mm	84.8		
0.425 mm	80.1		
0.250 mm	74.9		
0.106 mm	60.0		
0.075 mm	55.5		
0.0440 mm.	49.0		
0.0316 mm.	45.8		
0.0204 mm.	41.8		
0.0120 mm.	37.8		
0.0086 mm.	34.6		
0.0062 mm.	30.5		
0.0031 mm.	24.1		
0.0013 mm.	18.5		

* (no specification provided)

Soil Description

Silty Sand with Clay, trace Gravel

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 3.1749 D_{85}= 0.9037 D_{60}= 0.1058
D_{50}= 0.0477 D_{30}= 0.0059 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

K<1.0x10^-6 cm/sec

Location: BH8 SS4, Sampled on March 30, 2011
Sample Number: E7271

Date:

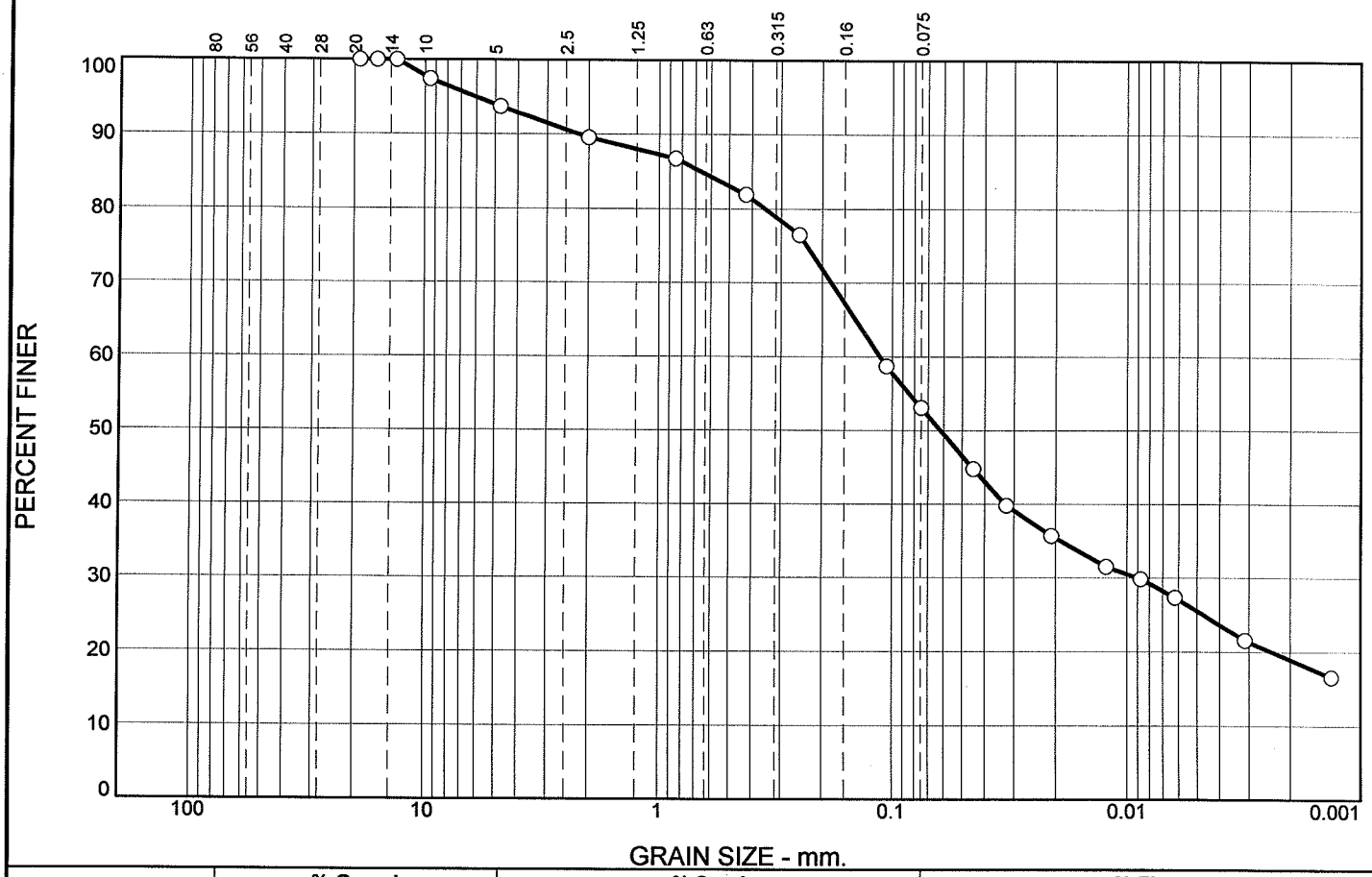
AMC Materials Engineering

Client: Mattamy Homes
Project: North & South Sides of Whitevale Road, Pickering

Project No: 40840.292 **Figure**

Particle Size Distribution Report

MW2-11-09



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	6.3	4.1	7.7	28.8	34.2	18.9

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
19 mm	100.0		
16 mm	100.0		
13.2 mm	100.0		
9.5 mm	97.4		
4.75 mm	93.7		
2.00 mm	89.6		
0.850 mm	86.8		
0.425 mm	81.9		
0.250 mm	76.5		
0.106 mm	58.7		
0.075 mm	53.1		
0.0448 mm.	44.8		
0.0324 mm.	39.8		
0.0209 mm.	35.6		
0.0123 mm.	31.5		
0.0087 mm.	29.8		
0.0062 mm.	27.4		
0.0031 mm.	21.6		
0.0013 mm.	16.6		

* (no specification provided)

Soil Description

Silty Sand with some Clay, trace Gravel

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 2.1946 D_{85}= 0.6592 D_{60}= 0.1129
D_{50}= 0.0620 D_{30}= 0.0090 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

K<1.0x10^-6 cm/sec

Location: BH9 SS4, Sampled on March 31, 2011
Sample Number: E7271

Date:

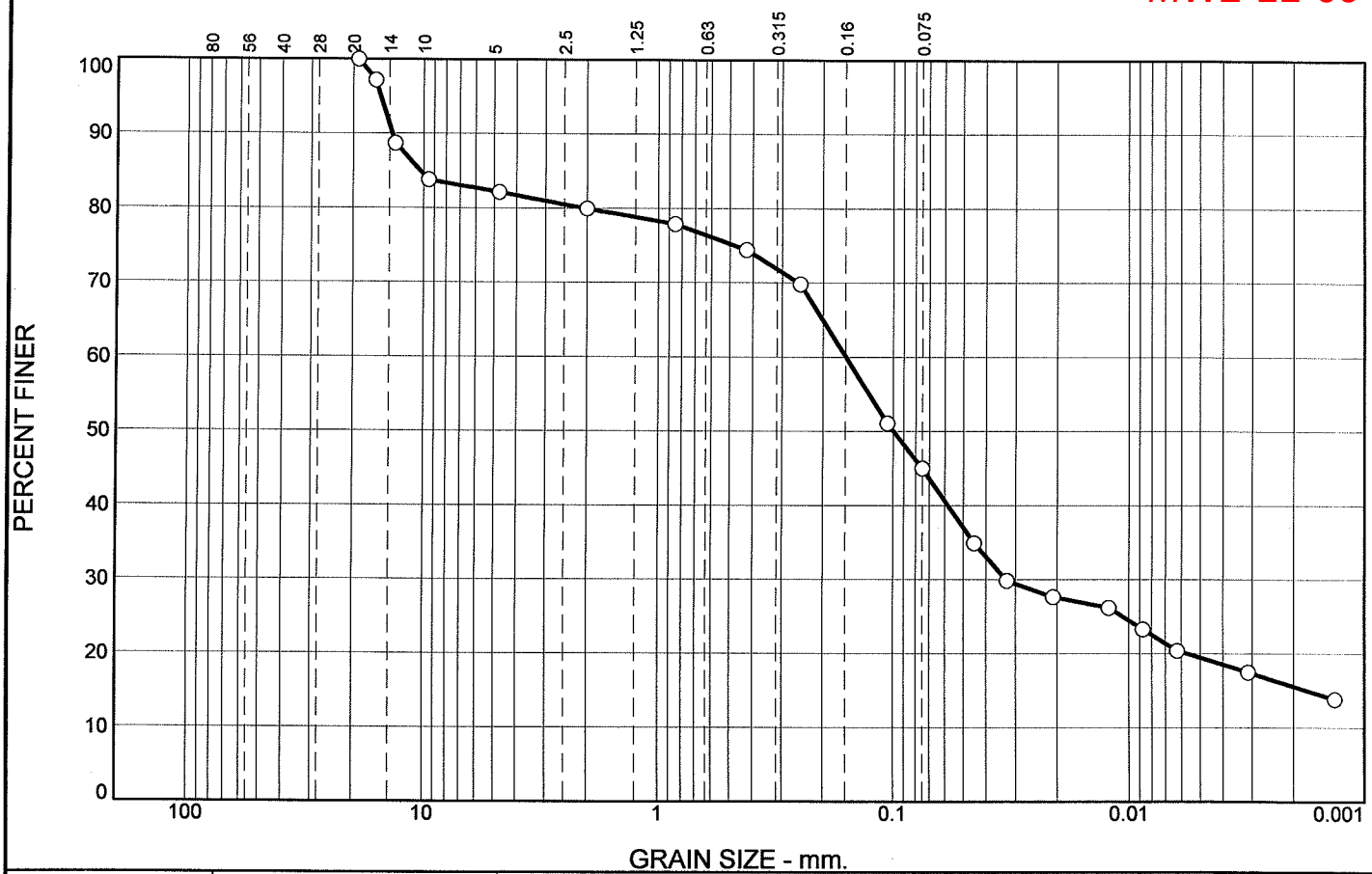
AME Materials Engineering

Client: Mattamy Homes
Project: North & South Sides of Whitevale Road, Pickering

Project No: 40840.292 **Figure**

Particle Size Distribution Report

MW2-11-09



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	17.8	2.3	5.5	29.4	29.4	15.6

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
19 mm	100.0		
16 mm	97.2		
13.2 mm	88.7		
9.5 mm	83.8		
4.75 mm	82.2		
2.00 mm	79.9		
0.850 mm	77.9		
0.425 mm	74.4		
0.250 mm	69.8		
0.106 mm	51.1		
0.075 mm	45.0		
0.0450 mm.	34.9		
0.0326 mm.	29.8		
0.0208 mm.	27.7		
0.0121 mm.	26.2		
0.0087 mm.	23.3		
0.0063 mm.	20.4		
0.0031 mm.	17.5		
0.0013 mm.	13.8		

* (no specification provided)

Soil Description

Silty Sand with some Clay and some Gravel

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 13.6019 D_{85}= 10.2957 D_{60}= 0.1593
D_{50}= 0.0995 D_{30}= 0.0330 D_{15}= 0.0018
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

K<1.0x10^-6 cm/sec

Location: BH9 SS6, Sampled on March 31, 2011
Sample Number: E7271

Date:

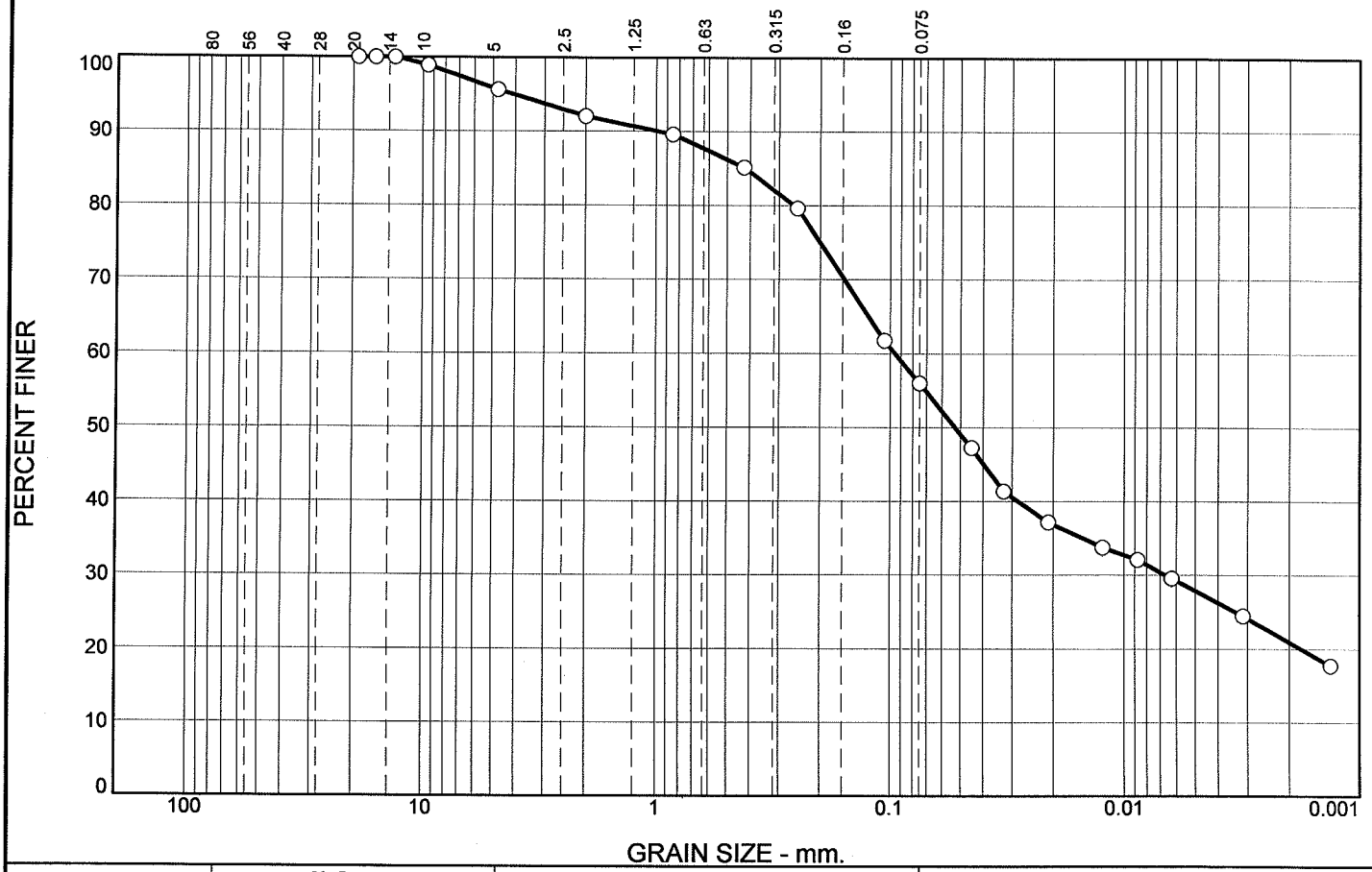
AMC Materials Engineering

Client: Mattamy Homes
Project: North & South Sides of Whitevale Road, Pickering

Project No: 40840.292 **Figure**

Particle Size Distribution Report

MW2-11-09a



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	4.4	3.5	6.9	29.2	35.1	20.9

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
19 mm	100.0		
16 mm	100.0		
13.2 mm	100.0		
9.5 mm	98.9		
4.75 mm	95.6		
2.00 mm	92.1		
0.850 mm	89.6		
0.425 mm	85.2		
0.250 mm	79.6		
0.106 mm	61.8		
0.075 mm	56.0		
0.0449 mm.	47.3		
0.0326 mm.	41.4		
0.0210 mm.	37.1		
0.0123 mm.	33.8		
0.0088 mm.	32.1		
0.0063 mm.	29.5		
0.0031 mm.	24.5		
0.0013 mm.	17.7		

* (no specification provided)

Soil Description

Silty Sand with Clay, trace Gravel

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.9765 D_{85}= 0.4185 D_{60}= 0.0953
D_{50}= 0.0528 D_{30}= 0.0067 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

K<1.0x10^-6 cm/sec

Location: BH9a SS3, Sampled on March 30, 2011
Sample Number: E7271

Date:

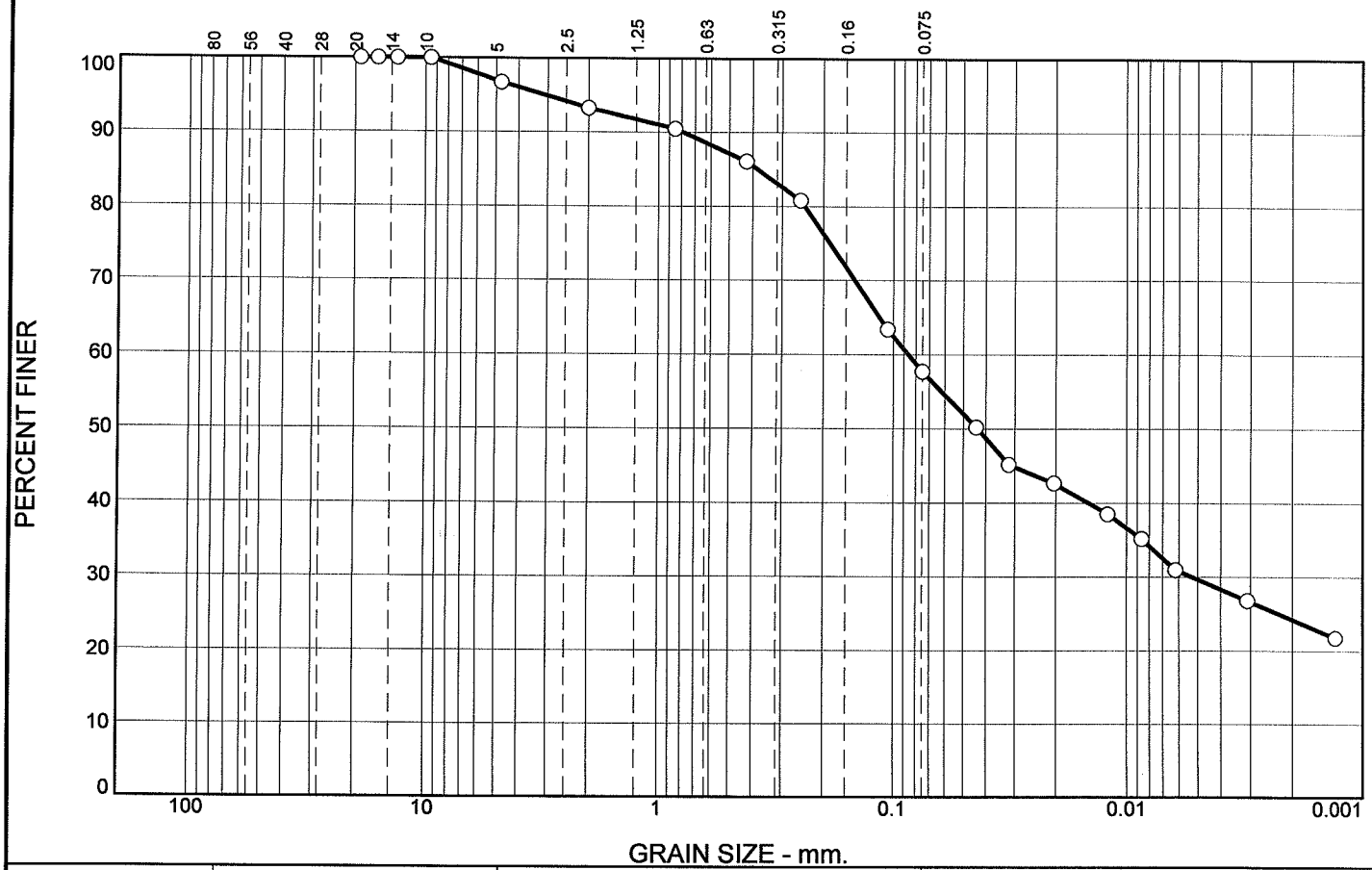
AME Materials Engineering

Client: Mattamy Homes
Project: North & South Sides of Whitevale Road, Pickering

Project No: 40840.292 **Figure**

Particle Size Distribution Report

MW2-11-09a



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	3.3	3.4	7.2	28.4	33.5	24.2

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
19 mm	100.0		
16 mm	100.0		
13.2 mm	100.0		
9.5 mm	100.0		
4.75 mm	96.7		
2.00 mm	93.3		
0.850 mm	90.5		
0.425 mm	86.1		
0.250 mm	80.8		
0.106 mm	63.4		
0.075 mm	57.7		
0.0440 mm.	50.2		
0.0319 mm.	45.2		
0.0204 mm.	42.7		
0.0120 mm.	38.5		
0.0086 mm.	35.2		
0.0062 mm.	31.0		
0.0031 mm.	26.8		
0.0013 mm.	21.8		

* (no specification provided)

Soil Description

Silty Sand with Clay, trace Gravel

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.7862 D_{85}= 0.3803 D_{60}= 0.0862
D_{50}= 0.0434 D_{30}= 0.0053 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

K<1.0x10^-6 cm/sec

Location: BH9a SS5, Sampled on March 31, 2011
Sample Number: E7271

Date:

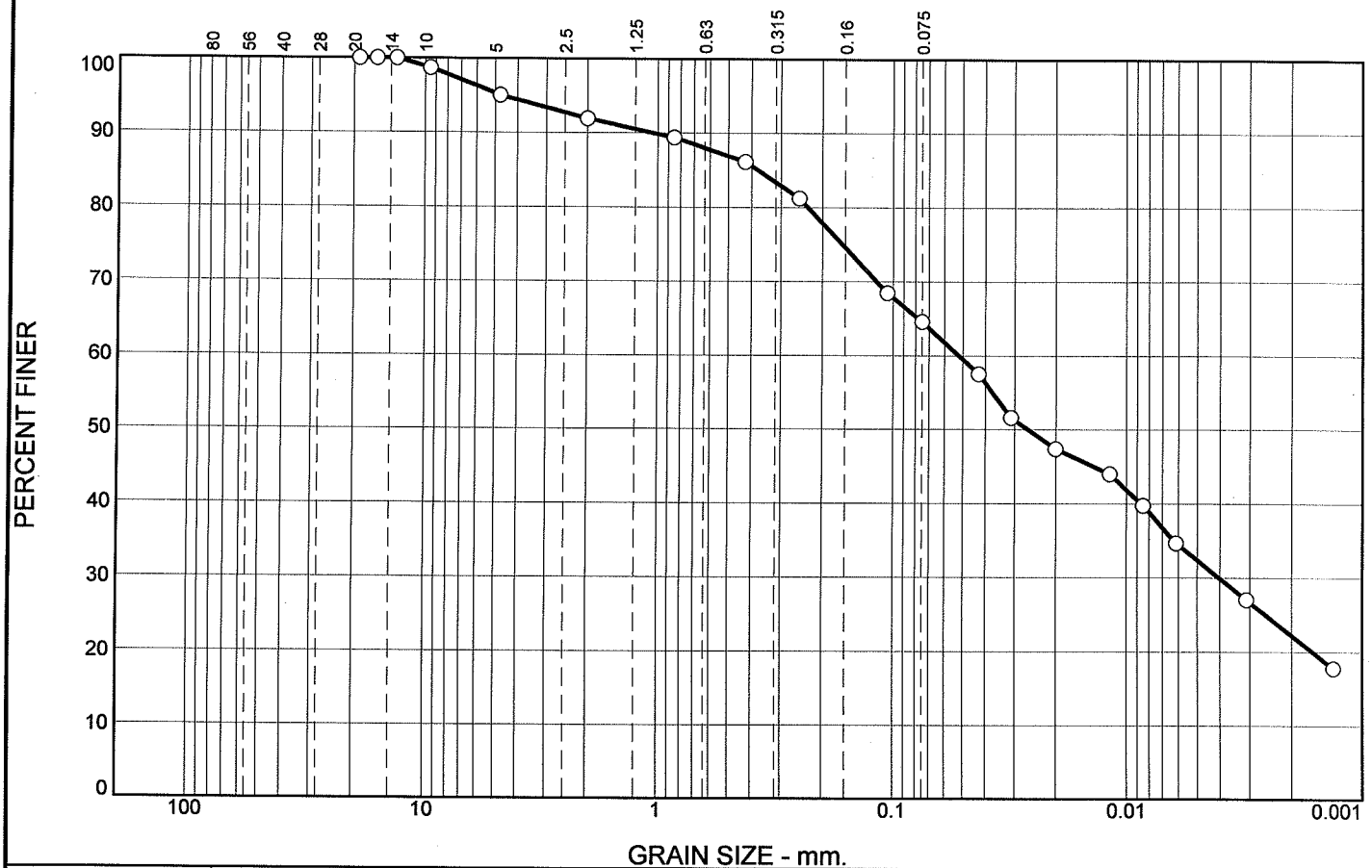
AME Materials Engineering

Client: Mattamy Homes
Project: North & South Sides of Whitevale Road, Pickering

Project No: 40840.292 **Figure**

Particle Size Distribution Report

MW2-11-12



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	4.9	3.2	5.7	21.6	42.4	22.2

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
19 mm	100.0		
16 mm	100.0		
13.2 mm	100.0		
9.5 mm	98.7		
4.75 mm	95.1		
2.00 mm	91.9		
0.850 mm	89.4		
0.425 mm	86.2		
0.250 mm	81.2		
0.106 mm	68.5		
0.075 mm	64.6		
0.0427 mm.	57.5		
0.0311 mm.	51.6		
0.0201 mm.	47.4		
0.0118 mm.	44.0		
0.0085 mm.	39.8		
0.0061 mm.	34.7		
0.0031 mm.	27.1		
0.0013 mm.	17.8		

* (no specification provided)

Soil Description

Sandy Silt with Clay, trace Gravel

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 1.0412 D_{85}= 0.3754 D_{60}= 0.0521
D_{50}= 0.0264 D_{30}= 0.0040 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

K<1.0x10^-6 cm/sec

Location: BH12 SS4, Sampled on March 31, 2011
Sample Number: E7271

Date:

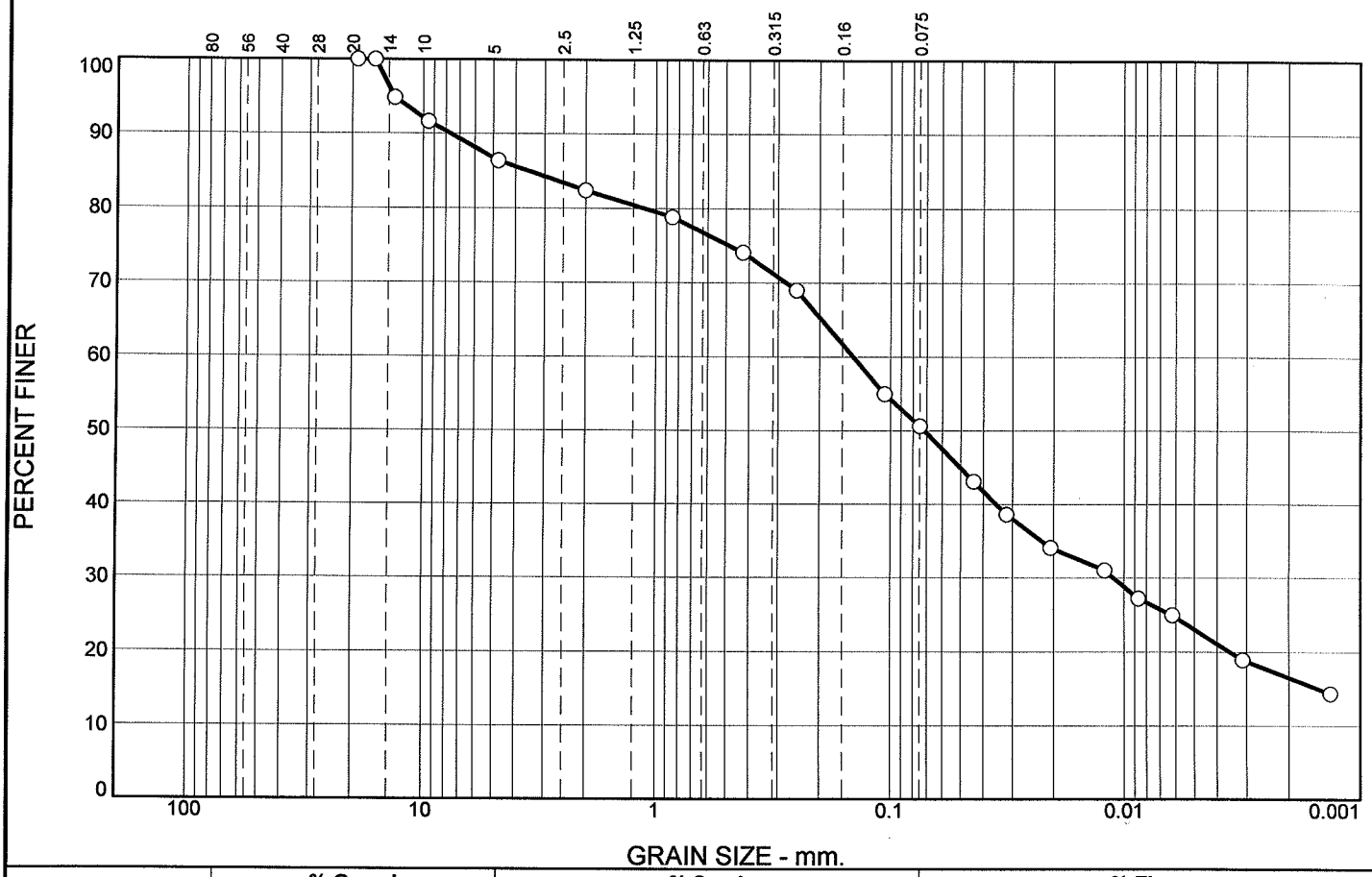
AME Materials Engineering

Client: Mattamy Homes
Project: North & South Sides of Whitevale Road, Pickering

Project No: 40840.292 **Figure**

Particle Size Distribution Report

MW2-11-12



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	13.6	4.0	8.3	23.5	34.1	16.5

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
19 mm	100.0		
16 mm	100.0		
13.2 mm	94.9		
9.5 mm	91.6		
4.75 mm	86.4		
2.00 mm	82.4		
0.850 mm	78.8		
0.425 mm	74.1		
0.250 mm	69.0		
0.106 mm	55.0		
0.075 mm	50.6		
0.0440 mm.	43.1		
0.0319 mm.	38.6		
0.0206 mm.	34.0		
0.0121 mm.	31.0		
0.0087 mm.	27.2		
0.0062 mm.	25.0		
0.0031 mm.	18.9		
0.0013 mm.	14.4		

* (no specification provided)

Soil Description

Silty Sand with some Clay and some Gravel

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 7.6600 D_{85}= 3.5103 D_{60}= 0.1442
D_{50}= 0.0717 D_{30}= 0.0111 D_{15}= 0.0015
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

K<1.0x10^-6 cm/sec

Location: BH12 SS6, Sampled on March 31, 2011
Sample Number: E7271

Date:

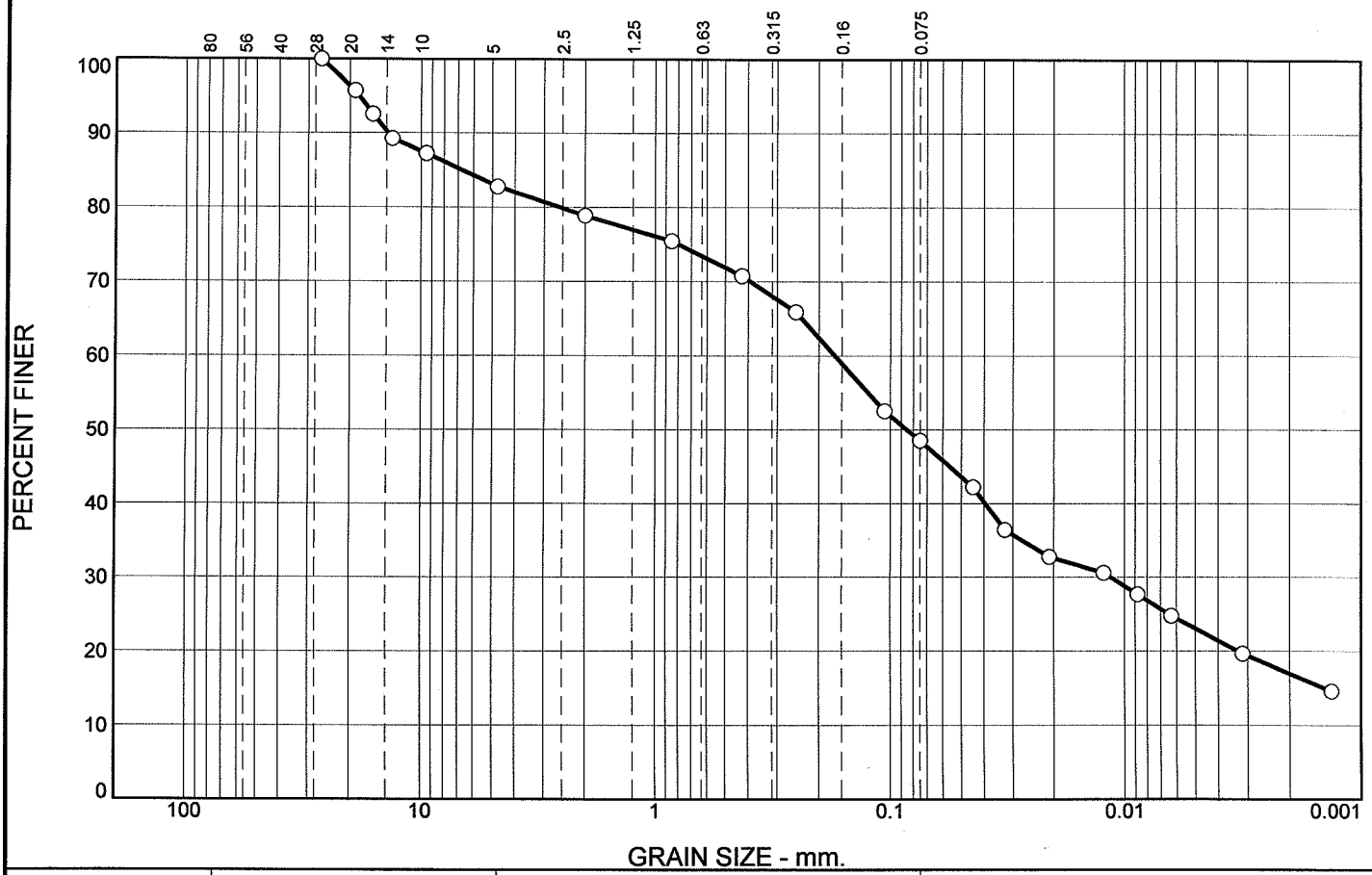
AME Materials Engineering

Client: Mattamy Homes
Project: North & South Sides of Whitevale Road, Pickering

Project No: 40840.292 **Figure**

Particle Size Distribution Report

MW2-11-12



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	4.3	12.9	3.9	8.1	22.3	31.5	17.0

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
26.5 mm	100.0		
19 mm	95.7		
16 mm	92.6		
13.2 mm	89.3		
9.5 mm	87.3		
4.75 mm	82.8		
2.00 mm	78.9		
0.850 mm	75.5		
0.425 mm	70.8		
0.250 mm	65.9		
0.106 mm	52.5		
0.075 mm	48.5		
0.0447 mm.	42.2		
0.0326 mm.	36.4		
0.0210 mm.	32.8		
0.0122 mm.	30.6		
0.0088 mm.	27.7		
0.0063 mm.	24.8		
0.0032 mm.	19.7		
0.0013 mm.	14.6		

* (no specification provided)

Soil Description

Silty Sand with some Clay and some Gravel

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 13.7763 D_{85}= 6.6821 D_{60}= 0.1711
D_{50}= 0.0851 D_{30}= 0.0115 D_{15}= 0.0014
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

K<1.0x10^-6 cm/sec

Location: BH12 SS8, Sampled on March 31, 2011
Sample Number: E7271

Date:

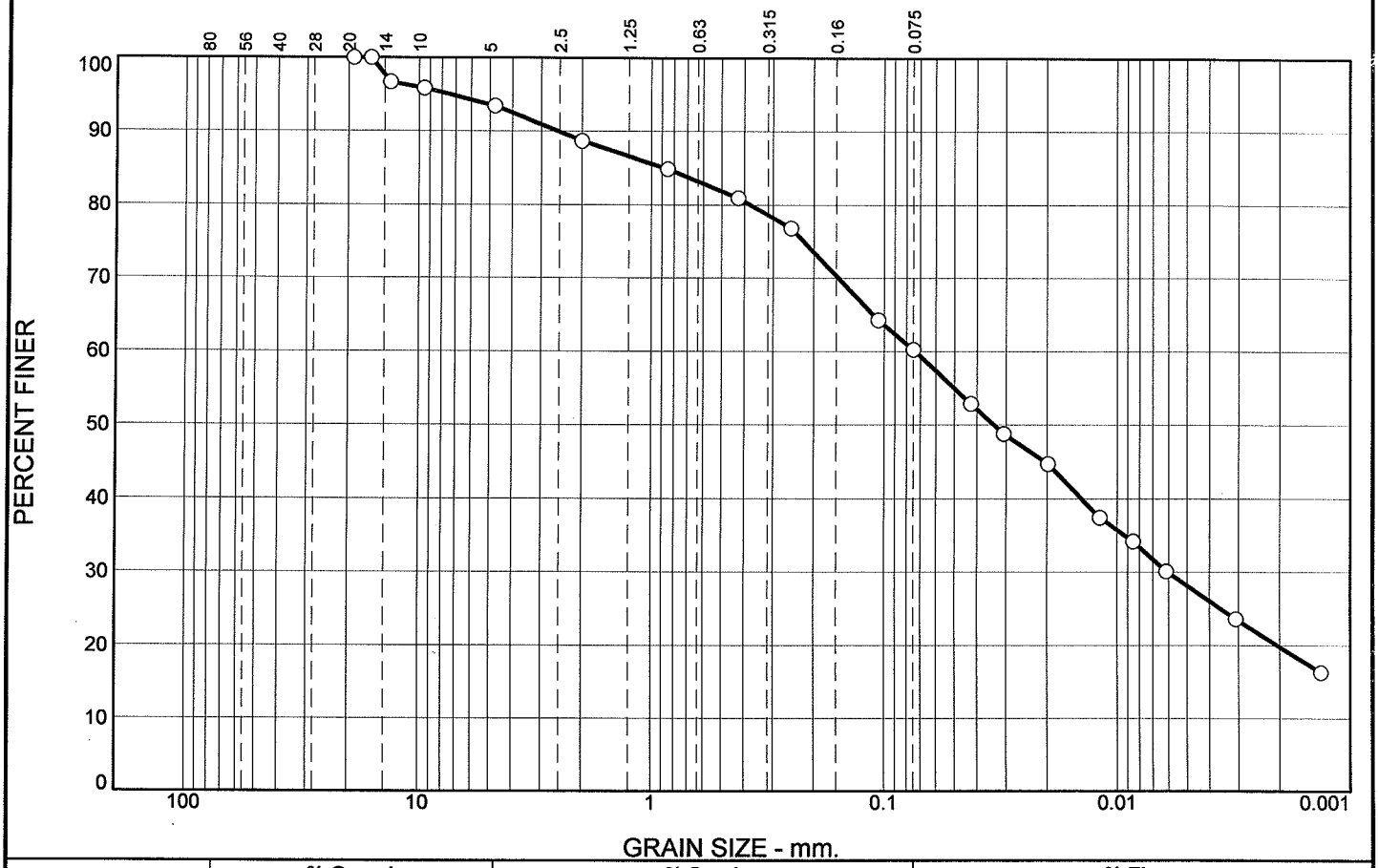
AME Materials Engineering

Client: Mattamy Homes
Project: North & South Sides of Whitevale Road, Pickering

Project No: 40840.292 **Figure**

Particle Size Distribution Report

MW2-11-12a



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	6.6	4.7	7.8	20.6	40.5	19.8

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
19 mm	100.0		
16 mm	100.0		
13.2 mm	96.7		
9.5 mm	95.9		
4.75 mm	93.4		
2.00 mm	88.7		
0.850 mm	84.9		
0.425 mm	80.9		
0.250 mm	76.8		
0.106 mm	64.3		
0.075 mm	60.3		
0.0426 mm.	52.9		
0.0307 mm.	48.8		
0.0198 mm.	44.7		
0.0119 mm.	37.4		
0.0085 mm.	34.2		
0.0062 mm.	30.1		
0.0031 mm.	23.6		
0.0013 mm.	16.3		

* (no specification provided)

Soil Description

Sandy Silt with some Clay, trace Gravel

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 2.5361 D_{85}= 0.8667 D_{60}= 0.0736
D_{50}= 0.0338 D_{30}= 0.0061 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

K<1.0x10^-6 cm/sec

Location: BH12a SS3, Sampled on March 31, 2011
Sample Number: E7271

Date:

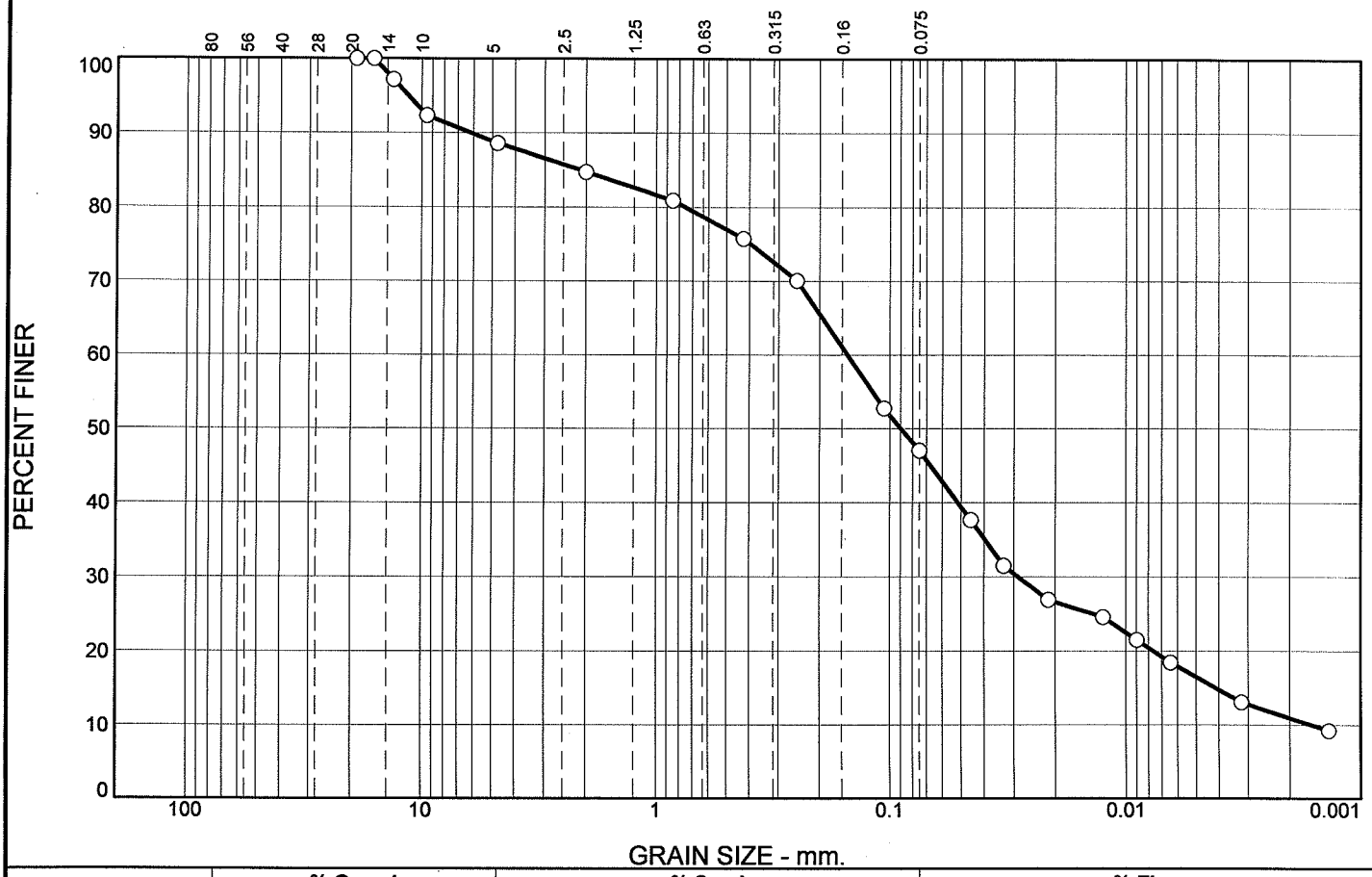
AME Materials Engineering

Client: Mattamy Homes
Project: North & South Sides of Whitevale Road, Pickering

Project No: 40840.292 **Figure**

Particle Size Distribution Report

MW2-11-12a



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	11.4	3.8	9.0	28.7	36.2	10.9

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
19 mm	100.0		
16 mm	100.0		
13.2 mm	97.2		
9.5 mm	92.3		
4.75 mm	88.6		
2.00 mm	84.8		
0.850 mm	80.9		
0.425 mm	75.8		
0.250 mm	70.1		
0.106 mm	52.7		
0.075 mm	47.1		
0.0456 mm.	37.7		
0.0332 mm.	31.5		
0.0214 mm.	26.9		
0.0125 mm.	24.6		
0.0090 mm.	21.5		
0.0064 mm.	18.5		
0.0032 mm.	13.1		
0.0014 mm.	9.2		

* (no specification provided)

Soil Description

Silty Sand with some Clay and some Gravel

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 6.1354 D_{85}= 2.1136 D_{60}= 0.1518
D_{50}= 0.0897 D_{30}= 0.0287 D_{15}= 0.0041
D_{10}= 0.0016 C_u= 93.50 C_c= 3.35

Classification

USCS= AASHTO=

Remarks

K≈2.6x10^-6 cm/sec

Location: BH12a SS5, Sampled on March 31, 2011
Sample Number: E7271

Date:

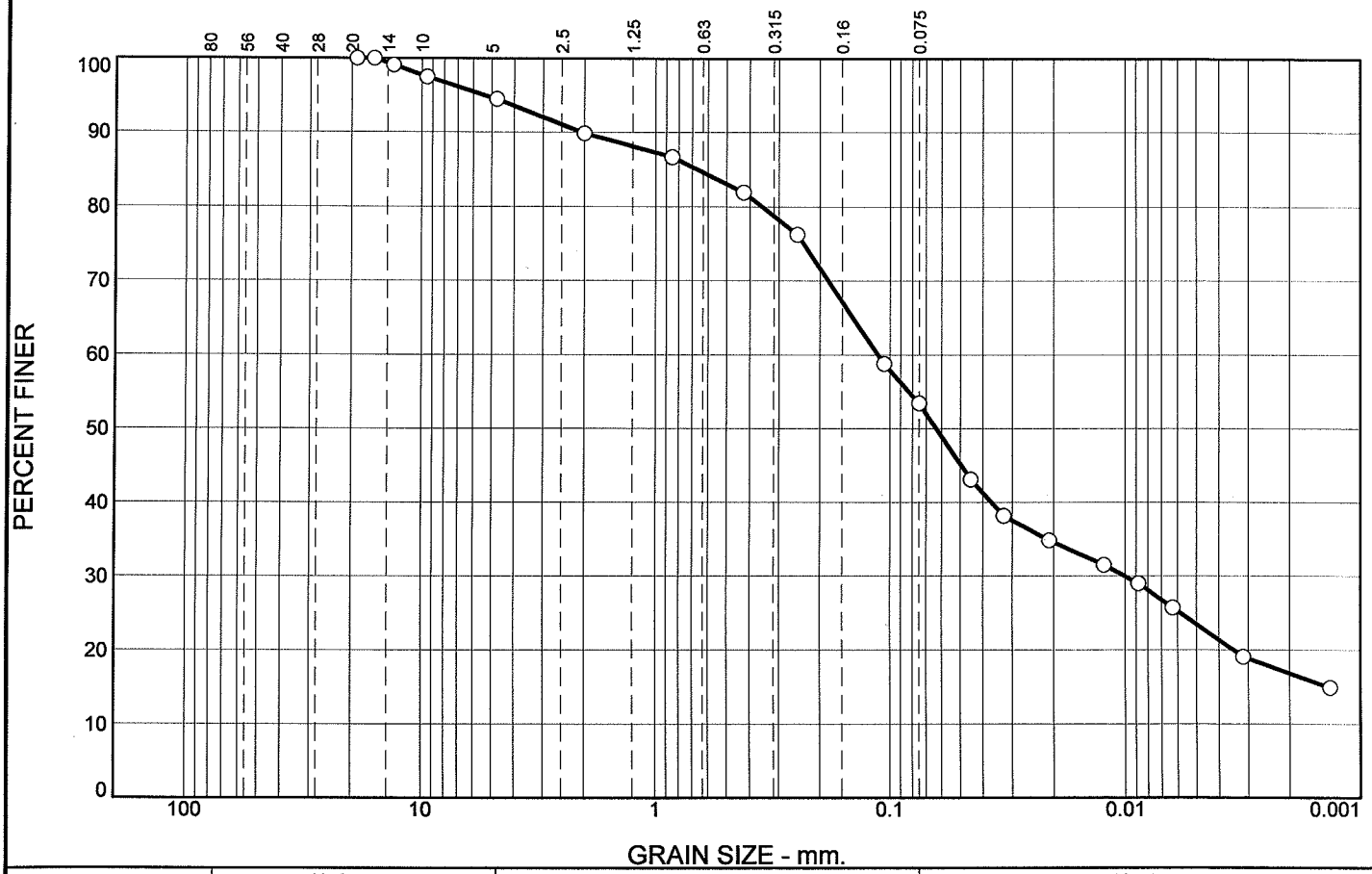
AME Materials Engineering

Client: Mattamy Homes
Project: North & South Sides of Whitevale Road, Pickering

Project No: 40840.292 **Figure**

Particle Size Distribution Report

BH2-11-14



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	5.5	4.6	7.9	28.6	36.6	16.8

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
19 mm	100.0		
16 mm	100.0		
13.2 mm	99.1		
9.5 mm	97.5		
4.75 mm	94.5		
2.00 mm	89.9		
0.850 mm	86.7		
0.425 mm	82.0		
0.250 mm	76.2		
0.106 mm	58.8		
0.075 mm	53.4		
0.0451 mm.	43.1		
0.0326 mm.	38.1		
0.0210 mm.	34.8		
0.0123 mm.	31.5		
0.0088 mm.	29.0		
0.0063 mm.	25.7		
0.0032 mm.	19.1		
0.0013 mm.	14.9		

* (no specification provided)

Soil Description

Silty Sand with some Clay, trace Gravel

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 2.0552 D_{85}= 0.6625 D_{60}= 0.1125
D_{50}= 0.0633 D_{30}= 0.0100 D_{15}= 0.0014
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

K<1.0x10^-6 cm/sec

Location: BH14 SS2, Sampled on March 31, 2011
Sample Number: E7271

Date:

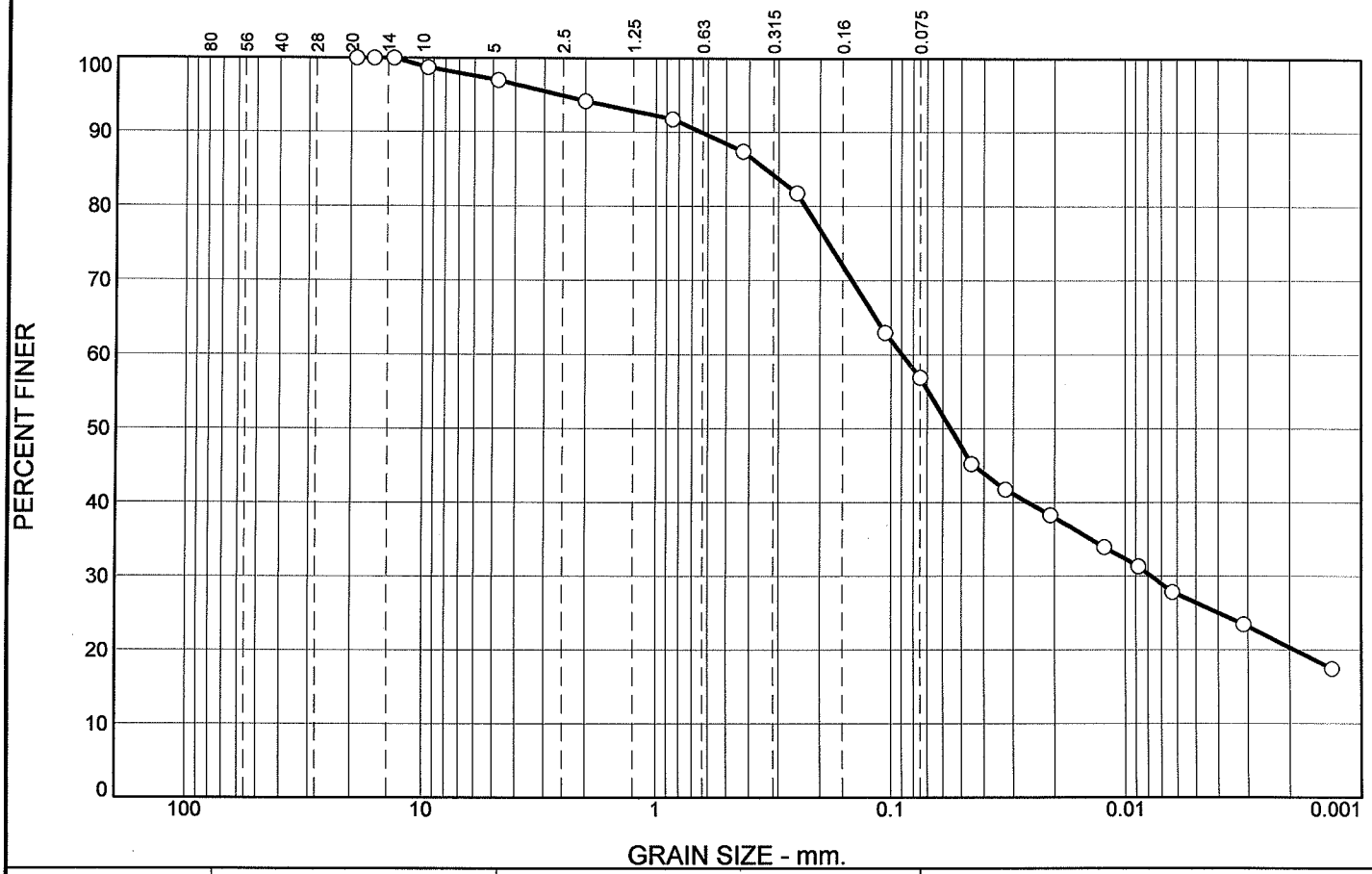
AMC Materials Engineering

Client: Mattamy Homes
Project: North & South Sides of Whitevale Road, Pickering

Project No: 40840.292 **Figure**

Particle Size Distribution Report

BH2-11-14



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	3.0	2.8	6.8	30.5	36.6	20.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
19 mm	100.0		
16 mm	100.0		
13.2 mm	100.0		
9.5 mm	98.7		
4.75 mm	97.0		
2.00 mm	94.2		
0.850 mm	91.8		
0.425 mm	87.4		
0.250 mm	81.8		
0.106 mm	63.0		
0.075 mm	56.9		
0.0452 mm.	45.2		
0.0325 mm.	41.8		
0.0209 mm.	38.3		
0.0123 mm.	33.9		
0.0088 mm.	31.3		
0.0063 mm.	27.8		
0.0031 mm.	23.5		
0.0013 mm.	17.4		

* (no specification provided)

Soil Description

Silty Sand with Clay, trace Gravel

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.6417 D_{85}= 0.3390 D_{60}= 0.0894
D_{50}= 0.0556 D_{30}= 0.0077 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

K<1.0x10^-6 cm/sec

Location: BH14 SS5, Sampled on March 31, 2011
Sample Number: E7271

Date:

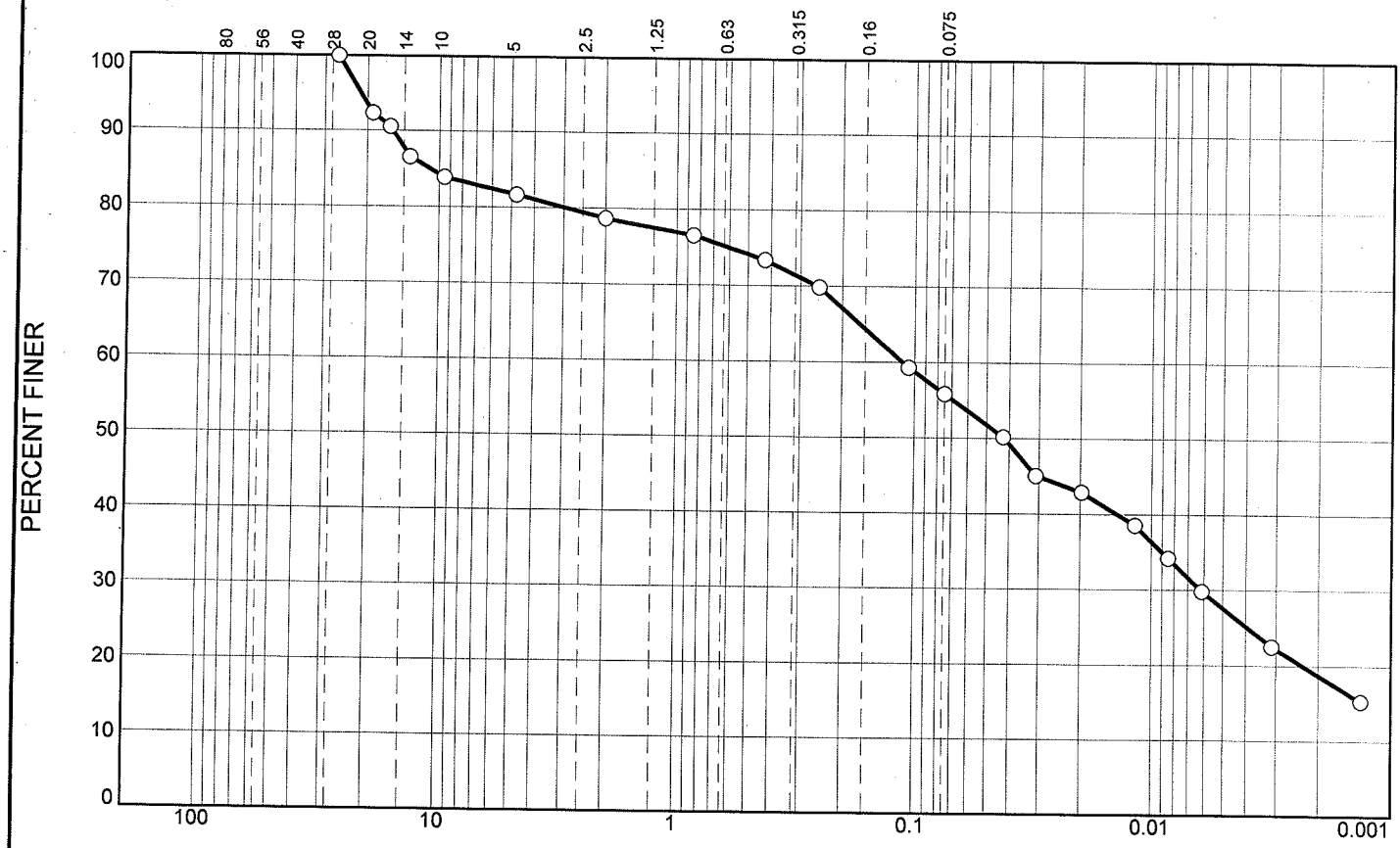
AMC Materials Engineering

Client: Mattamy Homes
Project: North & South Sides of Whitevale Road, Pickering

Project No: 40840.292 **Figure**

Particle Size Distribution Report

BH2-11-15



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	7.6	10.7	3.1	5.2	17.6	37.1	18.7

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
26.5 mm	100.0		
19 mm	92.3		
16 mm	90.6		
13.2 mm	86.6		
9.5 mm	83.9		
4.75 mm	81.7		
2.00 mm	78.6		
0.850 mm	76.6		
0.425 mm	73.4		
0.250 mm	69.9		
0.106 mm	59.3		
0.075 mm	55.8		
0.0425 mm.	50.2		
0.0310 mm.	45.1		
0.0198 mm.	42.9		
0.0117 mm.	38.5		
0.0085 mm.	34.2		
0.0061 mm.	29.8		
0.0031 mm.	22.5		
0.0013 mm.	15.3		

* (no specification provided)

Soil Description

Silty sand with clay,some gravel

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 15.5759 D_{85}= 10.8767 D_{60}= 0.1122
D_{50}= 0.0421 D_{30}= 0.0062 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

K<1.0x10^-6 cm/sec

Location: BH15 SS5, Sampled on April 01, 2011
Sample Number: E7271

Date:

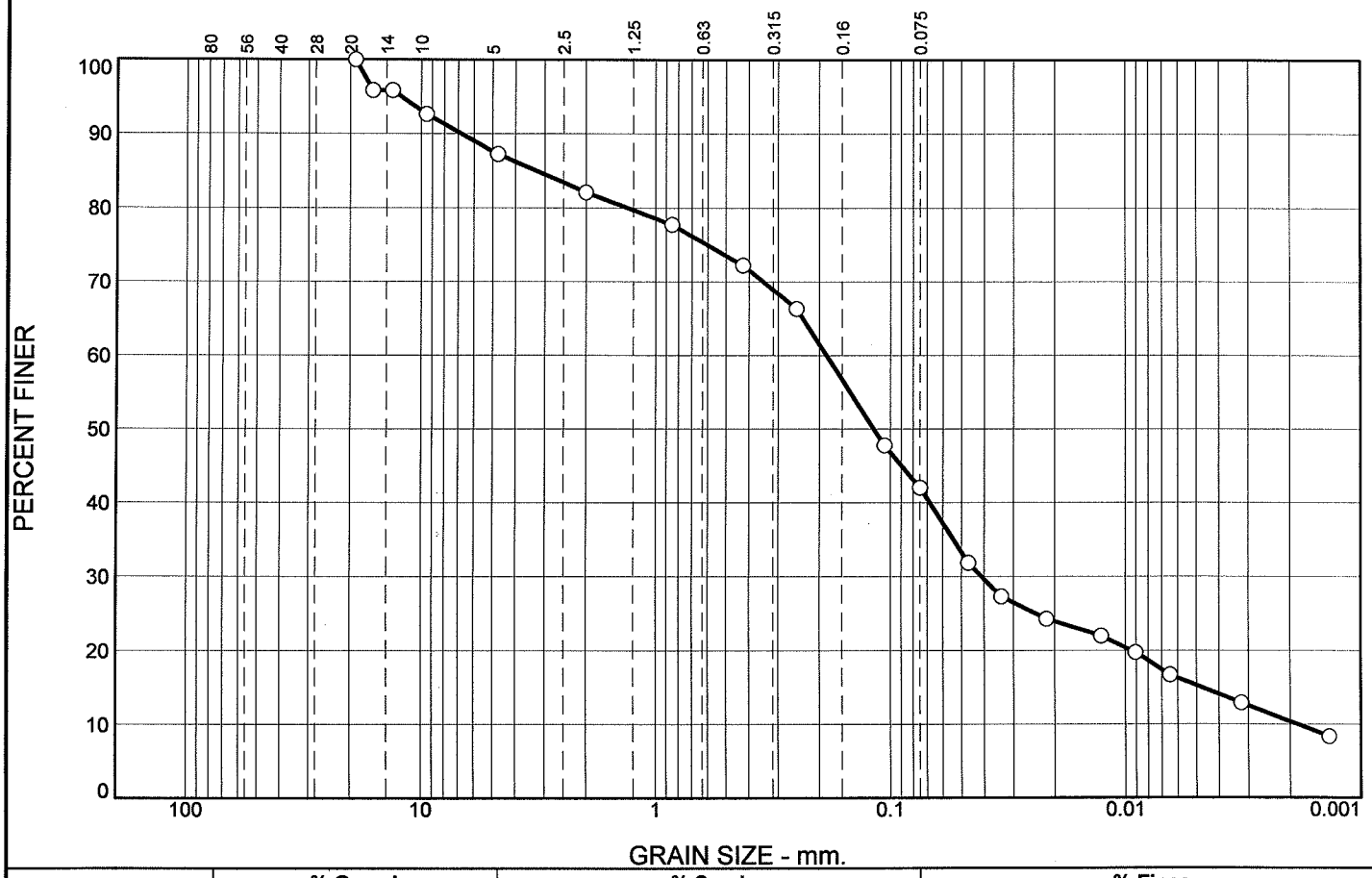
AME Materials Engineering

Client: Mattamy Homes
Project: North & South Sides of Whitevale Road, Pickering

Project No: 40840.292 **Figure**

Particle Size Distribution Report

MW2-11-16



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	12.7	5.2	9.8	30.3	31.6	10.4

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
19 mm	100.0		
16 mm	95.8		
13.2 mm	95.8		
9.5 mm	92.6		
4.75 mm	87.3		
2.00 mm	82.1		
0.850 mm	77.7		
0.425 mm	72.3		
0.250 mm	66.4		
0.106 mm	47.7		
0.075 mm	42.0		
0.0469 mm.	31.9		
0.0339 mm.	27.3		
0.0217 mm.	24.3		
0.0127 mm.	22.0		
0.0090 mm.	19.7		
0.0065 mm.	16.7		
0.0032 mm.	12.9		
0.0014 mm.	8.3		

* (no specification provided)

Soil Description

Silty Sand with some Clay and some Gravel

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 6.7677 D_{85}= 3.2455 D_{60}= 0.1865
D_{50}= 0.1176 D_{30}= 0.0411 D_{15}= 0.0047
D_{10}= 0.0019 C_u= 100.09 C_c= 4.85

Classification

USCS= AASHTO=

Remarks

K≈3.6x10^-6 cm/sec

Location: BH16 SS3, Sampled on April 01, 2011
Sample Number: E7271

Date:

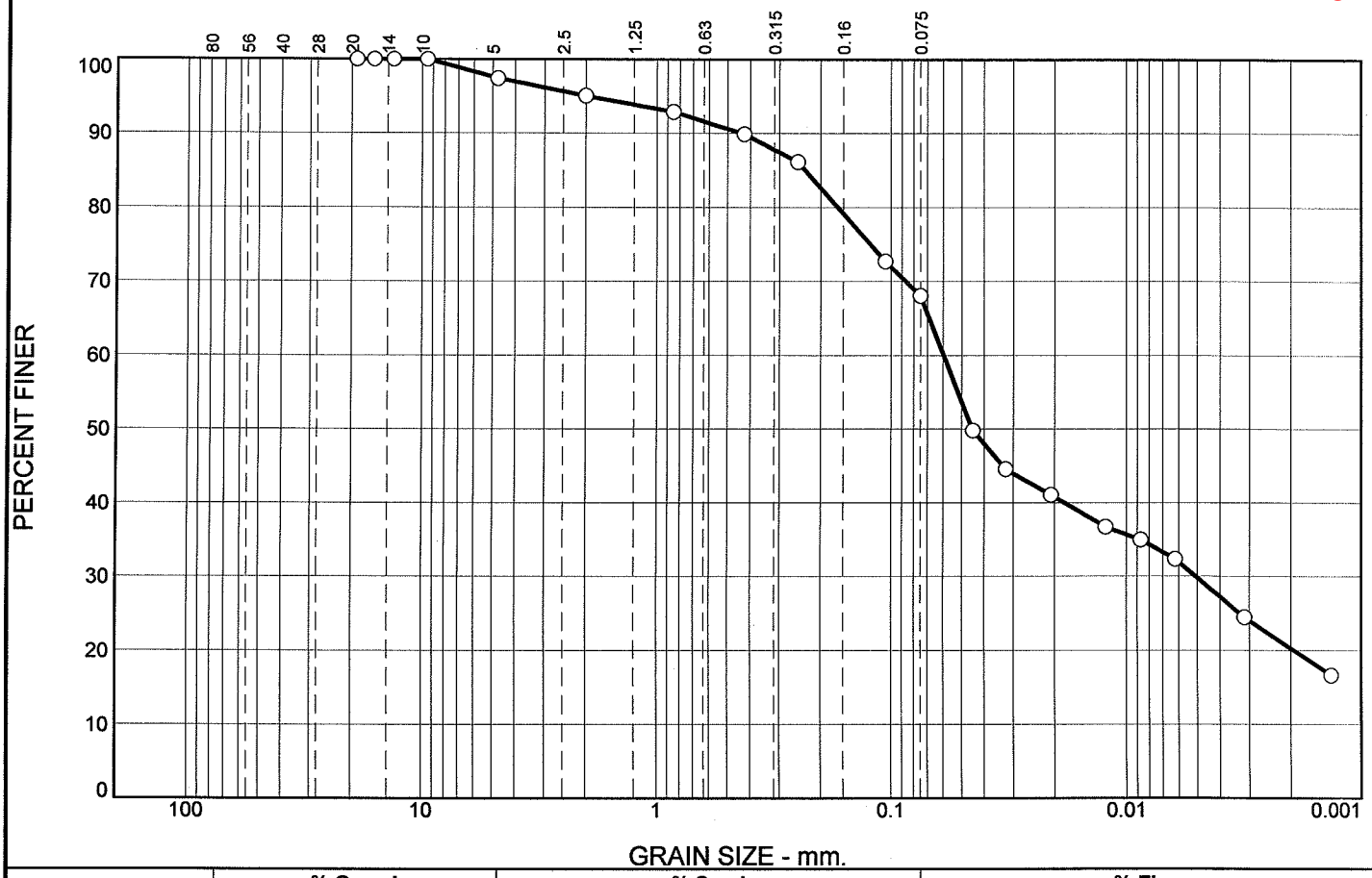
AMC Materials Engineering

Client: Mattamy Homes
Project: North & South Sides of Whitevale Road, Pickering

Project No: 40840.292 **Figure**

Particle Size Distribution Report

MW2-11-16



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	2.6	2.4	5.1	21.8	47.8	20.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
19 mm	100.0		
16 mm	100.0		
13.2 mm	100.0		
9.5 mm	100.0		
4.75 mm	97.4		
2.00 mm	95.0		
0.850 mm	92.9		
0.425 mm	89.9		
0.250 mm	86.1		
0.106 mm	72.7		
0.075 mm	68.1		
0.0448 mm.	49.8		
0.0324 mm.	44.6		
0.0208 mm.	41.1		
0.0122 mm.	36.7		
0.0087 mm.	34.9		
0.0062 mm.	32.3		
0.0031 mm.	24.5		
0.0013 mm.	16.6		

* (no specification provided)

Soil Description

Sandy Silt with Clay, trace Gravel

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.4360 D_{85}= 0.2325 D_{60}= 0.0597
D_{50}= 0.0450 D_{30}= 0.0051 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

K<1.0x10^-6 cm/sec

Location: BH16 SS6, Sampled on April 01, 2011
Sample Number: E7271

Date:

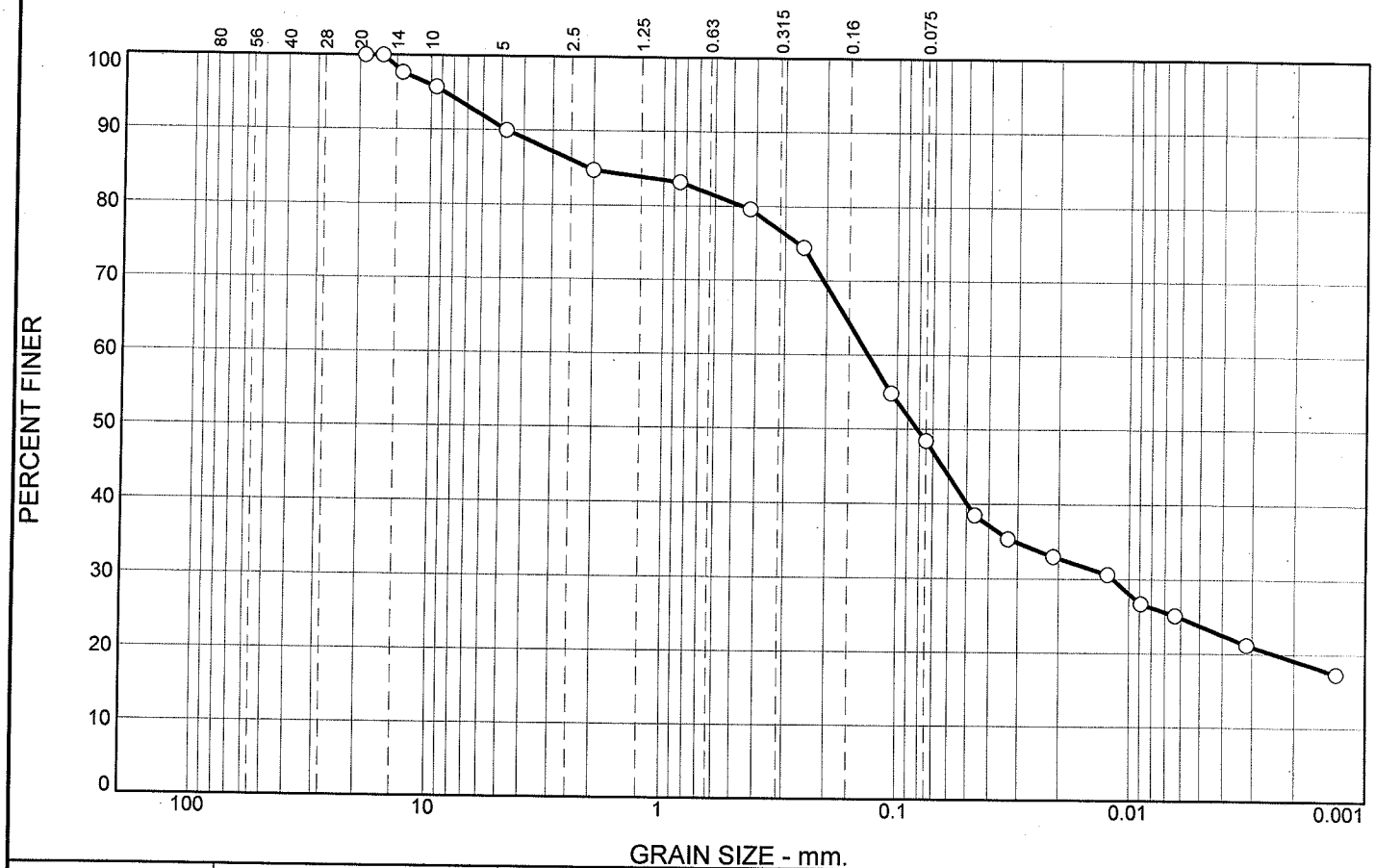
AMC Materials Engineering

Client: Mattamy Homes
Project: North & South Sides of Whitevale Road, Pickering

Project No: 40840.292 **Figure**

Particle Size Distribution Report

MW2-11-16



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	10.0	5.3	5.1	31.2	29.3	19.1

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
19 mm	100.0		
16 mm	100.0		
13.2 mm	97.7		
9.5 mm	95.7		
4.75 mm	90.0		
2.00 mm	84.7		
0.850 mm	83.2		
0.425 mm	79.6		
0.250 mm	74.5		
0.106 mm	54.8		
0.075 mm	48.4		
0.0462 mm.	38.5		
0.0331 mm.	35.3		
0.0212 mm.	33.0		
0.0124 mm.	30.6		
0.0089 mm.	26.7		
0.0063 mm.	25.1		
0.0032 mm.	21.2		
0.0013 mm.	17.3		

* (no specification provided)

Soil Description

Silty sand with clay,trace gravel

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 4.7561 D_{85}= 2.0922 D_{60}= 0.1330
D_{50}= 0.0817 D_{30}= 0.0117 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

K<1.0x10^-6 cm/sec

Location: BH16 SS8, Sampled on April 01, 2011
Sample Number: E7271

Date:

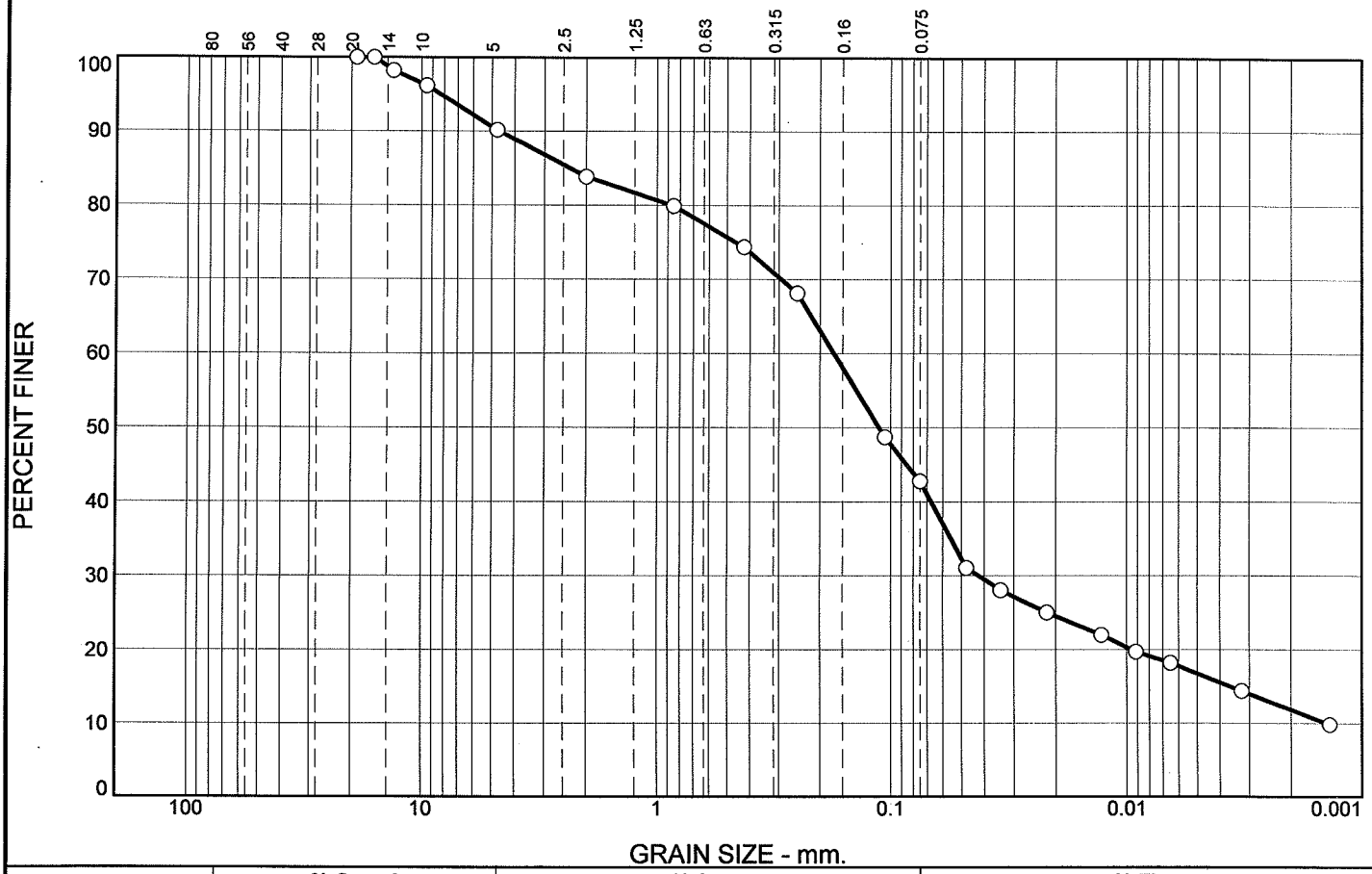
AME Materials Engineering

Client: Mattamy Homes
Project: North & South Sides of Whitevale Road, Pickering

Project No: 40840.292 **Figure**

Particle Size Distribution Report

MW2-11-16a



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	9.8	6.3	9.5	31.6	31.0	11.8

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
19 mm	100.0		
16 mm	100.0		
13.2 mm	98.2		
9.5 mm	96.2		
4.75 mm	90.2		
2.00 mm	83.9		
0.850 mm	79.9		
0.425 mm	74.4		
0.250 mm	68.2		
0.106 mm	48.7		
0.075 mm	42.8		
0.0476 mm.	31.1		
0.0341 mm.	28.0		
0.0219 mm.	25.0		
0.0128 mm.	22.0		
0.0091 mm.	19.7		
0.0065 mm.	18.2		
0.0032 mm.	14.4		
0.0014 mm.	9.8		

* (no specification provided)

Soil Description

Silty Sand with some Clay, trace Gravel

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 4.6402 D_{85}= 2.3327 D_{60}= 0.1744
D_{50}= 0.1122 D_{30}= 0.0424 D_{15}= 0.0036
D_{10}= 0.0014 C_u= 123.57 C_c= 7.30

Classification

USCS= AASHTO=

Remarks

K≈2.0x10^-6 cm/sec

Location: BH16a SS4, Sampled on April 01, 2011
Sample Number: E7271

Date:

AME Materials Engineering

Client: Mattamy Homes
Project: North & South Sides of Whitevale Road, Pickering

Project No: 40840.292 **Figure**

BH2-90-1

AME - Materials Engineering

Grain Size Analysis

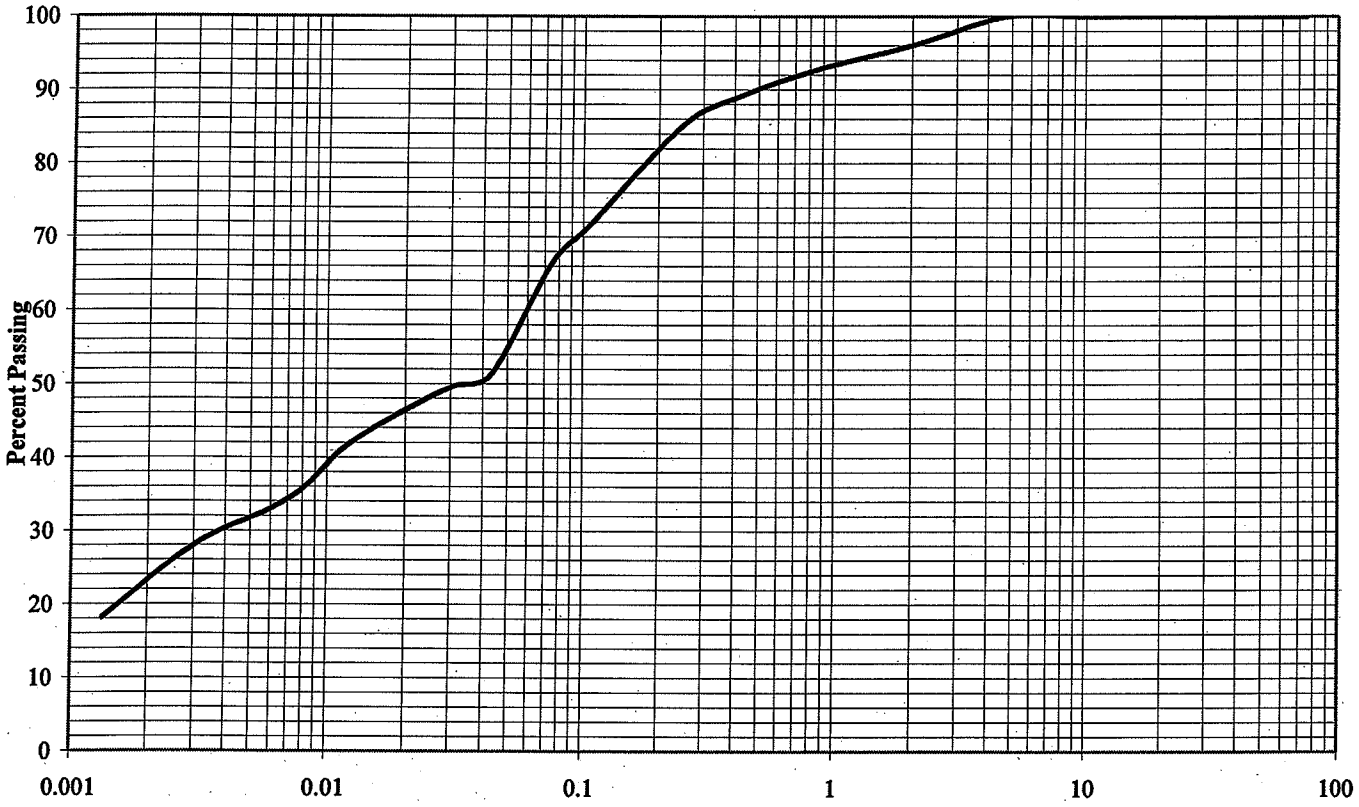
SAMPLE NUMBER: E3876
PROJECT NUMBER: 40840.90
PROJECT: Seaton Lands, Parcel 3
CONTRACT:
CLIENT: Mattamy Homes
CONTRACTOR:
PROJECT SITE: Seaton
SAMPLED BY: SK/AME
DATE SAMPLED: 20-Apr-06
SUPPLIER:
SAMPLE LOCATION: BH 90-1, SS4
DESCRIPTION: Sandy Silt, some clay, trace gravel
DATE TESTED: 24-Apr-06
SPECIFICATION:

COMMENTS:

Gravel = 4.0%		Liquid Limit =	0.0%
Sand = 32.0%		Plastic Limit =	0.0%
Silt = 40.0%		Plasticity Index =	0.0%
Clay = 24.0%			

K<1.0x10^-6 cm/sec

SIEVE SIZE	PERCENT PASSING	SPECIFICATIONS
150.0 mm	100.0	
106.0 mm	100.0	
75.0 mm	100.0	
63.0 mm	100.0	
53.0 mm	100.0	
37.5 mm	100.0	
26.5 mm	100.0	
19.0 mm	100.0	
16.0 mm	100.0	
13.2 mm	100.0	
9.5 mm	100.0	
4.75 mm	100.0	
2.00 mm	96.0	
850 µm	92.7	
425 µm	89.1	
250 µm	85.1	
106 µm	71.5	
75 µm	66.4	
0.0434	51.3	1 minute
0.0310	49.7	2 minute
0.0199	46.4	5 minute
0.0118	41.4	15 minute
0.0085	36.4	30 minute
0.0061	33.1	60 minute
0.0031	28.1	250 minute
0.0013	18.2	1440 minute



AME - Materials Engineering

MW2-91-2

Grain Size Analysis

SAMPLE NUMBER: E3879
PROJECT NUMBER: 40840.91
PROJECT: Seaton Parcel 4
CONTRACT:
CLIENT: Mattamy Homes
CONTRACTOR:
PROJECT SITE: Seaton
SAMPLED BY: SK/AME
DATE SAMPLED: 21-Apr-06
SUPPLIER:
SAMPLE LOCATION: BH 91-2 SS5
DESCRIPTION: Silty sand, some clay, trace gravel
DATE TESTED: 24-Apr-06
SPECIFICATION:

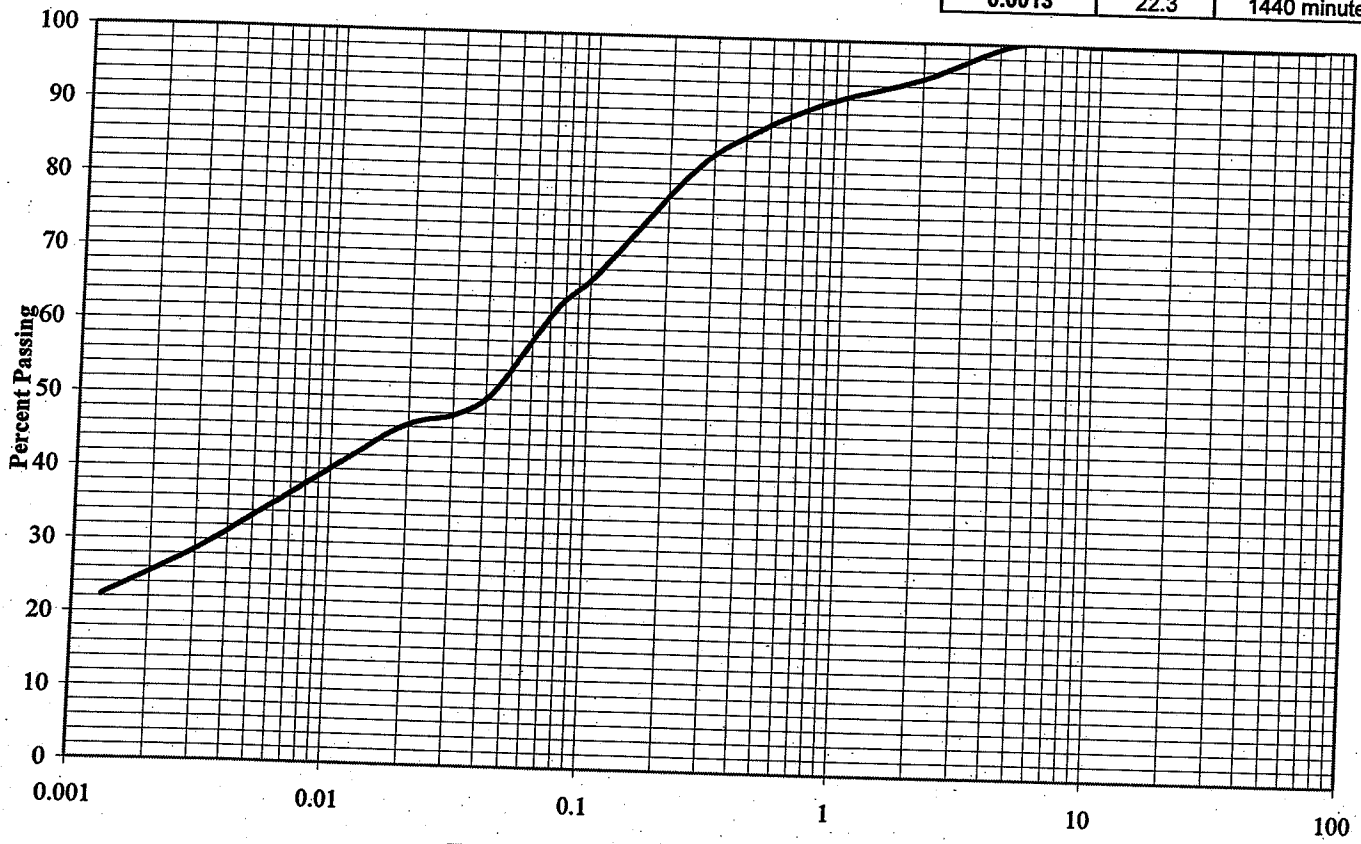
COMMENTS:

Gravel = 5.0%
Sand = 37.0%
Silt = 32.0%
Clay = 26.0%

Liquid Limit = 0.0%
Plastic Limit = 0.0%
Plasticity Index = 0.0%

K<1.0x10^-6 cm/sec

SIEVE SIZE	PERCENT PASSING	SPECIFICATIONS
150.0 mm	100.0	
106.0 mm	100.0	
75.0 mm	100.0	
63.0 mm	100.0	
53.0 mm	100.0	
37.5 mm	100.0	
26.5 mm	100.0	
19.0 mm	100.0	
16.0 mm	100.0	
13.2 mm	100.0	
9.5 mm	100.0	
4.75 mm	100.0	
2.00 mm	95.0	
850 µm	91.5	
425 µm	86.9	
250 µm	81.6	
106 µm	67.3	
75 µm	62.7	
0.0429	51.0	1 minute
0.0308	47.8	2 minute
0.0197	46.2	5 minute
0.0116	41.4	15 minute
0.0084	38.3	30 minute
0.0060	35.1	60 minute
0.0030	28.7	250 minute
0.0013	22.3	1440 minute



BH2-92-10

AME - Materials Engineering

Grain Size Analysis

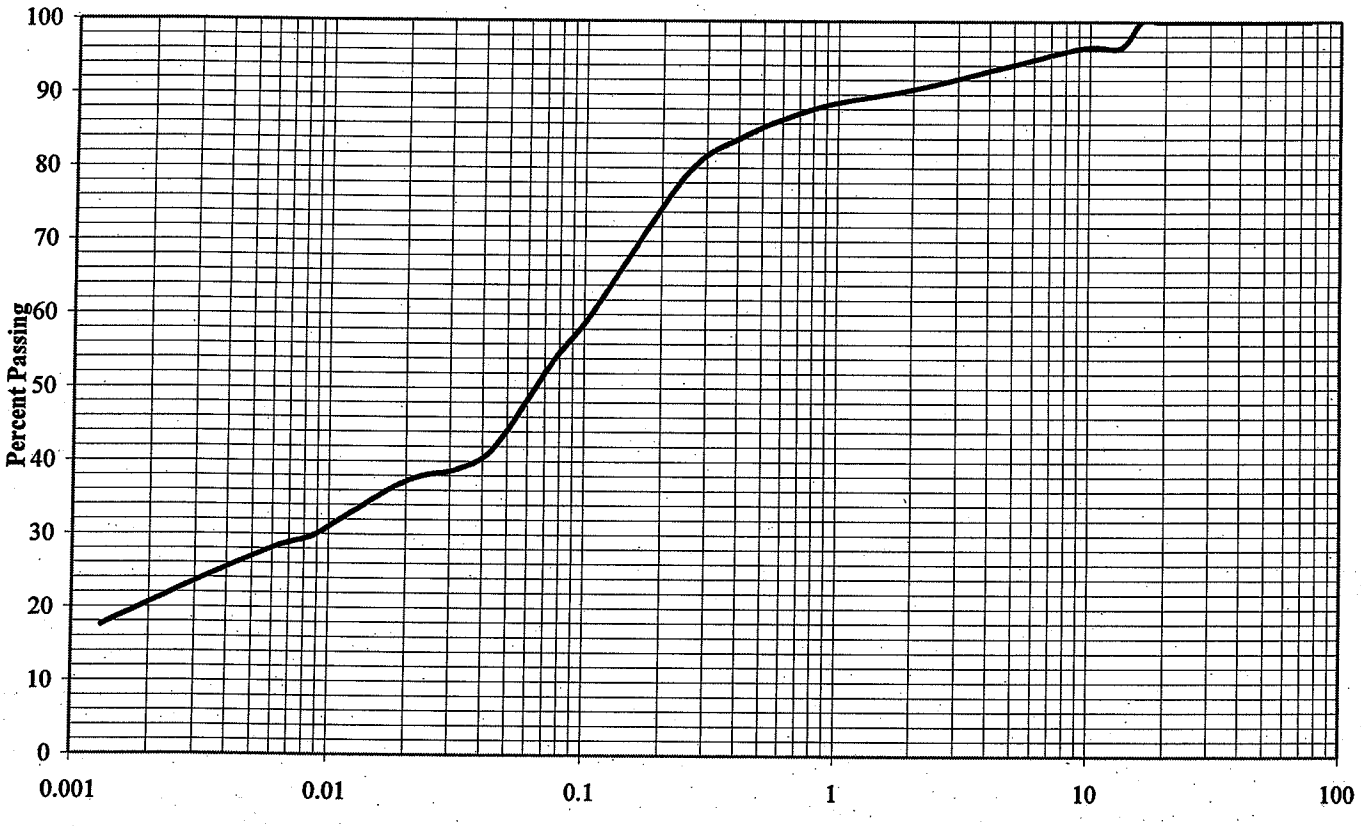
SAMPLE NUMBER: E3898
PROJECT NUMBER: 40840.92
PROJECT: Seaton - Parcel 5
CONTRACT:
CLIENT: Mattamy Homes
CONTRACTOR:
PROJECT SITE: Parcel 5
SAMPLED BY: SK/AME
DATE SAMPLED: 21-Apr-06
SUPPLIER:
SAMPLE LOCATION: BH92-10 SS7
DESCRIPTION: Silty sand, trace gravel, some clay
DATE TESTED: 2-May-06
SPECIFICATION:

COMMENTS:

Gravel = 9.3%	Liquid Limit	=	0.0%
Sand = 40.7%	Plastic Limit	=	0.0%
Silt = 29.5%	Plasticity Index	=	0.0%
Clay = 20.5%			

K<1.0x10^-6 cm/sec

SIEVE SIZE	PERCENT PASSING	SPECIFICATIONS
150.0 mm	100.0	
106.0 mm	100.0	
75.0 mm	100.0	
63.0 mm	100.0	
53.0 mm	100.0	
37.5 mm	100.0	
26.5 mm	100.0	
19.0 mm	100.0	
16.0 mm	100.0	
13.2 mm	96.4	
9.5 mm	96.4	
4.75 mm	93.9	
2.00 mm	90.7	
850 µm	88.3	
425 µm	84.3	
250 µm	79.0	
106 µm	59.9	
75 µm	53.5	
0.0449	42.0	1 minute
0.0322	38.9	2 minute
0.0205	37.4	5 minute
0.0121	32.8	15 minute
0.0087	29.8	30 minute
0.0062	28.3	60 minute
0.0031	23.7	250 minute
0.0013	17.6	1440 minute



MW2-93-5

AME - Materials Engineering

Grain Size Analysis

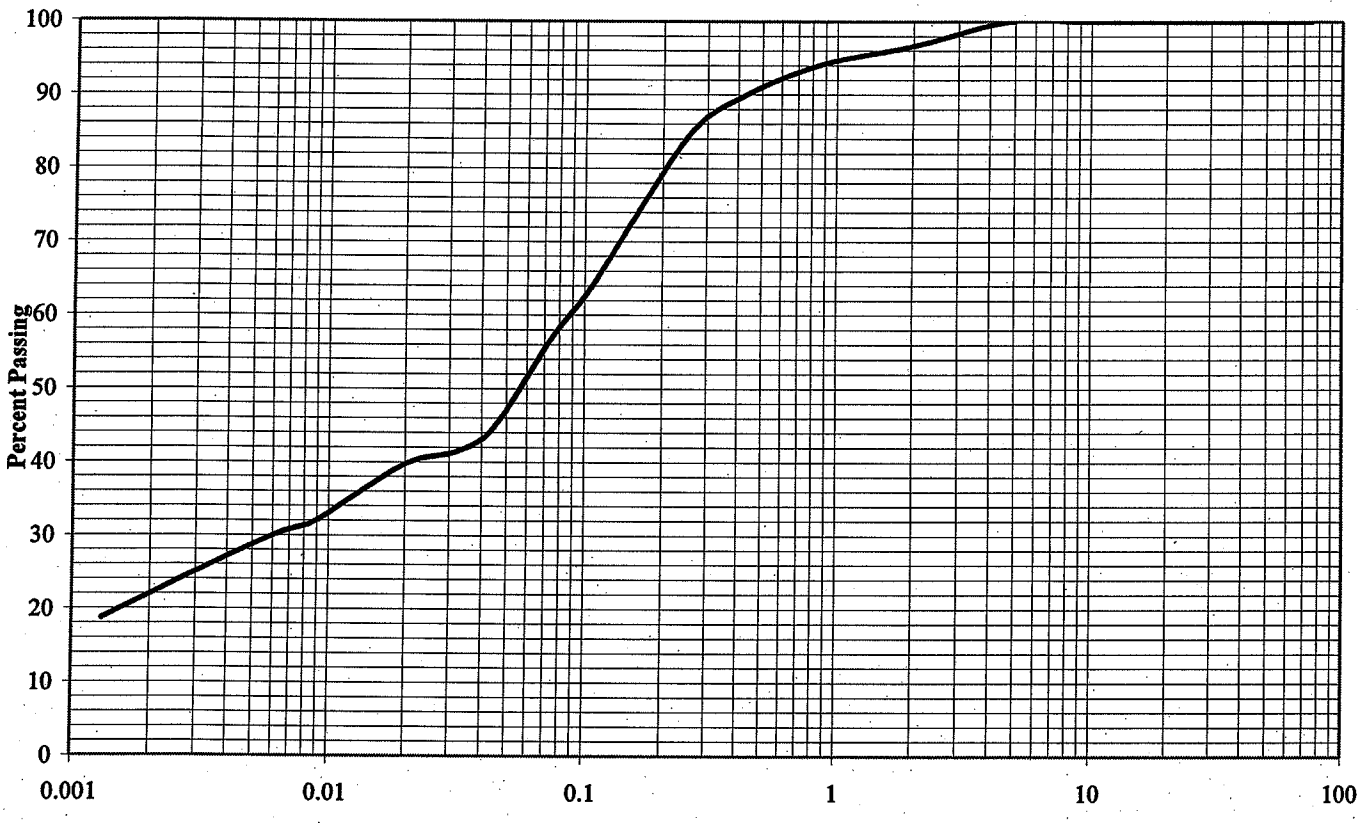
SAMPLE NUMBER: E3898
PROJECT NUMBER: 40840.93
PROJECT: Seaton - Parcel 6
CONTRACT:
CLIENT: Mattamy Homes
CONTRACTOR:
PROJECT SITE:
SAMPLED BY: SK/AME
DATE SAMPLED: 1-May-06
SUPPLIER:
SAMPLE LOCATION: BH93-5 SS5
DESCRIPTION: Silty sand, some clay, trace gravel
DATE TESTED: 2-May-06
SPECIFICATION:

COMMENTS:

Gravel = 3.4%		Liquid Limit =	0.0%
Sand = 44.6%		Plastic Limit =	0.0%
Silt = 30.0%		Plasticity Index =	0.0%
Clay = 22.0%			

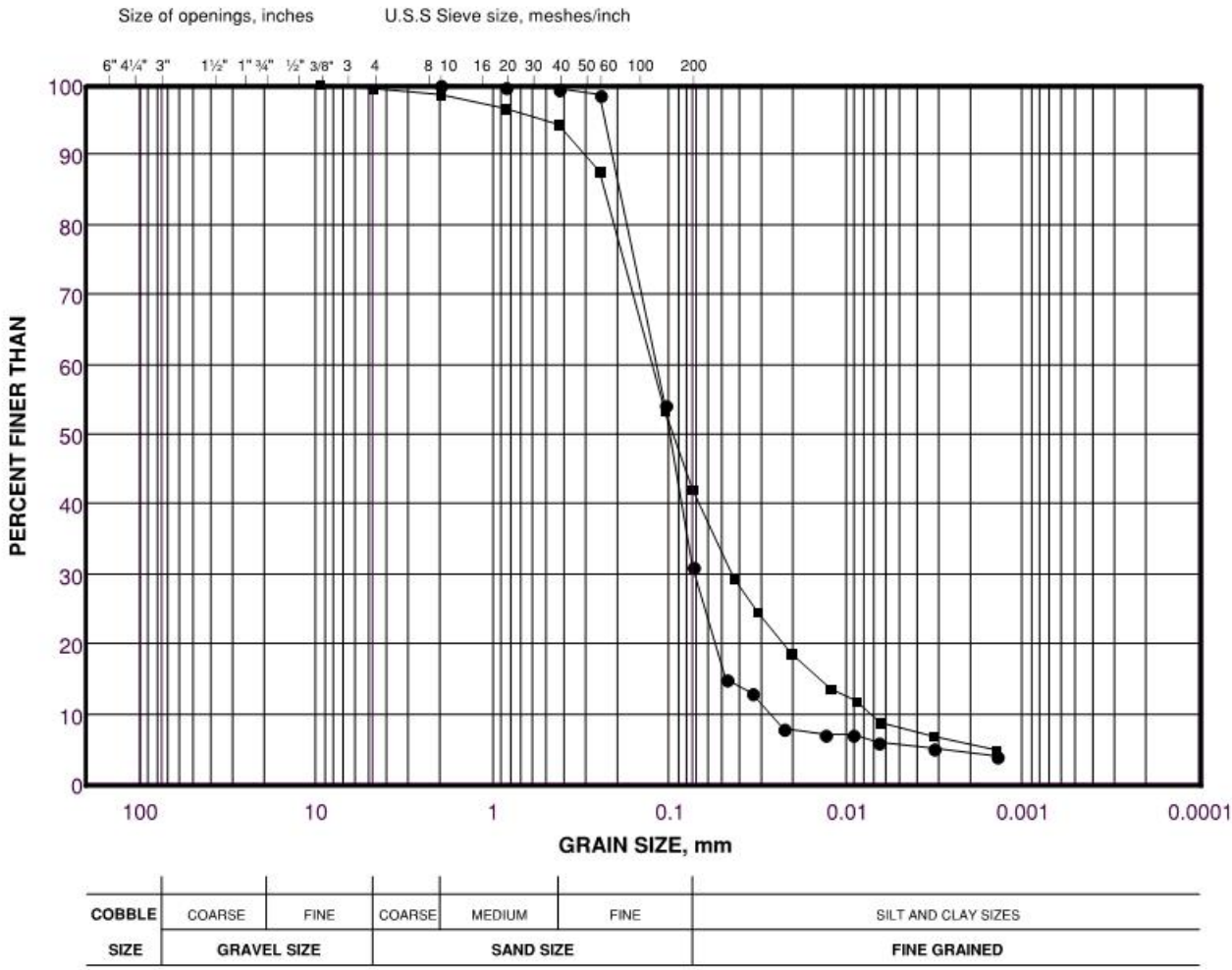
K<1.0x10^-6 cm/sec

SIEVE SIZE	PERCENT PASSING	SPECIFICATIONS
150.0 mm	100.0	
106.0 mm	100.0	
75.0 mm	100.0	
63.0 mm	100.0	
53.0 mm	100.0	
37.5 mm	100.0	
26.5 mm	100.0	
19.0 mm	100.0	
16.0 mm	100.0	
13.2 mm	100.0	
9.5 mm	100.0	
4.75 mm	100.0	
2.00 mm	96.6	
850 µm	94.0	
425 µm	89.8	
250 µm	84.1	
106 µm	63.8	
75 µm	56.9	
0.0449	44.7	1 minute
0.0322	41.5	2 minute
0.0205	39.9	5 minute
0.0121	35.0	15 minute
0.0087	31.7	30 minute
0.0062	30.1	60 minute
0.0031	25.2	250 minute
0.0013	18.7	1440 minute



GRAIN SIZE DISTRIBUTION
SILTY FINE SAND

FIGURE 3



LEGEND

SYMBOL	BOREHOLE	SAMPLE	DEPTH(m)
●	11-18	4	2.30 - 2.40
■	11-39	7	6.10 - 6.60

MW9-11-18 K≈7.3x10^-4 cm/sec
BH9-11-39 K≈5.6x10^-5 cm/sec

Project Number: 11-1111- 0052

Checked By: O.S

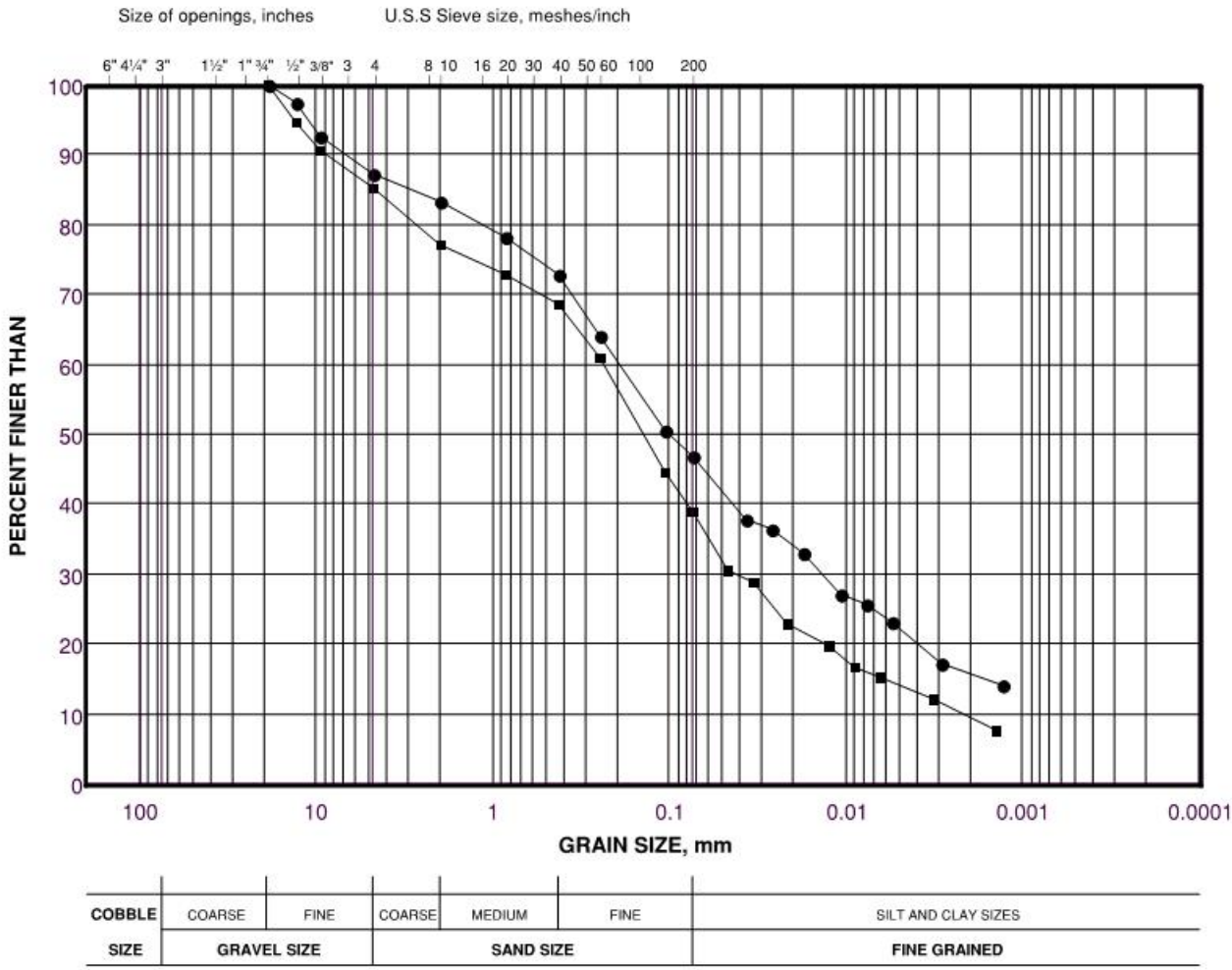
Golder Associates

Date: 08-Jun-11

GRAIN SIZE DISTRIBUTION

SILTY SAND TILL

FIGURE 4



LEGEND

SYMBOL	BOREHOLE	SAMPLE	DEPTH(m)
●	11-52	5	3.0 - 3.20
■	11-55	6	4.60 - 4.90

BH9-11-52 K<1.0x10^-6 cm/sec
BH9-11-55 K≈4.4x10^-6 cm/sec

Project Number: 11-1111- 0052

Checked By: O.S

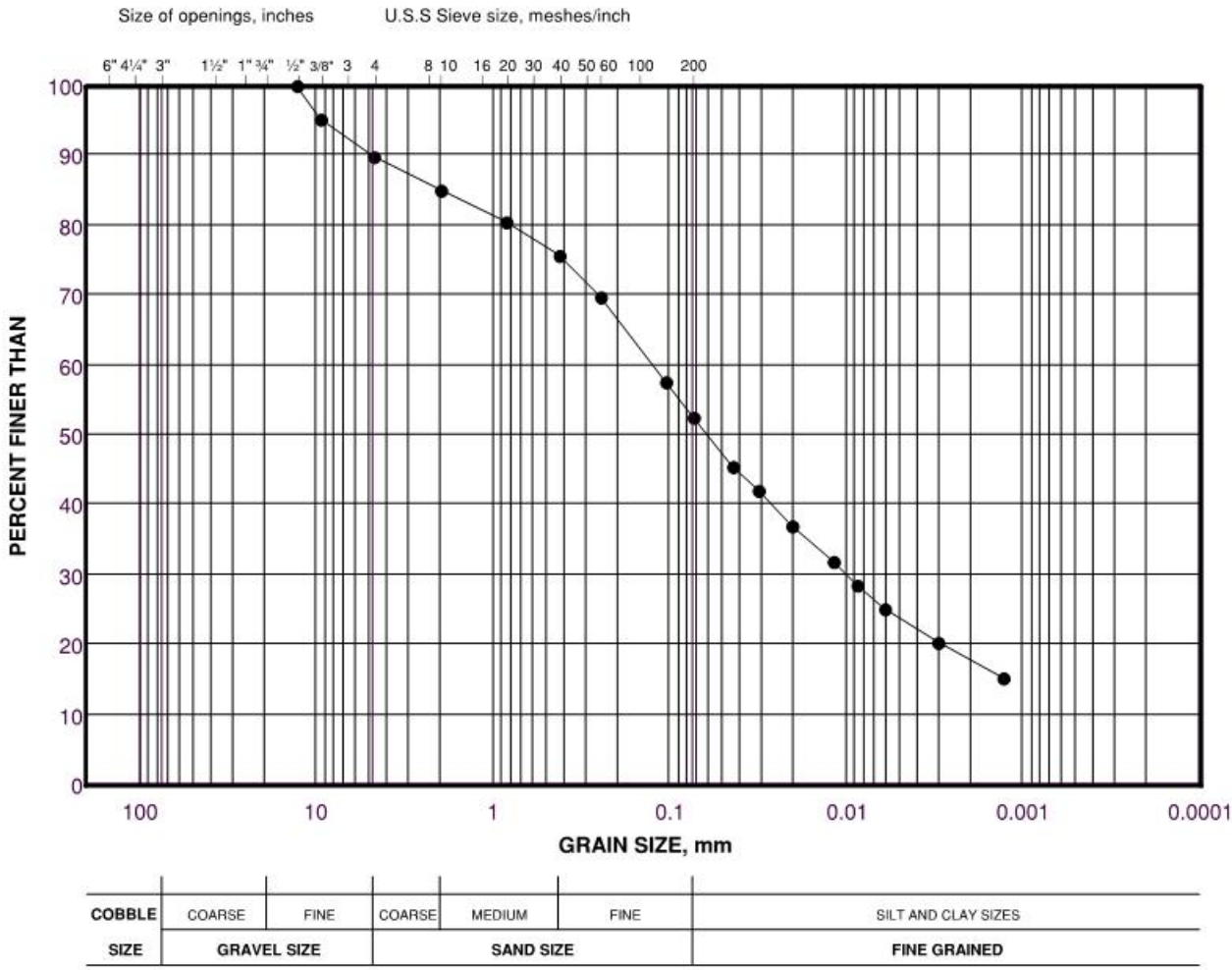
Golder Associates

Date: 08-Jun-11

GRAIN SIZE DISTRIBUTION

SILTY SAND TILL to SANDY SILT TILL

FIGURE 5



LEGEND

SYMBOL	BOREHOLE	SAMPLE	DEPTH(m)
•	11-50	8	7.60 - 7.90

BH9-11-50 K<1.0x10^-6 cm/sec

Project Number: 11-1111- 0052

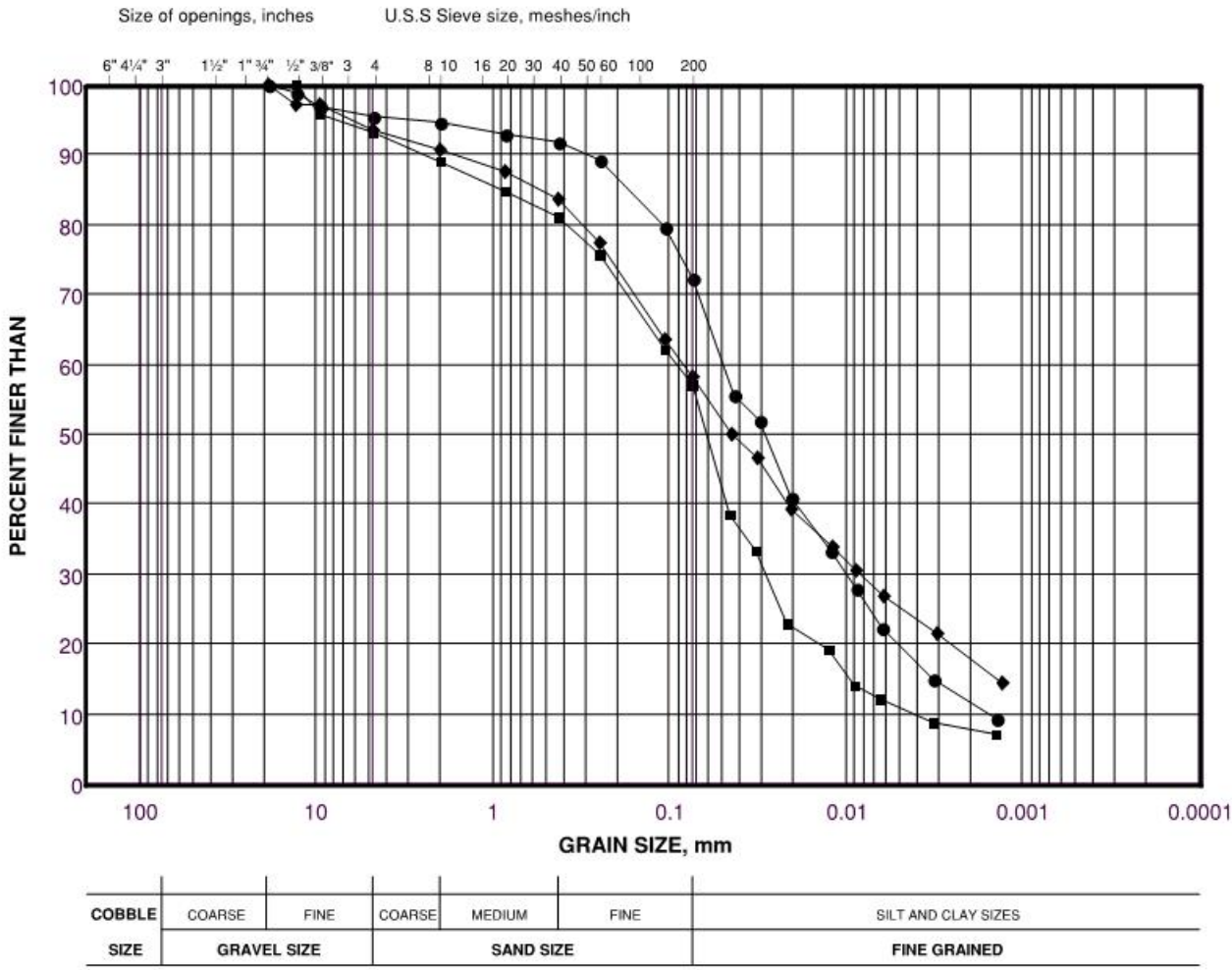
Checked By: O.S

Golder Associates

Date: 08-Jun-11

GRAIN SIZE DISTRIBUTION
SANDY SILT TILL

FIGURE 6



LEGEND

SYMBOL	BOREHOLE	SAMPLE	DEPTH(m)
●	11-44	3	1.50 - 2.0
■	11-38	4	2.30 - 2.70
◆	11-49	4	2.30 - 2.70

BH9-11-44 K≈2.6x10^-6 cm/sec
BH9-11-38 K≈1.6x10^-5 cm/sec
BH9-11-49 K<1.0x10^-6 cm/sec

Project Number: 11-1111- 0052

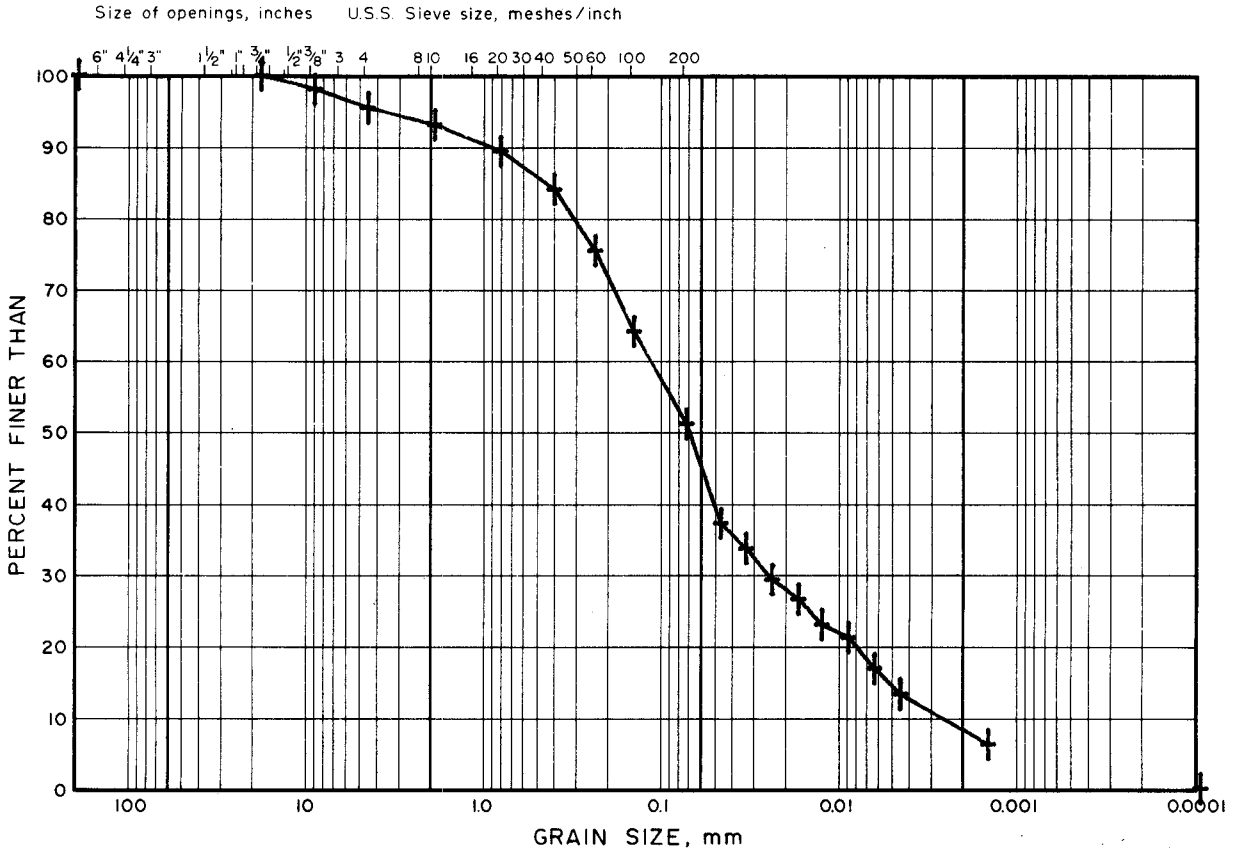
Checked By: O.S

Golder Associates

Date: 08-Jun-11

GRAIN SIZE DISTRIBUTION

FIGURE



COBBLE SIZE	COARSE	MEDIUM	FINE	COARSE	MEDIUM	FINE	SILT SIZE	CLAY SIZE
	GRAVEL SIZE			SAND SIZE			FINE GRAINED	

LEGEND

SYMBOL	BOREHOLE	SAMPLE	DEPTH (m)
+	EE 10/3-1	4	2.1

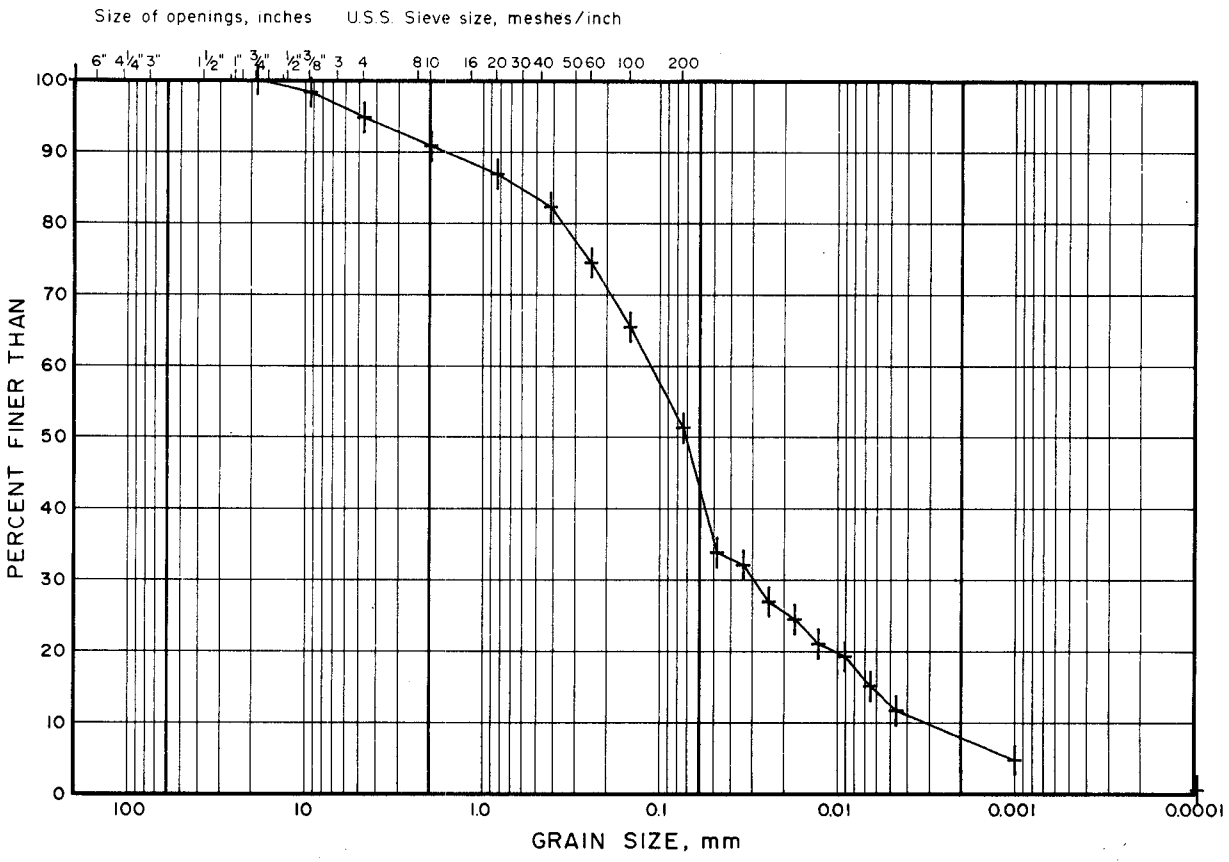
K≈6.3x10^-6 cm/sec

Project 931-1316

Golder Associates

GRAIN SIZE DISTRIBUTION

FIGURE



COBBLE SIZE	COARSE	MEDIUM	FINE	COARSE	MEDIUM	FINE	SILT SIZE	CLAY SIZE
	GRAVEL SIZE			SAND SIZE			FINE GRAINED	

LEGEND

SYMBOL	BOREHOLE	SAMPLE	DEPTH (m)
+	EE 10/3-1	5	3.0

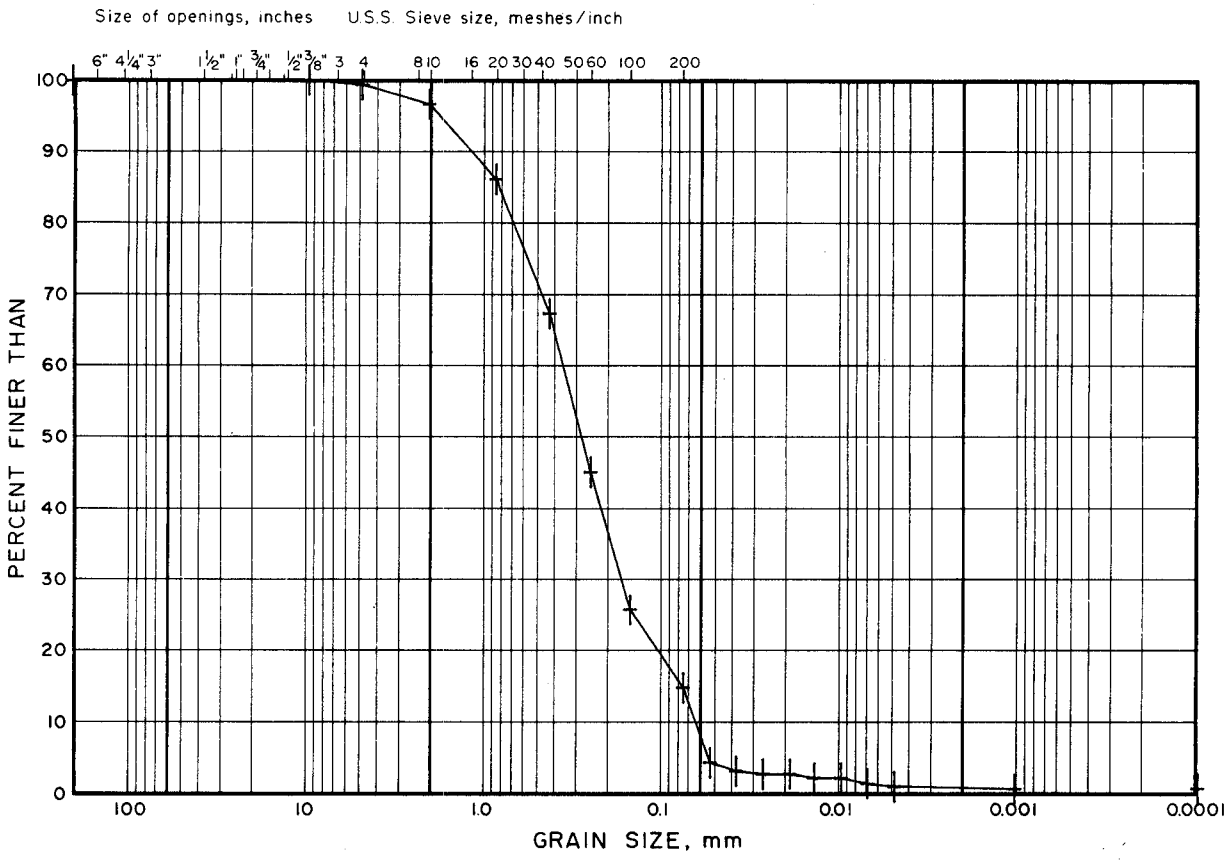
K≈9.0x10^-6 cm/sec

Project 931-1316

Golder Associates

GRAIN SIZE DISTRIBUTION

FIGURE



COBBLE SIZE	COARSE	MEDIUM	FINE	COARSE	MEDIUM	FINE	SILT SIZE	CLAY SIZE
	GRAVEL SIZE			SAND SIZE			FINE GRAINED	

LEGEND

SYMBOL	BOREHOLE	SAMPLE	DEPTH (m)
+	EE 10/3-1	16	9.4

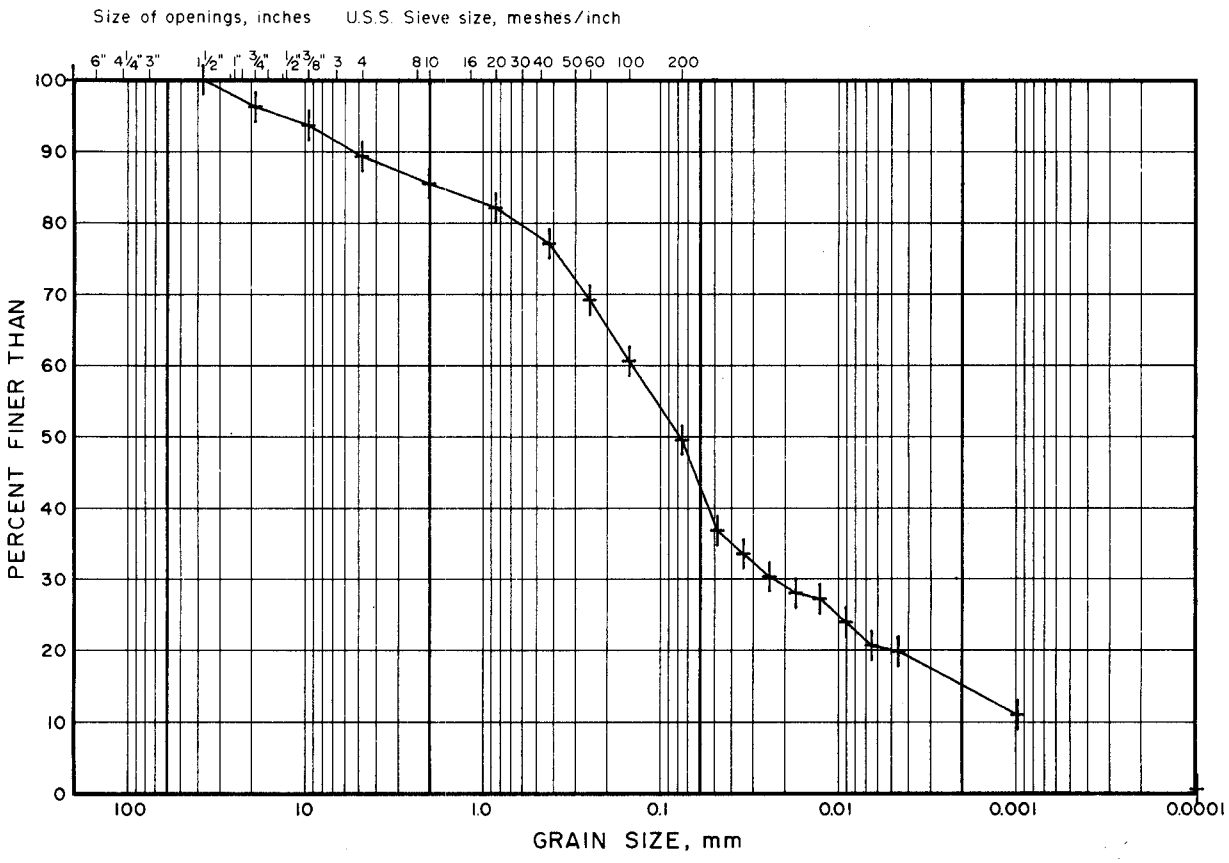
K≈4.2x10^-3 cm/sec

Project 931-1316

Golder Associates

GRAIN SIZE DISTRIBUTION

FIGURE



COBBLE SIZE	GRAVEL SIZE			SAND SIZE			FINE GRAINED	
	COARSE	MEDIUM	FINE	COARSE	MEDIUM	FINE	SILT SIZE	CLAY SIZE

LEGEND

SYMBOL	BOREHOLE	SAMPLE	DEPTH (m)
+	EE 10/3-1	21	13.7

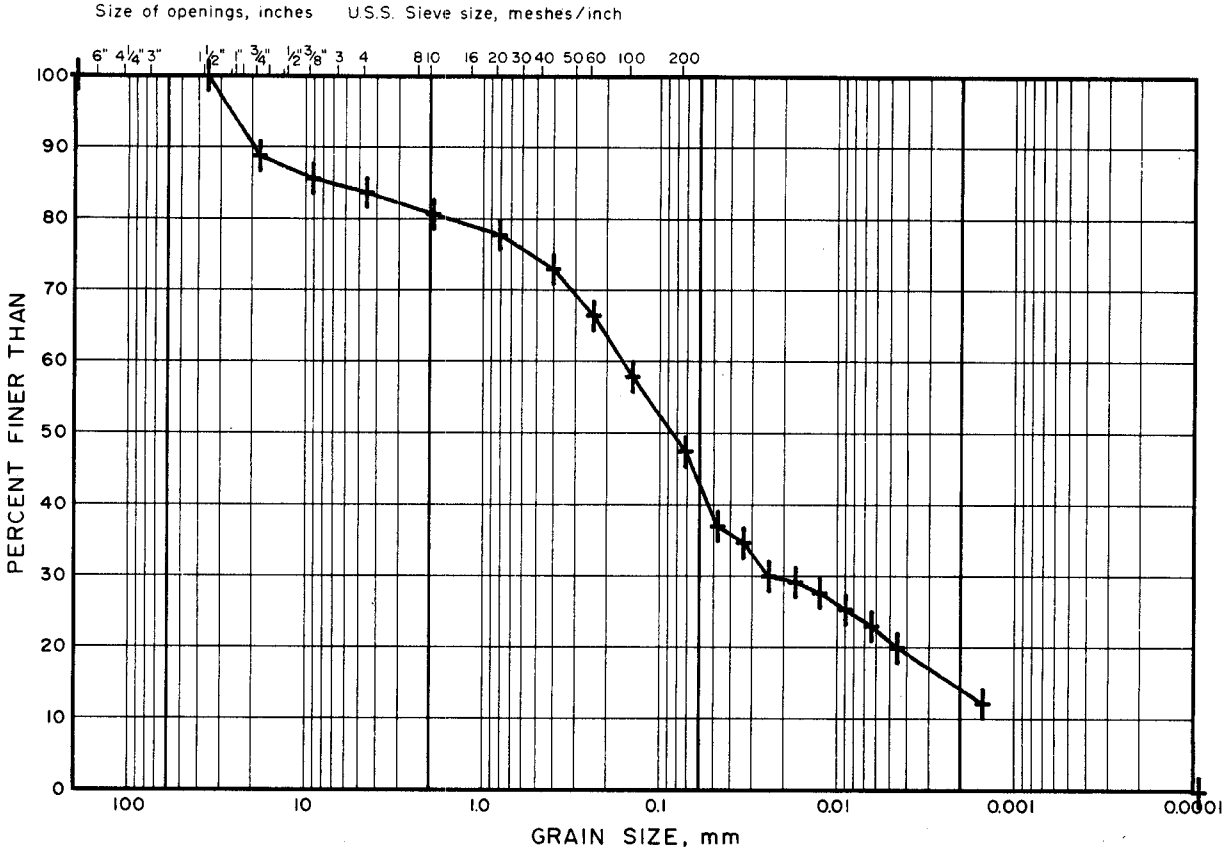
K<1.0x10^-6 cm/sec

Project 931-1316

Golder Associates

GRAIN SIZE DISTRIBUTION

FIGURE



COBBLE SIZE	COARSE	MEDIUM	FINE	COARSE	MEDIUM	FINE	SILT SIZE	CLAY SIZE
	GRAVEL SIZE			SAND SIZE			FINE GRAINED	

LEGEND

SYMBOL	BOREHOLE	SAMPLE	DEPTH ()
+	EE10/3-1	28X1	

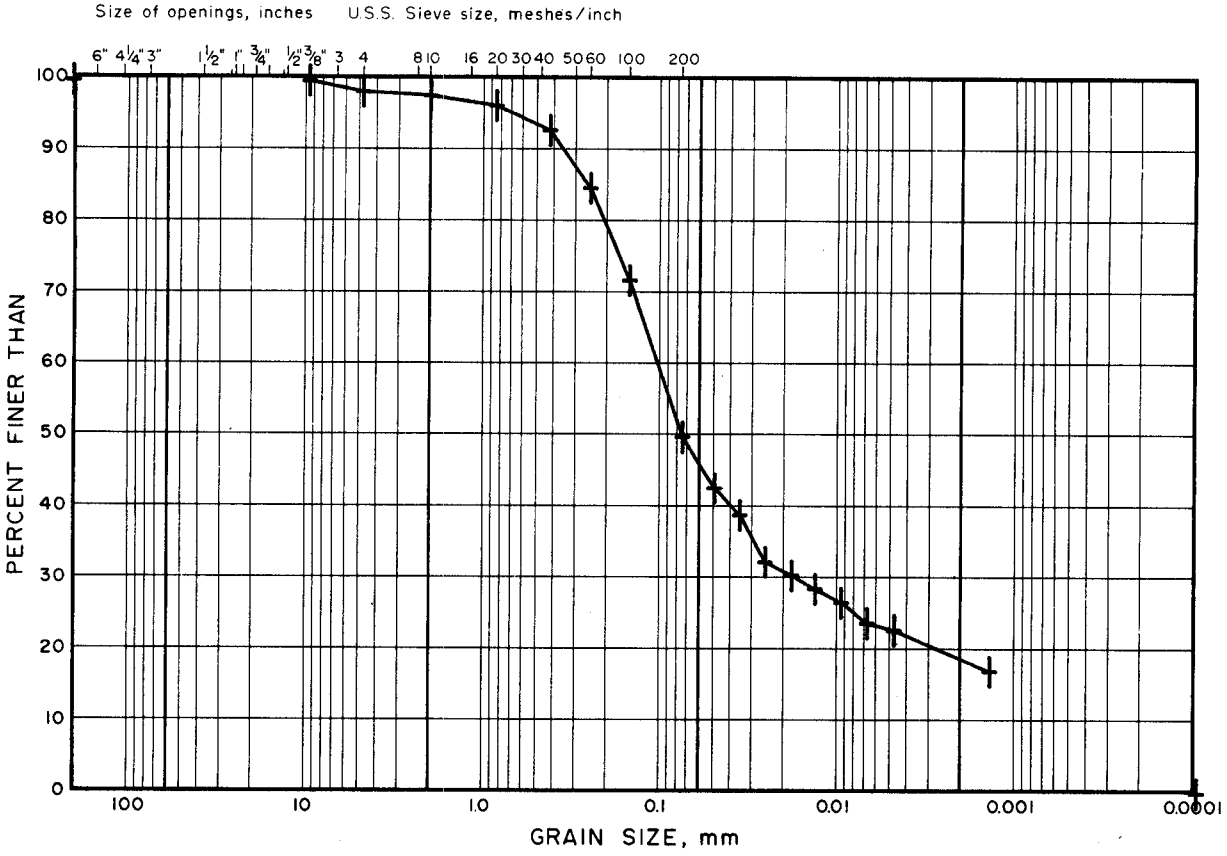
K<1.0x10^-6 cm/sec

Project 931-1316

Golder Associates

GRAIN SIZE DISTRIBUTION

FIGURE



COBBLE SIZE	GRAVEL SIZE			SAND SIZE			FINE GRAINED	
	COARSE	MEDIUM	FINE	COARSE	MEDIUM	FINE	SILT SIZE	CLAY SIZE

LEGEND

SYMBOL	BOREHOLE	SAMPLE	DEPTH ()
+	EE10/3-1	30X1	

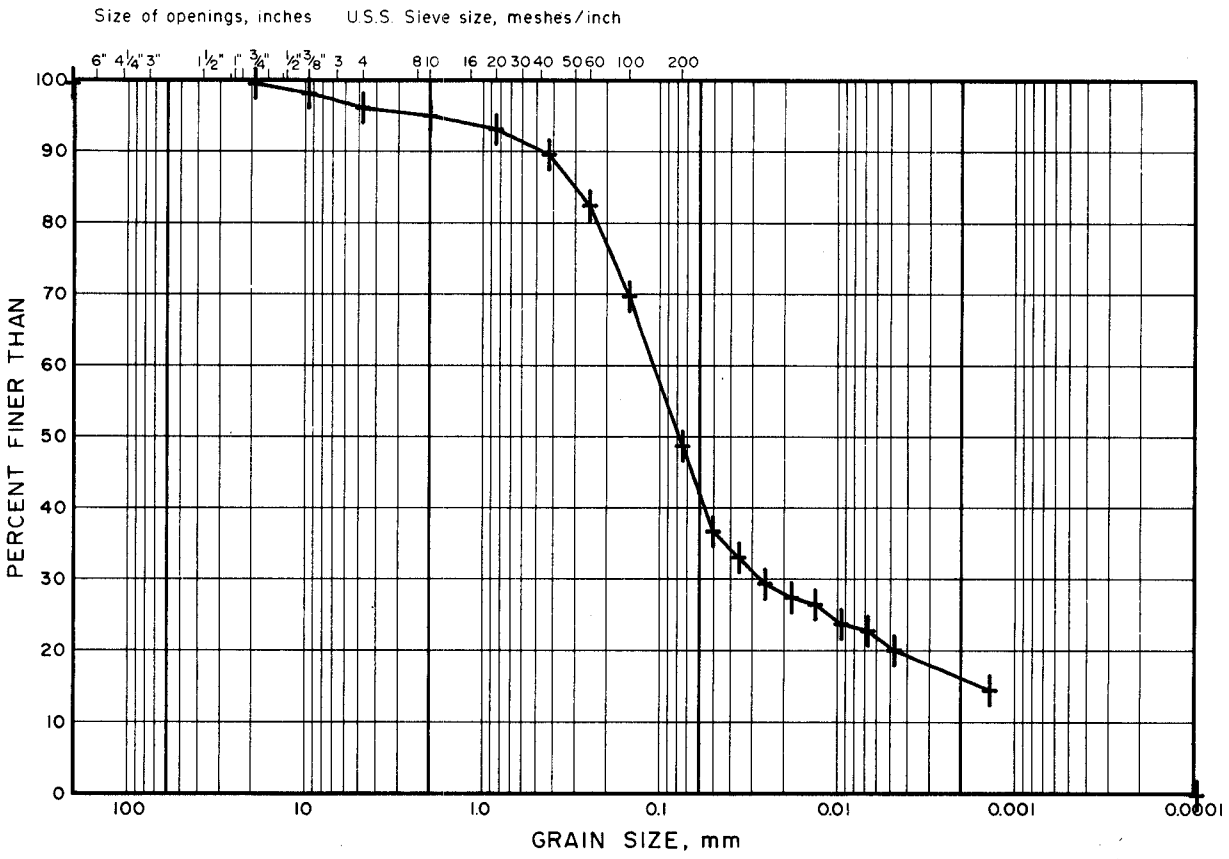
K<1.0x10^-6 cm/sec

Project 931-1316

Golder Associates

GRAIN SIZE DISTRIBUTION

FIGURE



COBBLE SIZE	COARSE	MEDIUM	FINE	COARSE	MEDIUM	FINE	SILT SIZE	CLAY SIZE
	GRAVEL SIZE			SAND SIZE			FINE GRAINED	

LEGEND

SYMBOL	BOREHOLE	SAMPLE	DEPTH ()
+	EE10/3-1	35X1	

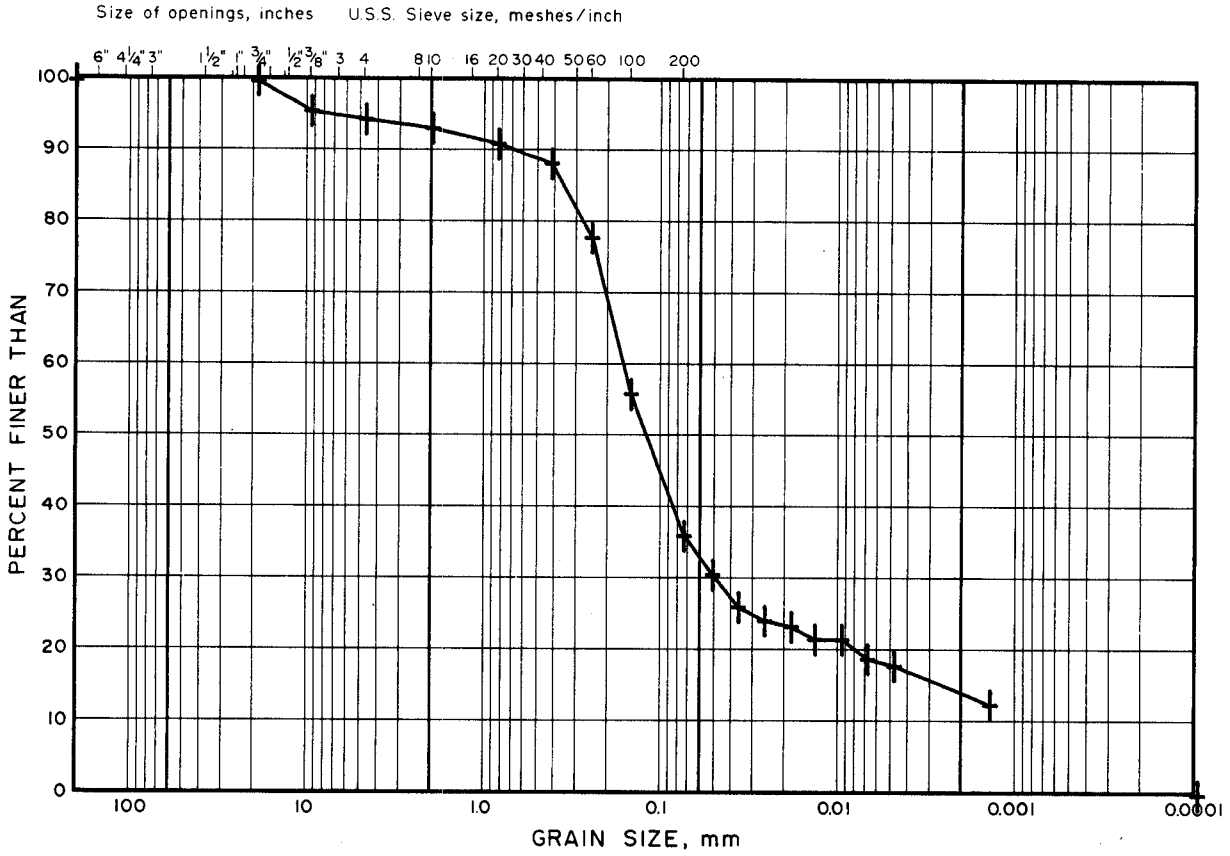
K<1.0x10^-6 cm/sec

Project 931-1316

Golder Associates

GRAIN SIZE DISTRIBUTION

FIGURE



COBBLE SIZE	GRAVEL SIZE			SAND SIZE			FINE GRAINED	
	COARSE	MEDIUM	FINE	COARSE	MEDIUM	FINE	SILT SIZE	CLAY SIZE

LEGEND

SYMBOL	BOREHOLE	SAMPLE	DEPTH ()
+	EE10/3-1	39X1	

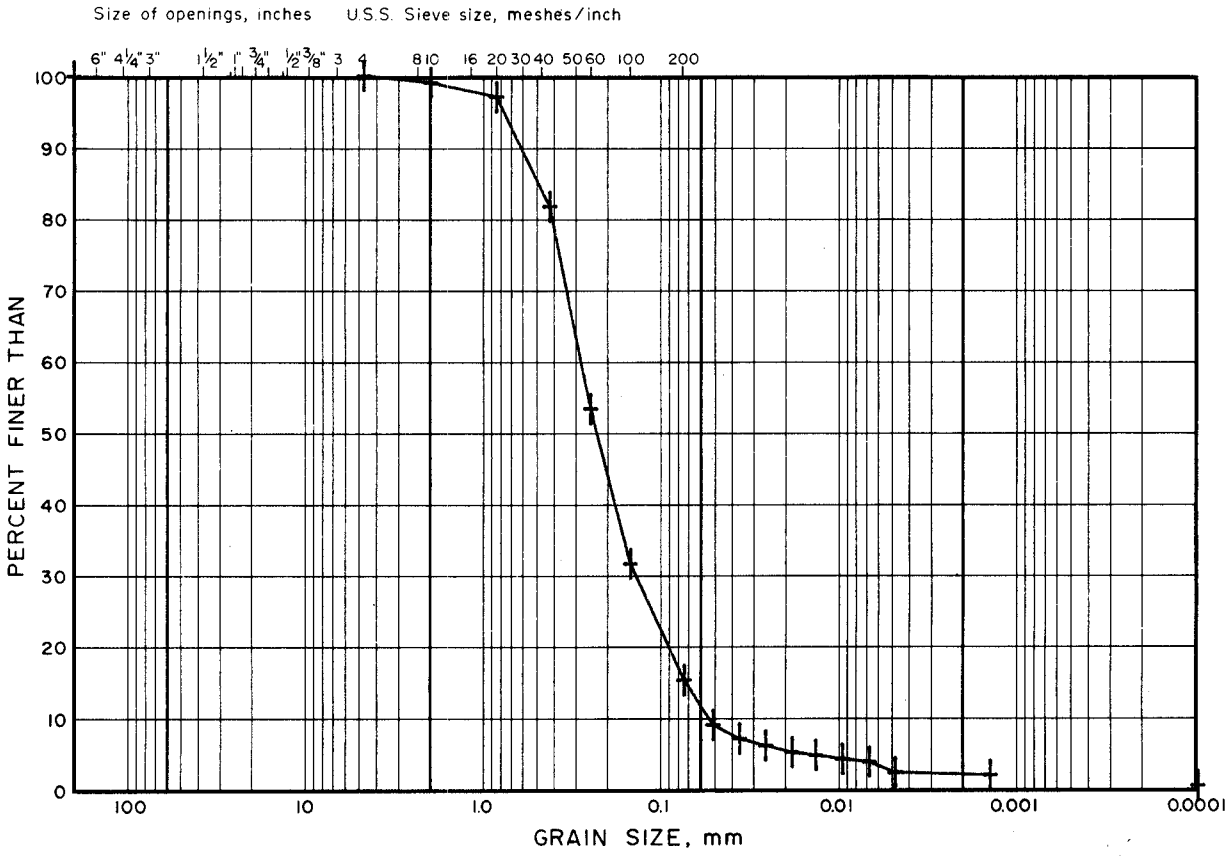
K<1.0x10^-6 cm/sec

Project 931-1316

Golder Associates

GRAIN SIZE DISTRIBUTION

FIGURE



COBBLE SIZE	GRAVEL SIZE			SAND SIZE			FINE GRAINED	
	COARSE	MEDIUM	FINE	COARSE	MEDIUM	FINE	SILT SIZE	CLAY SIZE

LEGEND

SYMBOL	BOREHOLE	SAMPLE	DEPTH (m)
+	EE 10/4-1	5	6.4

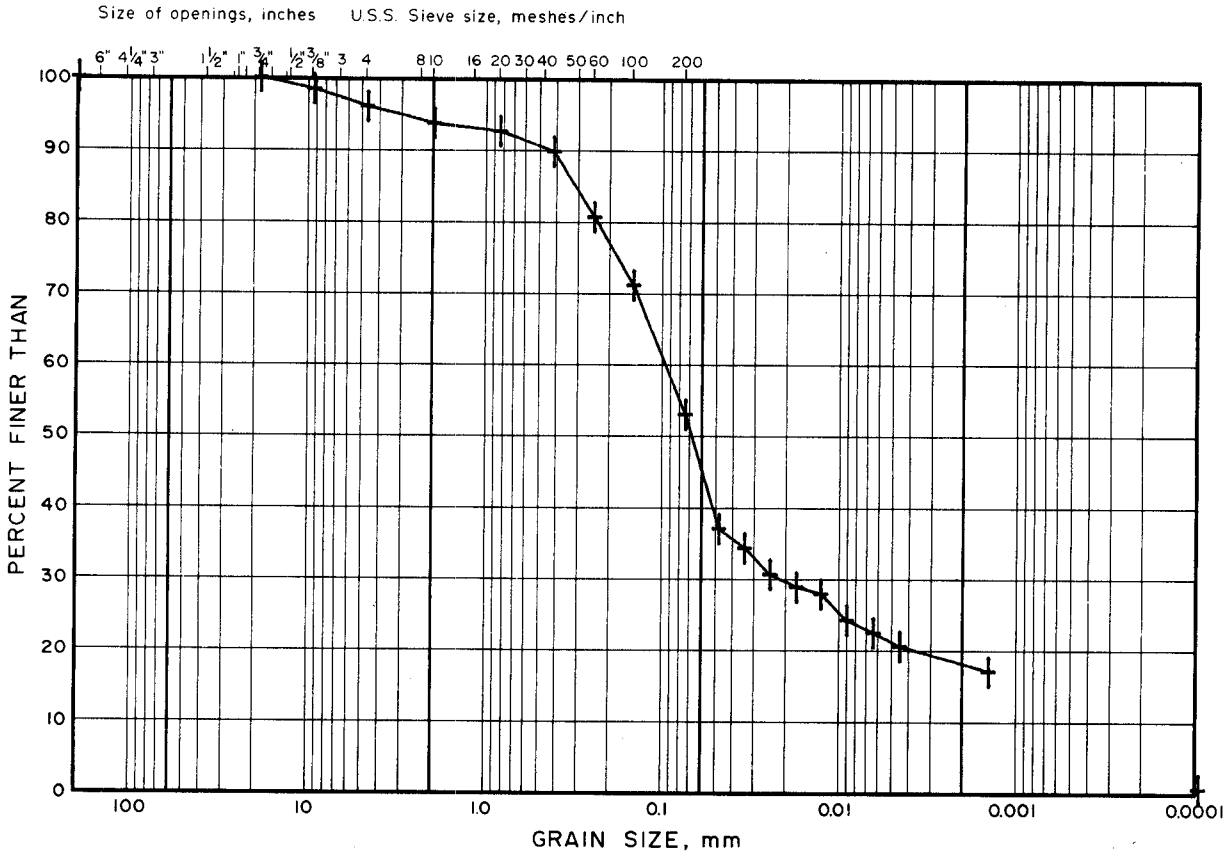
K≈3.0x10^-3 cm/sec

Project 931-1316

Golder Associates

GRAIN SIZE DISTRIBUTION

FIGURE



COBBLE SIZE	GRAVEL SIZE			SAND SIZE			FINE GRAINED	
	COARSE	MEDIUM	FINE	COARSE	MEDIUM	FINE	SILT SIZE	CLAY SIZE

LEGEND

SYMBOL	BOREHOLE	SAMPLE	DEPTH (m)
+	EE 10/4-1	24	33.7

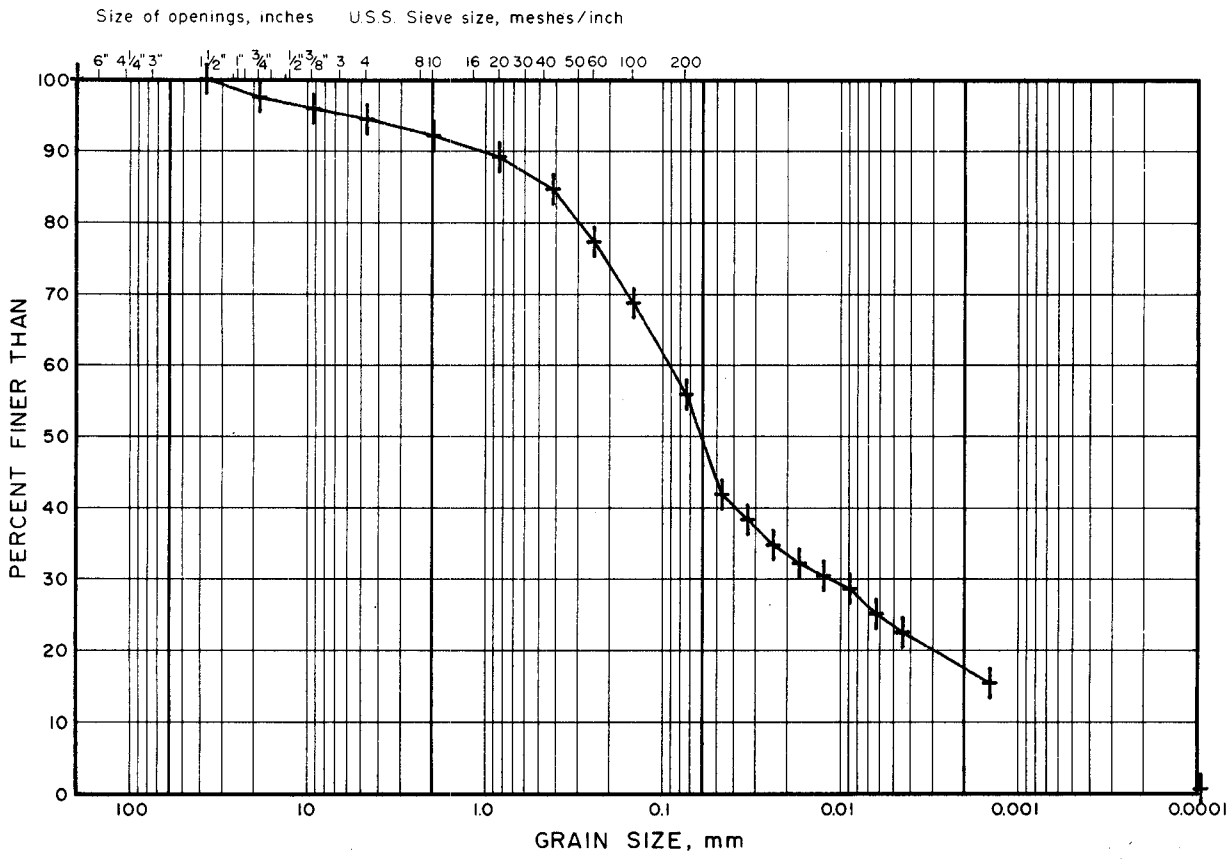
K<1.0x10^-6 cm/sec

Project 931-1316

Golder Associates

GRAIN SIZE DISTRIBUTION

FIGURE



COBBLE SIZE	GRAVEL SIZE			SAND SIZE			FINE GRAINED	
	COARSE	MEDIUM	FINE	COARSE	MEDIUM	FINE	SILT SIZE	CLAY SIZE

LEGEND

SYMBOL	BOREHOLE	SAMPLE	DEPTH (m)
+	EE 10/5-1	10	14.3

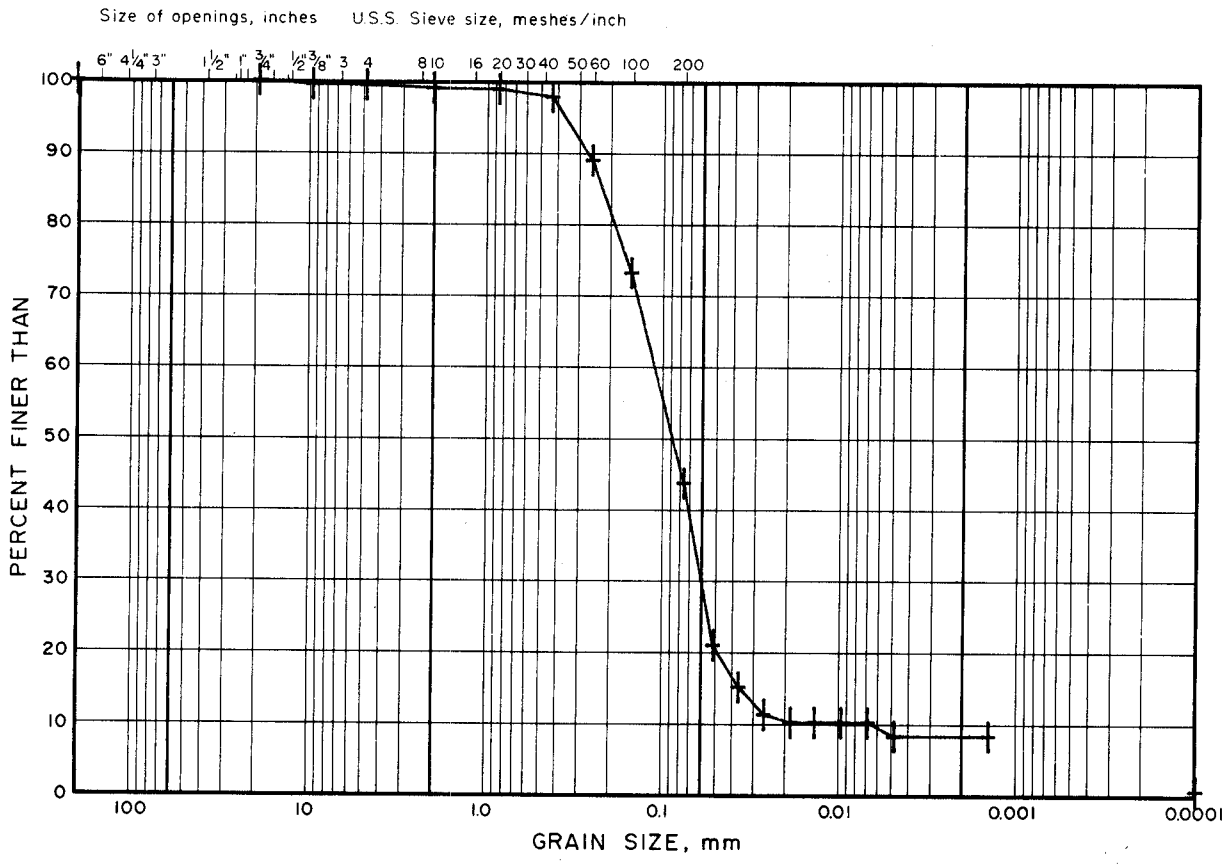
K<1.0x10^-6 cm/sec

Project 931-1316

Golder Associates

GRAIN SIZE DISTRIBUTION

FIGURE



COBBLE SIZE	COARSE	MEDIUM	FINE	COARSE	MEDIUM	FINE	SILT SIZE	CLAY SIZE
	GRAVEL SIZE			SAND SIZE			FINE GRAINED	

LEGEND

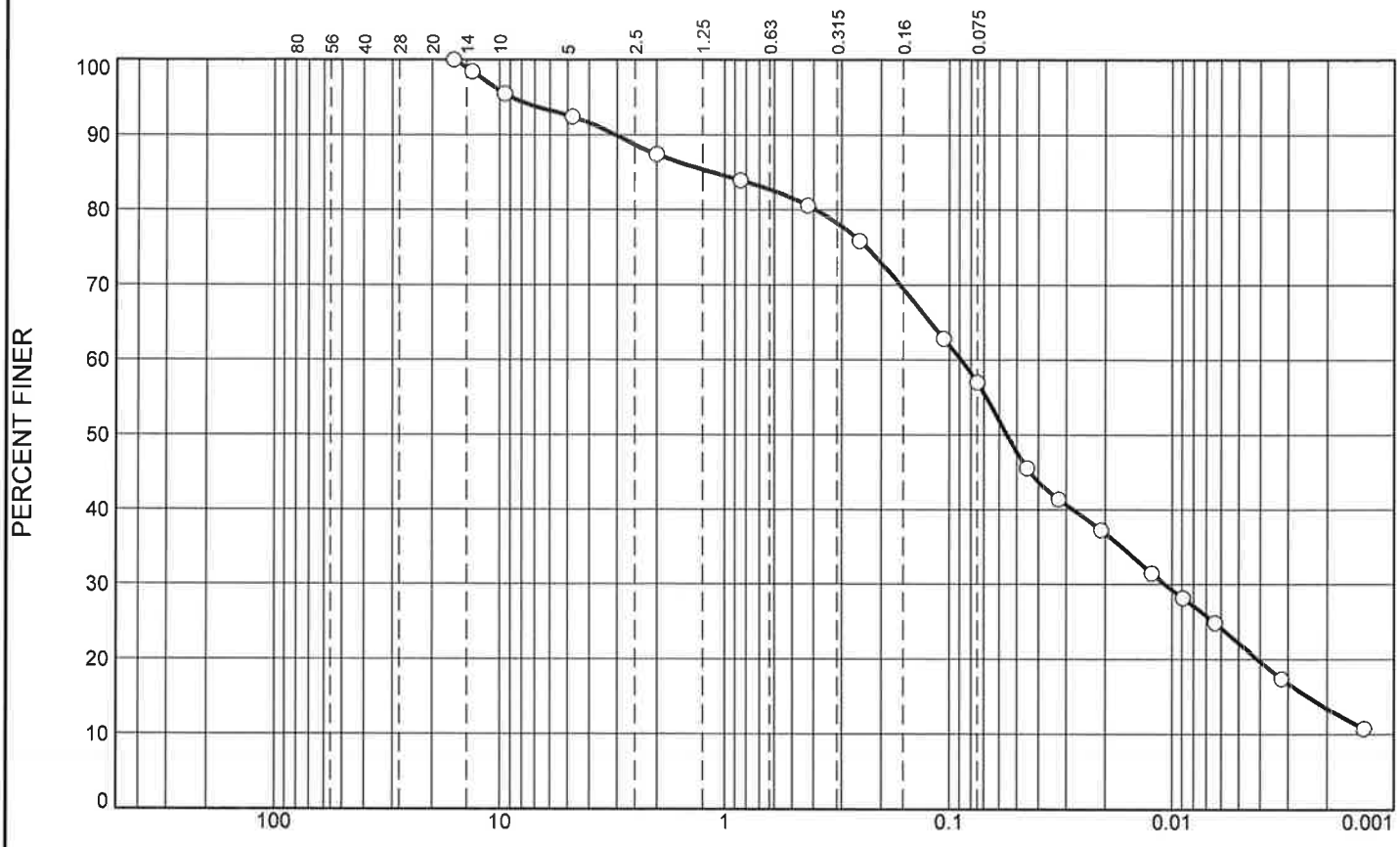
SYMBOL	BOREHOLE	SAMPLE	DEPTH (m)
+	EE 10/5-1	18	27.7

K≈4.0x10^-4 cm/sec

Project 931-1316

Golder Associates

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	7.6	5.0	6.8	23.6	43.6	13.4

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
16mm	100.0		
13.2mm	98.4		
9.5mm	95.5		
4.75mm	92.4		
2.00mm	87.4		
0.850mm	84.0		
0.425mm	80.6		
0.250mm	75.9		
0.106mm	62.8		
0.075mm	57.0		
0.0451 mm.	45.6		
0.0325 mm.	41.4		
0.0210 mm.	37.3		
0.0124 mm.	31.5		
0.0089 mm.	28.2		
0.0064 mm.	24.8		
0.0032 mm.	17.4		
0.0014 mm.	10.8		

* (no specification provided)

Soil Description

Brown sandy silt trace of gravel with some clay

Atterberg Limits

PL= 12 LL= 19 PI= 7

Coefficients

D_{90}= 3.0490 D_{85}= 1.1244 D_{60}= 0.0885
D_{50}= 0.0555 D_{30}= 0.0108 D_{15}= 0.0025
D_{10}= C_u= C_c=

Classification

USCS= CL-ML AASHTO= A-4(1)

Remarks

K= 2.3x10^-6 cm/sec

Location: BH13-4, SS3
Sample Number: M-0001

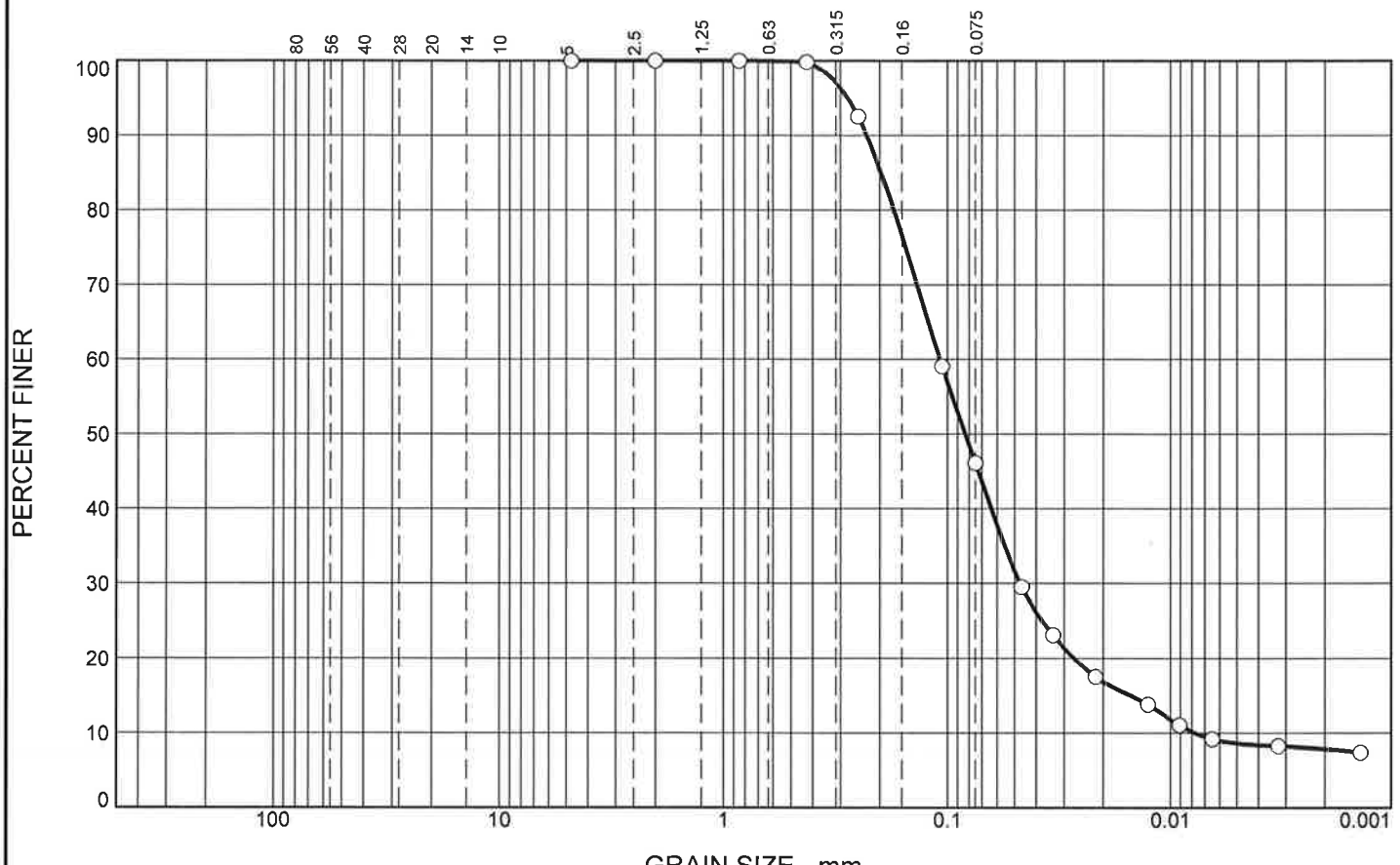
Date:

SPL Consultants Limited
Geotechnical Environmental Materials Hydrogeology

Client: Mattamy Homes
Project: Mulberry Ln. & Conc. 5, Pickering

Project No: 1607-910 **Figure** 14

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	0.2	53.7	38.2	7.9

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
4.75mm	100.0		
2.00mm	100.0		
0.850mm	100.0		
0.425mm	99.8		
0.250mm	92.4		
0.106mm	59.0		
0.075mm	46.1		
0.0466 mm.	29.5		
0.0337 mm.	23.1		
0.0217 mm.	17.5		
0.0127 mm.	13.8		
0.0091 mm.	11.1		
0.0065 mm.	9.2		
0.0033 mm.	8.3		
0.0014 mm.	7.4		

* (no specification provided)

Soil Description

Brown silty sand with trace of clay

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.2295 D_{85}= 0.1981 D_{60}= 0.1086
D_{50}= 0.0833 D_{30}= 0.0474 D_{15}= 0.0151
D_{10}= 0.0077 C_u= 14.07 C_c= 2.68

Classification

USCS= AASHTO=

Remarks

Non plasticity

K= 7.2x10^-5 cm/sec

Location: BH13-9, SS6
Sample Number: M-0001

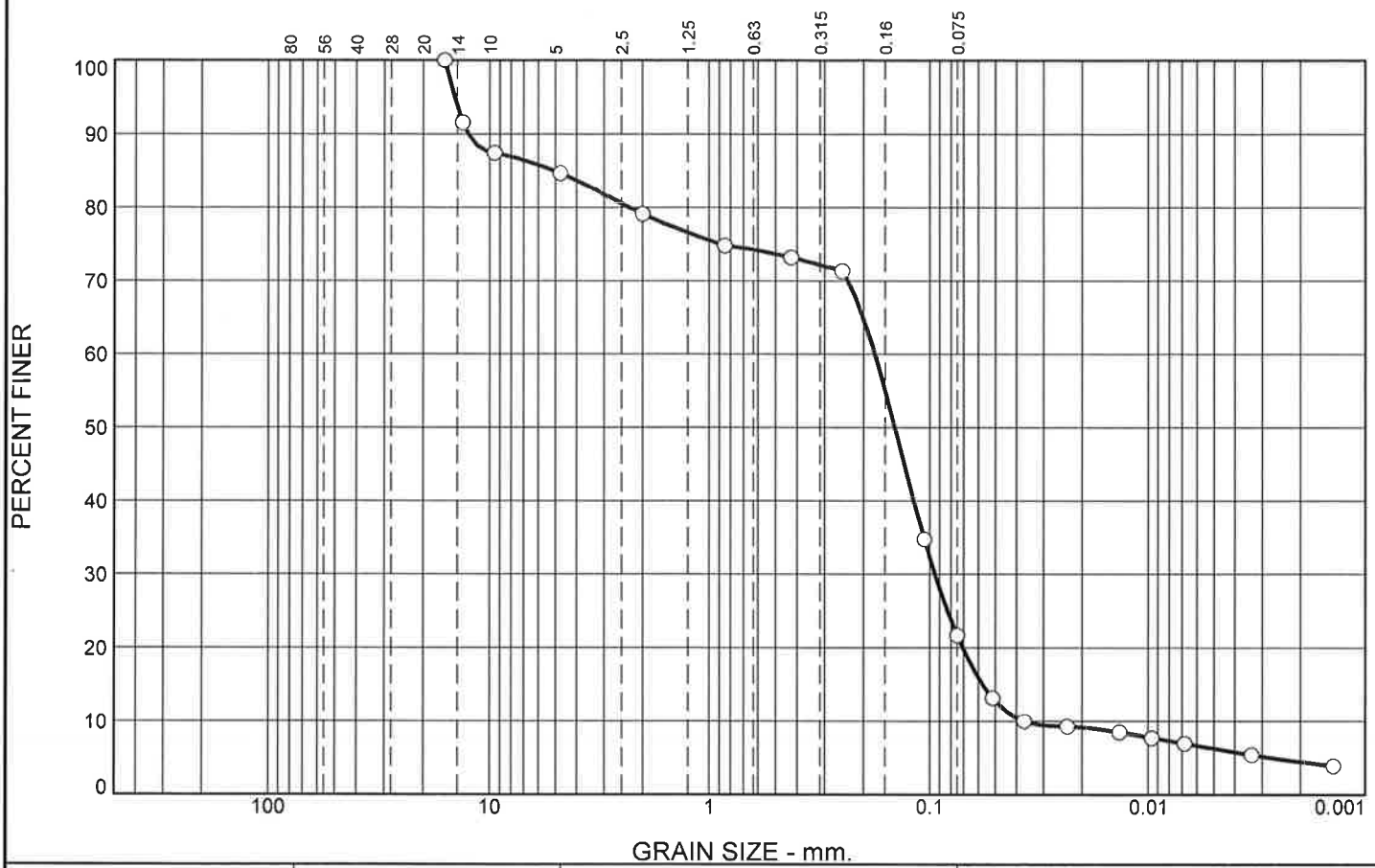
Date:

SPL Consultants Limited
Geotechnical Environmental Materials Hydrogeology

Client: Mattamy Homes
Project: Mulberry Ln. & Conc. 5, Pickering

Project No: 1607-910 **Figure** 15

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	15.3	5.6	5.9	51.5	17.2	4.5

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
16mm	100.0		
13.2mm	91.5		
9.5mm	87.5		
4.75mm	84.7		
2.00mm	79.1		
0.850mm	74.8		
0.425mm	73.2		
0.250mm	71.3		
0.106mm	34.7		
0.075mm	21.7		
0.0516 mm.	13.1		
0.0369 mm.	10.1		
0.0234 mm.	9.3		
0.0136 mm.	8.5		
0.0096 mm.	7.7		
0.0068 mm.	7.0		
0.0034 mm.	5.4		
0.0014 mm.	3.9		

* (no specification provided)

Soil Description

Brown fine sand trace of clay with some gravel

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 12.4774 D_{85}= 5.0430 D_{60}= 0.1787
D_{50}= 0.1449 D_{30}= 0.0948 D_{15}= 0.0574
D_{10}= 0.0365 C_u= 4.90 C_c= 1.38

Classification

USCS= AASHTO=

Remarks

Non Plasticity

K= 8.4x10^-4 cm/sec

Location: BH13-8, SS9
Sample Number: M-0001

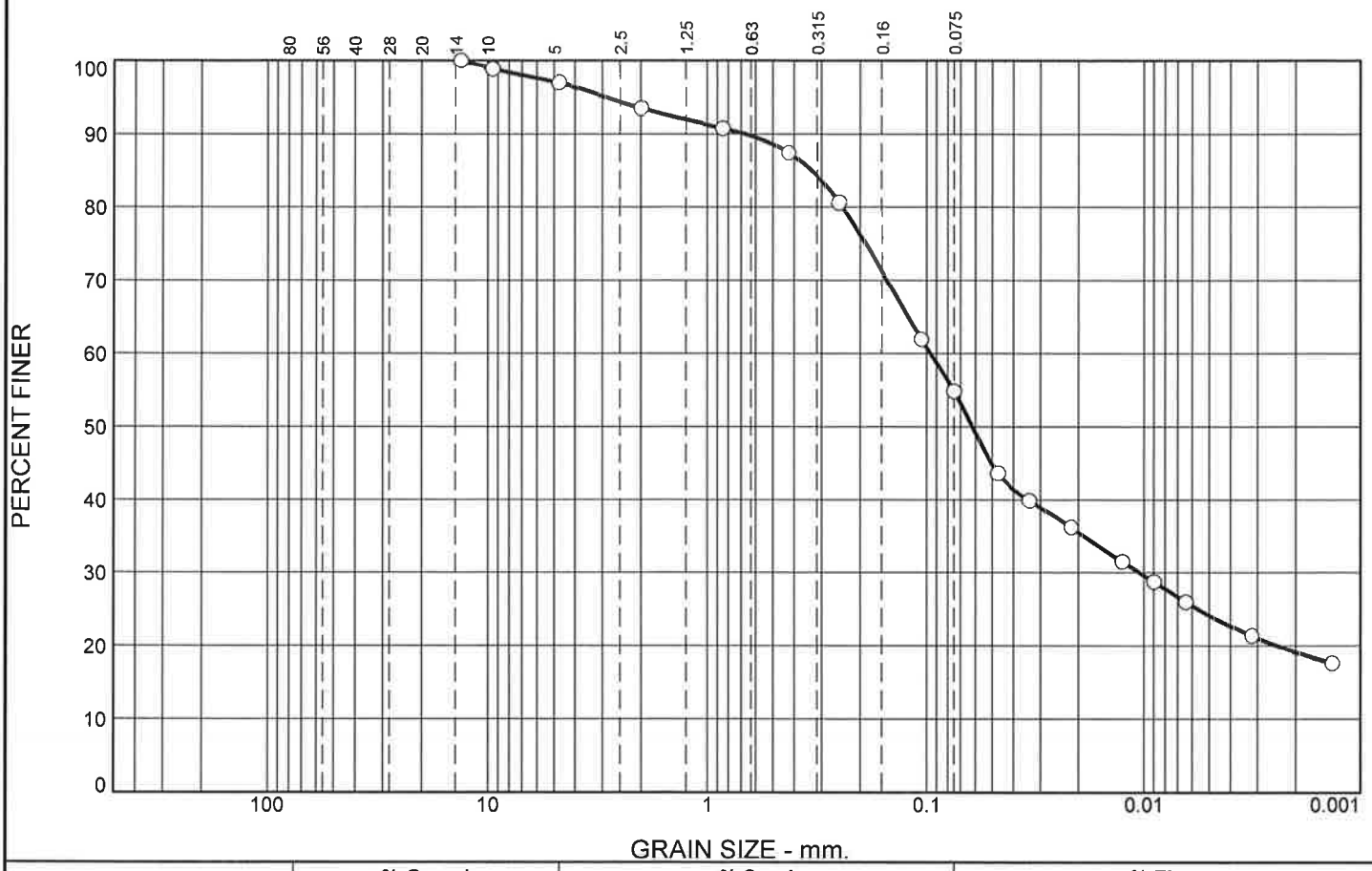
Date:

SPL Consultants Limited
Geotechnical Environmental Materials Hydrogeology

Client: Mattamy Homes
Project: Mulberry Ln. & Conc. 5, Pickering

Project No: 1607-910 **Figure** 16

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	3.1	3.4	6.1	32.5	35.8	19.1

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
13.2mm	100.0		
9.5mm	98.9		
4.75mm	96.9		
2.00mm	93.5		
0.850mm	90.8		
0.425mm	87.4		
0.250mm	80.6		
0.106mm	61.9		
0.075mm	54.9		
0.0471 mm.	43.6		
0.0338 mm.	39.9		
0.0217 mm.	36.2		
0.0127 mm.	31.5		
0.0090 mm.	28.8		
0.0064 mm.	26.0		
0.0032 mm.	21.3		
0.0014 mm.	17.6		

* (no specification provided)

Soil Description

Brown sandy silt trace of gravel with some clay

Atterberg Limits

PL= 9 LL= 15 PI= 6

Coefficients

D_{90}= 0.6650 D_{85}= 0.3351 D_{60}= 0.0961
D_{50}= 0.0620 D_{30}= 0.0105 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL-ML AASHTO= A-4(0)

Remarks

K<1.0x10^-6 cm/sec

Location: BH13-209, SS5
Sample Number: M-0002

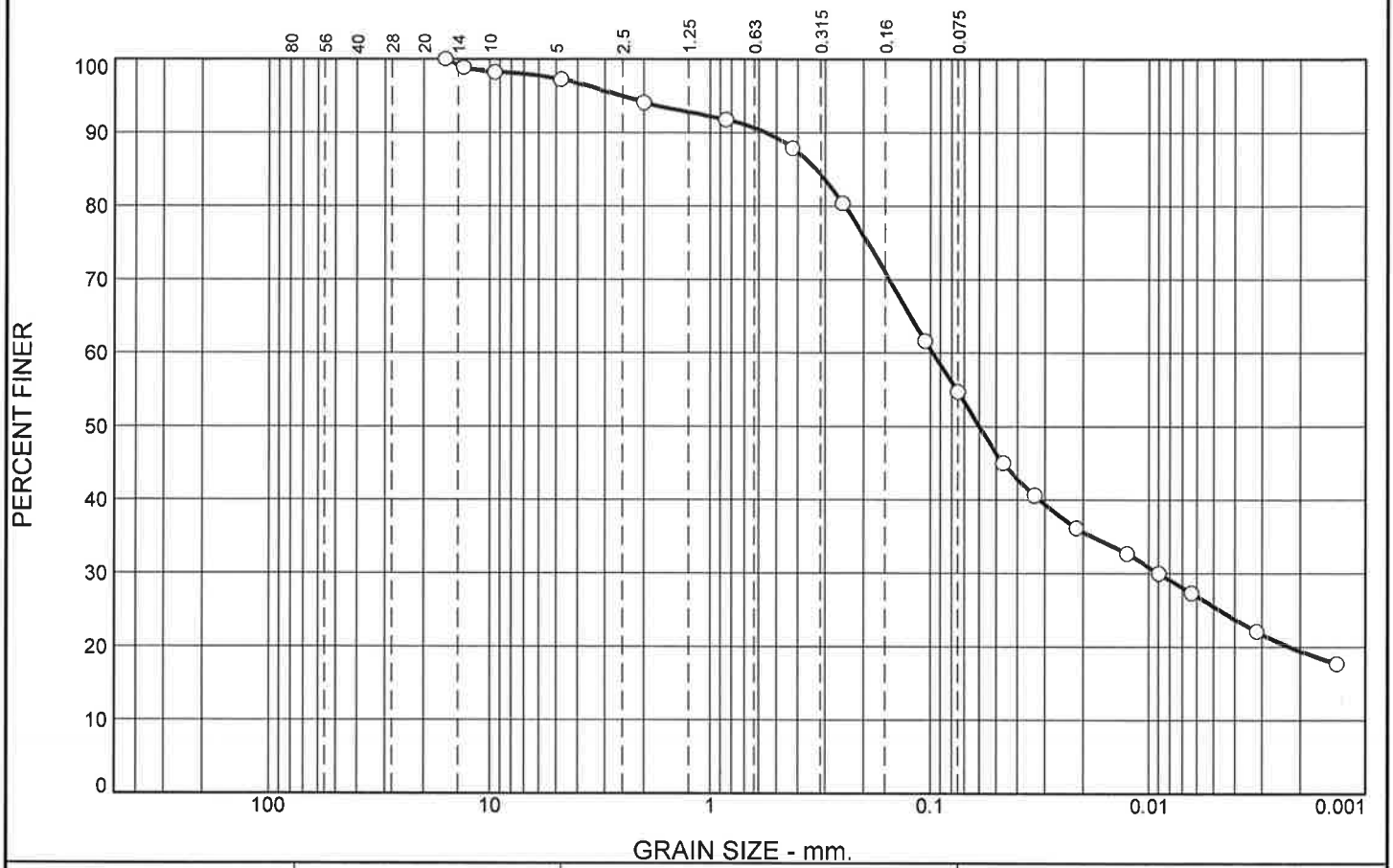
Date:

SPL Consultants Limited
Geotechnical Environmental Materials Hydrogeology

Client: Mattamy Homes
Project: Whitevale & Brock Rd., Pickering

Project No: 1609-910 **Figure** 20

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	2.8	3.1	6.2	33.2	35.3	19.4

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
16mm	100.0		
13.2mm	98.8		
9.5mm	98.3		
4.75mm	97.2		
2.00mm	94.1		
0.850mm	91.8		
0.425mm	87.9		
0.250mm	80.4		
0.106mm	61.6		
0.075mm	54.7		
0.0465 mm.	45.0		
0.0335 mm.	40.6		
0.0216 mm.	36.2		
0.0127 mm.	32.7		
0.0090 mm.	30.0		
0.0064 mm.	27.4		
0.0032 mm.	22.1		
0.0014 mm.	17.6		

* (no specification provided)

Soil Description

Brown sandy silt trace of gravel with some clay

Atterberg Limits

PL= 10 LL= 17 PI= 7

Coefficients

D_{90}= 0.5553 D_{85}= 0.3314 D_{60}= 0.0978
D_{50}= 0.0601 D_{30}= 0.0090 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL-ML AASHTO= A-4(0)

Remarks

K<1.0x10^-6 cm/sec

Location: BH13-216, SS4
Sample Number: M-0002

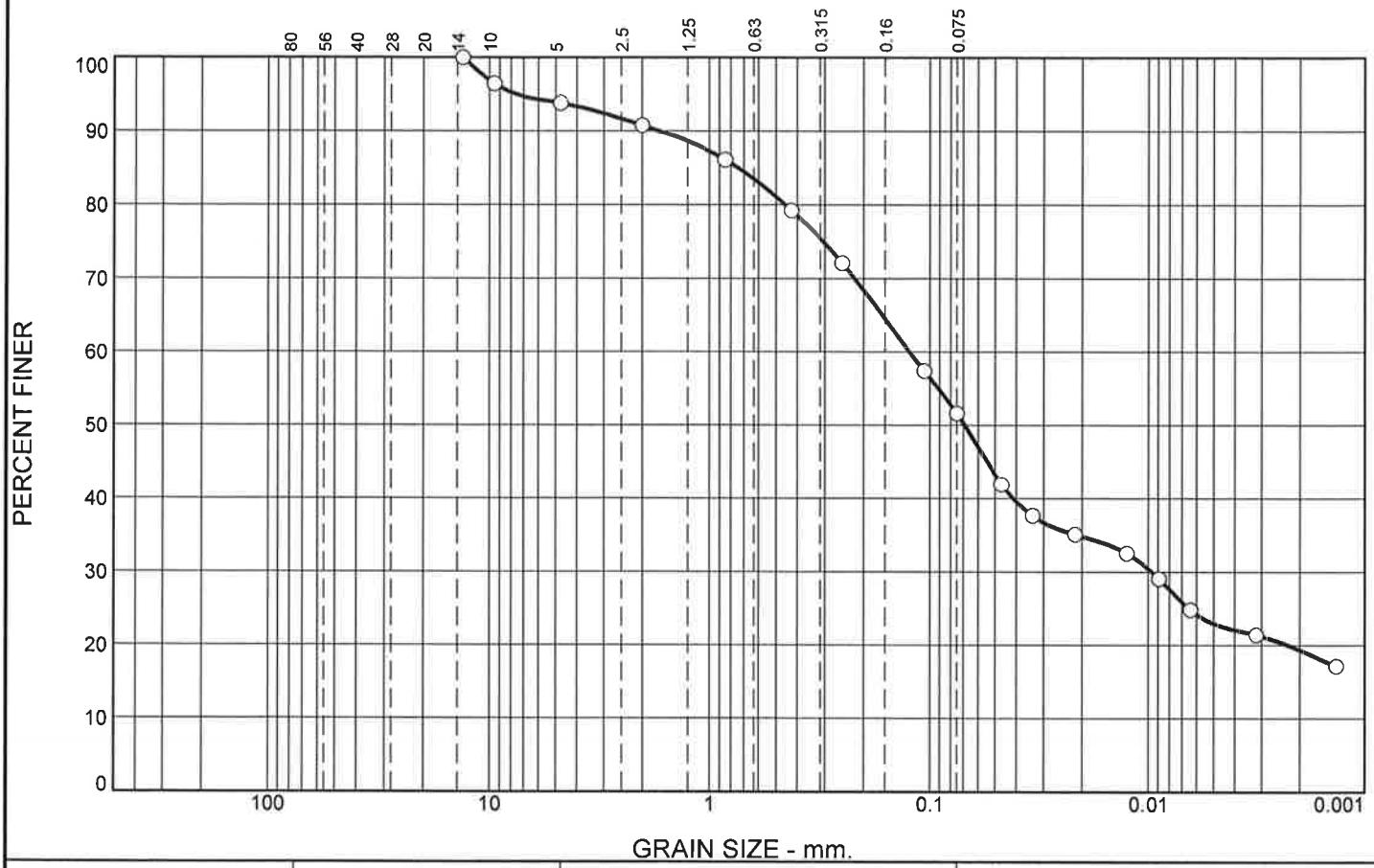
Date:

SPL Consultants Limited
Geotechnical Environmental Materials Hydrogeology

Client: Mattamy Homes
Project: Whitevale & Brock Rd., Pickering

Project No: 1609-910 **Figure** 21

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	6.2	3.0	11.6	27.6	32.3	19.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
13.2mm	100.0		
9.5mm	96.4		
4.75mm	93.8		
2.00mm	90.8		
0.850mm	86.1		
0.425mm	79.2		
0.250mm	72.1		
0.106mm	57.4		
0.075mm	51.6		
0.0468 mm.	42.0		
0.0337 mm.	37.7		
0.0216 mm.	35.1		
0.0126 mm.	32.5		
0.0089 mm.	29.1		
0.0064 mm.	24.8		
0.0032 mm.	21.4		
0.0014 mm.	17.1		

* (no specification provided)

Soil Description

Brown sandy silt trace of gravel with some clay

Atterberg Limits

PL= 10 LL= 17 PI= 7

Coefficients

D_{90}= 1.6691 D_{85}= 0.7390 D_{60}= 0.1241
D_{50}= 0.0691 D_{30}= 0.0096 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL-ML AASHTO= A-4(0)

Remarks

Location: BH13-211, SS3
Sample Number: M0002

Date:

SPL Consultants Limited
Geotechnical Environmental Materials Hydrogeology

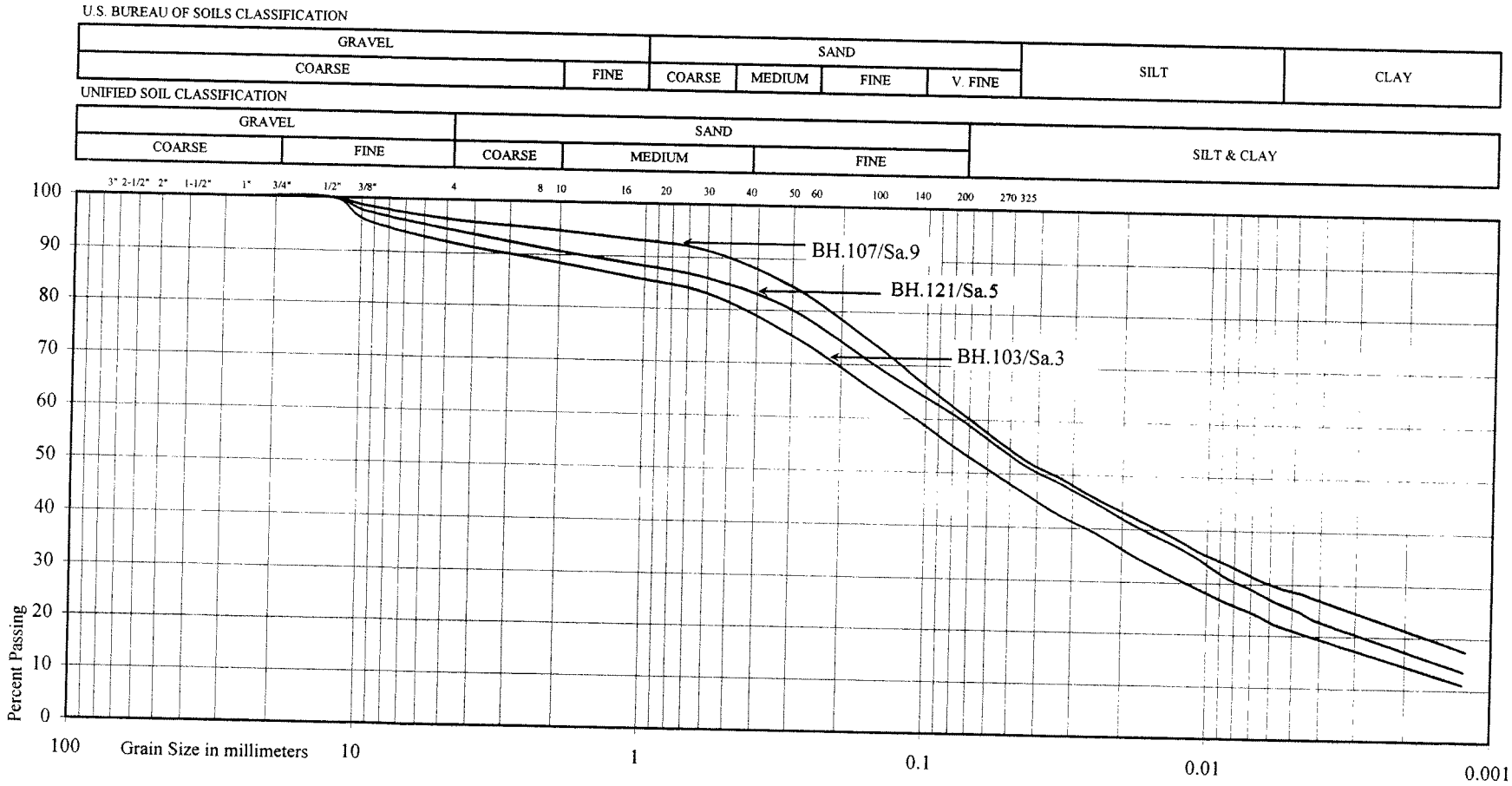
Client: Mattamy Homes
Project: Whitevale & Brock Rd., Pickering

Project No: 1609-910 **Figure** 22

Soil Engineers Ltd.

GRAIN SIZE DISTRIBUTION

Reference No: 1103-S079



Project: Geotechnical Investigation and Well Installation for Study by Others

Location: Various Locations along Whitevale Road, City of Pickering

Borehole No:	103	107	121
Sample No:	3	9	5
Depth (m):	1.8	9.3	3.2
Elevation (m):	198.44	177.73	196.45

BH103 Sa3 - K≈1.0x10^-6 cm/sec

BH./Sa.	103/3	107/9	121/5
Liquid Limit (%) =	21	27	25
Plastic Limit (%) =	14	16	15
Plasticity Index (%) =	7	11	10
Moisture Content (%) =	7	10	12
Estimated Permeability (cm./sec.) =	10^{-6}	10^{-6}	10^{-6}

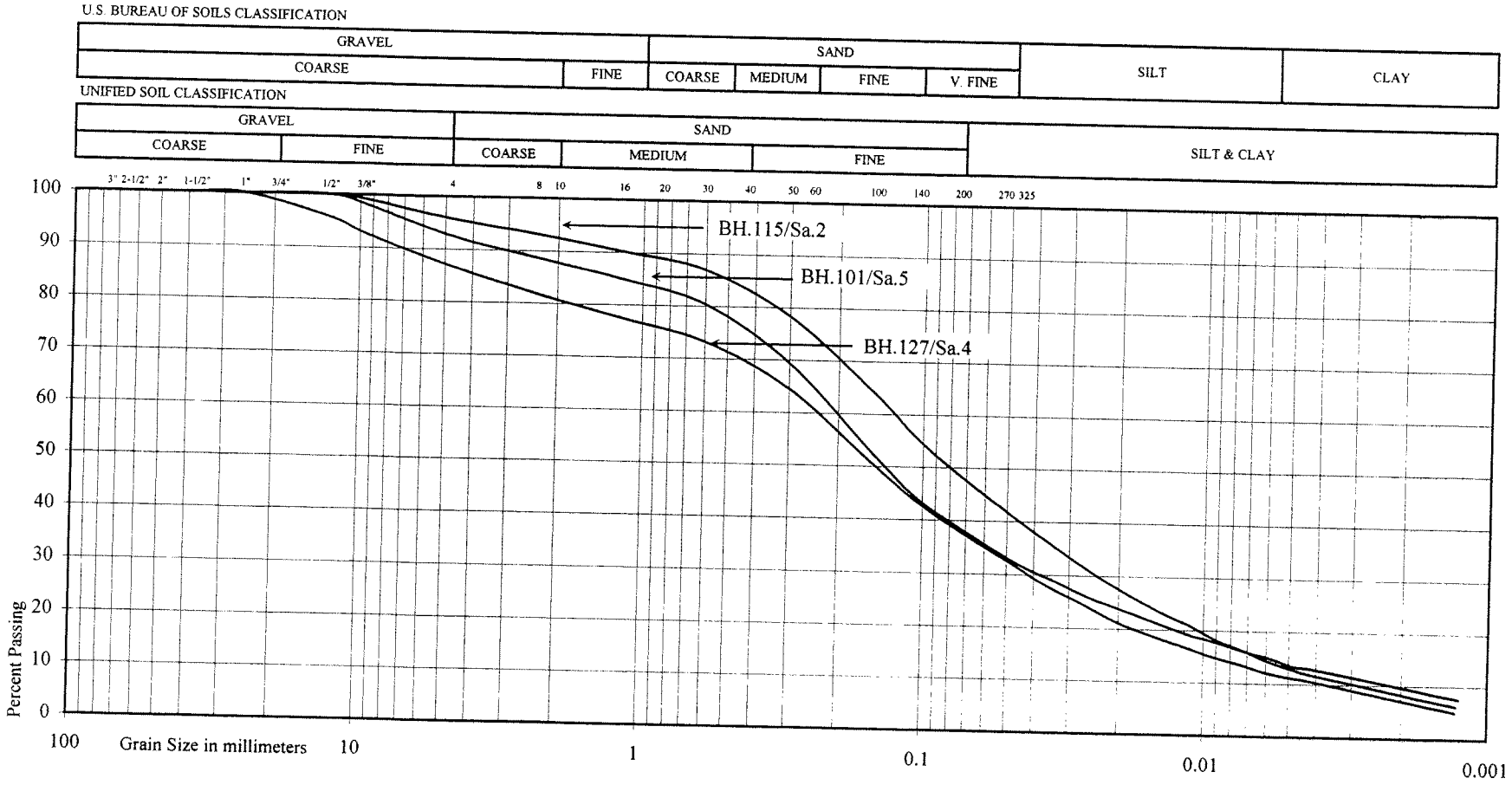
Classification of Sample [& Group Symbol]: SILTY CLAY, Till
sandy, a trace of gravel

Figure : 33

Soil Engineers Ltd.

GRAIN SIZE DISTRIBUTION

Reference No: 1103-S079



Project: Geotechnical Investigation and Well Installation for Study by Others

Location: Various Locations along Whitevale Road, City of Pickering

Borehole No:	101	115	127
Sample No:	5	2	4
Depth (m):	3.2	1.0	2.5
Elevation (m):	195.65	201.96	210.58

BH101 Sa5 - K≈1.3x10^-5 cm/sec

BH./Sa.	101/5	115/2	127/4
Liquid Limit (%) =	-	-	-
Plastic Limit (%) =	-	-	-
Plasticity Index (%) =	-	-	-
Moisture Content (%) =	7	17	8
Estimated Permeability (cm./sec.) =	10^{-6}	10^{-5}	10^{-5}

Classification of Sample [& Group Symbol]: SILTY SAND, Till

some clay, a trace to some gravel

Figure: 34