March 2014

2013 ANNUAL MONITORING REPORT

Tansley Quarry
Hanson Brick Ltd.
Burlington, Ontario

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REPORT

Report Number: 021-1228

Distribution:

8 copies: Hanson Brick Ltd.
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Golder Associates

Table of Contents

TABLES

FIGURES

APPENDICES

APPENDIX A
Regulatory Permits and Agreements

APPENDIX B
Borehole Logs

APPENDIX C
Groundwater Level Hydrographs

APPENDIX D
Groundwater Quality Results

APPENDIX E
Maxxam Analytical Certificates

APPENDIX F
Target Water Level Graphs

1.0 INTRODUCTION

1.1 Background and Purpose

In 2002, Golder Associates Ltd. (Golder) was retained by Hanson Brick Ltd. (Hanson) to conduct a pre-application hydrogeological assessment of the current Tansley Quarry site and its environs. The assessment involved borehole drilling and monitoring well installation, hydraulic conductivity testing, water quality testing, a private water well survey and groundwater level modelling to assess potential impacts on surrounding water wells and water seepage into the quarry. A monitoring program was subsequently established comprising annual water quality sampling and quarterly water level monitoring at on-site and private wells.

On March 21, 2007 Hanson entered into an Agreement with a number of private well owners comprising the Tremaine Neighbourhood Association (TNA). Hanson also entered into an Adaptive Groundwater Management Plan (AMP) Agreement with the Region of Halton on May 8, 2007. Both agreements provide that Hanson shall proactively ensure a continuous supply of potable water to property owners whose wells may be adversely affected by the quarry operation. To this end, construction of a Private Communal Water System (PCWS) began in December 2011. The water distribution system was completed in March 2012 and the communal reservoir system commissioned in February 2013. The PCWS has been operational as of April 2013.

In June 2007, Golder conducted further hydrogeological investigations at the Tansley Quarry site and surrounding area in order to fulfill the Pre-development Requirements set out in Section 2.2 of the AMP (Appendix A). The program comprised five basic elements including a baseline survey of private wells within a 1,000 m radius of the quarry, yield testing of selected private wells, installation of additional monitoring wells and level loggers for monitoring groundwater level fluctuation in and around the quarry, repair of existing TNA wells and updating of the existing hydrogeological model.

A monitoring report and updated hydrogeological assessment of the Tansley Quarry were submitted in March 2008 in fulfilment of Hanson's requirement under Section 2.3 of the AMP to provide an initial monitoring report within 90 days of issuance of its Aggregate Resources Act (ARA) Licence. The ARA Licence was issued by the Ministry of Natural Resources (MNR) on December 20, 2007 based upon a 9-drawing Site Plan. The AMP and Drawing 7 of the Site Plan also provide for a long term groundwater monitoring program, with monthly reports during Year 1 and annual reports thereafter.

Hanson obtained Permit To Take Water (PTTW) No. 1718-8WPJUV, dated September 14, 2012 to govern quarry dewatering activities at the site (Appendix A). The PTTW allows for pumping of water from the quarry sump at a rate of 50 L/s (4,320 m^3/day). PTTW monitoring conditions are dictated by the AMP.

1.2 Site Description and Quarry Development

Tansley Quarry is situated on part of Lots 1 and 2, Concession 1, north of Dundas Street, within the Geographic Township of Nelson, City of Burlington, Region of Halton. It is bounded to the north by No. 1 Side Road, to the east by Tremaine Road, to the south by Highway 407 and to the west by the CNR railway line (Figure 1).

Development at the Tansley Quarry site began on September 10, 2007 under a Burlington Municipal Site Alteration Permit. Excavation of overburden began on September 17, 2007 within the Sinking Cut stage

(Figure 2). Approximately 436,000 m^3 of overburden was removed from the sinking cut between September 17 and December 20, 2007. Extraction of shale began in January 2008 after the ARA licence was issued.

Hanson's contractor began dewatering the overburden stripping pit around the second week of October 2007. Pumping was frequent until mid-November 2007 and then tapered off by the end of the month. Hanson reinitiated dewatering of the site during the first week of December 2007 with discharge from the quarry sump being diverted towards the woodlot located approximately 150 m north of the excavation. Hanson made efforts to keep the discharged water on-site with rock check dams, straw bales and silt fencing being installed around all culverts, inlets and outlets to ensure filtration of any runoff before it left the site. Recorded pumping times and water volumes increased during December 2007 and early 2008 because of increased precipitation; however pumping was sporadic due to frequent breakdown of the pumps and their inability to move water up a vertical lift of approximately 14 m to 20 m. Pumping from the quarry sump was carried out on an as needed intermittent basis throughout 2009 to 2013.

Figure 2 shows the operational progress at the Tansley Quarry. Figure 3 provides cross sections North-South and East-West across the excavation. The excavation was surveyed by TLS Inc. on March 3, 2009. Although ice in the bottom of the excavation prevented obtaining an elevation of the quarry floor and sump floor, the elevation of the bottom of the quarry near the edge of the ice was surveyed at 149.02 metres above sea level (masl). Based on this ground elevation and estimates of the sump depth and ice thickness provided by Hanson, the quarry floor elevation was estimated at approximately 148 masl and the elevation of the base of the sump estimated at approximately 146 masl. Hanson indicated that by the end of 2010 the sump was approximately 30 m long by 10 m wide by 1 m deep. The quarry excavation covered an area of approximately 3.2 ha and the floor of the excavation had been lowered by approximately 4 m to an elevation of approximately 144 masl by the end of 2010, with the base of the sinking cut approximately 2 m lower at an elevation of 142 masl. Based on an elevation survey carried out in March 2012, the base of the excavation was at an elevation of approximately 140 masl with the base of the sump estimated at approximately 139 masl. A total of approximately 43,600 metric tonnes of shale was shipped from the site in 2012 and 47,661 metric tonnes shipped in 2013. Hence a total of 91,261 metric tonnes were shipped since the elevation survey was conducted in March 2012. Changes to the excavation area over the March 2012 to December 2013 period were therefore considered to be minimal.

The quarry sump discharge is currently directed to a decant pond located adjacent to the sinking cut (Figure 2). Water in the decant pond is allowed to settle for at least 24 hours prior to being discharged to the watercourse east of the pond under conditions as outlined in Certificate of Approval (C of A), Industrial Sewage Works No. 4408 7AUL75 (Appendix A) issued on February 4, 2008.

1.3 Precipitation

Figure 4 shows the monthly precipitation for the Millgrove Station and Hamilton Airport from 2002 to 2013. The Millgrove Station, located at an elevation of 255.1 masl, was discontinued in April 2006, and hence data from Hamilton Airport, which is located within a 25 km radius of the site at a similar elevation of 237.7 masl, have been utilized to date. It should be noted that the Hamilton Airport station was monitored by Environment Canada until 2011. The station is now monitored by NAV CANADA, and although the data are provided by Environment Canada, it is our understanding that the data were not quality checked by Environment Canada. Data gaps in the Hamilton Airport station were filled using data from the Royal Botanical Gardens station. The data indicate that the area received approximately 1,026.2 mm of precipitation in 2013, approximately 32% more than received in 2012 (775 mm).

Figure 5 shows the water budget (precipitation and surplus) for the Hamilton Airport from 2002 to 2013. The water budget assumes a 150 mm holding capacity for fine to sandy loam that supports pasture and shrubs, similar to pre-development site conditions. The surplus is the water that remains in the soil after evapotranspiration. On an average annual basis, the surplus indicates water available for infiltration and runoff. This available water can potentially affect groundwater levels. The water budget shows that water was available for infiltration and runoff during six months of the year, i.e., January to April 2013, and November to December 2013. The highest precipitation (approximately 119 mm) was observed in April 2013. The water budget indicates that the period from May to October 2013 was relatively dry with little water available for infiltration and runoff.

2.0 QUARRY PUMPING RATES

The quarry requires dewatering to remove water accumulated in the quarry sump from direct precipitation and seepage inflow. The direct catchment is largely limited to the current quarry footprint. The seepage inflow occurs from the sandy overburden layer around the northwestern, southwestern and southeastern perimeters of the pit.

During 2013, quarry dewatering was carried out by a portable diesel pump set up at the quarry sump that discharged via piping to the decant pond from a 15 cm (6-inch) diameter pipe. The pump is operated daily while site operations are in progress. This can vary for the full shift or until the sump is drained down depending upon the volume of water accumulated in the quarry bottom from groundwater and runoff. On average, in 2013 the sump pump was operated for six hours each day.

A summary of the 2013 records of sump discharge are presented in Table 1 and summarized on Figure 6. Pumping volumes provided by Hanson are collected by a flow meter installed on the discharge line from the pump. Over the 2013 period, the discharge rate ranged between 24 m^3/day to 814 m^3/day, with an average discharge rate of 380 m^3/day. Based on these volumes the discharge rate did not exceed the maximum daily discharge rate of 4,320 m^3/day as outlined by PTTW No. 1718-8WPJUV.

The total estimated volume of water pumped from the quarry in 2013 was 54,267 m^3 based on the reported daily pumping volumes. For comparison, the estimated volume pumped during 2012 was 46,206 m^3.

3.0 GROUNDWATER LEVEL MONITORING

Groundwater levels at the Tansley Quarry are monitored using a network of on-site and off-site monitoring wells and private wells (Figure 7). The monitoring well network comprises the on-site MW-Series well nests, off-site TW-Series wells and a number of private wells.

Groundwater level monitoring at the site commenced in the fall of 2002 and is ongoing. Quarry activity began in the fall 2007 with the stripping of approximately 10 m to 15 m of overburden to expose the shale and by early 2008 the excavation had advanced approximately 9 m into the shale in the sinking cut.

The on-site MW-Series monitoring well network comprises a total of 11 well nests. The AMP refers to wells in the well nests as shallow (S), intermediate (I) or deep (D). However, to avoid confusion between shallow overburden wells and straddle wells (wells straddling the overburden and upper shale bedrock) installed in 2007, the well nomenclature was revised and first used in the 2008 Annual Monitoring Report, dated April 2009. Based on the revised well nomenclature, each well nest consists of a shallow well installed in the overburden (O) and a well installed in the deep shale (D). In addition, well nests MW-01, MW-02, MW-03, MW-04, MW-05, MW-08 and MW-10 have an intermediate well installed in the upper shale (I) and well nests MW-05, MW-06, MW-09 and MW-11 have a well straddling the overburden/shale contact (S). Logs showing well installation details are presented in Appendix B.

Static water level measurements have been collected at monitor wells MW-01 to MW-08 from September 2002 to present. Water level data loggers have been installed in well MW-05I and well MW-03D since October 2005 and June 2005 respectively. Water level measurements at well nests MW-09, MW-10, MW-11 and wells MW-05S and MW-06S have been collected since August 2007. Water levels in the MW-Series wells were collected quarterly with the exception of the year 2008 when levels were collected monthly as required by Section 4.1 of the AMP. Water levels in well nests MW-04, MW-05 and MW-11 were collected monthly through 2011 on Hanson's initiative in order to more closely monitor groundwater levels in the vicinity of the Hendervale private wells. Loggers were installed in all the shallow wells in well nests MW-01 to MW-08 in September 2007 with the exception of well MW-01 which was blocked.

The off-site TW-Series wells (TW-1, TW-2 and TW-3) were drilled in August 2007 as part of a Class Environmental Assessment for a PCWS. The three test wells were located in the vicinity of the Tansley Quarry to determine if groundwater could be a viable source of water for the PCWS. These wells have also been included as part of the monitoring network to provide additional information on surrounding area groundwater elevations. The wells were surveyed in plan and elevation and logs are presented in Appendix B.

Water levels have also been monitored, where available, from a network of 11 private wells since 2005 to the present. These private wells comprise eight TNA wells (wells owned by members of the TNA namely Featherstone, Finucci, Wiggins and the five Hendervale wells) and three wells identified under the 2007 Baseline Survey (Bekkers, Simms and Wettlaufer). It should be noted that the Hendervale property is now owned by Iron Horse Equestrian Complex but the names of the wells have been retained for consistency. Private well names reflect either the names of the property owners or the name of the property. Private well details are provided in Table 2, and where possible, associated with an MOE Water Well Record number. The MOE Water Well Record for each well is provided in Appendix B. All private wells were installed with data loggers suspended from direct read cables. Loggers have been installed in the Featherstone, Finucci and Hendervale Barn wells since June 2005. Loggers have been installed in the Hendervale ABC Barn, Hendervale XYZ Barn and Hendervale Cottage wells since February 2006 and in the Hendervale House well since 2007. Loggers were installed in the Bekkers, Simms, Wiggins and Wettlaufer wells in early 2008. The logger in the Wettlaufer well was subsequently removed by the tenants in June 2008. The domestic wells were not surveyed and approximate elevations were estimated from Ontario Base Map (OBM) contour plans such that the water level data cannot be compared directly with the groundwater elevations reported for the monitoring wells.

Water level elevations based on manual water level measurements are presented in Table 3. Water level elevations based on manual measurements and logger data are presented on hydrographs in Appendix C.

3.1 Water Levels in MW-Series Wells

3.1.1 Well Nest MW-01

Well nest MW-01 is located at the northeastern corner of the site along Tremaine Road (Figure 7) and is approximately 625 m north of the current north quarry face and 715 m north of the quarry sump. This nest is comprised of an overburden well, an intermediate shale well and a deep shale well. Groundwater levels in the overburden well varied between 163.91 masl and 164.5 masl. This is within the historical range of fluctuations (162.9 masl and 165.54 masl) observed from between 2002 and 2012 (Figure C.1). Groundwater levels in the intermediate well were approximately the same as those of the overburden well and varied between 163.92 masl and 164.51 masl. This is within the historical range of water levels (161.14 masl and 164.64 masl) recorded for the well between 2002 and 2012. Groundwater levels in the deep bedrock well ranged from 159.74 masl to 160.19 masl. These groundwater levels were also within the range of water levels (158.19 masl to 161.27 masl) previously observed for the well. The groundwater levels all occur in the overburden.

The intermediate shale well appears to have shown a few metres of groundwater level decline in 2007 that began several months prior to excavation of the sinking cut. The levels subsequently recovered in 2008 indicating that the decline at this well location was likely linked to drier than average conditions in 2007. The overburden and intermediate shale wells have shown a similar declining trend in response to the dry conditions of 2012. Both wells showed a slight decline in water levels during the drier months of 2013 but recovered to historic water level averages in the fall of 2013.

The groundwater level in the deep shale well declined approximately 3 m during the dry 2007 period followed by a slow recovery to pre-2007 levels in the later part of 2011. The groundwater level in the deep shale well is approximately 5 m below the overburden/intermediate shale water levels indicating downward hydraulic gradients.

3.1.2 Well Nest MW-02

Well nest MW-02 is located at the north end of the site and is approximately 625 m north of the north quarry face and 715 m north of the quarry sump. The nest is comprised of an overburden well, an intermediate shale well and a deep shale well. In 2013, groundwater levels in the overburden well ranged between 165.77 masl and 166.30 masl. This is within the historical range of water levels observed for the well. This is within the range of groundwater levels observed historically (164.94 masl and 166.66 masl). Over the 2002 to 2013 period, groundwater levels in the overburden showed minimal fluctuation except during the dry period decline in 2007 and the 2012 dry period. Groundwater levels in the intermediate shale well varied between 161.42 masl and 162.10 masl, within the range of groundwater levels observed historically (159.79 masl and 162.63 masl). Groundwater levels in the intermediate shale well occur approximately 5 m below the overburden water levels. The groundwater levels in the deep shale well varied between 156.7 masl and 158.86 masl (Figure C.2).

The water level trends in the three wells at this location show seasonal fluctuations, downward gradients and no significant influence of quarry development. It should be noted that the groundwater level in the deep shale well rose by approximately 6.5 m over the 11 month period from October 2010 to August 2011. Following the 6.5 m water level rise, the water level stabilized at or just above the bedrock surface. This is indicative of the development of a hydraulic connection between the deep shale well monitoring zone and a shallow shale zone. Response testing of the deep well during sampling in late 2011 produced a hydraulic conductivity value consistent with historical results of 2 x 10^{-8} m/s for this well (Figure C.2) suggesting that the change in water level is not related to leakage of the bentonite seal. Throughout the 2013 monitoring season, water levels in the deep well steadily declined and now sit just below the bedrock surface. Based on water quality results there appears to be no hydraulic connection between the deep and intermediate wells. Water level monitoring will be continued in 2014.

3.1.3 Well Nest MW-03

The MW-03 well nest is located along the northwest edge of the quarry adjacent to No. 1 Sideroad and is approximately 620 m northwest of the north quarry face and 700 m north of the quarry sump. This nest is comprised of an overburden and deep shale well. However, due to the height of the sand pack in the deep well (approaching within 7 m of the bedrock surface) and the water level response of the well, it has been reclassified as an intermediate shale well with respect to groundwater responses (Figure C.3). The chloride concentrations in the groundwater are suggestive of mixed intermediate and deep shale groundwater quality conditions.

In 2013, groundwater levels in the overburden well ranged between 164.82 masl and 165.22 masl and groundwater levels in the intermediate well ranged between 161.27 masl and 161.74 masl (Figure C.3). These groundwater levels all occur in the overburden and are indicative of a slight downward hydraulic gradient. Although both the overburden and intermediate shale well showed a decline in groundwater levels in 2007, the groundwater levels in the overburden well have rebounded to pre-2007 levels whereas the groundwater levels in the deep shale well have remained approximately 1 m to 2 m below pre-2007 levels but respond synchronously with the seasonal fluctuations of the overburden well. The post-2007 vertical separation of the water levels between the overburden and intermediate shale wells indicating downward gradients is consistent with the other monitoring wells at the site suggesting that at MW-03, the pre-2007 data may not have been representative.

3.1.4 Well Nest MW-04

Well nest MW-04 is located on the western edge of the quarry site adjacent to the CNR railway line and is approximately 320 m from the quarry sump. During 2013, groundwater levels in the overburden well ranged between 165.6 masl and 166.32 masl. This is within the range of historical groundwater elevations. Groundwater level fluctuations in the overburden well follow typical seasonal responses including the 2007 water level decline and the smaller decline of 2012 (Figure C.4).

Prior to initiation of the sinking cut in September 2007, groundwater levels in the intermediate and deep shale wells occurred in the overburden, and ranged between approximately 161 masl and 165 masl (Figure C.4). Since initiation of the dry period of 2007 and the concurrent sinking cut in September 2007, groundwater levels in the intermediate and deep wells have declined several metres and now occur in the shale bedrock. The water levels in the intermediate well now occur slightly below the top of the bedrock surface, approximately 4 to 5 m below pre-sinking cut levels. In 2013, groundwater levels in the intermediate well ranged between 158.55 masl and 159.02 masl (Figure C.4). This is similar to the groundwater levels observed between 2009 and 2012.

The groundwater level in the deep well, that has historically been similar to that in the intermediate well, showed the same response to the 2007 dry period and sinking cut. However, the deep well has been affected by purging during the annual groundwater quality sampling events since 2008. It appears that the bentonite seal separating the intermediate and deep wells has progressively tightened up in response to the purging associated with the sampling events isolating the deeper shale well. The in-situ hydraulic conductivity of the shale based on the water level recoveries is extremely low as shown on Figure C.3. Accordingly, the rate of recovery of the deep well is extremely slow and static conditions will not be re-established in the near future. The groundwater levels in the deep shale prior to the 2008 sampling event are not considered to be representative based on the extremely low hydraulic conductivity conditions of the shale at this location.

3.1.5 Well Nest MW-05

Well nest MW-05 is located at the southwestern end of the quarry site and is approximately 50 m southwest of the quarry sump. This well nest is comprised of an overburden well, overburden/bedrock straddle well, intermediate well and a deep well. During 2013, groundwater levels in the overburden well ranged between 160.1 masl and 161.29 masl. Groundwater levels in the straddle well ranged between 158.22 masl and 158.84 masl. Both the overburden and straddle wells reflects seasonal fluctuations (Figure C.5).

Prior to initiation of the sinking cut in August 2007, groundwater levels in the intermediate well ranged between 158.41 masl and 161.73 masl and occurred in the overburden. By 2008, the groundwater level in the intermediate well was approximately 10 m lower than historical levels at approximately 150 masl and occurred within the upper shale bedrock. The elevation of 150 m corresponds to the floor of the 2008 sinking cut indicating that the water level lowering was in response to dewatering of the sinking cut. Since July 2009, the water levels have gradually declined from approximately 148 masl to 147.55 masl by the end of 2012. Groundwater levels in 2013 ranged from 147.98 masl to 148.24 masl. Based on the comparatively close proximity of MW-05 to the shale pit and the current pit floor elevation of approximately 140 masl, it would appear that the water level in the intermediate well is being influenced by the dewatering activities at the pit.

Groundwater level recovery in the deep well MW-05D is very slow, consistent with the very low hydraulic conductivity of the deep shale bedrock as indicated on Figure C.5. The water levels have never recovered and are not likely to recover in the near future.

3.1.6 Well Nest MW-06

Well nest MW-06 is located on the eastern edge of the quarry site and approximately 30 m northeast of the quarry face. During 2013, the groundwater levels in the overburden well ranged between 159.11 masl and 160.52 masl. Groundwater levels in the straddle well installed in mid-2007 were very similar to the overburden groundwater levels, ranging between 159.23 masl and 160.64 masl. The groundwater levels were within the range observed historically. In general, the groundwater levels in the overburden and straddle wells were slightly lower (approximately 2 to 3.5 m) than the water levels observed before August 2007, prior to initiation of the sinking cut. The decline in water levels can be attributed to the proximity of the wells to the excavation.

Groundwater levels in the deep well were very similar to the groundwater levels in the overburden well prior to initiation of the sinking cut but have since shown large fluctuations of up to 20 m in response to well sampling. Groundwater levels in the deep well show the effects of groundwater sample purging and hydraulic conductivity testing during the annual water quality sampling events. The deep shale water levels apparently have not stabilised due to the very low hydraulic conductivity of the shale (Figure C.6). Recovery would take several years based on the current hydrograph observations.

3.1.7 Well Nest MW-07

The MW-07 well nest is located near the centre of the property and 400 m north of the quarry face. The well nest is comprised of an overburden and deep shale well. In 2013, the groundwater levels in the overburden well varied between 164.1 masl and 165.17 masl (Figure C.7). Groundwater levels have shown a slight seasonal fluctuation over the 2002 to 2013 period of record. The overburden groundwater levels showed a decline of approximately 5 m in 2007 coinciding with a drier than average year. A similar declining trend of approximately 2.5 m occurred during the initial dry period in 2012 but was arrested by the return of rains in the fall. Seasonal groundwater level fluctuations for 2013 were within the historical range.

Groundwater levels in the deep shale well were relatively constant between 2002 and 2010, ranging between 151.89 masl and 152.93 masl sitting within the upper shale. However, the groundwater level in the deep shale well rose by approximately 6.5 m over the six month period from January 2011 to July 2011. Following the 6.5 m water level rise, the water levels remained at the bedrock surface (Figure C.7). The hydraulic conductivity response tests carried out over this period of time have remained consistent suggesting that the change in groundwater levels is not a result of well seal leakage. Groundwater levels started to slowly decline throughout 2013 and now sit just below the bedrock surface. A similar response was noted in well MW-02 and continued monitoring should assist in clarifying this response. Groundwater levels observed in the overburden and shale at well nest MW-07 are indicative of downward hydraulic gradients. No significant influence of quarry related drawdown is noted at well MW-07.

3.1.8 Well Nest MW-08

Well nest MW-08 is located at the centre of the quarry site and 300 m north of the quarry sump. The well nest is comprised of an overburden well, an intermediate well and a deep shale well. All groundwater levels occurred in the overburden. The groundwater level elevations in the three wells were approximately the same from 2002 through 2009 seasonally fluctuating between approximately 158 m and 166 m with little indication of vertical hydraulic gradient (Figure C.8). In January 2010 the intermediate shale water level began to bifurcate from that of the overburden and deep shale (Figure C.8). In December 2011 the deep shale water level declined several metres to coincide with that of the intermediate shale well.

The water level trends suggest that there was some drawdown effect from the sinking cut excavation in 2007 compounded by the dry year conditions. The water level in the intermediate shale appears to have been lowered approximately 2 m since 2007. The 2 m to 3 m decline in the deep shale well during the 2012 monitoring period appears to reflect the 2012 dry season influence as water levels increased slightly in 2013 although site dewatering activities remained the same. Seasonal groundwater fluctuations are seen in all wells throughout 2013.

3.1.9 Well Nest MW-09

Well nest MW-09 is located approximately 80 m northwest of the quarry face. The well nest consists of an overburden well, overburden/bedrock surface straddle well and deep shale well (Figure C.9). The deep shale well is sealed into very low permeability shale and is not anticipated to recover. The bedrock surface straddle well experienced a decline in water level of approximately 7.5 m during development of the overburden sinking cut in 2007 but the water level elevation has remained comparatively stable around 155 m to 156 m since 2008 suggesting that quarry deepening is having little effect. The overburden well demonstrates a strong seasonal fluctuation of approximately 4 m varying in elevation from approximately 161.89 masl to 164.2 masl. This is consistent with recharge related to the occurrence of seasonal surface flooding within the area of the well.

3.1.10 Well Nest MW-10

Well nest MW-10 is located approximately 180 m northwest of the quarry face. The nest consists of an overburden well, an intermediate shale well that also straddles the bedrock surface and a deep shale well (Figure C.10). As in the case of well nest MW-09, the deep shale well is sealed into very low permeability shale as indicated by hydraulic conductivity estimates based on analysis of water level responses during annual sampling events. The groundwater level has risen approximately 15 m since 2010 and is now at an elevation of approximately 140 masl, similar to the elevation of the quarry sump. Water level monitoring indicates that this well will reach static levels within the next several years.

As indicated on Figure C.10, the overburden and intermediate shale/bedrock surface wells show synchronous seasonal water level fluctuations. The intermediate well water level is approximately 3 m below that of the overburden well demonstrating downward hydraulic gradients. Both wells experienced water level decline in 2007 followed by recovery to pre-decline conditions. There is no direct indication of quarry related drawdown at this location.

3.1.11 Well Nest MW-11

Well nest MW-11 is located approximately 300 m northwest of the quarry face on the adjacent Hendervale property, within approximately 90 m of the Hendervale Main Barn well. The well nest is comprised of an overburden well, a straddle well and a deep shale well (Figure C.11). As in the case of well nest MW-09 and MW-10, the deep shale well is sealed into very low permeability shale. The groundwater level has risen approximately 6 m since the end of 2010 and now sits approximately 4 m below the elevation of the quarry sump. A similar response was noted in well MW-10 and continued monitoring should assist in understanding the behaviour of the water levels in this well.

The groundwater levels in the overburden and straddle well were similar and displayed similar seasonal trends in water level fluctuation of approximately 2 m to 3 m (Figure C.11). The groundwater levels in both wells ranged between approximately 164 masl and 166 masl. Groundwater levels in the overburden and straddle wells occur in the overburden within approximately 3 m of ground surface. There is no direct indication of quarry related drawdown at this location.

3.2 Water Levels in TW-Series Wells

In August 2007, three test wells (TW-1, TW-2 and TW-3) were drilled in the vicinity of the Tansley Quarry to determine if groundwater could be used as a viable source of water for a PCWS. The well locations are shown on Figure 7. These wells are conventional 6-inch water wells cased through the overburden and completed as open holes in the shale. The wells were surveyed in location and elevation. They were included as part of the monitoring network to provide additional information on surrounding area groundwater elevations. Hydrographs for the wells are provided on Figures C.12, C.13 and C.14.

Well TW-1 is located approximately 600 m west of the quarry and was completed at a depth of 18.29 metres below ground surface (mbgs). The well was cased through overburden to the top of bedrock (15.98 mbgs), and the lower 3 m was left as an open hole in the weathered shale. A data logger was installed in August 2013 to provide continuous water level data. Groundwater levels in 2013 ranged between 164.16 masl and 165.61 masl and show a slight seasonal level fluctuation trend (Figure C.12). The water levels are consistent with nearby monitoring wells MW-04 and MW-11.

Well TW-2 is located approximately 1,500 m north of the quarry and was cased through overburden to a depth of 18.3 mbgs and finished as an open hole in hard glacial till overburden to a depth of 32 mbgs. The well has been dry since its construction in August 2007 (Figure C.13).

Well TW-3 is located approximately 1,000 m northeast of the quarry. It was cased through overburden to the top of bedrock (19.82 mbgs) and completed as an open hole in shale to a depth of 23.62 mbgs. A data logger was installed in August 2013 to provide continuous water level data for comparison to water level data from the nearby Bekkers well. Groundwater levels at well TW-3 ranged between 156.68 masl and 157.51 masl in 2013 (Figure C.14) and showed similar water level fluctuations to the Bekkers well.

3.3 Water Levels in Private Wells

Groundwater level hydrographs for the 11 private wells monitored for water levels are presented on Figures C.15 to C.25. The wells were not surveyed and the water level elevations are approximate only. The groundwater levels and groundwater level fluctuations were within the range of historical observations. In general, groundwater levels were typically higher in the first part of each year following spring melt, and lower for the second half of the year. The private well locations are shown on Figure 7.

- **Featherstone Well**

Water levels in the Featherstone well, located approximately 800 m north of the quarry, showed seasonal fluctuations (Figure C.15). In December 2008, Hanson installed a cistern at the Featherstone residence as the primary water supply. The well was therefore no longer used to supply the residence. As a result, water levels in the Featherstone well rose to approximately 166 masl (Figure C.15). Water level readings have been recorded less frequently in the Featherstone well since December 10, 2008 as the logger was set to event based recording and records only after a 0.5% change in water levels. The discontinuation of well use meant that logger recording was no longer triggered by pumping induced drawdown.

- **Finucci Well**

Groundwater levels in the Finucci well located approximately 475 m northwest of the quarry (Figure C.16) recorded subsequent to the initiation of the sinking cut in August 2007 were within the general range of historical groundwater levels recorded at the well prior to quarry operation. The logger in the Finucci well malfunctioned in 2009 and was subsequently replaced in March 2010. Operation of the well continued through 2012 on pump cycle drawdowns fluctuating approximately 6 to 7 m. The logger malfunctioned in October 2012 and was not replaced until June 2013 as the well had been inaccessible.

- **Hendervale Wells**

The Hendervale wells are located approximately 400 m to 600 m west of the quarry. MOE water well records indicate that the Hendervale barn wells are completed in the shale bedrock, whereas the Hendervale House well and Cottage wells may be completed in the overburden. The groundwater level hydrograph for the Hendervale Main Barn well (Figure C.17) fluctuated between approximately 158 masl and 164 masl. Based on the hydrograph, there appears to have been a greater demand on the well since October 2009. The Hendervale Cottage well (Figure C.18) and Hendervale House well (Figure C.21) show very little pumping activity in 2013 and the water levels stabilized at approximately 163 masl and 157.5 masl respectively. Groundwater levels in the Hendervale ABC Barn well (Figure C.19) and Hendervale XYZ Barn well (Figure C.20) reflect usage of one or both wells in May and August 2010 that resulted in a drawdown of approximately 4 to 5 m. Similarly, the hydrographs show heavy usage of the wells in the latter half of 2011, 2012 and 2013, resulting in a drawdown of approximately 7 to 10 m. This is consistent with the timing of equestrian events where large quantities of water are required for washing show horses. It should be noted that the wells are relatively close and installed at similar depths therefore pumping of one well is usually reflected in the water levels of the other. All the barn wells now pump into cisterns on the site.

- **Simms Well**

The Simms well is located approximately 1,500 m northwest of the quarry. The groundwater levels at the Simms well (Figure C.22) have shown very large fluctuations in groundwater levels over time. Groundwater level fluctuations of up to 27 m (the full depth of the well) have been observed in the Simms well and they are considered to be a characteristic of a well reliant on well bore storage.

- **Wettlaufer Well**

The groundwater level in the Wettlaufer well, also located approximately 1,500 m northwest of the quarry showed little variation over the available monitoring period from January to June 2008. The logger installed in the Wettlaufer well was removed by the tenants in June 2008 (Figure C.23). The logger has not been re-installed in the Wettlaufer well to date.

- **Wiggins Well**

Groundwater levels in the Wiggins well located 700 m north of the quarry ranged between approximately 153 masl and 165 masl between late 2007 and the end of 2009. Hanson installed a cistern in December 2008 and the use of the well as a source of domestic water supply was discontinued in January 2009. Since the installation of the cistern and the cessation of well usage, the groundwater levels have risen slightly, fluctuating between approximately 165 masl and 167 masl (Figure C.24). The well was decommissioned on June 14, 2013 and can no longer be monitored.

- **Bekkers Well**

Groundwater levels at the Bekkers well located approximately 1,000 m northeast of the quarry ranged between approximately 152 masl and 160 masl (Figure C.25) and showed a pattern indicative of seasonal groundwater fluctuations and a large reliance on well bore storage noted by levels periodically approaching the bottom of the well. Similar seasonal fluctuations in groundwater levels have also been seen in the nearby well TW-3.

3.4 Summary of Groundwater Level Responses to Quarrying

Based on groundwater monitoring at the Tansley Quarry, the following general statements can be made regarding groundwater levels and groundwater flow:

Quarry related groundwater level lowering has apparently occurred in the overburden and intermediate shale wells in closer proximity to the quarry including MW-04 intermediate shale (5 m in response to sinking cut), MW-05 intermediate shale (12 to 13 m in response to sinking cut), MW-06 overburden and straddle wells (approximately 5 m in response to the sinking cut), MW-08 intermediate shale (approximately 1 to 2 m in response to the sinking cut) and MW-09 straddle well (approximately 7.5 m in response to the sinking cut). The respective groundwater levels have remained relatively constant since completion of the sinking cut at the end of 2007. All of these wells are in comparatively close proximity to the excavation (30 m to 300 m).

The deep shale wells MW-04, MW-05, MW-06, MW-09, MW-10 and MW-11 are all completed in shale of very low hydraulic conductivity in the range of 10^{-13} to 10^{-14} m/s as determined from the extremely slow groundwater level recovery rates shown on the respective hydrographs. These values represent near impermeable conditions for all practical purposes. The groundwater levels within these wells will not stabilise at any point in the near future. Due to the extremely low hydraulic conductivity of the shale associated with these wells, there is no potential for any significant interaction between the water wells and the quarry.

The deep shale wells MW-01, MW-02, MW-03, MW-07 and MW-08 are completed in shale with low to moderately low hydraulic conductivity conditions in the range of 10^{-8} m/s based on the results determined from the water level recovery rates following sampling as indicated on the respective hydrographs.

No off site groundwater level influences of quarry dewatering have been identified.

4.0 GROUNDWATER QUALITY

Groundwater quality sampling of MW-Series monitoring wells and off-site private wells was conducted between November 18 and 22, 2013 consistent with previous water quality sampling carried out in November 2002, May 2003, January 2007, October 2008, November/December 2009, October 2010, November 2011 and November 2012. All samples were analysed for a broad suite of general inorganic parameters and metals (including mercury and cyanide) as well as phenol. Groundwater quality results were compared to the Ontario Drinking Water Standards (ODWS) dated June 2006 and for the purposes of discharge to surface water courses, the results were also compared to the Provincial Water Quality Objectives (PWQO) dated July 1994. Water quality results are tabulated in Appendix D.

In order to ensure that samples taken were representative of groundwater conditions and to ensure the high quality of the analytical results the following quality assurance procedures were put in place for water quality sampling:

MW-Series Monitoring Wells

- Samples were collected using dedicated Waterra® tubing or dedicated bailers; and
- Prior to sampling, wells were either purged of three well volumes or purged until the well was dry to ensure that a representative groundwater sample was collected.

Private Wells

- Unfiltered samples were collected from taps located within or outside the residence prior to water treatment; and
- Taps were allowed to run for two to three minutes prior to sampling in order to clear the water lines of standing water and ensure that samples taken were representative of fresh groundwater.

The procedures followed for collection of all water samples included:

- Water samples were collected in bottles with the appropriate preservative for the specific analysis. The bottles were provided, and analysis completed, by Maxxam Analytics Inc. (Maxxam).
- A new pair of nitrile gloves was used when collecting water samples from each well. Care was taken to avoid physical contact with the mouth of the bottles.
- Water samples were stored in a cooler with ice packs and transported to the laboratory within 24 hours of sample collection.

For quality control purposes a duplicate sample was taken for every 10 groundwater samples collected and submitted to the laboratory. The analytical results from the original samples and the corresponding field duplicate sample are an indicator of the reliability of the laboratory analytical procedures and field sampling methodology. Field duplicates were collected from wells MW-02I, MW-04D and MW-08I.

Residents were notified individually by letter of the results of the water quality sampling at their well. The Maxxam certificates of analysis and a table summarizing the results of historical and current monitoring were also provided to the resident. Any exceedance of the applicable criteria was indicated in the letter and the resident provided with a contact number for the Medical Officer of Health in the event that they had any concerns.

4.1 On-site Monitor Wells

Samples were taken from 10 piezometer nests (MW-01 to MW-10) located on the Tansley Quarry site and one piezometer nest (MW-11) located on the Hendervale property in order to provide baseline water quality relative to nearby private wells. Wells MW-01O, MW-05D, MW-06O and MW-06D were not sampled as sufficient water was not available in the wells after purging. Water quality results for the on-site wells are presented in Tables D.1 and D.2 of Appendix D. Maxxam laboratory certificates are provided in Appendix E.

Table 4 provides a summary of water quality exceedances of ODWS. In general, the analytical results were below the ODWS criteria with the exception of alkalinity, aluminum, arsenic, barium, boron, cadmium, chloride, chromium, hardness, iron, lead, manganese, sodium, sulphate, sulphide, turbidity, uranium and pH.

- Aluminum (0.5 mg/L to 280 mg/L) exceeded the ODWS Operational Guidelines (OG) of 0.1 mg/L in all wells sampled.
- Alkalinity (550 mg/L to 730 mg/L) exceeded the OG in wells MW-02O, MW-07O and MW-08O only.
- Hardness exceeded the OG of 80-100 mg/L in all samples with concentrations ranging between 270 mg/L to 31,000 mg/L.
- pH levels were below the OG range of 6.5-8.5 only in well MW-09D (6.31). According to the ODWS, a pH level lower than 6.5 may result in corrosion of specific types of pipe.

It should be noted that the ODWS OG are non-health-related criteria that may negatively affect the treatment and distribution of water.

- Chloride, sulphate, sulphide, sodium, manganese, iron and turbidity exceeded the ODWS Aesthetic Objectives (AO). AOs are non-health-related criteria that reflect parameters that may impair the colour, smell or taste of water.
- Barium, cadmium, chromium, lead and uranium exceeded the Maximum Acceptable Concentration (MAC) in a number of the wells sampled. Parameters that exceed the MAC have known or suspected adverse health effects when present above a certain concentration. The concentration of barium exceeded the MAC of 1 mg/L in wells MW-03O (2.1 mg/L) and MW-11O (3.3 mg/L). The MAC for cadmium (0.005 mg/L) was exceeded in five wells with concentrations ranging between 0.0064 mg/L and 0.011 mg/L. Chromium (0.055 mg/L to 0.83 mg/L) exceeded the MAC of 0.05 mg/L at 12 of the 28 wells sampled. The lead concentration (0.018 mg/L to 0.27 mg/L) also exceeded the MAC of 0.01 mg/L at 12 of the 28 wells sampled. Uranium (0.026 mg/L to 0.029 mg/L) exceeded the MAC of 0.02 mg/L in five of the 28 wells sampled. Uranium may result in kidney damage when ingested in large quantities.
- Arsenic and boron exceeded the ODWS Interim Maximum Acceptable Concentrations (IMAC) in several of the wells sampled. Arsenic exceeded the IMAC of 0.025 mg/L in nine of the 28 wells sampled, with concentrations ranging between 0.032 mg/L to 0.2 mg/L. Arsenic is a carcinogen and must be removed by treatment where present in drinking water at levels above this concentration. Boron concentrations (5.1 mg/L to 8.6 mg/L) exceeded the ODWS IMAC of 5 mg/L in two overburden wells (MW-03O and MW-08O) and a number of the intermediate (MW-04I, MW-08I and MW-09S) and deep (MW-01D, MW-02D, MW-03D, MW-04D, MW-07D and MW-10D) shale wells. Infants, the elderly and individuals with kidney diseases are the most susceptible to the toxic effects of boron compounds.

A summary of exceedances of PWQO are provided in Table 5. The 2013 analytical results were below the PWQO with the exception of pH and traces of aluminum, arsenic, boron, cadmium, cobalt, copper, iron, lead, molybdenum, nickel, phosphorous, silver, thallium, uranium, vanadium and zinc. It should be noted that, with the exception of mercury (which did not exceed PWQO and was therefore not listed in Table 5) which was filtered prior to analysis, all other samples were unfiltered for comparison to PWQO in Table 5. In all cases, the sample bottles contained visible sediment; therefore the results may be biased high due to metals present in the sediment.

Overall, the analytical results indicate that the groundwater is very hard and mineralized with naturally occurring substances, including sodium, potassium, magnesium, calcium, chloride and sulphate. Groundwater is relatively fresh in the shallow overburden, with salinity increasing with depth as seen in the MW-04 well nest where chloride in the shallow overburden well (depth = 7.6 m) ranges between 4.0 and 12.2 mg/L, the intermediate well (depth = 30 m) ranges between 984 and 2,100 mg/L and the deep well (depth = 44 m) ranges between 9,180 and 45,000 mg/L. High salinity is associated with the deep shale pore water where the low hydraulic conductivity of the shale bedrock has limited fresh groundwater recharge and circulation.

4.2 Private Wells

During November 2013, a water quality sample was collected from the Simms well. A water sample was also taken from a cistern that was constructed on the Hendervale property in 2011 to supply water to the Hendervale barns. Samples were collected from taps located prior to private water treatment systems. All samples were analysed for a broad suite of general inorganic parameters, metals (including mercury and cyanide) and phenol.

Water quality samples were not obtained from the following wells:

- The Featherstone is no longer in use as a cistern was installed in December 2008.
- The Hendervale Cottage and Hendervale House wells were disconnected for the winter and therefore samples could not be collected.
- The Hendervale ABC Barn, Hendervale XYZ Barn and Hendervale Main Barn wells are each associated in close proximity to a cistern that receives the well water. It is our understanding that the cisterns are all interconnected and hence may receive water from any of the barn wells. Water may also be pumped into the cisterns from Bronte Creek to augment barn supplies. A water sample was taken from a tap near the Hendervale Main Barn well and is considered to be a cistern sample.
- The Eno/Myers well (previously called Des Roches) was indicated by the residents to not be in use. .
- The Robinson well was decommissioned in June 2013.
- The Stevenson well located on the Hanson property was decommissioned in June 2013.
- The pump was removed from the Finucci well in June 2013.
- The Sugiyama well is no longer in use and therefore was not sampled.
- The Bekkers well was inaccessible at the time of sampling.
- The Sicard well was inaccessible at the time of sampling.
- The Wiggins well was decommissioned in June 2013.

Inorganic water quality results are presented in Tables D.3 to D.17 of Appendix D and Maxxam laboratory certificates provided in Appendix E. Water quality exceedances of ODWS for AO, OG, IMAC and MAC are summarized in Table 6. The data showed that:

- Groundwater is consistently hard, exceeding the ODWS OG of 80 – 100 mg/L in both cases in 2013. The exceedances of the OG for hardness have been seen historically. The ODWS OG criteria are non-health-related.
- The Hendervale cistern sample showed an exceedance of iron and lead. Iron is an ODWS AO and is a non-health-related criteria that reflect parameters that may impair the colour, smell or taste of water. Lead is an ODWS MAC objective and may cause health effects in both adults and children.

5.0 LOGGER INSTALLATION AND WELL REPAIRS

5.1 Logger installation

Loggers were installed in off-site wells TW-1 and TW-3 in August 2013 to provide continuous water level monitoring at these locations. Both wells are located north of the quarry and are considered to be sentinel wells. TW-2 has been dry since installation in 2007 and therefore a logger was not installed with a data logger.

Loggers are currently installed in the following private wells:

Featherstone	Hendervale XYZ Barn
Finucci	Hendervale House
Hendervale Main Barn	Simms
Hendervale Cottage	Bekkers
Hendervale ABC Barn	

The loggers are installed by suspension from direct read cables to allow for downloading data without the services of a licensed water well technician to open the wells. The wells were selected to provide an indication of the potential effects of quarrying at various distances (between 0.20 km and 1.0 km) and directions from the quarry boundary as well as at various depths in the overburden and shale (approximately 10 m to 27 m).

Of the six wells (Bekkers, Paccione, Proud, Simms, Wettlaufer and Wiggins) originally identified for logger installation under the 2007 Baseline Survey, two well owners (Paccione and Proud) have not consented to the logger installation due to issues regarding public disclosure of data obtained from the monitoring program. The Wettlaufer well was fitted with a logger in January 2008. However in June 2008 the logger and pipe were removed by the tenants in order to conduct works on the well. Hanson has no plans to re install the data logger in the Wettlaufer well at this time. The Wiggins well was decommissioned in 2013 and the logger has since been removed.

Loggers have been installed in all the on-site overburden, straddle and selected intermediate and deep shale wells as outlined below. A logger was not installed in the overburden well in well nest MW-01 as the PVC pipe was pinched. In addition, a logger has not been installed in the intermediate well in the MW-02 well nest due to the small diameter (< 1.9 cm) of the PVC pipe. Wells MW-01I, MW-01D, and MW08-D were fitted with data loggers in 2012.

Well		Logger Installed	
		Yes	No
MW-01	Overburden		●
	Intermediate	●	
	Deep	●	
MW-02	Overburden	●	
	Intermediate		●
	Deep	●	
MW-03	Overburden	●	
	Deep	●	
MW-04	Overburden	●	
	Intermediate	●	
	Deep	●	
MW-05	Overburden	●	
	Straddle	●	
	Intermediate	●	
	Deep	●	
MW-06	Overburden	●	
	Straddle	●	
	Deep	●	
MW-07	Overburden	●	
	Deep	●	
MW-08	Overburden	●	
	Intermediate	●	
	Deep	●	
MW-09	Overburden	●	
	Straddle	●	
	Deep	●	
MW-10	Overburden	●	
	Intermediate	●	
	Deep	●	
MW-11	Overburden	●	
	Straddle	●	
	Deep	●	

5.2 Well Repairs and Water Supply Systems Modification

The following table provides a list of additional works undertaken by Hanson since 2008 as part of Section 2.2 of the AMP.

Date	Work Completed
June 2008	Hanson's contractor modified the existing cistern installed at the Finucci property by attaching a stainless steel riser to the cistern thereby raising the access port above ground level. This work improved the sanitary issues of having the port at ground level and the cistern accessible to surface runoff.
August 2008	It was discovered that the logger in the Hendervale ABC well was removed from the well, the direct read cable cut and the riser pipe and pitless adapter broken. Work on the well involved conducting a downhole camera investigation, removal of the broken riser pipe from the well, installation of new riser pipe and pitless adapter, and replacement of logger and direct read cable.
December 2008	Cisterns were installed at the Featherstone and Wiggins residences. Water from the cisterns is used as the primary water supply for the residences.
May 2009	A 3,000 imperial gallon (approximately 14 m^3) capacity cistern was installed on the Robinson property to provide potable water for the residence.
January to December 2012	Construction of the PCWS, which began in December 2011, continued through 2012. The water distribution system was completed in March 2012 and the communal reservoir was commissioned in February 2013. The PCWS will be fully operational in April 2013. As per the AMP, the following residences will be connected to the PCWS: Iron Horse (Hendervale Main House and Hendervale Cottage wells), Finucci, Featherstone, Wiggins, Hansen, Eno/Myers, Robinson and Bekkers. The Sicard and Sugiyami properties located south of Highway 407 are currently equipped with cisterns and will be serviced by the Halton Region's Tremaine Road Urban Watermain Extension, at Hanson's expense. As per the March 2007 TNA Agreement, Hanson paid for the installation of an additional 50,000 imperial gallon reservoir located adjacent to the Hendervale Main Barn well and pipe connections. This enables the owner to fill three reservoirs (two already existed on the property) in preparation for weekend equestrian events, when water demand may exceed well yields. The barn reservoir will not be connected to the PCWS unless well yields are reduced by > 10% as a result of quarry operations.
2013	■ The Featherstone, Finucci, Iron Horse (Hendervale Cottage and Hendervale House), Wiggins, Hansen, Robinson and Bekkers residences were connected to the PCWS in May 2013. The Eno/Myers residence was connected to the PCWS in June 2013. Backflow preventers were installed at all residences. ■ The Stephenson, Wiggins and Robinson wells were decommissioned on June 14, 2013. ■ The Robinson cistern was decommissioned in late June 2013. ■ The pump was removed from the Finucci well on June 26, 2013. ■ The Sugiyama and Sicard properties, both located south of the 407, have not yet been connected to Halton Region's Tremaine Road Urban Watermain Extension. In the interim, Hanson continues to supply water to the cisterns installed on the property.

6.0 IMPACT ASSESSMENT

The following sections provide an assessment of the impacts of the water takings at the Tansley Quarry on the groundwater, surface water and natural environment. Assessment of the impacts of the water taking was undertaken through a review of groundwater level data from a number of on-site monitoring wells and off-site private wells available prior to (July 2002 to August 2007) and after (September 2007 to November 2013) initiation of quarrying activities.

6.1 Radius of Influence

Quarry related groundwater level lowering has been identified at on-site wells within 30 m to 300 m of the excavation including wells MW-04, MW-05, MW-06, MW-08 and MW-09 as previously discussed in Section 3.4. The water level lowering of between approximately 2 and 12 m occurred in the overburden and upper-intermediate shale in response to the excavation of the sinking cut in 2007 with little change since that initial excavation period. The water level lowering is largely attributed to the exposure of the shale bedrock surface to drainage into the pit as well as lowering of water levels in the overlying sand alluvium. Considering that deepening of the quarry has not noticeably affected the shale groundwater levels since the excavation of the sinking cut, no anticipated future groundwater level drawdown is anticipated during the sinking cut phase which is anticipated to take an additional 5 to 10 years to complete.

A comparison of on-site groundwater levels from August 2007 (before initiation of sinking cut) with September 2013 is provided on Figure 8. As indicated, the current groundwater level lowering is focussed on the quarry excavation. The respective change in water levels is shown on Figure 9.

6.2 Well Interference Response

On March 21, 2007 Hanson entered into an Agreement with a number of private well owners comprising the TNA. Hanson also entered into an AMP Agreement with the Region of Halton on May 8, 2007 (Appendix A). Both agreements provide that Hanson shall proactively ensure a continuous supply of potable water to property owners whose wells may be adversely affected by the quarry operation. In addition to assuring the supply of water to property owners whose wells are adversely affected by the quarry operations the AMP also requires Hanson to construct and operate a PCWS which will service all properties identified within the Potential Zone of Influence as outlined in the AMP. PCWS construction began in December 2011 and continued through 2012. The water distribution system was completed in March 2012 and the communal reservoir was commissioned in February 2013. By following the requirements of the AMP and the PCWS agreement, Hanson will ensure that all property owners within the Zone of Influence of the quarry are provided with a continuous supply of potable water. In May 2013, the following residences were connected to the PCWS as required under Section 2.2 of the AMP: Iron Horse (Hendervale Main House and Hendervale Cottage wells), Finucci, Featherstone, Wiggins, Hansen, Eno/Myers, Robinson and Bekkers. There were no well complaints received by Hanson in 2013.

7.0 STATUS OF CURRENT MONITORING PROGRAM

The configuration of wells in the current monitoring program and frequency of monitoring employed (continuous water level monitoring in all wells where possible) and annual water quality sampling has successfully provided data to assess the impacts of dewatering activities at the Tansley Quarry site as discussed above.

As discussed in Section 3.4, the deep shale monitoring wells at MW-04, MW-05, MW-06, MW-09, MW-10 and MW-11 are completed in extremely low permeability shale and are not anticipated to recover in the near future. We recommend that water quality sampling of these specific wells be discontinued such that the slowly recovering water level profiles will not be disturbed.

As off-site residents are placed on cisterns or the PCWS with the associated well decommissioning, water quality and water level monitoring at these locations should be reduced or discontinued. At present, with the exception of the Wiggins well which has been decommissioned, all the wells have been retained for water level monitoring.

8.0 SETTING OF TRIGGER GROUNDWATER LEVELS

Trigger locations represent monitoring locations where a minimum groundwater level elevation (or target level) should be maintained in order to limit unpredicted impacts to private wells. As per Section 8.6(d) of the AMP, the setting of triggers involved the selection of monitoring wells based on proximity to the extraction area and ideally located between the active extraction area and private well locations as identified on Figure 6. Considering that the domestic wells around the perimeter of the quarry are being replaced by the PCWS, and wells south of Highway 407 will be serviced with municipal water, the remaining area of potential concern for domestic well interference is situated north of the quarry beyond the PCWS service area at minimum distances of 500 m to 700 m from the ultimate limit of quarry extraction. Therefore, the selected trigger wells should include MW-01, MW-02 and MW-03 and specifically the intermediate shale wells in each of these installations.

Target groundwater levels are based on seasonal average water levels calculated from the baseline monitoring at each location (pre-sinking cut excavation) and the subtraction of predicted drawdown estimated from the groundwater model. Seasonal target levels for each of the three groundwater trigger locations (MW-01, MW-02 and MW-03) are presented on Figures F.1 to F.3 in Appendix F. As indicated on Figures F.1 to F.3, the drawdown trigger levels for wells MW-01, 02 and 03 have been set at approximately 5 m, 7 m and 8 m respectively. These trigger levels will be addressed in the subsequent annual monitoring reports and will be revised as required based upon the on-going monitoring.

Target levels at each groundwater trigger location are established for the purpose of identifying when contingency measures may be necessary to protect against negative impacts at private wells. These target levels, if exceeded, would trigger enhanced monitoring of domestic wells to access the need for contingency provisions for any private wells in proximity to the potentially affected area.

9.0 ADEQUACY OF GROUNDWATER MONITORING

As per Section 5.2(e, f, g, h, i and j) of the AMP, the ongoing groundwater level monitoring program has provided sufficient understanding coupled with the previous groundwater model predictions, to indicate that no off-site domestic well interference problems would be anticipated prior to the full extraction of the quarry when the nearest wells would be 500 m to 700 m from the northern quarry face. The time frame for completion of the quarry to the final stage is decades into the future.

At this time there is no necessity to update the assumptions in the predictive groundwater model considering that ongoing monitoring has demonstrated that actual drawdowns are similar to or less than the predicted drawdowns. Further, the actual permeabilities of the shale layers in the model are higher than the permeabilities demonstrated in the field such that the model is considered conservative. Section 5.2(h) of the AMP requires that the groundwater model be updated for the annual report that applies to the year that the Sinking Cut stage is completed. It is anticipated that the Sinking Cut stage will require at least another five to ten years based on the current demand for the shale.

Due to the conservative nature of the predictive model, no revision is considered necessary for the potential zone of influence, but with the implementation of the PCWS, there are several private wells that can be removed from the monitoring program (see Section 10 below). To date there has been no adverse effects on off-site water supplies. Rather, water supply conditions have been significantly improved with the commissioning of the PCWS in 2013. Accordingly, no changes in quarry operations are required at this time with respect to water supplies.

10.0 PROPOSED MONITORING PROGRAM

With the commissioning of the PCWS in April 2013, the following property owners initially indicated their willingness to have their wells decommissioned as per Section 8.6 of the AMP: Wiggins, Hansen, Eno/Myers, Bekkers, Hendervale House and Cottage and Robinson. However, although the Hendervale main house, farm house and cottage were connected to the PCWS, the Hendervale House and Hendervale Cottage wells have been retained for use by Iron Horse. Similarly, the Bekkers well has been retained by the owners for uses other than domestic supply. Hanson has made arrangements with the Finucci and Featherstone property owners for the continued water level monitoring of their wells. The Sicard and Sugiyami wells will be decommissioned once they are connected to Halton Region's Urban Watermain Extension.

In light of the above, and upon review of the monitoring data collected between 2002 and 2013, the following monitoring program is proposed going forward:

- Continuous groundwater level monitoring at nested wells MW-01 to MW-11.
- Continuous groundwater level monitoring in wells TW-1 and TW-3. Well TW-2 has been dry since installation in August 2007 and should be decommissioned.
- Continuous groundwater level monitoring at the Hendervale ABC Barn, Hendervale XYZ Barn and Hendervale Main Barn wells, Finucci, Featherstone and Simms wells (total of six wells). Monitoring of the Hendervale, Finucci and Featherstone wells will provide information on any potential impacts of dewatering on groundwater levels within the 0.2 m potential zone of influence (PZI). Monitoring of the Simms wells will provide information on potential impacts outside the 0.2 m PZI north of the site. Continuous monitoring of groundwater levels at well TW-3 will replace the monitoring at the Bekkers well once the residence is

connected to the PCWS, and will provide information on any potential impacts of dewatering on groundwater levels outside of the 0.2 m PZI east of the site.

It should be noted that during the Baseline Survey conducted in 2007, a number of wells were chosen for inclusion in the Tansley Quarry monitoring program. This included the Paccione well (located along Tremaine Road north of the quarry), the Wettlaufer well located along No. 2 Sideroad and the Proud well located along Burnhamthorpe Road West. Permission for monitoring was not obtained from these well owners. The data logger initially installed in the Wettlaufer well was removed and permission for re-installation has not been received from the owner.

- Off-site groundwater quality monitoring will continue at the Simms well. All other domestic wells previously sampled as part of the monitoring program have either already been connected to the PCWS (i.e., Bekkers, Eno/Myers, Featherstone, Finucci, Hendervale House, Hendervale Cottage, Robinson and Wiggins) or are currently on cistern and awaiting connection to Halton Region's Tremaine Road Urban Watermain Extension (Sugiyama and Sicard). The Hendervale Main Barn, Hendervale ABC Barn and Hendervale XYZ Barn wells all pump into a cistern that may also receive water from other sources; discrete water samples cannot be obtained from the individual wells. Water quality monitoring will be continued at the Simms well as it is the only well that continues to be used for domestic purposes (e.g., cooking, washing, etc.).
- The on-site groundwater quality monitoring program has provided a significant understanding of the groundwater quality conditions beneath the site including spatial and temporal variations. Therefore, at this stage, the water quality monitoring program can be reduced to include only the straddle and intermediate shale wells. These horizons are considered representative of domestic well water quality conditions within the surrounding area. This would include 11 groundwater quality samples from the following wells: MW-01I, MW-02I, MW-03I, MW-04I, MW-05S, MW-05I, MW-06S, MW-08I, MW-09S, MW-10I and MW-11S.

The private well and on-site monitoring well network outlined above will continue to provide the necessary data on any potential groundwater level or groundwater quality impacts of dewatering at the Tansley Quarry.

11.0 SUMMARY AND CONCLUSIONS

Based on the above information the following conclusions can be made:

- During 2013, the daily sump discharge from quarry dewatering did not exceed the maximum discharge rate of 4,320,000 L/day as specified by the site water taking permit PTTW No. 1718-8WPJUV.
- The 2013 groundwater level monitoring results are consistent with the previous years' monitoring confirming long term trends since monitoring began.
- The 2013 groundwater level trends for the deep shale wells MW-04, MW-05, MW-06, MW-09, MW-10 and MW-11 have followed similar trends consistent with wells completed in shale of very low hydraulic conductivity in the range of 10^{-13} to 10^{-14} m/s as determined from the extremely slow recovery rates shown on the respective hydrographs. These wells will not recover to static conditions in the near future.
- Quarry related groundwater level lowering in the range of 2 m to 12 m occurred in the overburden and intermediate shale wells within 30 m to 300 m of the current quarry excavation including wells MW-04,

MW-05), MW-06, MW-08 and MW-09 during 2007 in response to the initial excavation of the sinking cut. The respective levels have remained relatively constant since completion of the sinking cut at the end of 2007.

- The range of groundwater level fluctuations seen in private wells was within the range of historical groundwater level responses indicating no drawdown influence from the quarry.
- A review of the groundwater levels suggest that the potential influence of quarry dewatering may extend approximately 500 m from the sinking cut, and has remained unchanged from 2011.
- The groundwater quality results indicate that the groundwater in and around the quarry is very hard and mineralized with naturally occurring substances, such as sodium, potassium, magnesium, calcium, chloride and sulphate. Groundwater is relatively fresh in the shallow overburden, with salinity increasing with depth.
- The groundwater quality parameters in the monitoring wells were below the ODWS criteria with the exception of aluminum, alkalinity, hardness, chloride, sulphate, sulphide, sodium, manganese, iron, turbidity, barium, cadmium, chromium, lead, arsenic, uranium and boron. These exceedances are considered to be naturally occurring in groundwater in the shale bedrock.
- The groundwater quality parameters in the monitoring wells were below PWQO criteria with the exception of aluminum, arsenic, boron, cadmium, cobalt, copper, iron, lead, molybdenum, nickel, selenium, silver, thallium, total phosphorus, uranium, vanadium and zinc. These exceedances are considered to be naturally occurring in groundwater in the shale bedrock.
- Groundwater quality in the Simms private well showed a non-health related ODWS exceedance of hardness. The composite Hendervale cistern sample also showed non health-related ODWS exceedances of hardness and iron. Lead also exceeded the MAC in the cistern sample.

12.0 RECOMMENDATIONS

- Monitoring of groundwater levels should be continued in 2014 as per the revised monitoring program outlined in Section 10 above;
- Water quality sampling should be conducted annually at MW-Series well nests and private wells as per the revised monitoring program outlined in Section 10 above; and
- Assess trigger levels in monitoring wells MW-01, 02 and 03 as part of subsequent annual reporting as per Section 8 above.

Report Signature Page

GOLDER ASSOCIATES LTD.

DRAFT

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TABLES

Table 1
2013 Daily Sump Discharge
Tansley Quarry - Hanson Brick Ltd.

Date	Total Daily	Total Daily Volume Pumped	Sump Dewatering Rate	
	(hrs)	(m^3)	(m^3/hr)	(igal/min)
1-Jan-13	0.0			
2-Jan-13	0.0			
3-Jan-13	6.8	372	49.7	182
4-Jan-13	0.0			
5-Jan-13	0.0			
6-Jan-13	0.0			
7-Jan-13	6.1	334	45.3	166
8-Jan-13	5.3	282	44.0	161
9-Jan-13	7.3	361	43.3	159
10-Jan-13	6.3	224	29.6	108
11-Jan-13	0.0			
12-Jan-13	0.0			
13-Jan-13	0.0			
14-Jan-13	0.0			
15-Jan-13	0.0			
16-Jan-13	10.0	814	78.9	289
17-Jan-13	7.6	617	75.9	278
18-Jan-13	6.3	491	74.3	272
19-Jan-13	0.0			
20-Jan-13	0.0			
21-Jan-13	0.0			
22-Jan-13	0.0			
23-Jan-13	0.0			
24-Jan-13	0.0			
25-Jan-13	6.2	483	75.1	275
26-Jan-13	0.0			
27-Jan-13	0.0			
28-Jan-13	6.8	520	74.6	274
29-Jan-13	9.9	758	81.3	298
30-Jan-13	3.0	218	84.5	310
31-Jan-13	0.0			
1-Feb-13	0.0			
2-Feb-13	0.0			
3-Feb-13	0.0			
4-Feb-13	0.0			
5-Feb-13	0.0			
6-Feb-13	0.0			
7-Feb-13	6.8	543	75.0	275
8-Feb-13	6.5	507	87.2	320
9-Feb-13	0.0			
10-Feb-13	0.0			
11-Feb-13	7.3	539	78.1	286
12-Feb-13	5.8	434	73.2	268
13-Feb-13	0.0			
14-Feb-13	0.0			
15-Feb-13	7.6	576	71.2	261
16-Feb-13	0.0			
17-Feb-13	0.0			
18-Feb-13	0.0			
19-Feb-13	3.8	296	73.4	269
20-Feb-13	8.2	634	78.3	287
21-Feb-13	6.8	502	74.4	273
22-Feb-13	0.0			
23-Feb-13	0.0			

Table 1
2013 Daily Sump Discharge
Tansley Quarry - Hanson Brick Ltd.

Date	Total Daily	Total Daily Volume Pumped	Sump Dewatering Rate	
	(hrs)	(m^3)	(m^3/hr)	(igal/min)
24-Feb-13	0.0			
25-Feb-13	0.0			
26-Feb-13	6.0	417	77.2	283
27-Feb-13	7.3	545	78.0	286
28-Feb-13	8.7	571	68.8	252
1-Mar-13	7.2	546	75.0	275
2-Mar-13	0.0			
3-Mar-13	0.0			
4-Mar-13	0.0			
5-Mar-13	3.3	241	80.0	293
6-Mar-13	8.1	574	74.9	274
7-Mar-13	7.4	551	74.9	275
8-Mar-13	6.8	560	90.4	331
9-Mar-13	0.0			
10-Mar-13	0.0			
11-Mar-13	0.0			
12-Mar-13	4.4	485	82.8	303
13-Mar-13	7.4	513	82.5	302
14-Mar-13	7.3	620	77.5	284
15-Mar-13	7.4	580	75.2	276
16-Mar-13	3.5	263	82.2	301
17-Mar-13	0.0			
18-Mar-13	0.0			
19-Mar-13	4.0	337	79.4	291
20-Mar-13	7.3	568	72.6	266
21-Mar-13	7.4	495	75.1	275
22-Mar-13	7.3	442	68.6	251
23-Mar-13	0.0			
24-Mar-13	0.0			
25-Mar-13	0.0			
26-Mar-13	4.9	347	74.2	272
27-Mar-13	7.1	456	71.4	262
28-Mar-13	7.3	515	76.5	280
29-Mar-13	0.0			
30-Mar-13	5.1	336	70.0	257
1-Apr-13	6.3	416	72.3	265
2-Apr-13	0.0			
3-Apr-13	0.0			
4-Apr-13	5.0	325	58.4	214
5-Apr-13	6.3	413	67.2	246
6-Apr-13	5.4	360	71.7	263
7-Apr-13	0.0			
8-Apr-13	3.0	180	70.6	259
9-Apr-13	4.2	253	71.4	262
10-Apr-13	4.0	274	83.6	306
11-Apr-13	0.0			
12-Apr-13	0.0			
13-Apr-13	0.0			
14-Apr-13	0.0			
15-Apr-13	0.0			
16-Apr-13	0.0			
17-Apr-13	3.1	210	78.1	286
18-Apr-13	7.0	453	74.7	274
19-Apr-13	7.0	425	66.8	245

Table 1
2013 Daily Sump Discharge
Tansley Quarry - Hanson Brick Ltd.

Date	Total Daily (hrs)	Total Daily Volume Pumped (m^3)	Sump Dewatering Rate (m^3/hr)	(igal/min)
20-Apr-13	0.0			
21-Apr-13	0.0			
22-Apr-13	7.8	489	60.4	221
23-Apr-13	7.5	482	75.0	275
24-Apr-13	0.0			
25-Apr-13	0.0			
26-Apr-13	0.0			
27-Apr-13	0.0			
28-Apr-13	0.0			
29-Apr-13	7.3	474	73.5	270
30-Apr-13	7.5	467	71.9	264
1-May-13	8.1	486	69.8	256
2-May-13	0.0			
3-May-13	0.0			
4-May-13	0.0			
5-May-13	0.0			
6-May-13	6.0	333	64.7	237
7-May-13	5.0	327	74.0	271
8-May-13	0.0			
9-May-13	0.0			
10-May-13	2.8	192	79.2	290
11-May-13	0.0			
12-May-13	0.0			
13-May-13	7.8	534	77.6	284
14-May-13	8.1	554	81.5	299
15-May-13	7.8	527	74.0	271
16-May-13	7.2	466	64.1	235
17-May-13	0.0			
18-May-13	0.0			
19-May-13	0.0			
20-May-13	0.0			
21-May-13	0.0			
22-May-13	7.3	447	70.4	258
23-May-13	7.6	467	67.8	249
24-May-13	7.8	511	76.0	279
25-May-13	0.0			
26-May-13	0.0			
27-May-13	7.3	429	65.0	238
28-May-13	2.2	132	65.5	240
29-May-13	0.0			
30-May-13	0.0			
31-May-13	9.7	585	66.6	244
1-Jun-13	0.0			
2-Jun-13	0.0			
3-Jun-13	7.4	467	73.8	271
4-Jun-13	10.0	630	71.2	261
5-Jun-13	6.4	393	93.7	343
6-Jun-13	0.0			
7-Jun-13	0.0			
8-Jun-13	0.0			
9-Jun-13	0.0			
10-Jun-13	0.0			
11-Jun-13	0.0			
12-Jun-13	0.0			

Table 1
2013 Daily Sump Discharge
Tansley Quarry - Hanson Brick Ltd.

Date	Total Daily	Total Daily Volume Pumped	Sump Dewatering Rate	
	(hrs)	(m^3)	(m^3/hr)	(igal/min)
13-Jun-13	0.0			
14-Jun-13	9.9	624	53.2	195
15-Jun-13	0.0			
16-Jun-13	0.0			
17-Jun-13	0.0			
18-Jun-13	8.8	522	66.0	242
19-Jun-13	9.8	618	73.5	269
20-Jun-13	7.0	421	65.6	241
21-Jun-13	0.0			
22-Jun-13	0.0			
23-Jun-13	0.0			
24-Jun-13	0.0			
25-Jun-13	0.0			
26-Jun-13	0.0			
27-Jun-13	9.1	520	66.3	243
28-Jun-13	0.0			
29-Jun-13	0.0			
30-Jun-13	0.0			
1-Jul-13	0.0			
2-Jul-13	0.0			
3-Jul-13	8.3	484	0.0	0
4-Jul-13	0.0			
5-Jul-13	0.0			
6-Jul-13	0.0			
7-Jul-13	0.0			
8-Jul-13	5.5	350	69.7	256
9-Jul-13	7.0	500	81.2	298
10-Jul-13	7.4	495	15.7	57
11-Jul-13	0.0			
12-Jul-13	0.0			
13-Jul-13	0.0			
14-Jul-13	0.0			
15-Jul-13	0.0			
16-Jul-13	7.4	500	73.8	271
17-Jul-13	5.3	343	73.8	271
18-Jul-13	1.6	82	49.9	183
19-Jul-13	1.3	69	59.5	218
20-Jul-13	0.0			
21-Jul-13	0.0			
22-Jul-13	0.0			
23-Jul-13	0.0			
24-Jul-13	8.3	547	75.8	278
25-Jul-13	7.1	485	76.2	279
26-Jul-13	2.2	131	53.6	197
27-Jul-13	0.0			
28-Jul-13	0.0			
29-Jul-13	0.0			
30-Jul-13	13.5	97	9.0	33
31-Jul-13	6.3	381	66.6	244
1-Aug-13	4.8	299	76.1	279
2-Aug-13	7.6	457	70.5	258
3-Aug-13	0.0			
4-Aug-13	0.0			
5-Aug-13	0.0			

Table 1
2013 Daily Sump Discharge
Tansley Quarry - Hanson Brick Ltd.

Date	Total Daily (hrs)	Total Daily Volume Pumped (m^3)	Sump Dewatering Rate	
			(m^3/hr)	(igal/min)
6-Aug-13	5.4	300	60.9	223
7-Aug-13	0.3	24	83.7	307
8-Aug-13	0.0			
9-Aug-13	0.9	51	30.4	112
10-Aug-13	0.0			
11-Aug-13	0.0			
12-Aug-13	1.8	105	45.8	168
13-Aug-13	0.0			
14-Aug-13	2.3	134	60.5	222
15-Aug-13	2.3	141	0.0	0
16-Aug-13	0.0			
17-Aug-13	0.0			
18-Aug-13	0.0			
19-Aug-13	2.0	110	57.3	210
20-Aug-13	1.3	79	86.5	317
21-Aug-13	1.8	105	63.3	232
22-Aug-13	0.0			
23-Aug-13	0.0			
24-Aug-13	0.0			
25-Aug-13	0.0			
26-Aug-13	1.5	90	80.3	295
27-Aug-13	4.9	282	65.0	238
28-Aug-13	3.2	183	63.8	234
29-Aug-13	1.3	74	61.4	225
30-Aug-13	0.0			
31-Aug-13	0.0			
1-Sep-13	0.0			
2-Sep-13	0.0			
3-Sep-13	4.6	276	67.7	248
4-Sep-13	0.0			
5-Sep-13	2.5	160	63.2	232
6-Sep-13	0.0			
7-Sep-13	0.0			
8-Sep-13	0.0			
9-Sep-13	5.0	280	59.1	217
10-Sep-13	2.7	147	71.9	263
11-Sep-13	2.0	104	55.3	203
12-Sep-13	0.0			
13-Sep-13	6.7	371	67.8	249
14-Sep-13	0.0			
15-Sep-13	0.0			
16-Sep-13	0.0			
17-Sep-13	3.3	178	58.0	213
18-Sep-13	0.0			
19-Sep-13	2.2	114	56.6	207
20-Sep-13	0.0			
21-Sep-13	0.0			
22-Sep-13	0.0			
23-Sep-13	7.1	444	72.1	264
24-Sep-13	6.8	414	66.1	242
25-Sep-13	6.6	372	66.9	245
26-Sep-13	7.2	392	59.4	218
27-Sep-13	3.5	180	49.7	182
28-Sep-13	0.0			

Table 1
2013 Daily Sump Discharge
Tansley Quarry - Hanson Brick Ltd.

Date	Total Daily (hrs)	Total Daily Volume Pumped (m^3)	Sump Dewatering Rate (m^3/hr)	(igal/min)
29-Sep-13	0.0			
30-Sep-13	0.0			
1-Oct-13	0.0			
2-Oct-13	0.0			
3-Oct-13	0.0			
4-Oct-13	0.0			
5-Oct-13	0.0			
6-Oct-13	0.0			
7-Oct-13	0.0			
8-Oct-13	7.5	420	63.0	231
9-Oct-13	7.8	430	59.7	219
10-Oct-13	7.4	413	61.6	226
11-Oct-13	7.3	364	56.8	208
12-Oct-13	0.0			
13-Oct-13	0.0			
14-Oct-13	0.0			
15-Oct-13	4.7	254	61.0	224
16-Oct-13	0.0			
17-Oct-13	0.0			
18-Oct-13	5.0	271	58.7	215
19-Oct-13	0.0			
20-Oct-13	0.0			
21-Oct-13	0.0			
22-Oct-13	0.0			
23-Oct-13	0.0			
24-Oct-13	6.5	374	62.0	228
25-Oct-13	7.0	369	59.7	219
26-Oct-13	0.0			
27-Oct-13	0.0			
28-Oct-13	7.0	396	61.8	227
29-Oct-13	4.7	263	59.6	218
30-Oct-13	0.0			
31-Oct-13	0.0			
1-Nov-13	0.0			
2-Nov-13	0.0			
3-Nov-13	0.0			
4-Nov-13	6.5	381	61.7	226
5-Nov-13	7.3	426	26.3	96
6-Nov-13	0.0			
7-Nov-13	0.0			
8-Nov-13	0.0			
9-Nov-13	0.0			
10-Nov-13	0.0			
11-Nov-13	0.0			
12-Nov-13	0.0			
13-Nov-13	0.0			
14-Nov-13	0.0	391	65.8	241
15-Nov-13	0.0	313	55.2	202
16-Nov-13	0.0			
17-Nov-13	0.0			
18-Nov-13	6.8	470	78.3	287
19-Nov-13	7.9	556	76.7	281
20-Nov-13	0.0			
21-Nov-13	7.1	308	48.5	178

Table 1
2013 Daily Sump Discharge
Tansley Quarry - Hanson Brick Ltd.

Date	Total Daily	Total Daily Volume Pumped	Sump Dewatering Rate	
	(hrs)	(m^3)	(m^3/hr)	(igal/min)
22-Nov-13	6.8	453	36.8	135
23-Nov-13	0.0			
24-Nov-13	0.0			
25-Nov-13	0.0			
26-Nov-13	0.0			
27-Nov-13	0.0			
28-Nov-13	0.0			
29-Nov-13	0.0			
30-Nov-13	0.0			
1-Dec-13	0.0			
2-Dec-13	6.4	419	65.1	239
3-Dec-13	5.0	298	60.9	223
4-Dec-13	0.0			
5-Dec-13	0.0			
6-Dec-13	0.0			
7-Dec-13	0.0			
8-Dec-13	0.0			
9-Dec-13	5.6	370	70.3	258
10-Dec-13	0.0			
11-Dec-13	0.0			
12-Dec-13	0.0			
13-Dec-13	3.5	213	61.3	225
14-Dec-13	0.0			
15-Dec-13	0.0			
16-Dec-13	0.0			
17-Dec-13	0.0			
18-Dec-13	0.0			
19-Dec-13	0.0			
20-Dec-13	4.0	248	75.6	277
21-Dec-13	0.0			
22-Dec-13	0.0			
23-Dec-13	6.9	463	57.8	212
24-Dec-13	3.0	206	55.6	204
25-Dec-13	0.0			
26-Dec-13	0.0			
27-Dec-13	0.0			
28-Dec-13	0.0			
29-Dec-13	0.0			
30-Dec-13	0.0			
31-Dec-13	0.0			
2013 Annual Total	**837**	**54,267**		

Note:
Discharge data Provided by Hanson Brick Ltd.

Table 2
Private Well Details
Tansley Quarry - Hanson Brick Ltd.

Property	Current Monitoring	MOE Well Record No.	Water Use	Measured Well Depth (m)	Casing Diameter (cm)	Formation Screened
Bekkers	WL, WQ	2810528	Domestic	22.7	91	Shale
Featherstone	WL	2804215	Domestic	24.5	15	Shale
Finucci	WL, WQ	2807948	Domestic	16.5	15	Shale
Hendervale Main Barn	WL, WQ	2808781	Domestic	12.8	15	Shale
Hendervale ABC Barn	WL, WQ	2808540	Domestic	>29	15	Shale
Hendervale XYZ Barn	WL, WQ	2808537	Domestic	21.4	15	Shale
Hendervale House	WL, WQ	2802793	Domestic	19.4	15	Shale
Hendervale Cottage	WL, WQ		Domestic	8.9	15	Overburden
Sicard	WQ	2803908	Domestic	≈18	15	Shale
Simms	WL, WQ	2804679	Domestic	27.4	76	Shale
Sugiyama	WQ	2807647	Domestic	15	15	Shale
Wettlaufer	NM	2807684	Domestic	20.7	15	Shale
Wiggins	NM	2803806	Domestic	18.2	15	Shale

Notes:

1) Water well records were assigned based on well location, construction details, owner's name and address where available, etc.
2) WL indicates well currently monitored for water levels.
3) WQ indicates well currently monitored for water quality.
4) NM indicates well not currently monitored for water levels or water quality.
5) MOE well records assigned to Hendervale property could not be assigned to each well on property.
6) Owner indicated that Hendervale House well was deepened from original depth of approximately 8 m to 26 m.
7) MOE well records assigned to Stevenson property (currently owned by Hanson Brick) could not be correlated with well currently identified on property.
8) Sicard and Sugiyama well depths are approximate (provided by owner).

Table 3
Groundwater Level Elevations in MW-Series and TW-Series Wells
September 30, 2002 to November 18, 2013
Tansley Quarry - Hanson Brick Ltd

Hole	Piezometer	Location		Ground Elev (m)	Stick-up (m)	Top of pipe elevation (masl)	30-Sep-02	7-Oct-02	10-Oct-02	25-Oct-02	31-Oct-02	17-Dec-02	07-Jan-03	14-Feb-03	20-Mar-03	21-Apr-03
		Easting (m)	Northing (m)													
MW-01	Overburden	596395	4809597	164.78	0.76	165.54								163.16	163.60	164.29
	Intermediate			164.78	0.80	165.58		162.56	162.56	162.28	162.36	162.51	163.10	163.18	163.61	164.27
	Deep			164.78	0.75	165.53		160.39	160.30	160.14	160.06	159.41	159.43	159.74	159.62	160.19
MW-02	Overburden	596248	4809618	166.58	0.78	167.36		165.64	165.58	165.49	165.64	165.59	165.96	166.66	166.16	166.35
	Intermediate			166.58	0.76	167.34		160.36	160.31	160.09	160.07	159.79	159.90	162.02	160.19	160.88
	Deep			166.58	0.74	167.32		152.93	153.15	152.79	152.77	152.50	152.60	152.61	152.69	152.73
MW-03	Overburden	596108	4809606	169.31	0.81	170.12	162.22	162.12	162.32	162.08	161.87	162.19	162.13	161.91	161.74	162.14
	Deep			169.31	0.75	170.06	162.04	162.04	162.06	162.00	161.96	162.04	161.92	161.82	161.86	162.15
MW-04	Overburden	595911	4809070	167.85	0.97	168.82	163.79	163.94	163.90	163.69	163.67	163.48	163.49	163.48	163.69	164.81
	Intermediate			167.85	0.94	168.79	161.53	161.51	161.49	161.36	161.33	161.23	161.21	161.14	161.15	161.80
	Deep			167.85	0.87	168.72	162.15	163.82	163.85	163.63	163.64	163.41	163.41	164.38	163.60	164.65
MW-05	Overburden	596135	4808768	166.88	0.88	167.76	160.40	160.33	160.31	160.16	160.09	159.92	159.87	159.76	159.72	160.40
	Intermediate			166.88	0.84	167.72	158.67	158.68	158.65	158.55	158.64	158.80	158.87	158.78	158.81	159.61
	Deep			166.88	0.81	167.69	130.45	130.62	130.63	130.84	130.93	131.28	131.50	131.71	132.00	132.16
	Straddle	596134	4808769	167.03	0.95	167.98										
MW-06	Overburden	596355	4808896	165.97	0.98	166.95	161.76	161.71	161.70	161.62	161.58	161.37	161.30	161.20	161.11	162.31
	Deep			165.97	0.90	166.87	161.25	161.17	161.15	161.02	160.93	160.94	160.97	161.02	160.87	162.36
	Straddle	596351	4808892	166.05	0.84	166.89										
MW-07	Overburden	596099	4809348	166.89	0.85	167.74	163.46	163.38	163.34	163.14	163.12	162.70	162.64	162.71	162.85	164.07
	Deep			166.89	0.87	167.76	152.00	152.05	152.00	151.97	152.04	151.96	152.10	151.99	152.26	152.28
MW-08	Overburden	596295	4809190	162.79	0.87	163.66	160.57	160.36	160.25	160.05	160.00	159.76	159.89	160.19	160.49	161.09
	Intermediate			162.79	0.84	163.63	160.46	160.26	160.19	159.97	159.95	159.66	159.75	159.91	160.05	160.78
	Deep			162.79	0.82	163.61	160.51	160.33	160.26	160.26	160.04	159.77	159.94	160.24	160.47	161.09
MW-09	Overburden	596166	4809014	165.53	0.76	166.29										
	Straddle	596166	4809014		0.82	166.35										
	Deep	596164	4809012		1.06	166.59										
MW-10	Overburden	596045	4809002	166.77	0.88	167.65										
	Intermediate	596045	4809002		0.94	167.71										
	Deep	596046	4809003		0.83	167.60										
MW-11	Overburden	595869	4808946	168.31	1.01	169.32										
	Straddle	595870	4808946		1.04	169.35										
	Deep	595871	4808948		1.12	169.42										
TW-1		595581	4808946	167.64	0.88	168.52										
TW-2		595621	4810361	176.33	0.82	177.15										
TW-3		596411	4810003	166.85	0.70	167.55										

Notes:
1. Shallow wells have screened intervals no deeper than 30' (9 m) below ground, completed in overburden.
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Groundwater Level Elevations in MW-Series and TW-Series Wells
September 30, 2002 to November 18, 2013
Tansley Quarry - Hanson Brick Ltd

Hole	Piezometer	Location		Ground Elev (m)	Stick-up (m)	Top of pipe elevation (masl)	05-May-03	16-Jun-03	14-Jul-03	31-Oct-03	12-Jan-04	05-Apr-04	15-Jul-04	15-Oct-04	28-Jan-05	03-May-05
		Easting (m)	Northing (m)													
MW-01	Overburden	596395	4809597	164.78	0.76	165.54	164.09	164.40	163.52	163.80	164.31	164.57	163.82	163.02	164.10	164.48
	Intermediate			164.78	0.80	165.58	164.23	164.39	163.49	163.78	164.25	164.55	163.80	162.99	164.11	164.47
	Deep			164.78	0.75	165.53	160.26	160.41	160.23	159.79	160.59	160.80	160.60	160.22	160.62	160.74
MW-02	Overburden	596248	4809618	166.58	0.78	167.36	166.31	166.23	165.65	165.93	166.10	166.29	165.88	165.27	166.30	166.21
	Intermediate			166.58	0.76	167.34	160.88	161.29	161.06	160.57	161.61	161.87	161.62	161.12	161.60	161.78
	Deep			166.58	0.74	167.32	152.77	152.70	152.72	152.89	153.02	153.09	153.15	153.01	152.99	153.06
MW-03	Overburden	596108	4809606	169.31	0.81	170.12	162.01	162.41	162.61	162.16	163.40	163.68	162.65	162.76	162.64	163.17
	Deep			169.31	0.75	170.06	162.28	162.36	162.47	161.61	163.28	163.71	163.02	162.63	162.99	163.35
MW-04	Overburden	595911	4809070	167.85	0.97	168.82	165.04	165.41	165.21	164.71	166.10	166.37	165.87	164.71	165.72	166.39
	Intermediate			167.85	0.94	168.79	162.03	162.37	162.00	161.71	162.72	163.17	162.69	162.12	162.80	163.35
	Deep			167.85	0.87	168.72	164.93	161.24	163.06	162.75	162.81	163.36	163.10	162.01	163.42	163.97
MW-05	Overburden	596135	4808768	166.88	0.88	167.76	160.73	162.16	161.70	160.45	161.50	163.66	161.97	160.66	161.34	163.96
	Intermediate			166.88	0.84	167.72	159.75	160.22	159.40	159.25	160.24	160.78	160.15	159.45	161.73	161.05
	Deep			166.88	0.81	167.69	132.20	132.32	132.44	132.75	132.94	133.10	133.16	133.11	133.47	133.71
	Straddle	596134	4808769	167.03	0.95	167.98										
MW-06	Overburden	596355	4808896	165.97	0.98	166.95	162.82	163.58	162.92	162.11	163.66	164.33	163.76	163.25	163.13	164.29
	Deep			165.97	0.90	166.87	162.85	163.67	162.61	161.58	163.71	164.32	163.91	162.85	163.43	164.34
	Straddle	596351	4808892	166.05	0.84	166.89										
MW-07	Overburden	596099	4809348	166.89	0.85	167.74	164.24	164.79	164.43	163.79	165.12	165.32	165.54	164.32	164.95	165.21
	Deep			166.89	0.87	167.76	152.27	152.29	152.38	152.53	152.70	152.72	152.86	152.57	152.47	152.58
MW-08	Overburden	596295	4809190	162.79	0.87	163.66	161.07	161.39	161.06	160.39	161.62	161.85	161.51	160.99	161.73	161.90
	Intermediate			162.79	0.84	163.63	160.80	161.13	160.88	160.33	161.31	161.58	161.26	160.83	161.29	161.46
	Deep			162.79	0.82	163.61	161.06	161.39	161.07	160.42	161.64	161.86	161.51	161.03	161.68	161.91
MW-09	Overburden	596166	4809014	165.53	0.76	166.29										
	Straddle	596166	4809014		0.82	166.35										
	Deep	596164	4809012		1.06	166.59										
MW-10	Overburden	596045	4809002	166.77	0.88	167.65										
	Intermediate	596045	4809002		0.94	167.71										
	Deep	596046	4809003		0.83	167.60										
MW-11	Overburden	595869	4808946	168.31	1.01	169.32										
	Straddle	595870	4808946		1.04	169.35										
	Deep	595871	4808948		1.12	169.42										
TW-1		595581	4808946	167.64	0.88	168.52										
TW-2		595621	4810361	176.33	0.82	177.15										
TW-3		596411	4810003	166.85	0.70	167.55										

Notes:
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September 30, 2002 to November 18, 2013
Tansley Quarry - Hanson Brick Ltd

Hole	Piezometer	Location		Ground Elev (m)	Stick-up (m)	Top of pipe	31-Aug-05	24-Mar-06	16-Jun-06	10-Aug-06	09-Jan-07	30-Apr-07	27-Jun-07	7-Aug-07	9-Aug-07	30-Aug-07
		Easting (m)	Northing (m)			elevation (masl)										
MW-01	Overburden	596395	4809597	164.78	0.76	165.54	165.54	164.45	163.84	163.94	165.54	164.45	163.40		165.54	165.54
	Intermediate			164.78	0.80	165.58	162.46	164.45	163.86	163.93	164.64	164.45	163.38		162.63	162.34
	Deep			164.78	0.75	165.53	159.76	160.70	160.61	160.79	160.90	161.27	160.75		160.32	160.04
MW-02	Overburden	596248	4809618	166.58	0.78	167.36	165.16	166.15	165.69	165.93	166.40	166.25	165.51		165.11	164.94
	Intermediate			166.58	0.76	167.34	160.50	161.71	161.51	161.93	162.63	162.55	162.25		161.95	161.77
	Deep			166.58	0.74	167.32	152.93	152.95	153.04	153.01	153.26	153.21	153.12		153.09	153.06
MW-03	Overburden	596108	4809606	169.31	0.81	170.12	162.05	163.06	162.08	163.68	164.37	164.01	162.36		162.49	161.92
	Deep			169.31	0.75	170.06	162.14	163.16	162.64	163.33	164.17	164.15	163.08		162.29	162.00
MW-04	Overburden	595911	4809070	167.85	0.97	168.82	164.56	166.14	165.80	165.95	166.77	166.45	165.10		163.79	163.60
	Intermediate			167.85	0.94	168.79	161.31	163.01	162.75	162.52	163.54	163.61	162.77		161.28	160.95
	Deep			167.85	0.87	168.72	161.98	163.20	162.95	162.81	164.15	163.69	162.81		161.37	161.02
MW-05	Overburden	596135	4808768	166.88	0.88	167.76	160.75	162.94	162.16	161.47	163.36	163.66	161.85	160.98	160.92	160.63
	Intermediate			166.88	0.84	167.72	158.41	160.45	160.19	159.79	160.90	161.07	160.23	160.17	159.91	159.69
	Deep			166.88	0.81	167.69	133.94	134.25		134.49	134.75	134.89	134.99	135.69	135.06	135.13
	Straddle	596134	4808769	167.03	0.95	167.98								160.66	160.62	160.35
MW-06	Overburden	596355	4808896	165.97	0.98	166.95	163.27	164.32	163.80	163.63	164.58	164.34	163.97	163.79	163.78	163.68
	Deep			165.97	0.90	166.87	162.07	164.19	163.25	163.34	164.46	164.48	163.23	162.07	162.05	161.70
	Straddle	596351	4808892	166.05	0.84	166.89								161.91	161.84	161.46
MW-07	Overburden	596099	4809348	166.89	0.85	167.74	163.91	165.08	164.75	164.96	165.63	165.38	164.39		163.84	163.49
	Deep			166.89	0.87	167.76	152.60	152.56	152.61	152.67	152.93	152.91	152.83		152.81	152.78
MW-08	Overburden	596295	4809190	162.79	0.87	163.66	160.56	162.04	161.70	161.83	162.55	162.45	161.59		160.96	160.60
	Intermediate			162.79	0.84	163.63	160.21	161.43	161.22	161.56	162.31	162.06	161.42		160.91	160.55
	Deep			162.79	0.82	163.61	160.58	162.06	161.72	161.86	162.57	162.44	161.61		160.99	160.63
MW-09	Overburden	596166	4809014	165.53	0.76	166.29								163.42	163.31	162.70
	Straddle	596166	4809014		0.82	166.35								161.86	161.83	161.43
	Deep	596164	4809012		1.06	166.59								125.54	125.38	125.44
MW-10	Overburden	596045	4809002	166.77	0.88	167.65								163.88	163.79	163.16
	Intermediate	596045	4809002		0.94	167.71								162.36	162.31	161.91
	Deep	596046	4809003		0.83	167.60								125.09	124.88	125.03
MW-11	Overburden	595869	4808946	168.31	1.01	169.32								163.42	163.37	163.14
	Straddle	595870	4808946		1.04	169.35								163.58	163.58	163.61
	Deep	595871	4808948		1.12	169.42								126.30	125.19	125.32
TW-1		595581	4808946	167.64	0.88	168.52										
TW-2		595621	4810361	176.33	0.82	177.15										
TW-3		596411	4810003	166.85	0.70	167.55										

Notes:
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September 30, 2002 to November 18, 2013
Tansley Quarry - Hanson Brick Ltd

Hole	Piezometer	Location		Ground Elev (m)	Stick-up (m)	Top of pipe	06-Dec-07	07-Dec-07	16-Jan-08	23-Jan-08	24-Jan-08	25-Jan-08	31-Jan-08	26-Feb-08	28-Mar-08	24-Apr-08
		Easting (m)	Northing (m)			elevation (masl)					AFTER TEST					
MW-01	Overburden	596395	4809597	164.78	0.76	165.54	165.54		163.73				163.48	164.40	164.46	164.10
	Intermediate			164.78	0.80	165.58	161.14		163.75				163.50	164.42	164.45	164.10
	Deep			164.78	0.75	165.53	159.53		158.35				158.19	158.27	158.32	158.43
MW-02	Overburden	596248	4809618	166.58	0.78	167.36	165.33		166.08				165.85	166.19	166.38	166.12
	Intermediate			166.58	0.76	167.34	160.93		160.56				160.42	160.25	160.15	160.13
	Deep			166.58	0.74	167.32	153.21		153.13				153.06	153.05	152.96	152.88
MW-03	Overburden	596108	4809606	169.31	0.81	170.12	161.10		161.20				161.17	161.86	161.81	162.05
	Deep			169.31	0.75	170.06	160.02		158.91				158.88	159.30	159.49	159.81
MW-04	Overburden	595911	4809070	167.85	0.97	168.82	162.48		162.97				163.19	163.88	164.48	164.65
	Intermediate			167.85	0.94	168.79	157.84		156.27				156.10	156.52	156.84	157.17
	Deep			167.85	0.87	168.72	157.95		156.35	156.39		156.25	156.16	156.81	156.96	157.27
MW-05	Overburden	596135	4808768	166.88	0.88	167.76		159.88	159.70		159.72		159.69	159.82	160.36	161.93
	Intermediate			166.88	0.84	167.72		153.55	150.23		149.45		149.40	150.21	149.40	149.60
	Deep			166.88	0.81	167.69		146.46	146.38		146.32		146.31	146.34	146.31	146.29
	Straddle	596134	4808769	167.03	0.95	167.98		158.56	157.58		157.44	157.46	157.36	157.72	158.23	159.06
MW-06	Overburden	596355	4808896	165.97	0.98	166.95	163.07		162.77		162.69	161.26	161.24	161.17	161.09	161.03
	Deep			165.97	0.90	166.87	159.37		158.96		159.20	152.91	152.63	151.60	150.65	149.95
	Straddle	596351	4808892	166.05	0.84	166.89	158.77		159.44		159.55	159.56	159.56	159.52	159.54	159.97
MW-07	Overburden	596099	4809348	166.89	0.85	167.74	161.62		161.28	161.27		161.50	161.45	162.09	162.92	163.33
	Deep			166.89	0.87	167.76		152.84	152.77	152.81		152.44	152.38	152.60	152.45	152.28
MW-08	Overburden	596295	4809190	162.79	0.87	163.66	159.56		159.21		159.15	160.11	159.01	159.00	159.23	159.36
	Intermediate			162.79	0.84	163.63	160.12		158.69	158.67		158.57	158.51	158.73	158.83	158.96
	Deep			162.79	0.82	163.61	159.63		159.17	159.20		157.65	158.97	159.02	159.21	159.34
MW-09	Overburden	596166	4809014	165.53	0.76	166.29	160.50		160.04	159.97		159.94	159.81	159.96	161.40	162.54
	Straddle	596166	4809014		0.82	166.35	156.77		154.32	154.38	154.35	154.44	154.31	154.76	154.91	155.01
	Deep	596164	4809012		1.06	166.59	125.53		125.54	125.51		151.51	151.33	151.18	151.00	150.93
MW-10	Overburden	596045	4809002	166.77	0.88	167.65	160.89		160.22	160.17		160.42	160.20	160.68	162.86	164.21
	Intermediate	596045	4809002		0.94	167.71	159.06		157.81	157.85		157.55	157.55	157.99	159.15	160.02
	Deep	596046	4809003		0.83	167.60	125.25		125.30	125.30		158.38	156.90	155.94	155.43	155.10
MW-11	Overburden	595869	4808946	168.31	1.01	169.32		162.41	163.03		163.44	163.47	163.37	164.25	164.84	164.99
	Straddle	595870	4808946		1.04	169.35		162.48	163.20		163.42	163.43	163.28	164.05	164.63	164.81
	Deep	595871	4808948		1.12	169.42		125.51	125.58		125.55	153.89	153.67	151.94	151.75	151.68
TW-1		595581	4808946	167.64	0.88	168.52			162.58					163.77	164.12	164.26
TW-2		595621	4810361	176.33	0.82	177.15			Dry					Dry	Dry	Dry
TW-3		596411	4810003	166.85	0.70	167.55			155.11					155.95	156.09	155.14

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September 30, 2002 to November 18, 2013
Tansley Quarry - Hanson Brick Ltd

Hole	Piezometer	Location		Ground Elev (m)	Stick-up (m)	Top of pipe	26-May-08	26-Jun-08	28-Jul-08	27-Aug-08	29-Sep-08	07-Oct-08	28-Oct-08	21-Nov-08	23-Dec-08	21-Jan-09
		Easting (m)	Northing (m)			elevation (masl)										
MW-01	Overburden	596395	4809597	164.78	0.76	165.54	164.00	163.99	164.25	164.11	163.99	164.17	164.33	164.38	164.44	164.46
	Intermediate			164.78	0.80	165.58	164.01	164.02	164.24	164.11	164.00	164.18	164.27	164.39	164.45	164.46
	Deep			164.78	0.75	165.53	158.42	158.27	158.39	158.63	158.75	158.77	158.81	158.86	159.19	159.27
MW-02	Overburden	596248	4809618	166.58	0.78	167.36	166.06	165.98	166.22	166.15	166.06	166.09	165.96	166.15	166.43	166.13
	Intermediate			166.58	0.76	167.34	160.12	160.03	159.96	159.96	160.07	160.11	160.63	160.79	161.15	161.35
	Deep			166.58	0.74	167.32	152.90	152.81	152.81	152.74	152.73	152.73	152.52	152.55	152.59	152.66
MW-03	Overburden	596108	4809606	169.31	0.81	170.12	160.92	160.60	159.88	161.12	162.90	163.00	162.75	162.90	163.35	163.82
	Deep			169.31	0.75	170.06	159.82	159.46	159.41	159.74	160.44	160.50	160.50	160.56	160.98	161.36
MW-04	Overburden	595911	4809070	167.85	0.97	168.82	164.64	164.50	164.55	164.97	164.97	164.71	164.68	164.63	165.16	165.37
	Intermediate			167.85	0.94	168.79	157.23	156.91	157.07	157.54	157.89	157.92	157.95	157.96	158.43	158.88
	Deep			167.85	0.87	168.72	157.29	157.04	157.14	157.70	158.10	157.95	132.85	133.12	133.43	133.80
MW-05	Overburden	596135	4808768	166.88	0.88	167.76	161.32	160.58	160.17	160.61	160.42	160.34	159.91	159.89	160.09	160.78
	Intermediate			166.88	0.84	167.72	149.88	149.16	149.64	150.00	150.29	150.16	150.21	149.99	150.39	150.99
	Deep			166.88	0.81	167.69	146.28	146.27	146.23	146.20	146.19	146.17	133.08	133.13	133.18	133.33
	Straddle	596134	4808769	167.03	0.95	167.98	158.58	157.80	157.52	158.03	157.92	157.86	157.75	157.67	158.17	158.93
MW-06	Overburden	596355	4808896	165.97	0.98	166.95	160.95	160.90	160.82	160.75	160.71	160.69	159.56	159.46	160.02	160.08
	Deep			165.97	0.90	166.87	149.17	148.65	148.28	148.17	148.22	148.24	152.06	152.94	152.05	151.56
	Straddle	596351	4808892	166.05	0.84	166.89	159.86	159.54	159.52	160.00	159.81	159.76	159.65	159.59	160.12	160.18
MW-07	Overburden	596099	4809348	166.89	0.85	167.74	163.42	163.13	163.11	163.88	164.01	163.97	164.14	164.13	164.55	164.59
	Deep			166.89	0.87	167.76	152.35	152.29	152.27	152.18	152.19	152.08	151.90	151.91	151.89	152.06
MW-08	Overburden	596295	4809190	162.79	0.87	163.66	159.33	159.26	159.39	159.65	159.74	159.77	159.85	159.94	160.28	160.40
	Intermediate			162.79	0.84	163.63	158.95	158.81	159.01	159.28	159.41	159.42	159.45	159.50	159.77	159.94
	Deep			162.79	0.82	163.61	159.30	159.22	159.38	159.63	159.74	159.77	159.83	159.94	160.28	160.39
MW-09	Overburden	596166	4809014	165.53	0.76	166.29	162.80	162.27	162.26	163.54	162.88	162.63	162.40	162.16	163.89	164.14
	Straddle	596166	4809014		0.82	166.35	155.02	154.90	155.19	155.63	155.82	155.81	155.89	155.77	156.10	156.40
	Deep	596164	4809012		1.06	166.59	150.85	150.78	150.72	150.63	150.57	150.53	127.40	127.44	127.45	127.61
MW-10	Overburden	596045	4809002	166.77	0.88	167.65	164.33	163.62	163.62	164.65	164.15	163.90	163.56	163.34	164.93	165.45
	Intermediate	596045	4809002		0.94	167.71	160.31	159.82	159.97	161.01	161.07	161.02	160.40	160.40	161.42	161.84
	Deep	596046	4809003		0.83	167.60	154.82	154.59	154.37	154.17	153.99	154.03	133.52	133.73	133.96	134.20
MW-11	Overburden	595869	4808946	168.31	1.01	169.32	164.66	164.37	164.68	165.03	164.72	164.61	164.33	164.48	165.21	165.21
	Straddle	595870	4808946		1.04	169.35	164.46	164.45	164.48	164.80	164.78	164.61	164.39	164.47	165.08	165.18
	Deep	595871	4808948		1.12	169.42	151.64	151.58	151.53	151.48	151.45	151.39	132.63	132.70	132.82	133.04
TW-1		595581	4808946	167.64	0.88	168.52	163.77	163.26	163.84	164.52	164.10		163.69	163.86	164.71	164.69
TW-2		595621	4810361	176.33	0.82	177.15	Dry	Dry	Dry	Dry	Dry		Dry	Dry	Dry	Dry
TW-3		596411	4810003	166.85	0.70	167.55	155.09	155.28	154.67	154.70	154.73		155.66	162.98	156.66	156.83

Notes:
1. Shallow wells have screened intervals no deeper than 30' (9 m) below ground, completed in overburden. The overburden ranged from 7 m to 9 m thick in the boreholes on-site.
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Groundwater Level Elevations in MW-Series and TW-Series Wells
September 30, 2002 to November 18, 2013
Tansley Quarry - Hanson Brick Ltd

Hole	Piezometer	Location		Ground Elev (m)	Stick-up (m)	Top of pipe elevation (masl)	27-Apr-09	24-Jul-09	26-Oct-09	30-Nov-09	26-Jan-10	5-Mar-10	12-Mar-10	25-Mar-10	26-Apr-10	19-May-10
		Easting (m)	Northing (m)													
MW-01	Overburden	596395	4809597	164.78	0.76	165.54	164.59	163.95	164.29	164.36	164.46			164.49		
	Intermediate			164.78	0.80	165.58	164.58	163.95	164.29	164.35	164.45			164.50		
	Deep			164.78	0.75	165.53	159.49	158.84	158.91	159.02	159.22			159.30		
MW-02	Overburden	596248	4809618	166.58	0.78	167.36	166.38	165.77	165.87	165.95	166.26			166.31		
	Intermediate			166.58	0.76	167.34	161.70	160.82	160.93	161.07	161.03			161.12		
	Deep			166.58	0.74	167.32	152.69	152.75	152.62	152.64	152.64			152.62		
MW-03	Overburden	596108	4809606	169.31	0.81	170.12	164.78	163.95	163.86	164.81	164.01			163.98		
	Deep			169.31	0.75	170.06	161.66	160.52	160.27	160.24	160.37			160.28		
MW-04	Overburden	595911	4809070	167.85	0.97	168.82	165.96	164.72	164.60	164.78	165.20	164.86		165.73	165.81	165.68
	Intermediate			167.85	0.94	168.79	159.02	157.56	157.24	157.17	157.20	157.00		157.20	157.37	157.30
	Deep			167.85	0.87	168.72	144.65	151.33	151.83	151.94	125.84	126.01		126.06	126.15	126.27
MW-05	Overburden	596135	4808768	166.88	0.88	167.76	162.47	160.57	159.82	159.63	159.77	159.62		159.97	160.64	160.72
	Intermediate			166.88	0.84	167.72	150.39	147.96	147.89	147.80	147.85	147.73		147.80	147.72	147.66
	Deep			166.88	0.81	167.69	133.49	133.70	133.81	133.88	127.03	127.06	127.07	127.08	127.12	127.14
	Straddle	596134	4808769	167.03	0.95	167.98	160.31	158.69	158.25	158.13	158.08	157.82	157.87	158.21	158.64	158.59
MW-06	Overburden	596355	4808896	165.97	0.98	166.95	160.52	159.64	159.37	159.36	159.76		159.73			
	Deep			165.97	0.90	166.87	160.60	159.21	159.34	159.19	138.83		138.95			
	Straddle	596351	4808892	166.05	0.84	166.89	158.22	159.74	159.46	159.33	159.83		159.87			
MW-07	Overburden	596099	4809348	166.89	0.85	167.74	164.84	163.87	163.92	164.03	164.26			164.56		
	Deep			166.89	0.87	167.76	152.03	152.06	151.95	152.05	152.06			152.01		
MW-08	Overburden	596295	4809190	162.79	0.87	163.66	160.72		160.13	160.22	161.15			161.38		
	Intermediate			162.79	0.84	163.63	160.19		159.56	159.71	159.85			160.00		
	Deep			162.79	0.82	163.61	160.71		160.06	160.15	161.10			161.40		
MW-09	Overburden	596166	4809014	165.53	0.76	166.29	164.64	162.43	154.69	161.18	161.95			163.35		
	Straddle	596166	4809014		0.82	166.35	156.30	155.08	161.29	154.77	154.92			155.09		
	Deep	596164	4809012		1.06	166.59	127.86	128.19	128.48	128.65	126.24			126.32		
MW-10	Overburden	596045	4809002	166.77	0.88	167.65	166.25	163.53	162.53	162.62	163.34			164.70		
	Intermediate	596045	4809002		0.94	167.71	162.01	159.90	159.21	159.16	159.06			159.73		
	Deep	596046	4809003		0.83	167.60	134.89	135.58	136.00	136.17	124.93			125.17		
MW-11	Overburden	595869	4808946	168.31	1.01	169.32	166.06	164.15	163.99	164.04	164.53	164.13			165.47	165.25
	Straddle	595870	4808946		1.04	169.35	165.95	164.40	164.19	164.32	164.73	164.38			165.38	165.18
	Deep	595871	4808948		1.12	169.42	133.51	134.11	134.60	134.81	136.59	136.71			137.11	137.16
TW-1		595581	4808946	167.64	0.88	168.52	165.38	168.52	163.89		164.38			165.19		
TW-2		595621	4810361	176.33	0.82	177.15	Dry	Dry	Dry		Dry			Dry		
TW-3		596411	4810003	166.85	0.70	167.55	156.55	167.55	155.91		156.83			156.53		

Notes:
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September 30, 2002 to November 18, 2013
Tansley Quarry - Hanson Brick Ltd

Hole	Piezometer	Location		Ground Elev (m)	Stick-up (m)	Top of pipe elevation (masl)	28-Jun-10	27-Jul-10	31-Aug-10	30-Sep-10	18-Oct-10	1-Dec-10	23-Dec-10	26-Jan-11	24-Feb-11	21-Mar-11
		Easting (m)	Northing (m)													
MW-01	Overburden	596395	4809597	164.78	0.76	165.54		164.33			164.37			164.23		
	Intermediate			164.78	0.80	165.58		164.31			164.37			164.23		
	Deep			164.78	0.75	165.53		159.17			159.16			159.46		
MW-02	Overburden	596248	4809618	166.58	0.78	167.36	166.18	166.13			166.12			165.83		
	Intermediate			166.58	0.76	167.34	161.04	160.91			160.97			161.20		
	Deep			166.58	0.74	167.32	152.69	152.66			153.03			154.25		
MW-03	Overburden	596108	4809606	169.31	0.81	170.12		163.97			163.88			164.31		
	Deep			169.31	0.75	170.06		160.26			160.19			160.51		
MW-04	Overburden	595911	4809070	167.85	0.97	168.82	165.46	165.09	164.77	164.64	164.93	165.54	165.37	165.23	165.28	165.80
	Intermediate			167.85	0.94	168.79	157.27	157.12	157.02	156.98	157.08	157.30	157.41	157.42	157.41	157.65
	Deep			167.85	0.87	168.72	126.35	126.52	126.88	126.96	127.01	123.88	123.93	124.07	124.15	124.21
MW-05	Overburden	596135	4808768	166.88	0.88	167.76	160.60	160.36	160.07	159.83	159.85	159.85	159.96	159.88	159.79	160.34
	Intermediate			166.88	0.84	167.72	147.59	147.55	147.44	147.36	147.46	147.44	147.45	147.46	147.47	147.60
	Deep			166.88	0.81	167.69	127.17	127.16	127.19	127.24	127.21	127.24	127.26	127.29	127.32	127.34
	Straddle	596134	4808769	167.03	0.95	167.98	158.46	158.27	157.98	157.81	157.89	157.86	157.83	157.72	157.70	158.20
MW-06	Overburden	596355	4808896	165.97	0.98	166.95		159.87			159.36			159.55		
	Deep			165.97	0.90	166.87		139.17			139.30			137.40		
	Straddle	596351	4808892	166.05	0.84	166.89		159.77			159.17			159.66		
MW-07	Overburden	596099	4809348	166.89	0.85	167.74		164.03			164.10			164.15	164.27	
	Deep			166.89	0.87	167.76		151.96			152.00			152.60	152.92	
MW-08	Overburden	596295	4809190	162.79	0.87	163.66		162.06			161.94			161.70		
	Intermediate			162.79	0.84	163.63		159.79			159.83			160.08		
	Deep			162.79	0.82	163.61		162.06			161.95			161.69		
MW-09	Overburden	596166	4809014	165.53	0.76	166.29		162.50			161.21			162.84		
	Straddle	596166	4809014		0.82	166.35		155.12			155.14			155.47		
	Deep	596164	4809012		1.06	166.59		126.55			126.67			126.84		
MW-10	Overburden	596045	4809002	166.77	0.88	167.65		163.96			163.02			164.19		
	Intermediate	596045	4809002		0.94	167.71		159.49			159.29			159.91		
	Deep	596046	4809003		0.83	167.60		125.86			126.30			127.17		
MW-11	Overburden	595869	4808946	168.31	1.01	169.32	164.99	164.59	163.99	163.79	164.35	165.16	165.00	164.72	164.86	165.64
	Straddle	595870	4808946		1.04	169.35	164.89	164.56	164.20	164.12	164.48	165.23	164.91	164.70	164.71	165.32
	Deep	595871	4808948		1.12	169.42	137.42	137.51	137.70	137.90	137.96	129.45	129.51	129.62	129.74	129.82
TW-1		595581	4808946	167.64	0.88	168.52		164.39			164.50			164.27		
TW-2		595621	4810361	176.33	0.82	177.15		Dry			Dry			Dry		
TW-3		596411	4810003	166.85	0.70	167.55		155.10			155.71			156.69		

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September 30, 2002 to November 18, 2013
Tansley Quarry - Hanson Brick Ltd

Hole	Piezometer	Location		Ground Elev (m)	Stick-up (m)	Top of pipe elevation (masl)	18-Apr-11	19-May-11	21-Jun-11	21,26-Jul-11	25-Aug-11	20-Sep-11	28-Oct-11	14-Nov-11	25-Nov-11	21-Dec-11
		Easting (m)	Northing (m)													
MW-01	Overburden	596395	4809597	164.78	0.76	165.54	164.58			163.47		Dry				164.52
	Intermediate			164.78	0.80	165.58	164.60			163.48		162.86				164.53
	Deep			164.78	0.75	165.53	159.77			159.44		159.14				160.02
MW-02	Overburden	596248	4809618	166.58	0.78	167.36	166.37			165.76		165.48		166.10		166.40
	Intermediate			166.58	0.76	167.34	161.62			161.21		160.82		161.35		161.76
	Deep			166.58	0.74	167.32	156.43			158.40		158.19		158.63		159.02
MW-03	Overburden	596108	4809606	169.31	0.81	170.12	164.71			164.48		163.96		164.40		164.81
	Deep			169.31	0.75	170.06	160.92			160.82		160.43		160.72		161.09
MW-04	Overburden	595911	4809070	167.85	0.97	168.82	165.95	166.22	165.92	165.59		164.74	165.47	165.72	165.75	166.25
	Intermediate			167.85	0.94	168.79	157.92	158.20	158.16	157.68		157.46	157.77	157.71	157.97	158.32
	Deep			167.85	0.87	168.72	124.31	124.40	124.51	124.63		124.77	124.88	124.94	124.06	119.17
MW-05	Overburden	596135	4808768	166.88	0.88	167.76	161.04	162.63	162.10	161.22	160.54	160.24	160.15	160.19	160.13	160.49
	Intermediate			166.88	0.84	167.72	147.66	147.85	147.69	147.49	147.55	147.44	147.47	147.35	147.49	147.56
	Deep			166.88	0.81	167.69	127.37	127.38	127.40	127.41	127.45	127.46	127.46	127.47	126.11	126.15
	Straddle	596134	4808769	167.03	0.95	167.98	158.60	159.69	159.15	158.49	158.14	157.96	158.09	158.06	158.22	158.59
MW-06	Overburden	596355	4808896	165.97	0.98	166.95	160.32			159.97		159.36		159.27		159.98
	Deep			165.97	0.90	166.87	137.49			137.60		137.67		137.73	137.10	137.18
	Straddle	596351	4808892	166.05	0.84	166.89	160.43			160.06		159.41		159.34		160.09
MW-07	Overburden	596099	4809348	166.89	0.85	167.74	164.76			164.17		163.63		164.50		165.01
	Deep			166.89	0.87	167.76	154.03			156.74		156.71		157.01		156.95
MW-08	Overburden	596295	4809190	162.79	0.87	163.66	162.30			162.30		162.17		162.36		163.17
	Intermediate			162.79	0.84	163.63	160.47			160.11		159.74		160.29		160.74
	Deep			162.79	0.82	163.61	162.28			162.32		162.17		162.35		159.66
MW-09	Overburden	596166	4809014	165.53	0.76	166.29	164.57			163.19		161.59		161.24		163.06
	Straddle	596166	4809014		0.82	166.35	155.91			155.74		155.50		155.75		156.22
	Deep	596164	4809012		1.06	166.59	126.97			127.14		127.26		127.56		126.58
MW-10	Overburden	596045	4809002	166.77	0.88	167.65	166.34			164.59		162.91		163.29		164.90
	Intermediate	596045	4809002		0.94	167.71	161.31			160.68		160.08		160.50		161.57
	Deep	596046	4809003		0.83	167.60	127.90			129.13		130.06		131.10		129.32
MW-11	Overburden	595869	4808946	168.31	1.01	169.32	165.94	166.33		164.64		163.97	164.59	164.96	165.07	165.98
	Straddle	595870	4808946		1.04	169.35	165.50	165.75		164.98		164.00	164.90	165.09	165.18	165.73
	Deep	595871	4808948		1.12	169.42	129.92	130.03	130.24	129.51		130.92	131.20	131.45	128.90	129.01
TW-1		595581	4808946	167.64	0.88	168.52	165.55			164.52		163.72				165.54
TW-2		595621	4810361	176.33	0.82	177.15	Dry			Dry		Dry				Dry
TW-3		596411	4810003	166.85	0.70	167.55	157.15			154.52		155.32				156.79

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Hole	Piezometer	Location		Ground Elev (m)	Stick-up (m)	Top of pipe	27-Jan-12	23-Feb-12	28-Mar-12	20-Apr-12	25-May-12	20-Jun-12	12-Sep-12	13-Nov-12	13-Dec-12
		Easting (m)	Northing (m)			elevation (masl)									
MW-01	Overburden	596395	4809597	164.78	0.76	165.54	164.62	164.49	164.46	164.17	163.88	163.69	162.9	164.25	
	Intermediate			164.78	0.80	165.58	164.635	164.495	164.465	164.175	163.895	163.695	162.905	164.265	
	Deep			164.78	0.75	165.53	160.115	160.13	159.91	159.94	159.8	159.67	159.255	159.45	
MW-02	Overburden	596248	4809618	166.58	0.78	167.36	166.435	166.33	166.32	166.095		165.81	165.355	165.935	
	Intermediate			166.58	0.76	167.34	161.845	161.9	161.89	161.685		161.34	160.86	161.15	
	Deep			166.58	0.74	167.32	159.185	159.25	159.23	159.11		158.88	158.46	158.655	
MW-03	Overburden	596108	4809606	169.31	0.81	170.12	165.078	165.198	165.258	165.088		164.688	164.078	164.073	
	Deep			169.31	0.75	170.06	161.31	161.51	161.47	161.16		161.09	160.54	160.56	
MW-04	Overburden	595911	4809070	167.85	0.97	168.82	166.29	166.3	166.255	165.89	165.6	165.56	164.37	164.87	
	Intermediate			167.85	0.94	168.79	158.48	158.56	158.605	158.16	158.05	158.29	157.685	157.81	
	Deep			167.85	0.87	168.72	124.25	127.72	129.84	129.98	130.15	130.27	130.725	131.17	
MW-05	Overburden	596135	4808768	166.88	0.88	167.76	160.69	161	161.23	160.975		160.37	159.62	159.58	
	Intermediate			166.88	0.84	167.72	147.54	147.565	147.565	147.455		147.53	147.355	147.55	
	Deep			166.88	0.81	167.69	126.18	126.18	126.21	126.25		126.28	126.33	126.37	
	Straddle	596134	4808769	167.03	0.95	167.98	158.4671	158.5871	158.7471	158.4371		158.0371	157.5121	157.6871	
MW-06	Overburden	596355	4808896	165.97	0.98	166.95			160.35		159.7	159.56	158.94	158.755	
	Deep			165.97	0.90	166.87			137.3	137.34	137.39	137.41	137.48	137.56	
	Straddle	596351	4808892	166.05	0.84	166.89						159.681	159.066	158.881	158.716
MW-07	Overburden	596099	4809348	166.89	0.85	167.74			165.035	164.73		164.355	163.62	164.025	
	Deep			166.89	0.87	167.76			157.25	157.165		156.88	156.5	156.44	
MW-08	Overburden	596295	4809190	162.79	0.87	163.66			163.25		162.915	162.95	162.54	162.795	
	Intermediate			162.79	0.84	163.63			160.76		160.415	160.29	159.83	160.11	160.37
	Deep			162.79	0.82	163.61			161.315		160.955	160.635	160.205	160.275	
MW-09	Overburden	596166	4809014	165.53	0.76	166.29			164.673			163.923	161.413	160.448	
	Straddle	596166	4809014		0.82	166.35			156.336			156.136	155.731	155.851	
	Deep	596164	4809012		1.06	166.59			126.76			126.96	127.175	127.405	126.435
MW-10	Overburden	596045	4809002	166.77	0.88	167.65			166.351	165.891	165.591	164.921	162.636	161.736	
	Intermediate	596045	4809002		0.94	167.71			162.715	162.355	162.21	162.075	160.78	160.425	
	Deep	596046	4809003		0.83	167.60			131.191	131.631	132.181	132.661	133.906	134.841	
MW-11	Overburden	595869	4808946	168.31	1.01	169.32	166	165.89	165.88	165.32		164.63	163.205	163.695	
	Straddle	595870	4808946		1.04	169.35	165.814	165.709	165.749	165.319		165.019	163.604	164.279	
	Deep	595871	4808948		1.12	169.42	129.197	129.322	129.427	129.572		129.932	130.702	131.347	
TW-1		595581	4808946	167.64	0.88	168.52			165.559278			164.454278	163.309278		164.44428
TW-2		595621	4810361	176.33	0.82	177.15			Dry			Dry	Dry		Dry
TW-3		596411	4810003	166.85	0.70	167.55			157.312494			155.772494	154.932494		156.06249

Notes:
1. Shallow wells have screened intervals no deeper than 30' (9 m) below ground, completed in overburden.
   The overburden ranged from 7 m to 9 m thick in the boreholes on-site.
2. Intermediate wells have screens within the upper/shallow bedrock, to depths no greater than 100' (30 m) below ground.
3. Deep wells have screen intervals at depths between 100' and 150' below ground, (30 m to 50 m).

Table 3
Groundwater Level Elevations in MW-Series and TW-Series Wells
September 30, 2002 to November 18, 2013
Tansley Quarry - Hanson Brick Ltd

Hole	Piezometer	Location		Ground Elev (m)	Stick-up (m)	Top of pipe elevation (masl)	26-Mar-13	26-Jun-13	23-Sep-13	18-Nov-13
		Easting (m)	Northing (m)							
MW-01	Overburden	596395	4809597	164.78	0.76	165.54	164.5	163.91	164.01	164.44
	Intermediate			164.78	0.80	165.58	164.51	163.92	164.04	164.45
	Deep			164.78	0.75	165.53	160.19	160.09	159.74	159.96
MW-02	Overburden	596248	4809618	166.58	0.78	167.36	166.3	166.01	165.77	166.02
	Intermediate			166.58	0.76	167.34	162.1	161.83	161.42	161.7
	Deep			166.58	0.74	167.32	158.86	158.02	157.09	156.7
MW-03	Overburden	596108	4809606	169.31	0.81	170.12	165.22	165.22	164.82	165.09
	Deep			169.31	0.75	170.06	161.6	161.74	161.27	161.51
MW-04	Overburden	595911	4809070	167.85	0.97	168.82	166.12	166.32	165.6	166.11
	Intermediate			167.85	0.94	168.79	158.94	159.02	158.55	158.84
	Deep			167.85	0.87	168.72	129.54	130.06	130.52	130.82
MW-05	Overburden	596135	4808768	166.88	0.88	167.76	160.97	161.29	160.2	160.1
	Intermediate			166.88	0.84	167.72	147.98	148.15	148.21	148.24
	Deep			166.88	0.81	167.69	125.65	125.7	125.76	125.78
	Straddle	596134	4808769	167.03	0.95	167.98	158.84	158.84	158.22	158.34
MW-06	Overburden	596355	4808896	165.97	0.98	166.95	160.52	160.16	159.54	159.11
	Deep			165.97	0.90	166.87	137.53	137.71	137.89	138
	Straddle	596351	4808892	166.05	0.84	166.89	160.64	159.93	159.31	159.23
MW-07	Overburden	596099	4809348	166.89	0.85	167.74	165.17	164.88	164.1	164.61
	Deep			166.89	0.87	167.76	156.81	156.23	155.41	155.19
MW-08	Overburden	596295	4809190	162.79	0.87	163.66	163.19	163.12	162.8	163.16
	Intermediate			162.79	0.84	163.63	160.9	160.77	160.36	160.67
	Deep			162.79	0.82	163.61	161.27	161.12	160.7	161.22
MW-09	Overburden	596166	4809014	165.53	0.76	166.29	164.2	164.1	162.17	161.89
	Straddle	596166	4809014		0.82	166.35	156.65	156.65	156.23	156.41
	Deep	596164	4809012		1.06	166.59	126.8	127.09	127.46	127.93
MW-10	Overburden	596045	4809002	166.77	0.88	167.65	166.12	165.58	163.53	163.42
	Intermediate	596045	4809002		0.94	167.71	163.35	163.18	161.84	161.83
	Deep	596046	4809003		0.83	167.60	134.84	137.43	139.39	140.62
MW-11	Overburden	595869	4808946	168.31	1.01	169.32	165.5	165.83	164.13	164.65
	Straddle	595870	4808946		1.04	169.35	165.43	165.3	164.98	165.52
	Deep	595871	4808948		1.12	169.42	131.51	133.23	134.58	135.63
TW-1		595581	4808946	167.64	0.88	168.52	165.61		164.16	165.01
TW-2		595621	4810361	176.33	0.82	177.15	Dry		Dry	Dry
TW-3		596411	4810003	166.85	0.70	167.55	157.46		156.68	157.51

Notes:
1. Shallow wells have screened intervals no deeper than 30' (9 m) below ground, completed in overburden. The overburden ranged from 7 m to 9 m thick in the boreholes on-site.
2. Intermediate wells have screens within the upper/shallow bedrock, to depths no greater than 100' (30 m) below ground.
3. Deep wells have screen intervals at depths between 100' and 150' below ground, (30 m to 50 m).

Table 4
Summary of 2013 Groundwater Quality Exceedances of ODWS
MW-Series Monitoring Wells
Tansley Quarry - Hanson Brick Ltd.

Parameter	Aluminum	Alkalinity	Hardness	pH	Chloride	Sulphate	Sulphide	Sodium	Manganese	Iron	Turbidity	Barium	Cadmium	Chromium	Lead	Uranium	Arsenic	Boron
ODWS	0.1 mg/L	30-500 mg/L	80-100 mg/L	6.5-8.5	250 mg/L	500 mg/L	0.05 mg/L	200 mg/L	0.05 mg/L	0.3 mg/L	1 NTU	1 mg/L	0.005 mg/L	0.05 mg/L	0.01 mg/L	0.02 mg/L	0.025 mg/L	5 mg/L
	OG	OG	OG	OG	AO	AO	AO	AO	AO	AO	AO	MAC	MAC	MAC	MAC	MAC	IMAC	IMAC
MW-01O	Not Sampled																	
MW-01I	31		770						1.5	58	210			0.055	0.034			
MW-01D	57		6700		13000	1900		8000	4.4	110	140		0.008	0.83	0.13		0.045	6.3
MW-02O	25	730	1900			1300	0.18		1.8	48	550				0.018			
MW-02I	10		990			1100			0.54	14	450							
MW-02D	2.9		6500		13000	2000		5400	1.1	7	110							5.1
MW-03O	230		920			890		310	35	510	890	2.1	0.0079	0.48	0.27	0.029	0.19	1.8
MW-03D	1.4		5000		7600	1600		3400	0.77	4.8	72							5.1
MW-04O	2.3		470				0.069		0.3	4.6	160							
MW-04I	2		2000		2000	1800	0.94	1100	0.39	4.9	81							6.1
MW-04D	7.4		16000		33000	1400	1.4	10000	3.5	26	300					0.028		7.7
MW-05O	11		440						2.8	24	520				0.019			
MW-05S	98		270						13	200	610			0.17	0.085		0.12	
MW-05I	1.5		320						0.11	30	170						0.1	
MW-05D	Not Sampled																	
MW-06O	Not Sampled																	
MW-06S	1.4		400						0.12	2.9	49							
MW-06D	Not Sampled																	
MW-07O	81	550	500						4	170	250			0.13	0.068		0.044	8.6
MW-07D	4.9		11000		18000	1500		8100	1.9	11	170							7.6
MW-08O	280	570	910			550	0.28		12	460	1100			0.42	0.2	0.028	0.1	
MW-08I	2.1		2100		2400	1000		1200	0.25	2.7	73							5.9
MW-08D	0.5		600					260	0.16	2.7	12		0.011	0.069				
MW-09O	46		390						2.9	63	430			0.11	0.027			
MW-09S	39		480			400		350	3.5	53	690			0.064	0.034		0.032	5.6
MW-09D	1.4		31000	6.31	53000	1200		18000	5.8	61	320							
MW-10O	42		480						3.3	74	1900			0.081	0.028			
MW-10I	8.3		360						1.2	37	440						0.2	
MW-10D	1.5		26000		44000	1400		16000	4.5	32	260		0.0064			0.026		7.1
MW-11O	180		390				0.057		14	320	4700	3.3		0.55	0.13		0.079	
MW-11S	18		600						1.5	33	800							
MW-11D	0.77		24000		38000	1600		15000	2.8		15		0.011	0.26		0.029		

Note:

1. ODWS: Ontario Drinking Water Standard, June 2006.
   AO: Aesthetic Objective; MAC: Maximum Acceptable Concentration:
   IMAC: Interim Maximum Acceptable Concentration; OG: Operational Guideline
2. Wells designated as: **O** = Overburden, **I** = Intermediate, **D** = Deep, **S** = Straddle

Table 5
Summary of 2013 Groundwater Quality Exceedances of PWQO
MW-Series Monitoring Wells
Tansley Quarry - Hanson Brick Ltd.

Parameter	**Aluminum**	**Arsenic**	**Boron**	**Cadmium**	**Cobalt**	**Copper**	**Iron**	**Lead**	**pH**	**Molybdenum**	**Nickel**	**Silver**	**Thallium**	**Total Phosphorous**	**Uranium**	**Vanadium**	**Zinc**
PWQO	0.075 mg/L	0.005 mg/L	0.2 mg/L	0.0005 mg/L	0.0009 mg/L	0.005 mg/L	0.3 mg/L	0.005 mg/L	6.5-8.5 pH units	0.04 mg/L	0.025 mg/L	0.0001 mg/L	0.0003 mg/L	0.01 mg/L	0.005 mg/L	0.006 mg/L	0.02 mg/L
	Interim	Interim		Interim		Interim		Interim					Interim			Interim	Interim
MW-01O	**Not Sampled**																
MW-01I	31				0.031	0.064	58	0.034			0.052		0.0004	1.7			0.17
MW-01D	57	0.045	6.3	0.008	0.069	0.24	110	0.13			0.47		0.0006	2.4		0.095	0.41
MW-02O	25	0.011	0.33		0.021	0.042	48	0.018			0.042	0.0002	0.0004	1.2	0.018	0.056	0.12
MW-02I	10	0.0053	2.1		0.0071	0.013	14	0.0079						0.47		0.021	0.038
MW-02D	2.9		5.1				7							0.44			
MW-03O	230	0.19		0.0079	0.24	0.66	510	0.27			0.41	0.0014	0.0029	16	0.029	0.5	1.5
MW-03D	1.4		5.1				4.8							0.13			0.09
MW-04O	2.3				0.0034	0.0076	4.6							0.12	0.0087		
MW-04I	2		6.1			0.0055	4.9							0.19			
MW-04D	7.4		7.7			0.17	26				0.099			1.1	0.028	0.029	0.71
MW-05O	11	0.0076			0.015	0.069	24	0.019						0.58		0.024	0.077
MW-05S	98	0.12	1.3	0.0022	0.096	0.29	200	0.085			0.18		0.0013	13	0.0073	0.2	0.61
MW-05I	1.5	0.1	2.4		0.0013	0.008	30							0.14			
MW-05D	**Not Sampled**																
MW-06O	**Not Sampled**																
MW-06S	1.4	0.0082		0.001	0.0013	0.0063	2.9							0.3			
MW-06D	**Not Sampled**																
MW-07O	81	0.044	8.6	0.0008	0.078	0.16	170	0.068			0.17		0.0008	4.2	0.013	0.16	0.44
MW-07D	4.9		7.6	0.0028		0.042	11							0.32	0.0068		
MW-08O	280	0.1	2.6	0.0048	0.23	0.43	460	0.2			0.5	0.0018	0.0031	7.8	0.028	0.5	1.3
MW-08I	2.1		5.9				2.7							0.069			
MW-08D	0.5	0.0077	4.2	0.011		0.01	2.7							0.099			0.054
MW-09O	46	0.022	0.57	0.0006	0.043	0.041	63	0.027			0.083	0.0004	0.0003	2.9	0.0051	0.078	0.24
MW-09S	39	0.032	5.6	0.0006	0.032	0.027	53	0.034			0.065	0.0002		3.8		0.064	0.16
MW-09D	1.4		3.9				61		6.31		0.32			0.65			
MW-10O	42	0.019		0.0006	0.047	0.073	74	0.028			0.099	0.0002	0.0004	3.3	0.0054	0.084	0.23
MW-10I	8.3	0.2	0.73	0.0006	0.0098	0.011	37	0.01						1.6		0.017	0.05
MW-10D	1.5		7.1	0.0064			32			0.11	0.18			1.4	0.026		0.35
MW-11O	180	0.079	0.69	0.0016	0.17	0.48	320	0.13			0.34	0.0013	0.002	7.7	0.014	0.34	0.87
MW-11S	18	0.015	2.4		0.018	0.037	33	0.0091			0.037			1.6		0.035	0.086
MW-11D	0.77		4.6	0.011						0.12	0.19			0.17	0.029		0.44

Note:

1. PWQO: Provincial Water Quality Objectives, July 1994
2. Cadmium standard is 0.0002 mg/L when hardness < 100 mg/L and 0.0005 mg/L when hardness > 100 mg/L
3. Wells designated as: O = Overburden, I = Intermediate, D = Deep, S = Straddle

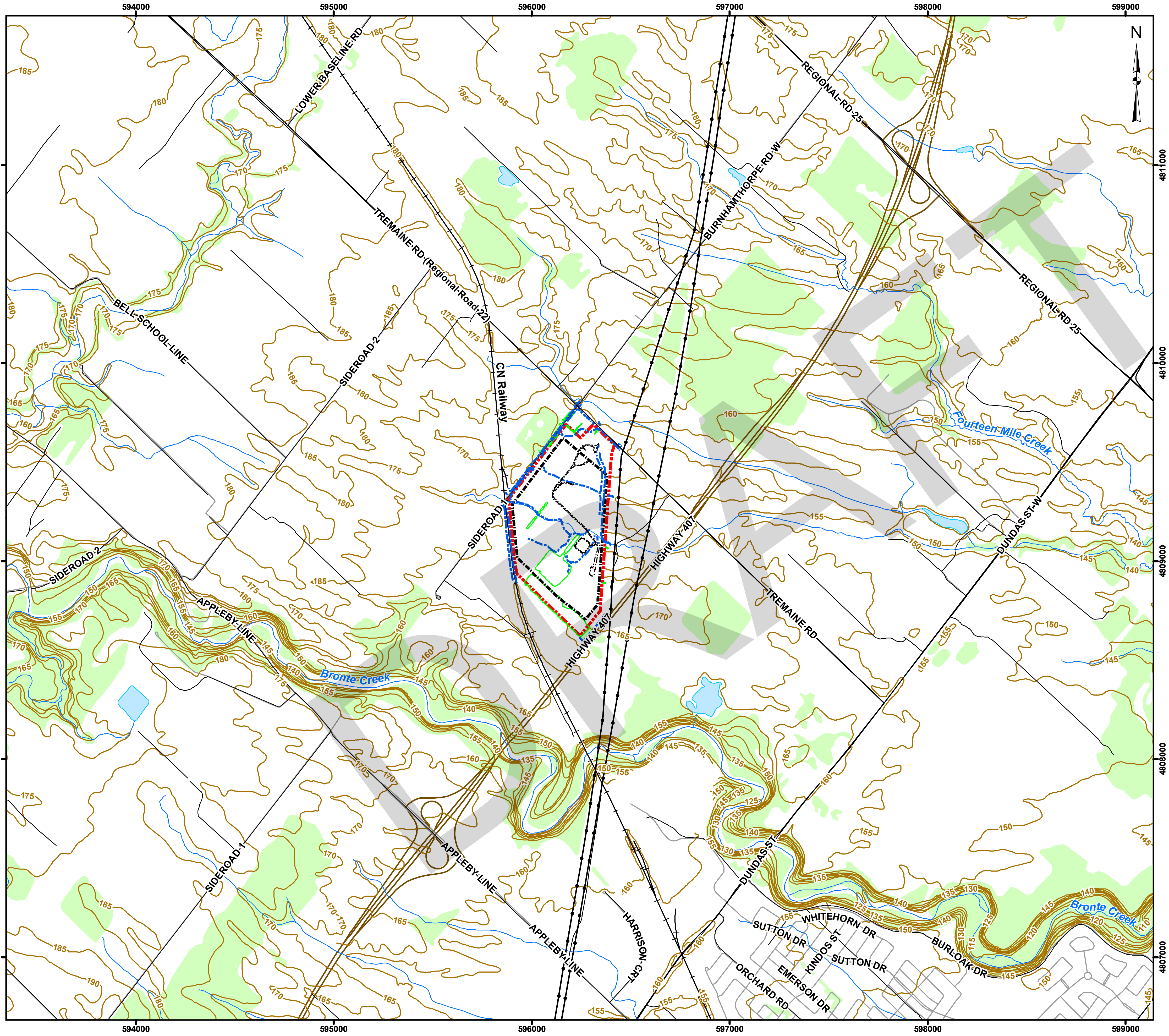
Table 6
Summary of 2013 Groundwater Quality Exceedances of ODWS
Private Wells
Tansley Quarry - Hanson Brick Ltd.

Parameter	**Hardness**	**Lead**	**Iron**
ODWS	80-100 mg/L	0.01 mg/L	0.3 mg/L
	OG	MAC	AO
Finucci	Not sampled - well not in use		
Featherstone	Not sampled - cistern installed		
Sicard	Not sampled - inaccessible		
Wiggins	Not sampled - well decomissioned		
Sugiyami	Not sampled - well not in use		
Eno/Myers	Not sampled - well not in use		
Robinson	Not sampled - well not in use		
Stevenson	Not sampled - well not in use		
Hendervale House	Not sampled - well not in use		
Hendervale Cottage	Not sampled - well not in use		
Hendervale Barn Cistern (Main Barn Tap)	470	0.027	1.2
Simms	330	-	-
Bekkers	Not sampled - inaccessible		

Note:

1. Individual samples not obtained from Hendervale ABC Barn, Hendervale XYZ Barn and Hendervale Main Barn wells.
2. ODWS: Ontario Drinking Water Standard, June 2006
   AO: Aesthetic Objective; MAC: Maximum Acceptable Concentration;
   IMAC: Interim Maximum Acceptable Concentration;
   OG: Operational Guideline

FIGURES



LEGEND

┼┼	Railways
●─●	Utility Line
─	Topographic Elevation Contour (5m Interval)
-·-	Ditch
─	Watercourse
▭	WaterBody
▭	Limit of Extraction
▭	Property Boundary
🟩	Wooded Areas

NOTE

On-Site details obtained from 2009 topographic contour map updated with 2012 field survey data provided by Long Environmental Consultants Inc.

REFERENCE

Base Data - MNR NRVIS, obtained 2004, CANMAP v2005.4
Produced by Golder Associates Ltd under licence from
Ontario Ministry of Natural Resources, © Queens Printer 2006
Datum: NAD 83 Projection: UTM Zone 17N.

0 0.25 0.5 1 1.5

Kilometers

PROJECT

TANSLEY QUARRY
2013 ANNUAL MONITORING REPORT
HANSON BRICK LTD.

TITLE

SITE LOCATION PLAN

Golder Associates
Mississauga, Ontario

PROJECT NO. 021-1228			SCALE 1:20,000	Ver. 1.0
DESIGN	KD	18 Dec. 2006	FIGURE: 1	
GIS	KD	24 Jan. 2014		
CHECK	JB	24 Jan. 2014		
REVIEW	SW	27 Mar. 2014		

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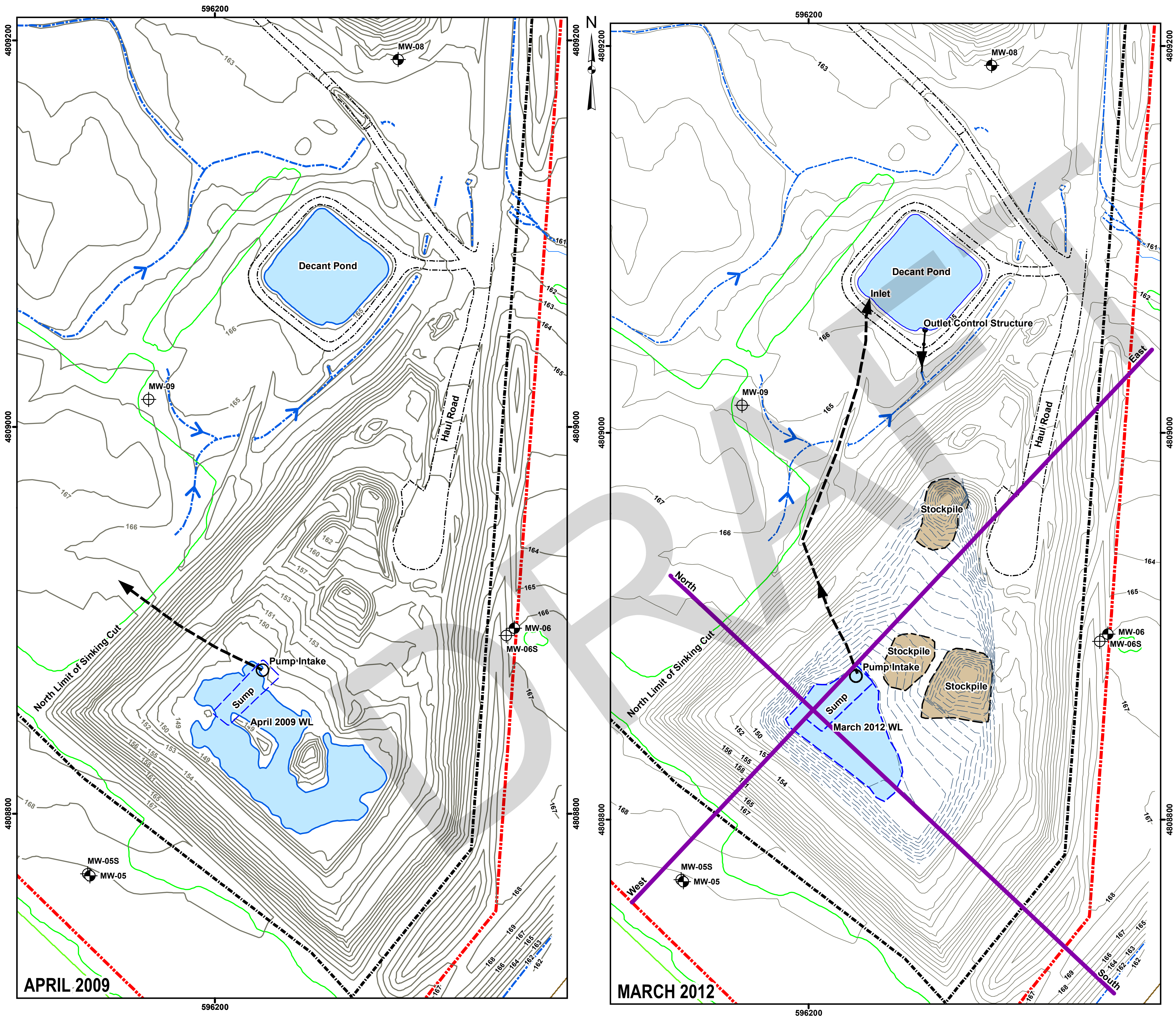

LEGEND

- ⊕ Monitoring Well (Golder, 2002)
- ⊕ Monitoring Well (Golder, 2007)
- ⊕ Test Well (Golder, 2007)
- ▬ Section Locations
- ‑·‑ Ditch
- ▨ Water Body
- ▨ Wetland
- ☐ Limit of Extraction
- ☐ Property Boundary
- ▨ Stockpile
- ☐ Wooded Areas

NOTE

1. On-Site details obtained from 2009 topographic contour map updated with 2012 field survey data provided by Long Environmental Consultants Inc.
2. Location of sump and pump intake are approximate.
3. Water in sump discharged to north woodlot prior to commissioning of the decant pond in June 2009.

REFERENCE

Base Data - MNR NRVIS, obtained 2004, CANMAP v2005.4
Produced by Golder Associates Ltd under licence from
Ontario Ministry of Natural Resources, © Queens Printer 2006
Datum: NAD 83 Projection: UTM Zone 17N.

0 25 50 100 150
Meters

PROJECT
TANSLEY QUARRY
2013 ANNUAL MONITORING REPORT
HANSON BRICK LTD.

TITLE

OPERATIONAL PROGRESS

Golder Associates
Mississauga, Ontario

PROJECT NO. 021-1228			SCALE 1:2,000	Ver. 1.0
DESIGN	KD	18 Dec. 2006	FIGURE: 2	
GIS	KD	26 Feb. 2014		
CHECK	SW	26 Feb. 2014		
REVIEW	RB	26 Feb. 2014		

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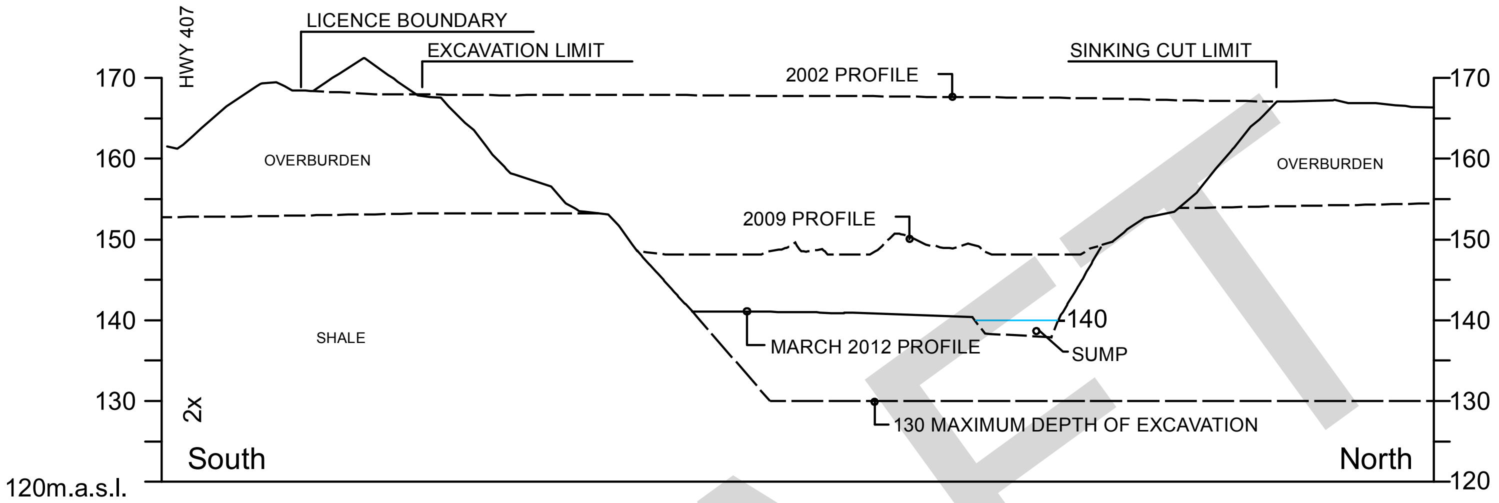

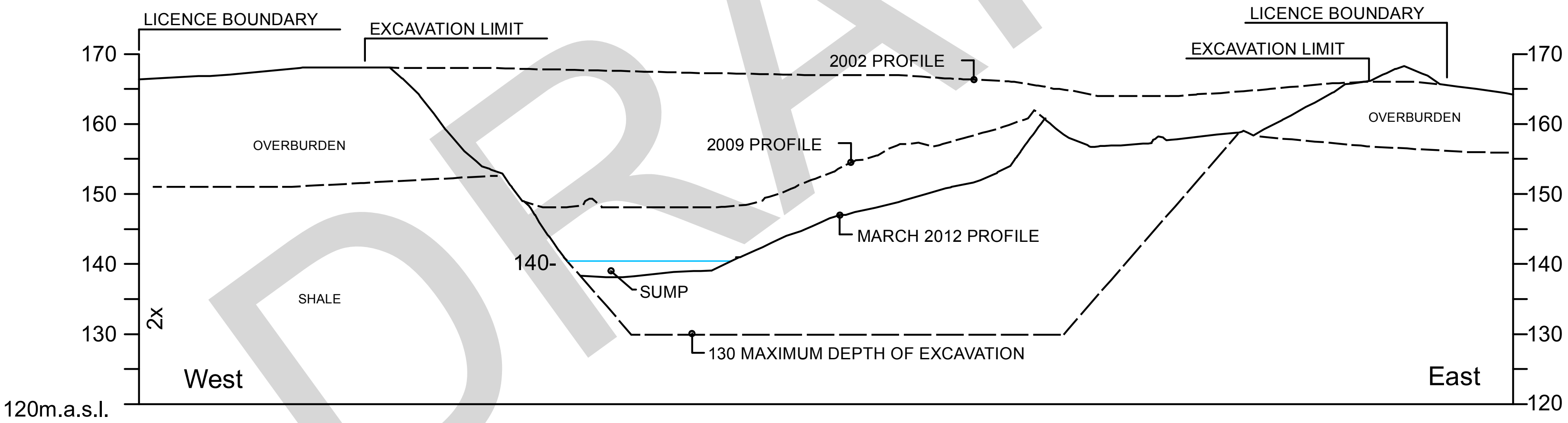

SOURCE:

Long Environmental Consultants Inc., April 2012.

PROJECT

TANSLEY QUARRY
2013 ANNUAL MONITORING REPORT
HANSON BRICK LTD.

TITLE

CROSS - SECTIONS

Golder Associates
Mississauga, Ontario

PROJECT NO. 021-1228			SCALE AS SHOWN	REV. 0.0
DESIGN	KD	12 Apr. 2012		
GIS	KD	26 Feb. 2014		
CHECK	SW	26 Feb. 2014		
REVIEW	RB	26 Feb. 2014		

FIGURE: 3

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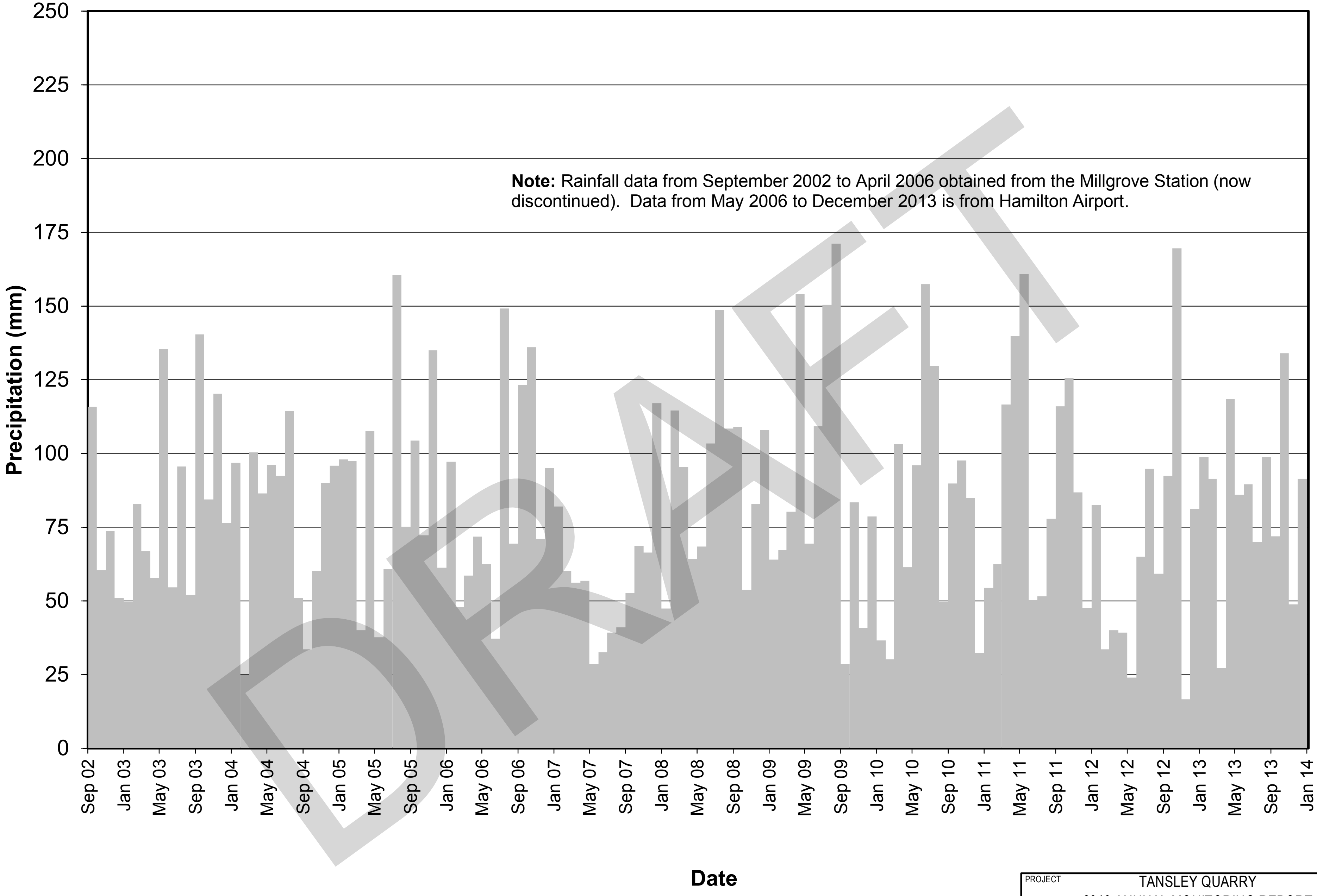

Note: Rainfall data from September 2002 to April 2006 obtained from the Millgrove Station (now discontinued). Data from May 2006 to December 2013 is from Hamilton Airport.

PROJECT
TANSLEY QUARRY
2013 ANNUAL MONITORING REPORT
HANSON BRICK LTD.

TITLE
MONTHLY PRECIPITATION (MM)
MILLGROVE STATION / HAMILTON AIRPORT

Golder Associates
Mississauga, Ontario

PROJECT NO. 021-1228			SCALE AS SHOWN	REV. 0.0
DESIGN	KD	12 Apr. 2012	**FIGURE: 4**	
GIS	KD	30 Jan. 2014		
CHECK	SW	30 Jan. 2014		
REVIEW	RB	27 Mar. 2014		

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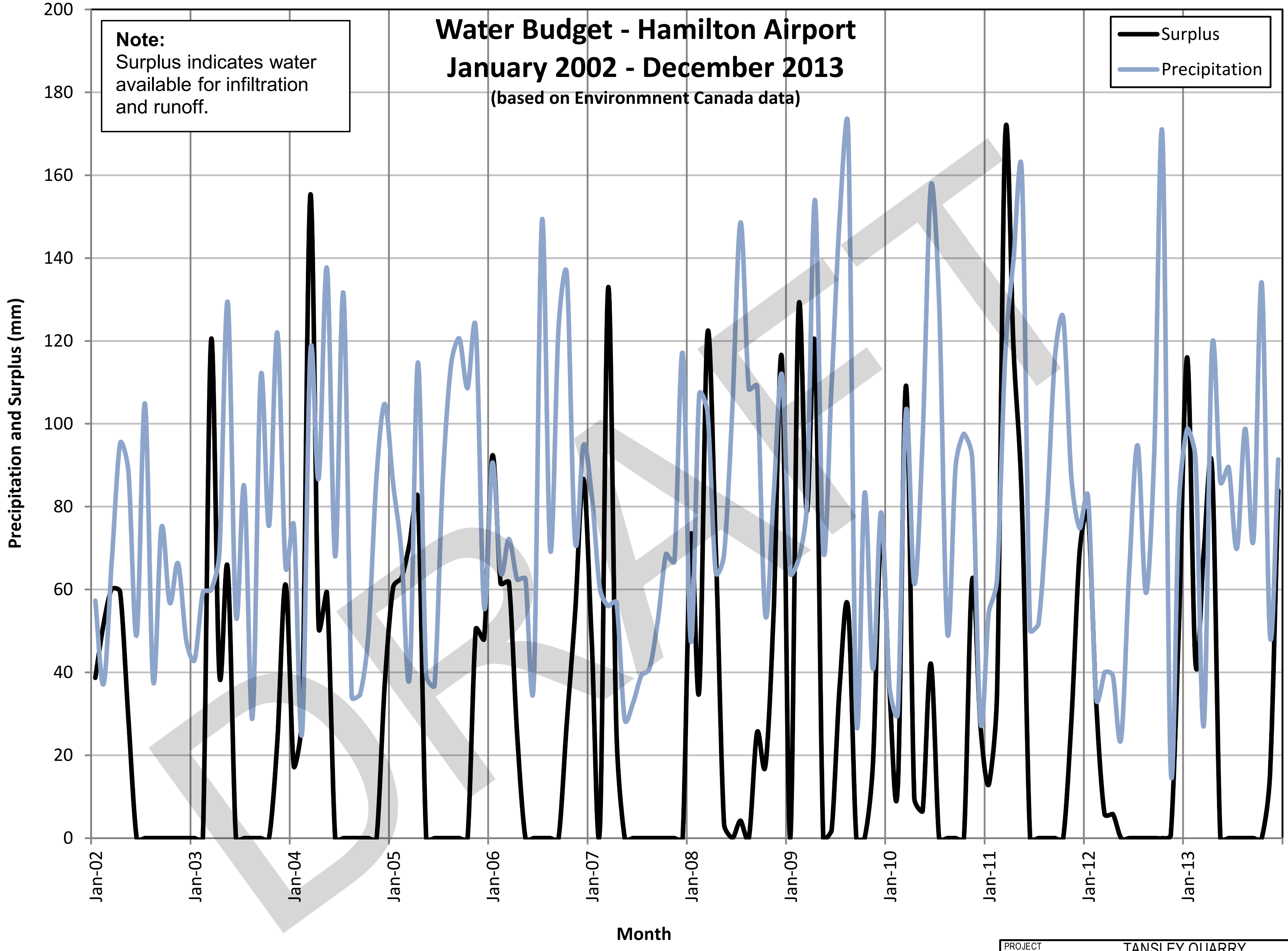


NOTE

1) Surplus indicates water available for infiltration and runoff.
2) Monthly water budget estimate using daily data to December 14, 2013; data has undergone only preliminary quality checking by Environment Canada.
3) Report will be updated with Environment Canada water balance information when the data becomes available.

G:\Projects\2002\021-1228_Tremaine_Quarry\GIS\MXDs\Draft\2013_Annual_Report\2013_Water_Budget.mxd

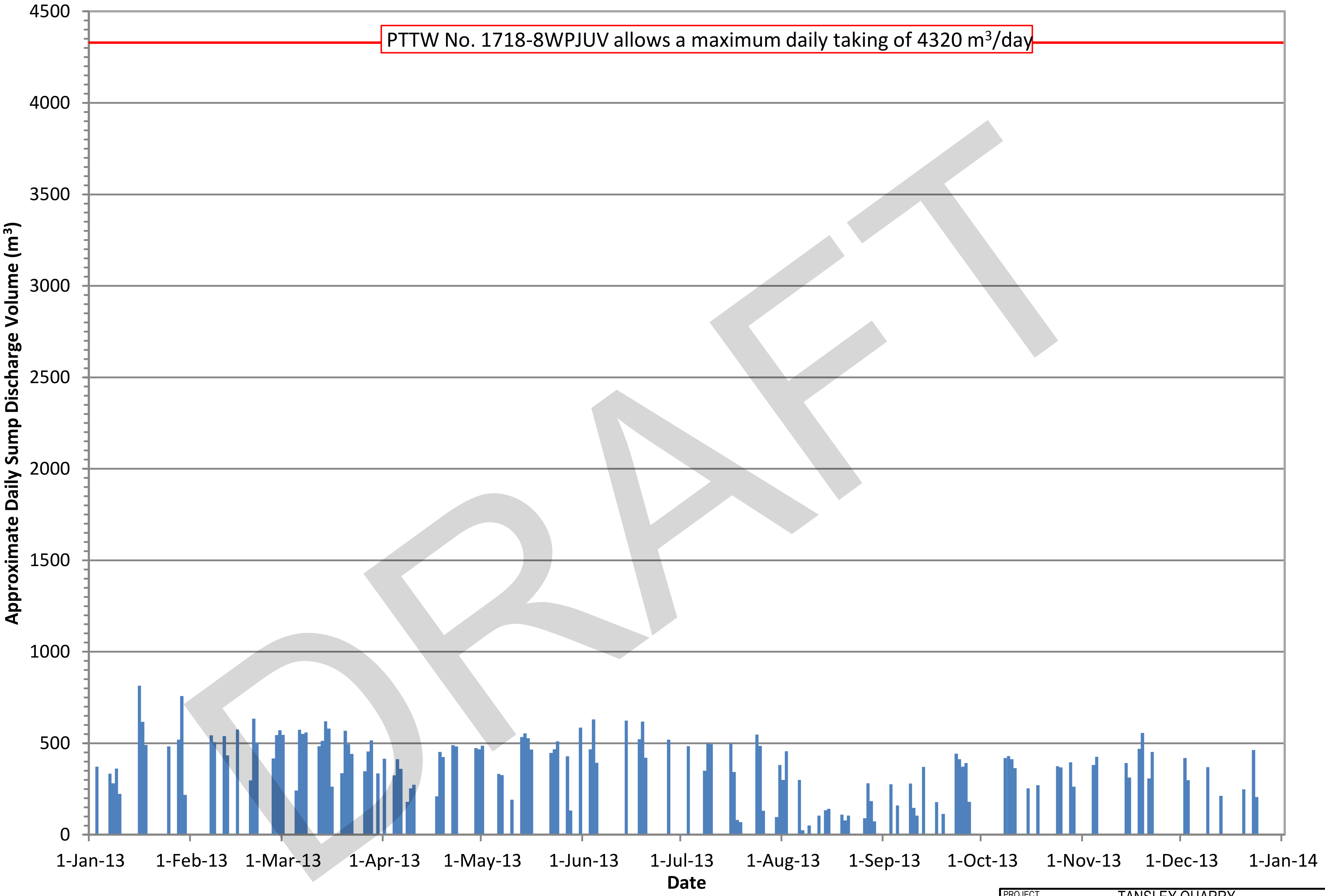
PROJECT
TANSLEY QUARRY
2013 ANNUAL MONITORING REPORT
HANSON BRICK LTD.

TITLE
WATER BUDGET - HAMILTON AIRPORT
SEPTEMBER 2002 - DECEMBER 2013

Golder Associates
Mississauga, Ontario

PROJECT NO. 021-1228			SCALE AS SHOWN	REV. 0.0
DESIGN	KD	12 Apr. 2012	
GIS	KD	30 Jan. 2014	
CHECK	SW	30 Jan. 2014	
REVIEW	RB	27 Mar. 2014	

FIGURE: 5



SOURCE:
Long Environmental Consultants Inc.

PROJECT
TANSLEY QUARRY
2013 ANNUAL MONITORING REPORT
HANSON BRICK LTD.

TITLE
2013 DAILY SUMP DISCHARGE VOLUMES

Golder Associates
Mississauga, Ontario

PROJECT NO. 021-1228			SCALE AS SHOWN	REV. 0.0
DESIGN	KD	12 Apr. 2012	**FIGURE: 6**	
GIS	KD	26 Feb. 2014		
CHECK	SW	19 Apr. 2013		
REVIEW	RB	26 Feb. 2014		

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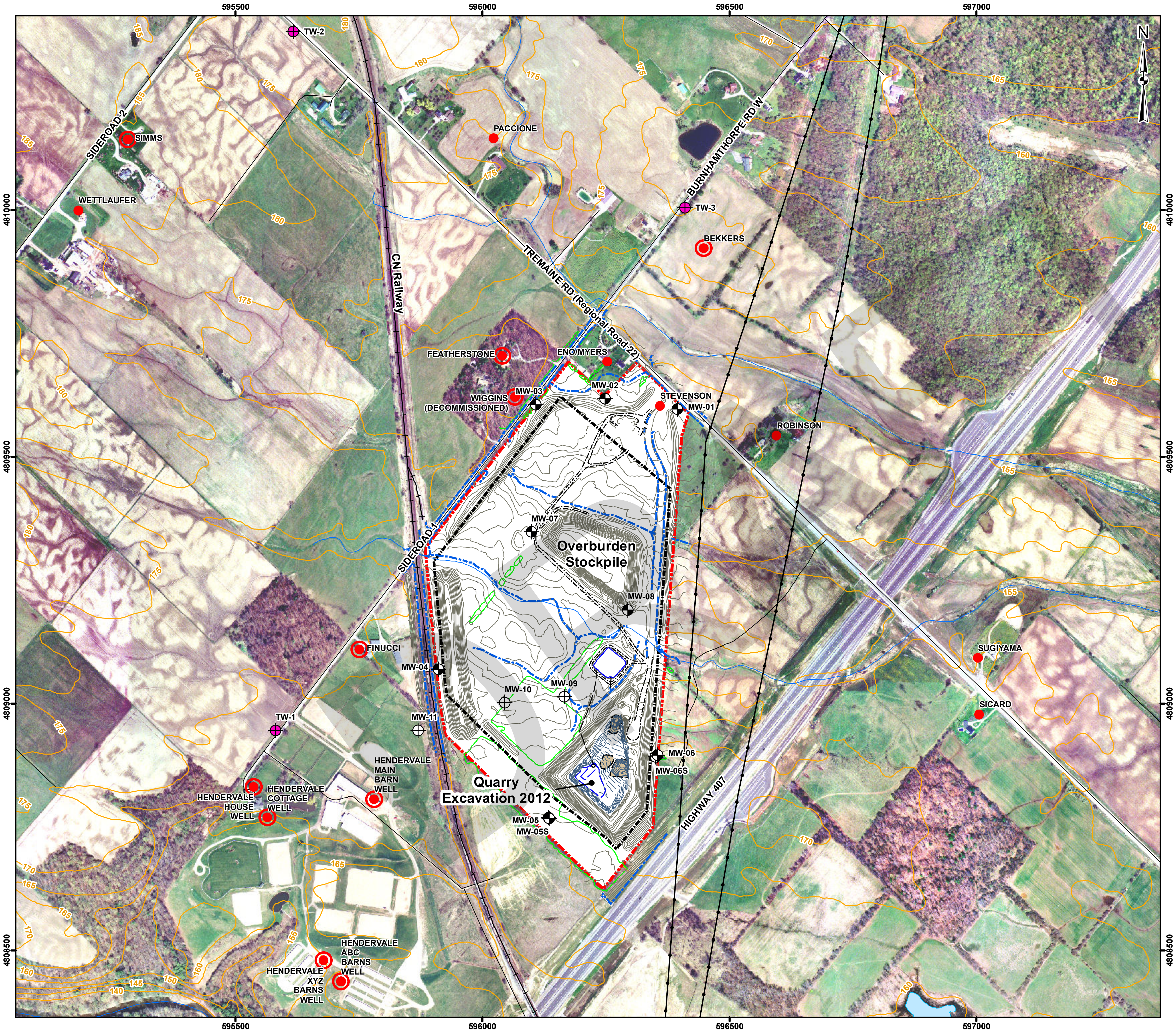


LEGEND

- ● Private Well
- ◉ Private Well with Level Logger Installed
- ⊕ Monitoring Well (Golder, 2002)
- ⊕ Monitoring Well (Golder, 2007)
- ⊕ Test Well (Golder, 2007)
- Railways
- Utility Line
- Topographic Elevation Contour (5m Interval)
- 2009 Topographic Elevation Contour (1m Interval)
- 2012 Topographic Elevation Contour (1m Interval)
- Ditch
- Watercourse
- WaterBody
- Limit of Extraction
- Property Boundary
- Stockpile

NOTE

On-Site details obtained from 2009 topographic contour map updated with 2012 field survey data provided by Long Environmental Consultants Inc.

Index Map

REFERENCE

Base Data - MNR NRVIS, obtained 2004, CANMAP v2005.4
Produced by Golder Associates Ltd under licence from
Ontario Ministry of Natural Resources, © Queens Printer 2006
Datum: NAD 83 Projection: UTM Zone 17N.
Imagery: First Base Solutions, 2002.

0 100 200 400 600

Meters

PROJECT

TANSLEY QUARRY
2013 ANNUAL MONITORING REPORT
HANSON BRICK LTD.

TITLE

MONITORING WELL NETWORK

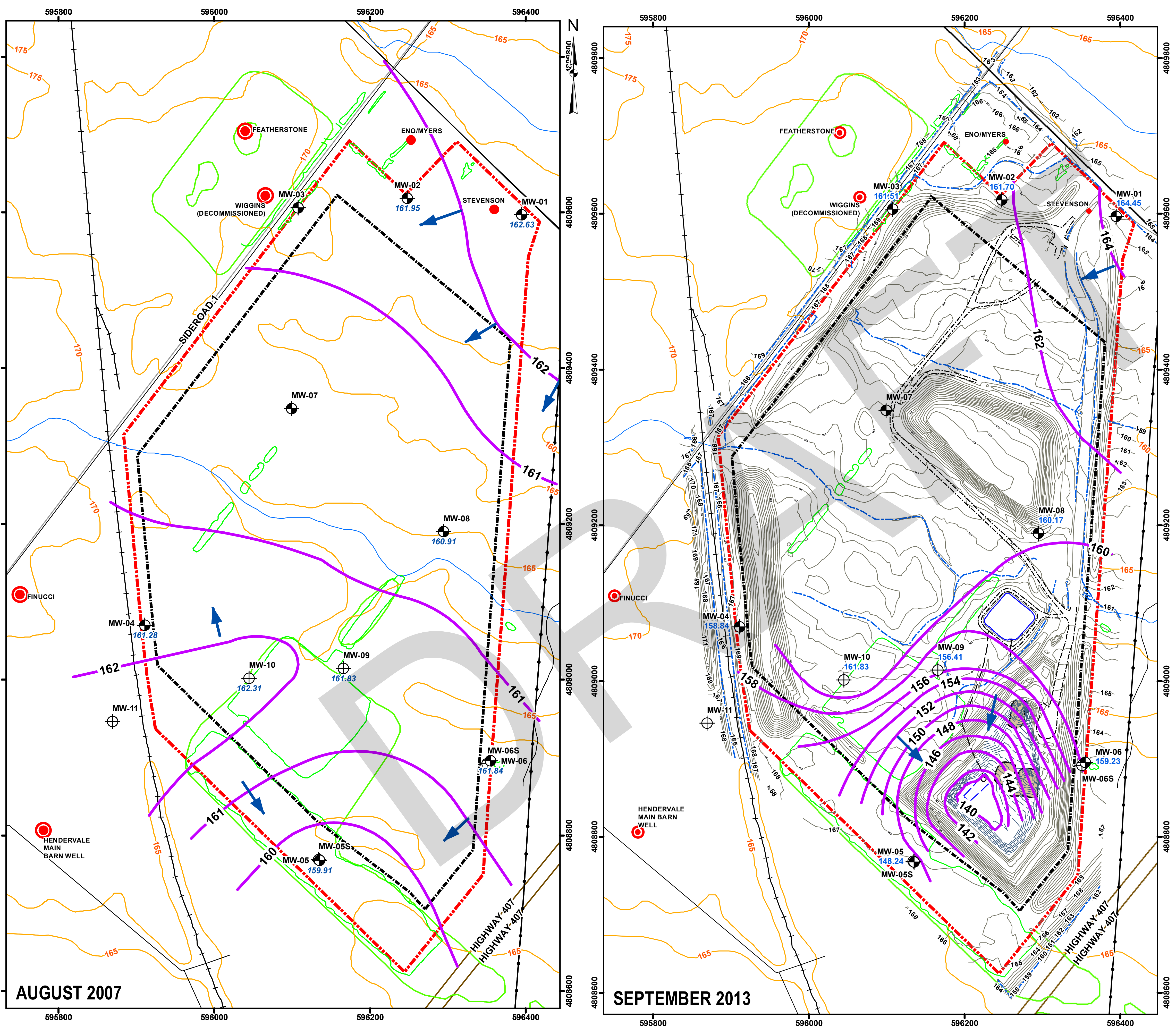
Golder Associates
Mississauga, Ontario

PROJECT NO. 021-1228		
DESIGN	KD	18 Dec. 2006
GIS	KD	24 Jan. 2014
CHECK	JB	24 Jan. 2014
REVIEW	SW	27 Mar. 2014

SCALE 1:8,000
Ver. 1.0

FIGURE: 7

G:\Projects\2002\021-1228_Tremaine_Quarry\GIS\MXDs\Draft\2013_Annual_Report\Well_Location.mxd



G:\Projects\2002\021-1228_Tremaine_Quarry\GIS\MXDs\Draft\2013_Annual_Report\GW_Elevation_Upper_Shale.mxd

LEGEND

- ● Private Well
- ◉ Private Well with Level Logger Installed
- ⊕ Monitoring Well (Golder, 2002)
- ⊕ Monitoring Well (Golder, 2007)
- ⊕ Test Well (Golder, 2007)
- Railways
- Utility Line
- ← Inferred Groundwater Direction
- Groundwater Elevation Contours
- Topographic Elevation Contour (5m Interval)
- 2009 Topographic Elevation Contour (1m Interval)
- 2012 Topographic Elevation Contour (1m Interval)
- Ditch
- Watercourse
- Waterbody
- Limit of Extraction
- Property Boundary
- Stockpile
- Wooded Areas

NOTE

On-Site details obtained from 2009 topographic contour map updated with 2012 field survey data provided by Long Environmental Consultants Inc.

REFERENCE

Base Data - MNR NRVIS, obtained 2004, CANMAP v2005.4
Produced by Golder Associates Ltd under licence from
Ontario Ministry of Natural Resources, © Queens Printer 2006
Datum: NAD 83 Projection: UTM Zone 17N.

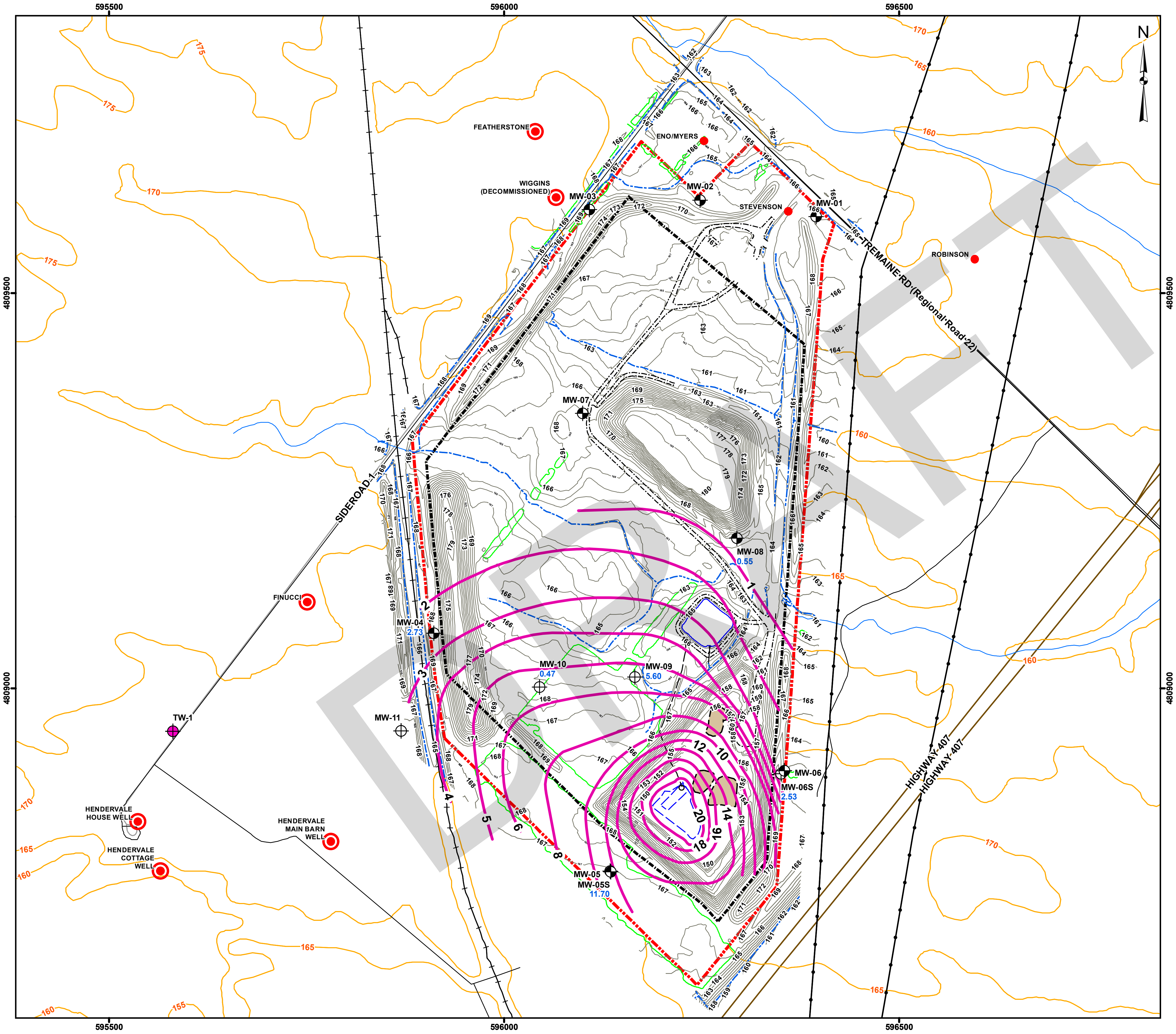
0 50 100 200 300 400
Meters

PROJECT
TANSLEY QUARRY
2013 ANNUAL MONITORING REPORT
HANSON BRICK LTD.

TITLE
GROUNDWATER ELEVATION
UPPER (INTERMEDIATE) SHALE

Golder Associates
Mississauga, Ontario

PROJECT NO. 021-1228			SCALE 1:5,000	Ver. 1.0
DESIGN	KD	18 Dec. 2006	FIGURE: 8	
GIS	KD	19 Mar. 2014		
CHECK	SW	19 Mar. 2014		
REVIEW	RB	19 Mar. 2014		



LEGEND

- ● Private Well
- ◎ Private Well with Level Logger Installed
- ⊕ Monitoring Well (Golder, 2002)
- ⊕ Monitoring Well (Golder, 2007)
- ⊕ Test Well (Golder, 2007)
- Railways
- Utility Line
- Topographic Elevation Contour (5m Interval)
- Drawdown Contour
- 2009 Topographic Elevation Contour (1m Interval)
- 2012 Topographic Elevation Contour (1m Interval)
- Ditch
- Watercourse
- ▭ Waterbody
- ▭ Limit of Extraction
- ▭ Property Boundary
- ▨ Stockpile

NOTE

On-Site details obtained from 2009 topographic contour map updated with 2012 field survey data provided by Long Environmental Consultants Inc.

REFERENCE

Base Data - MNR NRVIS, obtained 2004, CANMAP v2005.4
Produced by Golder Associates Ltd under licence from
Ontario Ministry of Natural Resources, © Queens Printer 2006
Datum: NAD 83 Projection: UTM Zone 17N.

0 50 100 200 300 400
Meters

PROJECT
TANSLEY QUARRY
2013 ANNUAL MONITORING REPORT
HANSON BRICK LTD.

TITLE
DRAWDOWN IN UPPER (INTERMEDIATE) SHALE
SEPTEMBER 2013

Golder Associates
Mississauga, Ontario

PROJECT NO. 021-1228			SCALE 1:5,000	Ver. 1.0
DESIGN	KD	18 Dec. 2006	**FIGURE: 9**	
GIS	KD	19 Mar. 2014		
CHECK	SW	19 Mar. 2014		
REVIEW	RB	19 Mar. 2014		

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APPENDIX A

Regulatory Permits and Agreements

HANSON BRICK LTD.

TREMAINE QUARRY APPLICATIONS

ADAPTIVE GROUNDWATER MANAGEMENT PLAN (AMP)

1. RATIONALE AND GOAL

1.1 Hanson proposes to develop a 38.5 ha quarry in stages, over a relatively long period of time, producing 100,000 to 300,000 tonnes of shale annually. Hanson will first excavate the area described as "Sinking Cut Stage" and then excavate the area described as "Initial Stage", both areas are shown on Figure 1 and Figure 4. There are no predicted groundwater impacts during the Sinking Cut Stage. The Sinking Cut Stage will be completed in five to eight years. The Initial Stage will likely continue for another 10 to 20 years; Full Extraction will likely continue for another 40 to 60 years; and it may take approximately 80 years to fill the rehabilitated, 18.2 ha. lake, based upon average annual precipitation ("Surface Water Assessment Proposed Tremaine Quarry," Phillips Engineering Ltd., January 23, 2004) (Philips, 2004).

1.2 Excavation of shale bedrock during the Initial Stage from below the water table may influence the availability of potable water from private wells within the Potential Zone of Influence ("PZI"). The PZI in this context, refers to the potential drawdown contours, determined by the groundwater flow model shown on Figure 1 ("Hydrogeological Assessment of the Proposed Hanson Brick Tremaine Quarry, Burlington Ontario," Golder Associates, January 2004) (Golder, 2004). This model will be updated periodically as set out in subsection 5.2(h).

1.3 Properties listed in subsections 9.1 and 9.2 with wells within the 0.2 m PZI shown on Figure 1 are referred to herein as "Eligible Properties" and their owners from time to time are referred to as "Eligible Property Owners". Notwithstanding any changes to the PZI area based on additional modeling or data, it is agreed all provisions of this AMP applicable to Eligible Properties or Eligible Property Owners at the date of the AMP Agreement shall always apply to those Eligible Properties and Eligible Property Owners.

1.4 This AMP has been prepared to set out the program by which the potential effects of the quarry can be monitored and to guarantee that affected property owners will have access to an uninterrupted supply of potable water through well restoration; temporary imported water for onsite storage, or private communal water system ("PCWS"). Potable water means water that meets the drinking water quality standards set out in the *Safe Drinking Water Act*, 2002 and its regulations as amended or replaced by law governing drinking water.

1.5 The goals of this AMP are to:

a) Proactively ensure a continuous supply of potable water for property owners whose private wells may be adversely affected by the quarry operation; and

b) Update and refine the groundwater flow model, data and analysis, based upon measured data, to enable proactive prediction of the Potential Zone of Influence, as warranted.

1.6 The following attachments form part of this AMP and may be amended as outlined in subsection 5.2:

Figure 1	Potential Steady State Zones of Influence
Figure 2	Onsite Monitor Network
Figure 3	Communal Water Supply Line
Figure 4	Sinking Cut and Initial Stages
Table 1	Groundwater Level Monitoring Program
Table 2	Groundwater Quality Monitoring Program; and
Schedule 1	Expedited Arbitration for Technical Disputes

Reference in this AMP to Figures 1, 2, 3, and 4 Tables 1 and 2, Schedule 1, and the list in subsection 9.3, should be read to include amendments from time to time as provided for under this AMP and the AMP Agreement.

1.7 All reports prepared under this AMP will be prepared by experts selected and paid for by Hanson, and acceptable to the Region, and will provide for reliance by both Hanson and the Region.

1.8 This AMP is intended to provide the basis for a) an Adaptive Groundwater Management Plan Agreement, between the Region of Halton and Hanson Brick Ltd., b) agreements between owners of the existing business and residences listed in subsection 9.1 of this AMP and c) the Site Plan Drawing 7 – *"Adaptive Groundwater Management Plan"* that accompanies the *Aggregate Resources Act* (ARA) Licence, including excerpts of this AMP. The AMP includes 10 sections:

1. Rationale and Goal
2. Pre-Development Requirements;
3. Related Agreements;
4. Groundwater Monitoring Program;
5. Reporting and Annual Review;
6. Complaints Response Program;
7. Water Supply Restoration Program;
8. Communal Water Servicing;
9. Communal Water Supply Line; and
10. Definitions

2. PRE-DEVELOPMENT REQUIREMENTS

2.1 The groundwater flow model, Golder, 2004, indicates that two existing private wells could be affected, by up to 0.5 m of drawdown, by the completion of the Initial Stage as shown in Figure 1. These wells, (the Finucci Well and the Hendervale Farms' Main Barn Well) are predicted to have sufficient capacity to sustain this order of drawdown. However, continuous monitoring of those wells, selected on and offsite monitor wells installed for the quarry; and monitoring of other potentially affected wells in the area will enable regular updating of the flow model and the corresponding PZI.

2.2 As soon as possible after the Halton Region Council has adopted the Official Plan Amendment, including policy amendments, to permit a private communal water system, Hanson will commence the class environmental assessment approval process for the establishment of the PCWS and will, to the extent permission from private landowners is granted:

a) Complete the baseline survey of private wells listed in subsection 9.1 and any other private wells located within 1,000 m of the boundaries of the site, generally on Tremaine and Burnhamthorpe Roads, No. 1 and No. 2 Sideroad, and including these lots substantially within the 0.2 M PZI :

Road	PIN
No. 2 Sideroad	07201-0008
No. 2 Sideroad	07201-0045
Tremaine Road	07201-0101
Tremaine Road	24927-0133

b) Complete upgrades, meter and monitor installations, for private wells listed in subsection 9.1. Upgrades, subject to the consent of the well owners, will include repairs to the existing wells and water systems, by Hanson's licensed contractor, at a cost of up to $3,000 (as adjusted annually to reflect C.P.I. increase plus GST) ("as Adjusted") per well.

c) After work in subsection 2 b) is completed, estimate yield of private wells ("Well Yield Estimate") for the Finucci well, the Wiggins well, Hendervale house well, Hendervale cottage well, Hendervale XYZ barn well. Well Yield will be estimated by the following procedure: i) remove pump from well, ii) conduct step drawdown test at 3 specific rates (30 minute test per step) iii) monitor well recovery to static conditions to within 90% of the initial water level; iv) pump well dry iv) monitor well recovery to static conditions to within 90% of the initial water level and v) determine an estimate of well yield by interpreting results of step drawdown test and results of monitoring water level recovery in well.

d) Complete the installation of the proposed initial onsite and offsite groundwater monitoring network comprised of the monitoring wells and private wells described in Tables 1.1 and 1.4 in the locations shown on Figure 1, a continuous groundwater level monitor and meter on the drilled well of the lands municipally known as 3369 Burnhamthorpe Road owned by Mr. Jack Proud as of the date of the AMP Agreement (PIN 24927-0021), and a continuous groundwater level monitor and meter on Productive Wells. A Productive Well is a well which, when pumped continuously, is capable of sustaining its pumping rate and recovering to 90% of its yield after 30 minutes.

2.3 Hanson will initiate the monitoring program, set out in section 4, upon issuance of the ARA Licence; and will complete the Initial Monitoring Report, described in section 5, within 90 days after issuance of the ARA Licence.

3. RELATED AGREEMENTS

3.1 Prior to issuance of the ARA Licence, Hanson will enter the following Agreements with the Region:

a) Adaptive Groundwater Management Plan Agreement (AMP Agreement)

b) Private Communal Water System Agreement

c) Transportation Servicing Agreement

d) Access Agreement

e) Framework Agreement

3.2 Hanson will provide the Region of Halton with letters of credit and other financial assurance required by the Region to guarantee Hanson's performance under the agreements referred to in 3.1, above.

4. GROUNDWATER MONITORING PROGRAM

4.1 The annual monitoring program will initially include (in the first year), to the extent permission from landowners is granted:

a) Monthly collection of water level data from transducers and data loggers from monitoring wells on Figure 1 and more particularly described as "continuous" in Tables 1.1 to 1.4, for the first Annual Report during the initial period of monitoring, with future expansion of data collection, as developed through reporting and annual review.

b) Monthly collection of manual water levels from the Existing Private Wells on Figures 1 and 2.

c) Monthly collection of continuous monitor and meter data from on-site and private monitoring wells referred to in paragraph 2.2(d).

4.2 Annual collection of water samples from the wells set out in Tables 1.1 to 1.4, for laboratory analysis for the parameter suite listed in Table 2. Hanson will collect quarterly water samples from Productive Wells of Eligible Property Owners who request re-sampling until the dwellings are connected to the PCWS.

5. REPORTING AND ANNUAL REVIEW

5.1 Annual reporting will be implemented during the first calendar year following issuance of ARA Licence and continue for the term of the AMP Agreement. The following interim reporting will be provided prior to the preparation of the first annual report:

a) An Initial Monitoring Report on the baseline survey and monitoring, described in sections 2 and 4, prepared to the standard of the annual reports, set out below, including updated modeling; and

b) Monthly submissions of all monitoring results, within 30 days of commencement of monthly monitoring, to the Ministry of Natural Resources (MNR), Ministry of Environment (MOE) and the Region of Halton Planning & Public Works Department, with a letter report and updated tables and hydrographs, during Year 1.

5.2 Annual reports will be submitted by April 30th each year, for the preceding calendar year, to the MNR, MOE and the Region of Halton Planning & Public Works Department. Summaries and any information collected that relates to each Eligible Property Owner's well will be provided by Hanson to the Eligible Property Owner. Annual Reports will be available for viewing at the Region and on the water informational website of Hanson Brick. The reports will include:

a) The results of groundwater level and quality monitoring for the period, with comparisons to the results of historical monitoring;

b) Assessment of the water levels and quality at the onsite and offsite monitors and private wells, for evidence of any adverse effects or indication that adverse effects may occur;

c) Review onsite and offsite monitors and private wells to assess, report and provide recommendations on their adequacy, configuration, replacement and monitoring frequency (i.e. manual or transducer recording), and on the need for additional testing to determine Well Yield Estimates;

d) Recommendations for setting triggers for Hanson to implement contingency mechanisms and responses to triggers, as identified in the Initial Monitoring Report, based upon the available monitoring data;

e) An opinion on the potential for and time frame over which one or more other private wells, referred to in subsection 2.2 a) might be compromised to the extent that restoration may be required;

f) An opinion about the sufficiency of data to predict whether the wells on lots substantially within the 0.2 m PZI listed in subsection 2.2 a) might be compromised to the extent that well restoration could be required;

g) A comparison of neighbouring wells assessments to previous modeling and assessments, with a recommendation for revising the model assumptions, and updating the scope of monitoring and modeling;

h) The modeling will be updated for the annual report that applies to the year that the Sinking Cut Stage is completed, and prior to commencing excavation beyond the northern limit of the Sinking Cut Stage;

i) A review of the Potential Zone of Influence, with recommendation for revising the zone and the configuration and measurement frequency for onsite and offsite monitors and private wells; and

j) A concise evaluation of the effects of the quarry operation, with recommendations for adjustment of Quarry operations to minimize adverse effects on water supply;

5.3 Notwithstanding the requirement to report annually, Hanson will report any unusual water level or quality data, during the year, within 30 days of detection. "Unusual data" refers to changes in levels or quality which were not anticipated, based upon previous modeling and monitoring.

5.4 Annual Reports will be submitted for the approval of the Region of Halton and at the same time, a summary and any information collected about any Eligible Property Owner's well will be provided by Hanson to the Eligible Property Owner.

5.5 Hanson will compensate the Region of Halton for its costs to administer this AMP and to review and approve the Annual Reports.

5.6 Hanson will comply at its expense with recommendations in the Annual Report within the timelines set out in the Annual Report. Revisions and amendments to this AMP, approved by the Region and the MNR as a result of Annual Report review and approval, will be reflected in an updated version but will not require formal amendments to the AMP Agreement, ARA Site Plan, or Permit to Take Water, unless so required by the approving agency. Hanson and the Region will confirm in writing that the revised AMP replaces Schedule A of the AMP Agreement. Such amendments will be binding on Hanson, and upon amendment, Hanson shall be responsible for preparing a consolidation of the AMP.

5.7 Any recommended change(s) to the operation of the quarry and/or to the ARA site plan will be submitted to the Ministry of Natural Resources to be formally reviewed and processed as a site plan amendment in accordance with section 16 of the Aggregate Resources Act.

5.8 Any revised or consolidated AMP will be circulated by Hanson to the Region, MOE, MNR, and Eligible Property Owners.

6. COMPLAINTS RESPONSE PROGRAM

6.1 This section 6 applies to responding to complaints about wells of Eligible Property Owners, except i) that complaints about the barn wells on the property municipally known as 5244 No. 1 Sideroad with PIN 07201-0018 ("the Hendervale Barn Well(s)") are to be resolved in accordance with section 7 and ii) as indicated below in subsections 6.7 and 6.8. Notwithstanding any potential future changes to the 0.2 m PZI, this section shall apply, and continue to apply to Eligible Properties to which it applied at the date of the AMP Agreement.

6.2 At any time prior to operation of the PCWS, Hanson will, at its expense, provide, install, and maintain (including any necessary cleaning and disinfection) a Cistern System for any of the Eligible Property Owners, upon request. A Cistern System refers to an underground storage tank and any plumbing required to connect the tank up to the property owner's internal water system, with a minimum storage capacity of 3,000 Imperial Gallons (13,600 litres). The tank will be installed in an area directed by the homeowner which is clear of trees, utilities and similar obstacles in close proximity to the dwelling, if, and that is clearly identified to, and approved by, Hanson.

6.3 Hanson will, at its cost, engage a local licenced Water Supply Maintenance Contractor, ("Contractor") on call 24/7, and Potable Water Supplier ("Water Supplier") for the Eligible Property Owners as set out in subsections 6.4, 6.5 and 6.6 and provide contact details to those owners.

6.4 Hanson will be responsible to keep the cisterns filled with water in the amounts set out in subsection 6.6. The cisterns will be equipped with a low level alarm. At any time that an Eligible Property Owner believes that the cistern requires refilling, he may contact the Water Supplier, who will fill the cistern at Hanson's expense.

6.5 The Eligible Property Owners may at any time they believe their water quality or quantity has been compromised, contact the Contractor at no charge or cost to the Region or the Owner (at Hanson's expense).

6.6 In the event that a complaint has been received pursuant to subsection 6.5 for an Eligible Property, the Contractor will provide as soon as practicable, and in any event within twenty-four hours of receiving the complaint, at Hanson's expense, a temporary supply in the form of trucked delivery of potable water, as frequently as required, in an amount up to the greater of:

a) the difference in daily volume between the Well Yield Estimate before excavation of the Initial Stage commenced and the Well Yield Estimate at the time of complaint, if the difference is more than 10%; or

b) 360 litres (79 imperial gallons) per day per resident with a minimum of 1000 litres (220 imperial gallons) per day for each Eligible Property.

6.7 This subsection 6.7 applies to wells on Eligible Properties set out in subsections 9.1 and 9.2 at the date of the Initial Monitoring Report ("Pre-existing Wells"). The Contractor will, as soon as practical, conduct a private well water system inspection on Pre-existing Wells, and complete any required maintenance or repair, at a cost of up to $3,000, as Adjusted, without authorization from Hanson. This is a one time expenditure per well by Hanson.

6.8 This subsection applies to i) Pre-existing Wells in subsection 9.1 properties that are Productive Wells, that is the Finucci well, Wiggins well, Hendervale house and cottage wells, ii) Pre-existing Wells in the subsection 9.2 properties that are Productive Wells at the date of the Initial Monitoring Report or an Annual Report iii) any Pre-existing Well on the property municipally known as 3500 Tremaine Road (PIN 07201-0064) that is a Productive Well at the date of the Initial Monitoring Report or Annual Report.

a) If the water supply has not been restored with the expenditures in subsection 6.7, the matter will be immediately referred to a qualified hydrogeologist selected by Hanson, and approved by the Region, (the "Hydrogeologist").

b) The Hydrogeologist shall, within six weeks of his or her retainer by Hanson complete an assessment and report on the well failure, the cause of the well failure (although cause of well failure does not affect Hanson's obligations in this section 6), whether it can be restored, and recommend a restoration option or options which will be based on consideration of all reasonable restoration options that can be achieved for a cost of less than $15,000 (as Adjusted). Restoration options shall include the well restoration options set out in subsection 7.3 below. Well restoration will be achieved if a well is restored to 90% of the Well Yield Estimate before the effect of the Quarry ("Successful Well Restoration").

c) Hanson will ensure that the Hydrogeologist's report is provided to the MOE, Region of Halton, and any Eligible Property Owner whose well is being restored. The Eligible Property Owner may engage a hydrogeologist to review the report up to an amount of $2,000, as Adjusted at Hanson's expense.

d) If the Hydrogeologist report concludes that restoration of water quality and/or quantity is not achievable at a cost of less than $15,000 (as Adjusted), Hanson will, at its cost, supply trucked, potable water in the amount set out in subsection 6.6, until connection to the PCWS is provided in subsection 6.9.

e) If the Hydrogeologist's report concludes that water quantity and/or quality can be restored by implementing a restoration option at a cost of less than $15,000 (as Adjusted) in addition to the $3,000, As Adjusted spent on repairs referred to in subsection 6.7, Hanson will, subject to obtaining the Owner's consent, implement the well restoration option at Hanson's expense, such expense to not more than $15,000 (as Adjusted).

f) If at some future date, the recommended restoration option fails, and a complaint is received with respect to a well which has been restored under this subsection, Hanson will investigate and implement further possible restoration measures. The cost of this investigation and restoration will not exceed $5,000 (as Adjusted). This is a one time expenditure per well by Hanson.

g) In the case where Hanson is unable to achieve Successful Well Restoration, Hanson will continue to be responsible to provide trucked potable water to the Eligible Property Owner pursuant to subsection 6.6.

6.9 The well restoration and trucked potable water supply program provided for in this section 6 will cease to apply once the property is connected to the PCWS, and supplied with potable water in compliance with the PCWS Agreement.

7. WATER SUPPLY RESTORATION PROGRAM

7.1 The Water Supply Restoration Program will be implemented to restore a) private wells beyond the 0.2M PZ1, b) private wells on lots listed in subsection 2.2 a), lots substantially within the 0.2 m PZI to the extent that these lots have wells within the 0.2 m PZI, c) lots within any future revised 0.2 m PZI, and d) the Hendervale Main Barn and ABC Barn Wells.

7.2 Wells will be restored under this section 7 if the Well Yield Estimate is reduced as a result of the quarry excavation. Successful Well Restoration is as defined in subsection 6.8 b). The objective is to restore water with an on-site groundwater supply, if feasible. As such, all feasible well restoration options will be explored first before connecting the property to the PCWS through subsection 7.5 b).

7.3 If a private well owner believes his well is compromised, he may contact Hanson. Hanson's Contractor and Hydrogeologist will investigate, at Hanson's costs, whether the well has been adversely affected by operation of the quarry, based upon Well Yield Estimates and historical groundwater monitoring data. If the Well Yield Estimate has not been reduced by more than 10% as a result of the operation of the quarry, Hanson will not be responsible to restore the well. If the Well Yield Estimate has been reduced by more than 10%, as a result of operation of the quarry, Hanson's Contractor and Hydrogeologist will recommend feasible restoration options through the steps in subsection 6.8 a) to e) except that the cost limit referred to in subsections 6.8 b) d) and e) will be $30,000 (as Adjusted). Feasible restoration options may include the following:

a) Well System Rehabilitation
The well system could be rehabilitated by deepening or replacement of pumps, pump lines flushing, etc., to improve well performance.

b) Well Replacement
The well could be replaced or augmented with a new well that could be located further from the quarry excavation. The feasibility of well replacement would be based on a test drilling program that could include more than one test well.

c) Additional Wells
Additional wells could be installed to supplement the supply of existing well(s). The feasibility of well replacement would be based upon a test drilling program that could include more than one test well.

d) Trickle Well(s) with Cistern(s)
Where feasible, the existing well(s) would be converted to a low yield pumping system, or installation of an additional well, including large diameter bored well(s) if appropriate; along with construction of a cistern to increase water storage.

7.4 While determining the cause of well failure and feasible options, Hanson will supply sufficient potable water to the owner. If it is found that the Quarry excavation did not compromise the well, and that the Owner's request is frivolous, Hanson may seek private remedies against the owners for costs of supplying potable water.

7.5 The Region, after considering the Hydrogeologist's report in consultation with Hanson and the MOE, will determine whether the well has been compromised by quarry caused interference and the feasibility of well restoration options. In the event that the Region determines that the well has been compromised by Hanson's quarry and

a) a well restoration option is feasible, the Region will determine which option and Hanson will implement it at Hanson's cost, or

b) well restoration options are not feasible, or if the restoration option fails to provide adequate supply of potable water, Hanson will continue to supply trucked, potable water until the owner of the well can be provided with water service by connection to the extended PCWS on an expeditious basis. The amount of water provided by the PCWS shall be a maximum rate of 2000 l/day/dwelling. The amount of water provided for private wells serving uses other than domestic use shall be the difference between the Well Yield Estimate before the effect of the quarry and the current Well Yield Estimate.

If Hanson, the Owner or Well Owner disagrees with the Region's determination in a) or b), Hanson, the Region, Owner or Well Owner may initiate expedited arbitration set out in Schedule 1 of this AMP by sending a Notice of Technical Arbitration to the other Parties within fourteen (14) calendar days of receipt of the determination.

7.6 Subsection 9.3 will be revised from time to time to include a list of any additional dwellings and buildings serviced by the private communal water system.

8. COMMUNAL WATER SERVICING

8.1 A private communal water system will be designed, constructed, maintained and operated to provide potable water supply to properties identified through the AMP process, all at Hanson's expense. Without derogating from the obligations in the PCWS Agreement or AMP Agreement, Hanson will operate the PCWS in compliance with the *Safe Drinking Water Act* and its regulations as amended or replaced from time to time. The PCWS may be expanded as a result of recommendations from the Reporting and Annual Review described above. The Environmental Study Report prepared for the Class Environmental Assessment shall evaluate all reasonable alternative solutions and identify a preferred option for the establishment of the PCWS, including the source of water. Prior to construction, the Region of Halton will approve the design, plans, specifications and location of the PCWS and any expansions to the PCWS. The PCWS will be completed in accordance with the PCWS Agreement.

8.2 The rural water line is expected to be of 100 mm diameter and located on Tremaine Road, from 300 m south of Highway 407 northerly to No. 1 Sideroad; then westerly on No. 1 Sideroad to the Hendervale residence at No. 5244 No. 1 Sideroad with PIN 07201-0018, as drawn on Figure 3. Hanson will install, at its own expense, prior to PCWS operation, a Service to, and a Service Valve on, the property line of all lots of record listed in subsections 9.1, 9.2 and 9.3.

8.3 In order to effect connection to the PCWS:

a) property owners listed in subsection 9.1 and 9.3 (as determined in subsection 7.5(b)) with dwellings at the time of installation of the PCWS, must install, at Hanson's expense, a Private Service from the Service Valve to the interior of dwellings identified in subsection 9.1, Water Meter, Backflow preventers, and, if requested by Hanson, a Remote Reader;

b) Property owners listed in subsection 9.2 (vacant lots) must install and pay for the Private Service, Water Meter, Backflow Preventer, and if requested by Hanson, Remote Reader;

c) Water Service components must be established, installed and maintained to Regional Standards; and

d) Individual property owners will abide by standard Water Service Terms provided by Hanson setting out the terms and conditions for the supply of water, including, but not limited to, all of the responsibilities in this section 8.

8.4 The property owners shall be responsible to maintain the Private Service and Backflow Preventer, including thawing of frozen Private Services. Hanson is not responsible to thaw frozen Private Services. At no time shall a Private Service be used to service more than one registered lot (Lot of Record) or dwellings not identified in section 9.

8.5 Hanson shall own and be responsible to maintain the Service, Water Meter, and Remote Reader. Hanson shall not be liable for any damages which may arise as a consequence of the thawing of frozen Water Service components, or the interruption or discontinuation of water supply as a result of an emergency, breakdown, repair or extension if reasonable notice of intention to interrupt or reduce service is given. Hanson will have the usual rights that a municipal water supplier and operator has such as the rights: to set limits on water use; to enter land and buildings in order to inspect, install, repair, alter or disconnect Water Service components; to discontinue or reduce the supply of water if the owner does not maintain the Private Service or Backflow Preventer or for non-payment of water bills.

8.6 Whenever Hanson connects a building or dwelling to the PCWS, Hanson will, at its own expense, decommission the well(s) using a Licenced Well Driller, and in accordance with the Wells Regulation (Ontario Regulation 903), subject to the owner's permission to use the well for monitoring purposes, and will decommission cistern systems to the satisfaction of the Region. Property owners may elect to continue to use their wells in addition to the PCWS water supply, on the conditions that a) there is no cost or liability to Hanson in relation to the well once the dwelling is connected, and b) the property owner establishes to the Region's satisfaction that the existing well and associated plumbing are in good structural condition, comply with applicable laws, guidelines and regulations including the MOE Wells Regulation and *Building Code Act,* and that the two water supply systems have been separated by a Backflow Preventer in accordance with Halton Region By-law nos. 157-05 and 42-04, as amended or replaced.

8.7 Hanson has agreed to assume the cost of maintaining the Private Communal Water System in perpetuity as further provided in the PCWS Agreement, unless municipal service becomes permitted and is available.

8.8 The serviced property owners connected to the PCWS will be expected to pay Hanson for their metered water consumption no more than the Region's 12-20 mm monthly meter charge and the water usage charge, as amended by the Region from time to time, excluding the cast iron watermain and wastewater surcharges, to be adjusted as such charges are amended by the Region from time to time, subject to private arrangements that Hanson may make with the property owners. Such private arrangements will not bind the Region.

8.9 It is predicted that there will be no impact on private wells within the first five years of Quarry operation, during which time only the Sinking Cut Stage area depicted on Figure 4 will be excavated. If despite concerted efforts by Hanson:

a) approvals, including but not limited to the Region's consent to commence construction of the PCWS, are not obtained for the PCWS by the earliest of :

(i) within 42 months from obtaining its ARA Licence or

(ii) prior to excavating beyond the Sinking Cut Stage;

or

b) if the PCWS is not constructed, installed, tested and fully operational within the earliest of

(i) 18 months of receiving the Region's consent to commence construction of the PCWS,

(ii) 5 years of issuance of the ARA Licence, or

(iii) prior to excavating beyond the Sinking Cut Stage,

then Hanson will cease excavation and dewatering and notify the Region and owners of properties listed in section 9. Subject to the extension in subsection 8.10, Hanson will rehabilitate the excavated area of the quarry, allow it to fill with water and surrender the ARA Licence.

8.10 If construction has been commenced within 6 months of the Region's authorization to commence construction but not completed, installed, tested and fully operational within the earlier of

a) 2 years of the Region's authorization to commence construction of the PCWS; or

b) 5 years of the issuance of the ARA Licence,

in both cases for reasons outside of Hanson's control, then Hanson is permitted an extra 6 months to complete construction. In no event shall there be excavation beyond the Sinking Cut Stage until the PCWS is fully installed, tested and operational.

8.11 If the ARA Licence is surrendered, suspended or revoked before the PCWS is fully operational then Hanson will continue to provide potable water to Eligible Property Owner, until Hanson's hydrogeology report, as approved by the Region, shows that there is no interference from the Quarry operations on private wells.

9. COMMUNAL WATER SUPPLY LINE

The private communal water supply service will be initially available to the owner of any lot of record as set out in 9.1 and 9.2. The Potential Zone of Influence will be updated through the review process in section 5, and will assist, along with water level data and Well Yield Estimates, to identify wells that may be affected in the future by the quarry. The Private Communal Water Supply service will be provided to lots with wells that are affected by the operation of the quarry, and which cannot be restored, through the process set out in section 7. Additional lots that are connected to the PCWS will be added to 9.3.

9.1 Existing Dwellings and Buildings located within the 0.2M PZI

Address	Owner	Building to be connected	PIN
3278 Tremaine Road	Sicard	dwelling	07201-0072
3287 Tremaine Road	Sugiyama	dwelling	24927-0108
3451 Tremaine Road	Robinson	dwelling	24927-0022
3500 Tremaine Road	Eno/Myers	dwelling	07201-0064
3510 Tremaine Road	Hansen	dwelling	07201-0063
3466 Burhamthorpe Road	Bekker	dwelling	24927-0110
5493 No. 1 Sideroad	Featherstone	dwelling	07201-0049
5465 No. 1 Sideroad	Wiggins	dwelling	07201-0048
5300 No. 1 Sideroad	Finucci	dwelling	07201-0062
5244 No. 1 Sideroad	Hendervale	Main House Farm House Cottage	07201-0018

9.2 Existing Vacant Lots of Record located within the 0.2 M PZI

Road	Owner	# on Figure 3	PIN
Tremaine Road	Stevenson	1	07201-0066
Tremaine Road	Robinson	5	24927-0109
Tremaine Road	# 1251638 Ontario Inc.	6	07201 - 0011
No. 1 Sideroad	Ironrose Investments Ltd	2	07201-0104
No. 1 Sideroad	Ironrose Investments Ltd.	7	07201-0097
No. 1 Sideroad	Pelletterio	3	07201-0105

9.3 **Additional Dwellings, Buildings and lots which may be, or are, connected to the private communal water system through the Water Supply Restoration Program in section 7 of the AMP (to be revised as the program progresses).**

Address	Owner	Building	PIN	Status
52544 No. 1 Sideroad	Hendervale	Main Barn well	07201-0018	Potential connection

10.0 DEFINITIONS

In this AMP the following expressions have the meanings set out below.

ARA as defined in subsection 1.8

as Adjusted as defined in subsection 2.2 (b)

Backflow Preventer is the same as Backflow Prevention Device defined in the Regional Municipality of Halton By-law No. 42-04 as amended from time to time

Cistern System as defined in subsection 6.2

Contractor as defined in subsection 6.3

Eligible Properties as defined in subsection 1.3

Eligible Property Owners as defined in subsection 1.3

Hendervale Barn Wells as defined in subsection 6.1

Hydrogeologist as defined in subsection 6.8 (a)

Initial Stage as defined in subsection 1.1

MNR as defined in subsection 5.1 b)

MOE as defined in subsection 5.1 b)
Operative Agreements as defined in subsection 3.1

PCWS as defined in subsection 1.4

Potable Water is defined in subsection 1.4

Pre-existing Wells as defined in subsection 6.7

Private Service means the portion of the Service that is located on private property.

Productive Well as defined in subsection 2.2 d)

PZI as defined in subsection 1.2

Regional Standards means, for the Water Service, the standards required by the Region in By-law Nos. 42-04 and 157-05

Remote Reader means a device used to record the quantity of water and is locted in an area remote from the Water Meter to which it is connected.

Service means the pipe which is connected to a water main distribution system which is designed to carry potable water within the municipal right of way.

Service Valve means a device consisting of a valve and box located at the property boundary for controlling the flow of water to a Private Service.

Sinking Cut Stage as defined in subsection 1.1

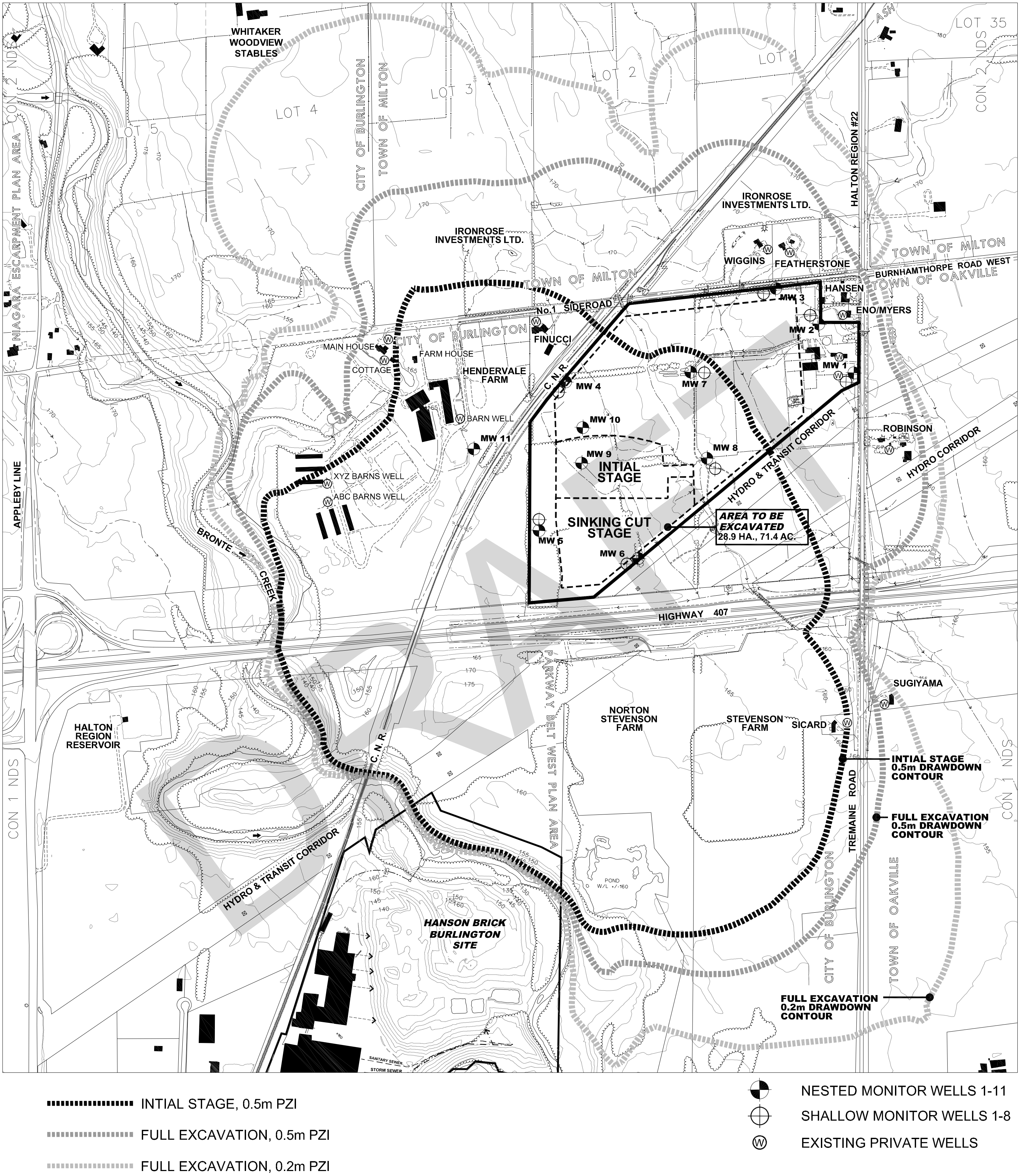
Successful Well Restoration as defined in subsection 6.8 b)

Water Meter means a device or mechanism which is the property of Hanson used for the purpose of measuring the flow and quantity of water consumed.

Water Service means all of the physical and mechanical equipment and devices to fully and completely service a property with water including the Water Meter.

Water Supplier as defined in subsection 6.3

Well Yield Estimate as defined in subsection 2.2 c)



Source: Golder Associates, June 2005

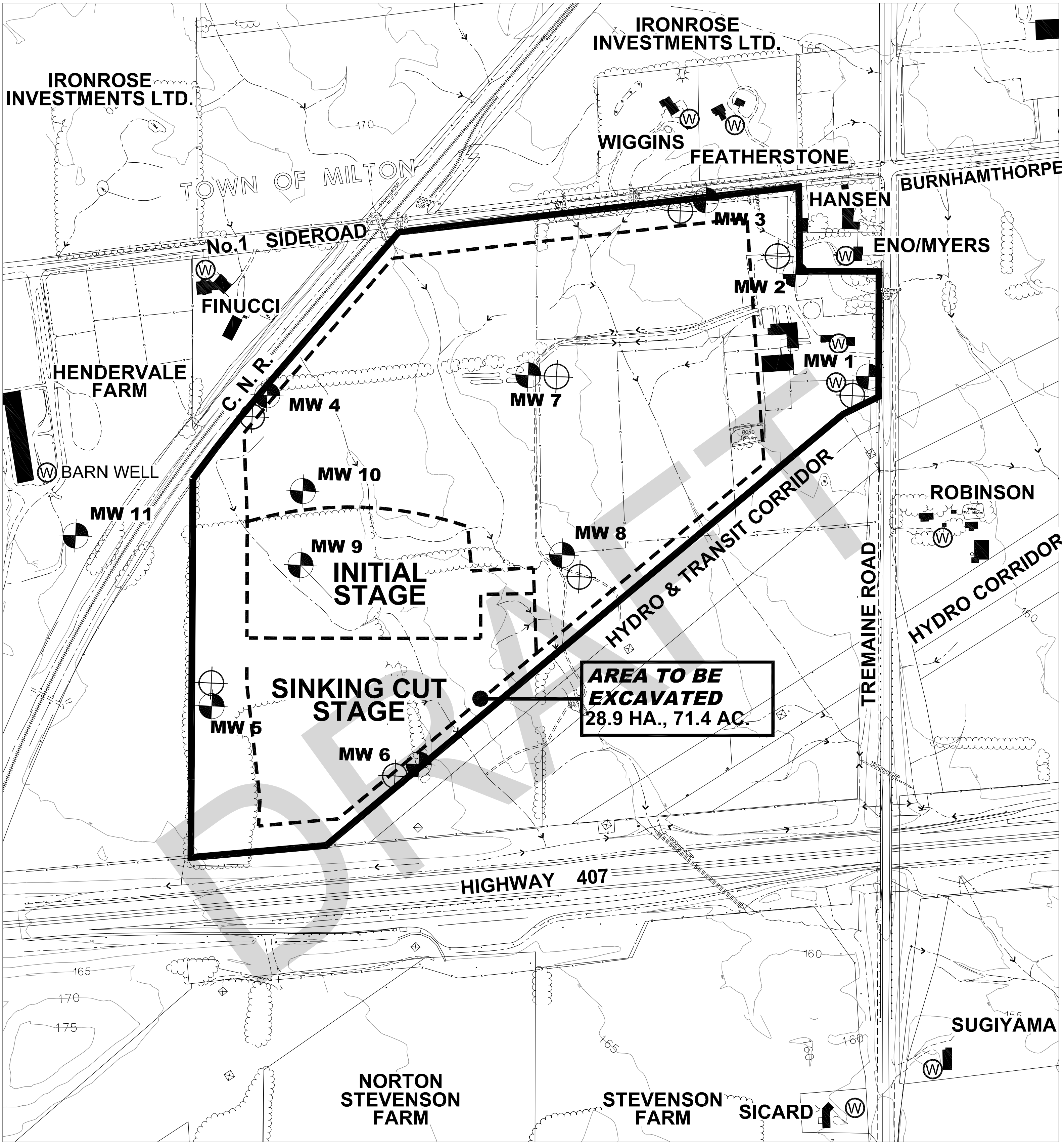
Figure 1

POTENTIAL STEADY STATE ZONES OF INFLUENCE

Scale: 1: 12,500

13 November 2006

Hanson Brick Ltd., Tremaine Quarry
ADAPTIVE GROUNDWATER MANAGEMENT PLAN



EXISTING NESTED MONITOR WELLS MW1-MW8

PROPOSED SHALLOW MONITOR WELLS MWS1-MWS8

PROPOSED SENTINEL WELLS MW9-MW11

Ⓦ EXISTING PRIVATE WELLS

Figure 2

ONSITE MONITOR NETWORK

Scale: 1: 6,000

Source: Golder Associates, June 2005

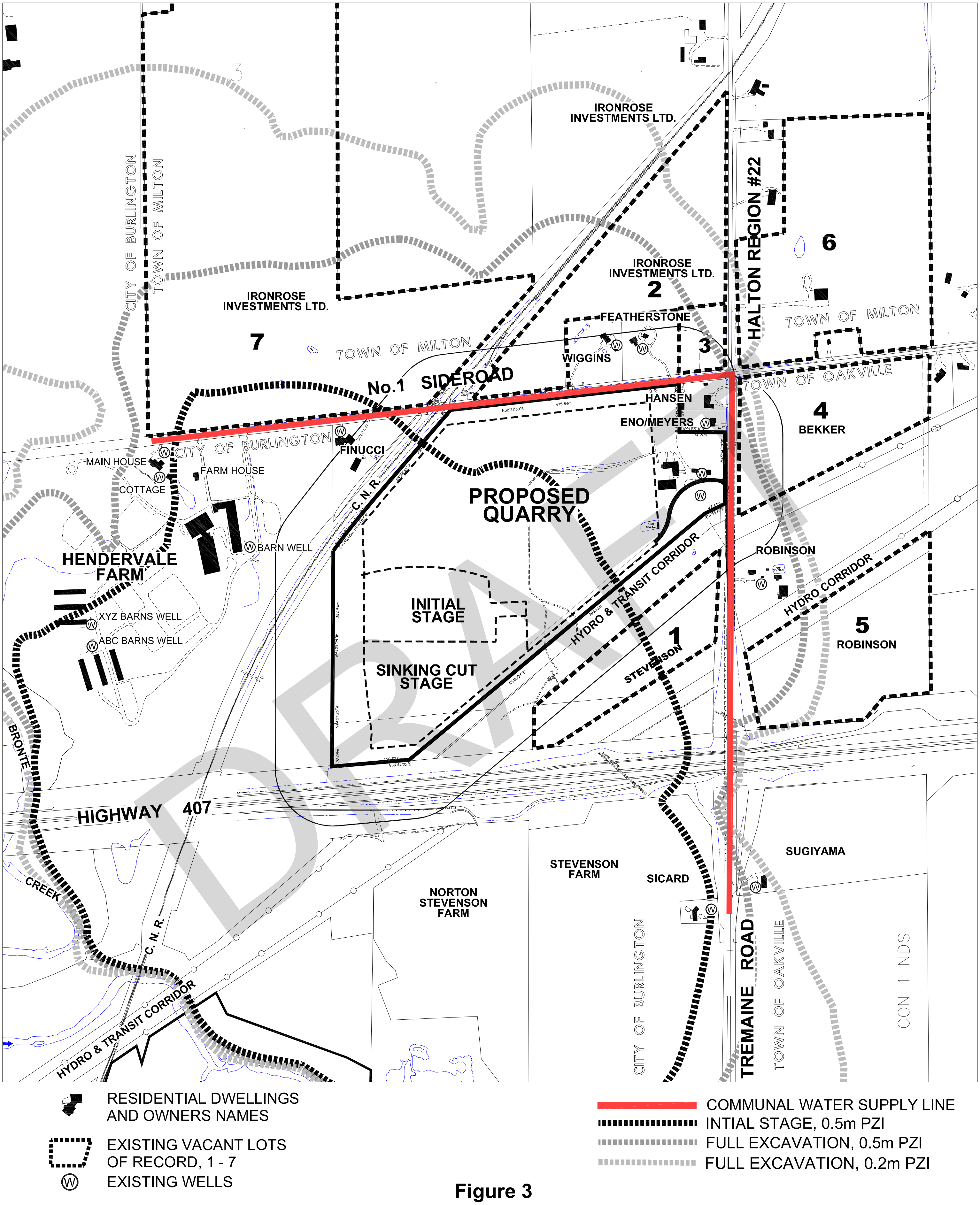
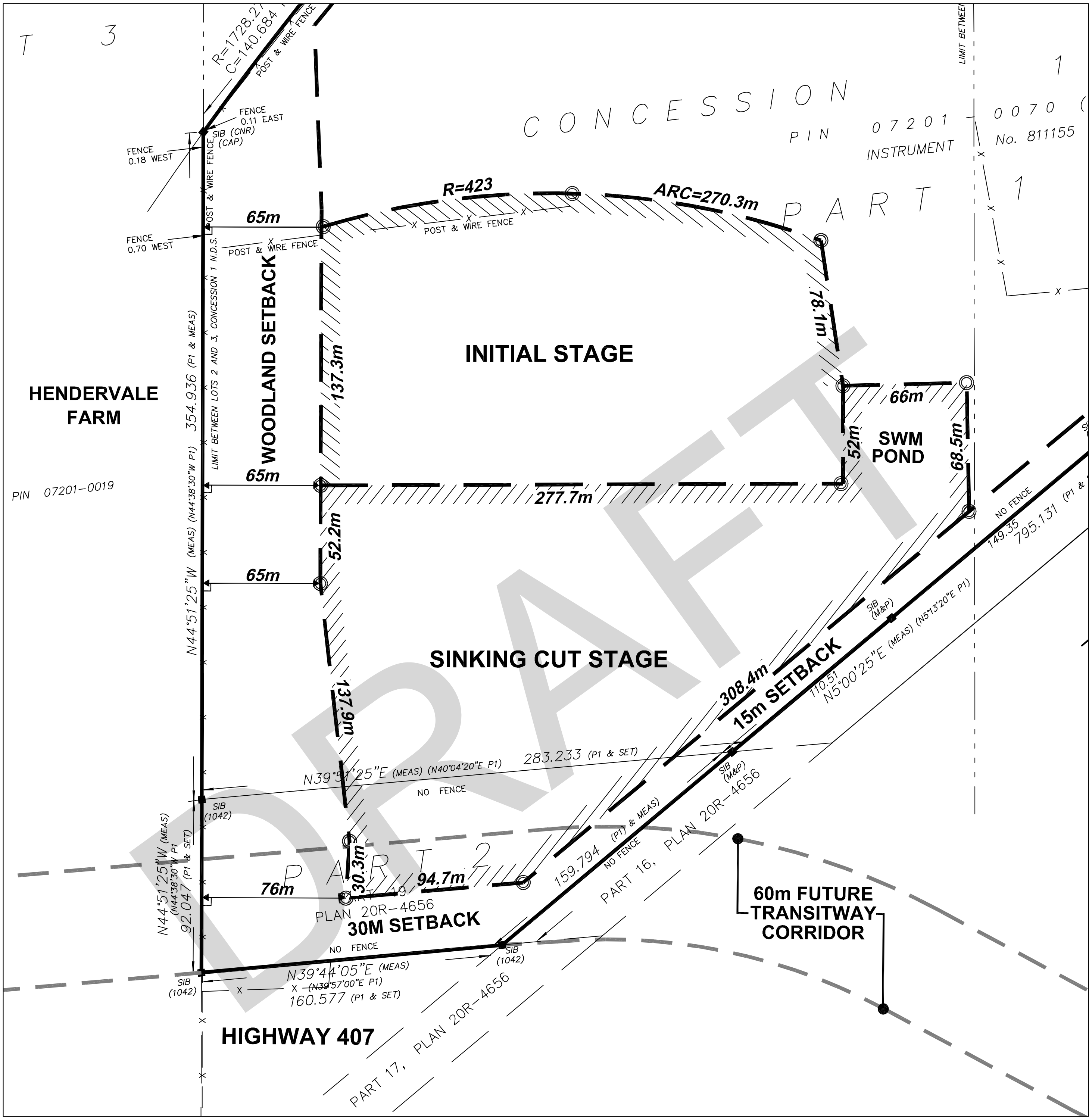


Figure 3

COMMUNAL WATER SUPPLY LINE

Scale: 1 : 10,000

13 November 2006



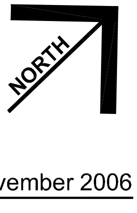
Source: Plan of Survey, 20R-14660 by Mackay Mackay & Peters Limited Completed 21 May 2002.

MAXIMUM DEPTH OF EXCAVATION
TO ELEVATION 130.0 m.a.s.l.

◎ 1.2m WOOD MARKER POSTS

Figure 4

SINKING CUT & INITIAL STAGES



Scale: 1:3,000

13 November 2006

TABLE 1.1 Groundwater Level Monitoring Program

Monitoring well /depth	*Monitoring Frequency*	*Comments*
MW1S	M	Previously called MW01-C
MW1I	M	Previously called MW01-B
MW1D	M	Previously called MW01-A
MW2S	M	Previously called MW02-C
MW2I	M	Previously called MW02-B
MW2D	M	Previously called MW02-A
MW3S / 26-47'	M	Previously called MW03-B
MW3D / 110-130'	C	Previously called MW03-A
MW4S	M	Previously called MW04-C
MW4I	M	Previously called MW04-B
MW4D	M	Previously called MW04-A
MW5S	M	Previously called MW05-C
MW5I	C	Previously called MW05-B
MW5D	M	Previously called MW05-A
MW6S / 10-23'	C	Previously called MW05-B
MW6I / 75-95'	M	Previously called MW05-A
MW7S / 17-27'	M	Previously called MW07-B
MW7D / 125-145'	M	Previously called MW07-A
MW8S	M	Previously called MW08-C
MW8I	M	Previously called MW08-B
MW8D	M	Previously called MW07-A

Notes:

1. **Names for existing wells**
   Original names from Golder Associates (2004); Figures 8, 9, 10 &A.1 to A.8
   Reference: Golder Technical Memorandum, October 16, 2006
   Revised names from R.J. Long Table 1 revised October 28, 2006

2. **Proposed monitoring**
   M: Monthly (manual)
   C: Continuous (pressure transducer)
   MW 1-6 inclusive and MW 11 are intended as permanent monitoring wells as they are located beyond the limit of excavation
   S = Shallow, I = Intermediate, D = Deep Piezometers

TABLE 1.2 Proposed new sentinel dedicated monitoring wells

Monitoring well	*Monitoring Frequency*	*Comments*
MW9S	C	
MW9I	C	
MW9D	C	
MW10S	C	
MW10I	C	
MW10D	C	
MW11S	C	
MW11I	C	
MW11D	C	

TABLE 1.3 Proposed new shallow dedicated monitoring wells

Monitoring well	*Monitoring Frequency*	*Comments*
MWS1	C	
MWS2	C	
MWS3	C	
MWS4	C	
MWS5	C	
MWS6	C	
MWS7	C	
MWS8	C	

TABLE 1.4 Domestic wells

*Domestic well**	*Monitoring Frequency*	*Comments*
Featherstone	C	
Finucci	C	
Proud	C	
Hendervale Main House	C	
Hendervale Cottage	C	
Hendervale Main Barn	C	
Hendervale ABC Barns	C	
Hendervale XYZ Barns	C	
All other available wells	M	

Notes:

* Subject to receiving Owner's permission

TABLE 2 Groundwater Quality Monitoring Program

General Chemistry	Anions	Metals	Other
Alkalinity, ammonia as N, nitrate as N, nitrite as N, hardness, pH, TSS, turbidity, sulphide.	bromide, chloride, fluoride, sulphate.	aluminium, antimony, arsenic, barium, beryllium, bismuth, boron, cadmium, calcium, chromium, cobalt, copper, free cyanide, iron, lead, magnesium, manganese, mercury, molybdenum, nickel, phosphate, phosphorous, total phosphorous, potassium, selenium, silicon, silver, sodium, strontium, thallium, tin, titanium, uranium, vanadium, zinc.	Phenols

NOTE: ANNUAL REVISIONS TO TABLES 1 AND 2 AND THE ADAPTIVE GROUNDWATER MANAGEMENT PLAN, THROUGH ANNUAL REPORT REVIEW AND APPROVAL, WILL NOT REQUIRE FORMAL AMENDMENTS TO THE AMP AGREEMENT, PTTW CONDITIONS OR SITE PLAN.

SCHEDULE 1

Expedited Arbitration for Technical Disputes

The following rules and procedure shall apply to any matter to be arbitrated by the Parties (Hanson, the Region, and Well Owner) under subsection 7.5 of the AMP

1. INITIATION OF ARBITRATION PROCEEDINGS

a) A Party wishing to initiate Expedited Arbitration shall send out a Notice of Technical Arbitration to the other Parties setting out the particulars of the matter in dispute and name a Technical Arbitrator (defined below) who is available to decide the matter within the time periods specified in this schedule.

b) For the purposes of this Schedule, a Technical Arbitrator shall mean an individual agreed between the Parties as being qualified in the subject matter of the dispute. The Technical Arbitrator shall be at arm's length from the Parties and shall not be a member of any firm regularly retained by any of the Parties. Hanson and the Region will establish a list of Technical Arbitrators and may add to or delete from the list upon mutual agreement between the Hanson and the Region.

2. EXCHANGE OF WRITTEN SUBMISSIONS

a) Within twenty-one (21) days after the delivery of the Notice of Technical Arbitration, each party shall send the other Parties and the Technical Arbitrator a statement ("the Written Submissions") setting out in sufficient detail, the facts and any contentions of law on which it relies, and the relief that it is seeking. The Written Submissions shall be accompanied by copies of all essential documents on which the party concerned relies and which have not previously been submitted by any party.

b) Within twenty-one (21) days of the receipt of the Written Submissions the Technical Arbitrator shall hold a hearing to determine the dispute. Further the Parties agree to continue to negotiate in good faith to attempt to resolve the dispute up to the date of such hearing.

3. DECISION

a) The Technical Arbitrator shall decide the procedure for the hearing to ensure that the dispute is resolved as fairly, efficiently and cost effectively as possible. By submitting to arbitration under this Schedule, the Parties shall be taken to have conferred on the Technical Arbitrator the jurisdiction and powers set out in this Schedule.

b) The Technical Arbitrator will send her or his decision to the Parties as soon as practicable after the conclusion of the hearing.

c) Any decision made by the Technical Arbitrator is final and binding.

4. COSTS OF ARBITRATION

Hanson will pay for the administrative costs of the arbitration including the costs of the Technical Arbitrator, and costs for the room, if any. Each party will bear its own costs in the arbitration.

5. ARBITRATIONS ACT

The rules and procedures of the Arbitrations Act shall apply to any arbitration undertaken hereunder except to the extent that they are modified by express provisions of this Schedule.

Ministry of the Environment
Ministère de l'Environnement

PERMIT TO TAKE WATER

Ground Water

NUMBER 1718-8WPJUV

Pursuant to Section 34 of the Ontario Water Resources Act, R.S.O. 1990 this Permit To Take Water is hereby issued to:

Hanson Brick Ltd./Briques Hanson Ltee
5155 Dundas St W P.O. Box 248
Burlington, Ontario, L7R 3Y2
Canada

For the water taking from: Tansley Quarry - Quarry Sump
3488 Tremaine Road

Located at: Part 1 & 2, Reference Plan 20R-14660
Burlington, Regional Municipality of Halton

For the purposes of this Permit, and the terms and conditions specified below, the following definitions apply:

DEFINITIONS

(a) "Director" means any person appointed in writing as a Director pursuant to section 5 of the OWRA for the purposes of section 34, OWRA.

(b) "Provincial Officer" means any person designated in writing by the Minister as a Provincial Officer pursuant to section 5 of the OWRA.

(c) "Ministry" means Ontario Ministry of the Environment.

(d) "District Office" means the Halton-Peel District Office.

(e) "Permit" means this Permit to Take Water No. 1718-8WPJUV including its Schedules, if any, issued in accordance with Section 34 of the OWRA.

(f) "Permit Holder" means Hanson Brick Ltd./Briques Hanson Ltee.

(g) "OWRA " means the *Ontario Water Resources Act*, R.S.O. 1990, c. O. 40, as amended.

You are hereby notified that this Permit is issued subject to the terms and conditions outlined below:

TERMS AND CONDITIONS

1. Compliance with Permit

1.1 Except where modified by this Permit, the water taking shall be in accordance with the application for this Permit To Take Water, dated May 29, 2012 and signed by John A. Hewitt, and all Schedules included in this Permit.

1.2 The Permit Holder shall ensure that any person authorized by the Permit Holder to take water under this Permit is provided with a copy of this Permit and shall take all reasonable measures to ensure that any such person complies with the conditions of this Permit.

1.3 Any person authorized by the Permit Holder to take water under this Permit shall comply with the conditions of this Permit.

1.4 This Permit is not transferable to another person.

1.5 This Permit provides the Permit Holder with permission to take water in accordance with the conditions of this Permit, up to the date of the expiry of this Permit. This Permit does not constitute a legal right, vested or otherwise, to a water allocation, and the issuance of this Permit does not guarantee that, upon its expiry, it will be renewed.

1.6 The Permit Holder shall keep this Permit available at all times at or near the site of the taking, and shall produce this Permit immediately for inspection by a Provincial Officer upon his or her request.

1.7 The Permit Holder shall report any changes of address to the Director within thirty days of any such change. The Permit Holder shall report any change of ownership of the property for which this Permit is issued within thirty days of any such change. A change in ownership in the property shall cause this Permit to be cancelled.

2. General Conditions and Interpretation

2.1 Inspections
The Permit Holder must forthwith, upon presentation of credentials, permit a Provincial Officer to carry out any and all inspections authorized by the OWRA, the *Environmental Protection Act* , R.S.O. 1990, the *Pesticides Act* , R.S.O. 1990, or the *Safe Drinking Water Act,* S. O. 2002.

2.2 Other Approvals
The issuance of, and compliance with this Permit, does not:

(a) relieve the Permit Holder or any other person from any obligation to comply with any other applicable legal requirements, including the provisions of the *Ontario Water Resources Act* , and the *Environmental Protection Act* , and any regulations made thereunder; or

(b) limit in any way any authority of the Ministry, a Director, or a Provincial Officer, including the authority to require certain steps be taken or to require the Permit Holder to furnish any further information related to this Permit.

2.3 Information

The receipt of any information by the Ministry, the failure of the Ministry to take any action or require any person to take any action in relation to the information, or the failure of a Provincial Officer to prosecute any person in relation to the information, shall not be construed as:

(a) an approval, waiver or justification by the Ministry of any act or omission of any person that contravenes this Permit or other legal requirement; or

(b) acceptance by the Ministry of the information's completeness or accuracy.

2.4 Rights of Action

The issuance of, and compliance with this Permit shall not be construed as precluding or limiting any legal claims or rights of action that any person, including the Crown in right of Ontario or any agency thereof, has or may have against the Permit Holder, its officers, employees, agents, and contractors.

2.5 Severability

The requirements of this Permit are severable. If any requirements of this Permit, or the application of any requirements of this Permit to any circumstance, is held invalid or unenforceable, the application of such requirements to other circumstances and the remainder of this Permit shall not be affected thereby.

2.6 Conflicts

Where there is a conflict between a provision of any submitted document referred to in this Permit, including its Schedules, and the conditions of this Permit, the conditions in this Permit shall take precedence.

3. Water Takings Authorized by This Permit

3.1 Expiry

This Permit expires on **December 17, 2014**. No water shall be taken under authority of this Permit after the expiry date.

3.2 Amounts of Taking Permitted

The Permit Holder shall only take water from the source, during the periods and at the rates and amounts of taking specified in Table A. Water takings are authorized only for the purposes specified in Table A.

Table A

	Source Name / Description:	Source: Type:	Taking Specific Purpose:	Taking Major Category:	Max. Taken per Minute (litres):	Max. Num. of Hrs Taken per Day:	Max. Taken per Day (litres):	Max. Num. of Days Taken per Year:	Zone/ Easting/ Northing:
1	Quarry Sump	Well Dug	Other - Dewatering	Dewatering	3,000	24	4,320,000	365	17 596217 4808863
						Total Taking:			

3.3 **Beginning December 31, 2012**, no water may be taken under this Permit until written consent is given by the Director that the information required to be submitted under Condition 4.2 is an acceptable assessment of possible impacts to the natural receiver(s) resulting from the discharge.

4. Monitoring

4.1 The Permit Holder shall, on each day water is taken under the authorization of this Permit, record the date, the volume of water taken on that date and the rate at which it was taken. The daily volume of water taken shall be measured by a flow meter. A separate record shall be maintained for each source. The Permit Holder shall keep all records required by this condition current and available at or near the site of the taking and shall produce the records immediately for inspection by a Provincial Officer upon his or her request. The Permit Holder, unless otherwise required by the Director, shall submit, on or before March 31st in every year, the daily water taking data collected and recorded for the previous year to the ministry's Water Taking Reporting System.

4.2 **Prior to November 30, 2012**, the Permit Holder shall submit a letter report prepared by a qualified professional confirming the ability of the natural receiver(s) to accept the discharge with no negative effects.

4.3 The Permit Holder shall implement the effluent management and monitoring plan and groundwater monitoring and mitigation plan as outlined in the Adaptive Management Plan of the Aggregate Resources Act (ARA) Licence (Pit Licence) referenced in Item 2 of Schedule A of this Permit.

4.4 The Permit Holder shall prepare an annual monitoring report which presents and interprets the monitoring data. The report shall also include an assessment of the long term impacts of the taking and any recommendations to alter the groundwater monitoring program identified in the "Adaptive Management Plan" Agreement or the general dewatering operations. The report shall be submitted to the Director by March 31 of each year and include the monitoring data for the 12 month period ending December 31 of the previous year, as well as historic data.

4.5 Any application submitted to the Ministry for renewal or amendment of this Permit shall be accompanied by all records and assessments required by the conditions of this Permit. The application shall also include a report prepared by a qualified hydrogeologist licensed to practice in Ontario, which interprets the data, predicts long term trends and makes recommendations regarding the groundwater taking and monitoring requirements. The report shall also document all well interference complaints and water supply/replacement activities.

4.6 If an application is submitted to the Ministry of Natural Resources (MNR) to amend the Adaptive Management Plan, that relates to either groundwater or surface water monitoring or mitigation programs being used under the authority of this permit, then the Director shall be notified forthwith.

5. Impacts of the Water Taking

5.1 Notification
The Permit Holder shall immediately notify the local District Office of any complaint arising from the taking of water authorized under this Permit and shall report any action which has been taken or is proposed with regard to such complaint. The Permit Holder shall immediately notify the local District Office if the taking of water is observed to have any significant impact on the surrounding waters. After hours, calls shall be directed to the Ministry's Spills Action Centre at 1-800-268-6060.

5.2 For Groundwater Takings
If the taking of water is observed to cause any negative impact to other water supplies obtained from any adequate sources that were in use prior to initial issuance of a Permit for this water taking, the Permit Holder shall take such action necessary to make available to those affected, a supply of water equivalent in quantity and quality to their normal takings, or shall compensate such persons for their reasonable costs of so doing, or shall reduce the rate and amount of taking to prevent or alleviate the observed negative impact. Pending permanent restoration of the affected supplies, the Permit Holder shall provide, to those affected, temporary water supplies adequate to meet their normal requirements, or shall compensate such persons for their reasonable costs of doing so.

If permanent interference is caused by the water taking, the Permit Holder shall restore the water supplies of those permanently affected.

5.3 The discharge shall be carried out in such a manner as to prevent the disruption of any fish, invertebrates, or sediment in the receiving waters.

5.4 The Permit Holder shall regulate the discharge rate such that there is no flooding to the receiving waters.

5.5 The discharge of water shall be controlled in such a way as to avoid erosion and sedimentation in the receiving waters. If necessary, headers to distribute the flow, and filtration/settling devises, shall be used to reduce velocity and eliminate erosion and turbidity during discharge.

6. **Director May Amend Permit**
The Director may amend this Permit by letter requiring the Permit Holder to suspend or reduce the taking to an amount or threshold specified by the Director in the letter. The suspension or reduction in taking shall be effective immediately and may be revoked at any time upon notification by the Director. This condition does not affect your right to appeal the suspension or reduction in taking to the Environmental Review Tribunal under the *Ontario Water Resources Act* , Section 100 (4).

The reasons for the imposition of these terms and conditions are as follows:

1. Condition 1 is included to ensure that the conditions in this Permit are complied with and can be enforced.

2. Condition 2 is included to clarify the legal interpretation of aspects of this Permit.

3. Conditions 3 through 6 are included to protect the quality of the natural environment so as to safeguard the ecosystem and human health and foster efficient use and conservation of waters. These conditions allow for the beneficial use of waters while ensuring the fair sharing, conservation and sustainable use of the waters of Ontario. The conditions also specify the water takings that are authorized by this Permit and the scope of this Permit.

In accordance with Section 100 of the Ontario Water Resources Act, R.S.O. 1990, you may by written notice served upon me, the Environmental Review Tribunal and the Environmental Commissioner, ***Environmental Bill of Rights****, R.S.O. 1993, Chapter 28, within 15 days after receipt of this Notice, require a hearing by the Tribunal. The Environmental Commissioner will place notice of your appeal on the Environmental Registry. Section 101 of the Ontario Water Resources Act, as amended provides that the Notice requiring a hearing shall state:*

1. The portions of the Permit or each term or condition in the Permit in respect of which the hearing is required, and;
2. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

In addition to these legal requirements, the Notice should also include:

3. The name of the appellant;
4. The address of the appellant;
5. The Permit to Take Water number;
6. The date of the Permit to Take Water;
7. The name of the Director;
8. The municipality within which the works are located;

This notice must be served upon:

The Secretary
Environmental Review Tribunal
655 Bay Street, 15th Floor
Toronto ON
M5G 1E5
Fax: (416) 314-4506
Email:
ERTTribunalsecretary@ontario.ca

AND

The Environmental Commissioner
1075 Bay Street
6th Floor, Suite 605
Toronto, Ontario M5S 2W5

AND

The Director, Section 34
Ministry of the Environment
8th Floor
5775 Yonge St
Toronto ON M2M 4J1
Fax: (416)325-6347

Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal:

by telephone at (416) 314-4600 ***by fax at (416) 314-4506*** ***by e-mail at www.ert.gov.on.ca***

This instrument is subject to Section 38 of the ***Environmental Bill of Rights*** *that allows residents of Ontario to seek leave to appeal the decision on this instrument. Residents of Ontario may seek to appeal for 15 days from the date this decision is placed on the Environmental Registry. By accessing the Environmental Registry, you can determine when the leave to appeal period ends.*

Dated at Toronto this 14th day of September, 2012.

Dan Orr
Director, Section 34
Ontario Water Resources Act , R.S.O. 1990

Schedule A

This Schedule "A" forms part of Permit To Take Water 1718-8WPJUV, dated September 14, 2012.

1. Application for a Permit to Take Water signed by John A. Hewitt and dated May 29, 2012.

2. Golder Associates Ltd., Application for Permit to Take Water, Hanson Brick Ltd, - Tansley Quarry, Burlington, Ontario. Dated May 16, 2012. Attachments.

3. Hanson Brick Ltd., Tremaine Quarry Applications, Adaptive Groundwater Management Plan (AMP), Law File 2002-516, 24 pages, not dated.

Ministry of the Environment
Ministère de l'Environnement
Ontario

CERTIFICATE OF APPROVAL
INDUSTRIAL SEWAGE WORKS
NUMBER 4408-7AUL75
Issue Date: February 4, 2008

Hanson Brick Ltd.
5155 Dundas St W PO Box 248
Burlington, Ontario
L7R 3Y2

Site Location: Tansley Quarry
West Side of Tremaine Rd South Side of No. 1 Sideroad
Burlington City, Regional Municipality of Halton

You have applied in accordance with Section 53 of the Ontario Water Resources Act for approval of:

the establishment of sewage works for the collection, transmission, treatment and disposal of groundwater and surface water accumulating in the confines of the excavated area of the quarry , consisting of the following:

- one (1) sump, with minimum measurements of 10 metres wide, 10 metres long and 2 metres deep, equipped with a pump operating at a minimum of 300 litres per minute, discharging to the decant pond;
- one (1) decant pond with a total active volume of 2,900 cubic metres and a sediment storage volume of approximately 1,225 cubic metres, discharging via an outlet control structure, consisting of a hickenbottom structure with a 150 millimetre diameter reverse gradient pipe, control manhole and 300 millimetre diameter discharge pipe with a control valve, to an existing watercourse that drains to 14 Mile Creek;
- all other controls, electrical equipment, instrumentation, piping, pumps, valves and appurtenances essential for the proper operation of the aforementioned sewage works;

all in accordance with the following submitted supporting documents:

1. Application for Approval of Industrial Sewage Works submitted by Stephen Luckett of Hanson Brick Ltd. dated October 30, 2007;
2. Tansley Quarry - Design Report for Industrial Storm Drainage, dated November 2007, prepared by Long Environmental Consultants Inc.;
3. Electronic mail and attachments dated December 18, 2007 and January 14, 2008 from Bob Long of Long Environmental Consultants Inc. to Randy Chin of the Ministry of the Environment.

RECEIVED
FEB 06 2008

For the purpose of this Certificate of Approval and the terms and conditions specified below, the following definitions apply:

"Certificate" means this entire certificate of approval document, issued in accordance with Section 53 of the *Ontario Water Resources Act* , and includes any schedules;

"Director" means any Ministry employee appointed by the Minister pursuant to section 5 of the *Ontario Water Resources Act* ;

"District Manager" means the District Manager of the Halton-Peel District Office of the Ministry;

"Ministry" means the Ontario Ministry of the Environment;

"Owner" means Hanson Brick Ltd. and includes its successors and assignees; and

"works" means the sewage works described in the Owner's application, this certificate and in the supporting documentation referred to herein, to the extent approved by this certificate.

You are hereby notified that this approval is issued to you subject to the terms and conditions outlined below:

TERMS AND CONDITIONS

1. GENERAL CONDITION

(1) Except as otherwise provided by these Conditions, the Owner shall design, build, install, operate and maintain the works in accordance with the description given in this Certificate, the application for approval of the works and the submitted supporting documents and plans and specifications as listed in this Certificate.

(2) Where there is a conflict between a provision of any submitted document referred to in this Certificate and the Conditions of this Certificate, the Conditions in this Certificate shall take precedence, and where there is a conflict between the listed submitted documents, the document bearing the most recent date shall prevail.

2. CHANGE OF OWNER

(1) The Owner shall notify the District Manager and the Director, in writing, of any of the following changes within 30 days of the change occurring:

(a) change of Owner or operating authority, or both;

(b) change of address of Owner or operating authority or address of new owner or operating authority;

(c) change of partners where the Owner or operating authority is or at any time becomes a partnership, and a copy of the most recent declaration filed under the *Partnerships Registration Act* ;

(d) change of name of the corporation where the Owner or operator is or at any time becomes a corporation, and a copy of the most current "Initial Notice or Notice of Change" (Form 1, 2 or 3 of O. Reg. 189, R.R.O. 1980, as amended from time to time), filed under the *Corporations Information Act* shall be included in the notification to the District Manager;

(2) In the event of any change in ownership of the works, the Owner shall notify in writing the succeeding owner of the existence of this certificate, and a copy of such notice shall be forwarded to the District Manager.

(3) The Owner shall ensure that all communications made pursuant to this condition will refer to this certificate's number.

3. OPERATIONS MANUAL

(1) The Owner shall prepare an operations manual prior to the commencement of operation of the sewage works, that includes, but not necessarily limited to, the following information:

(a) operating procedures for routine operation of the works;

(b) inspection programs, including frequency of inspection, for the works and the methods or tests employed to detect when maintenance is necessary;

(c) repair and maintenance programs, including the frequency of repair and maintenance for the works;

(d) contingency plans and procedures for dealing with potential spill, bypasses and any other abnormal situations and for notifying the District Manager; and

(e) complaint procedures for receiving and responding to public complaints.

(2) The Owner shall maintain the operations manual up to date through revisions undertaken from time to time and retain a copy at the location of the sewage works. Upon request, the Owner shall make the manual available for inspection and copying by Ministry personnel.

4. DISCHARGE OPERATIONS

(1) The decant pond shall be operated on a batch discharge basis such that the contents of the pond is allowed to settle for a period of at least 24 hours.

(2) Prior to initiating discharge from the decant pond, the Owner shall undertake pre-release water quality sampling, consisting of:

(a) the collection of a 4-Part composite sample, consisting of 4 grab samples from different locations in the pond; with

(b) the sample being analyzed for Total Suspended Solids and visible sheen; and

(c) analytical results conforming to Conditons 5 and 6.

5. EFFLUENT LIMITS

(1) The Owner shall design, construct and operate the works such that the concentrations of the materials named below as effluent parameters are not exceeded in the effluent from the works.

Table 1 - Effluent Limits

Effluent Parameter	**Concentration Limit** (milligrams per litre unless otherwise indicated)
Column 1	Column 2
Total Suspended Solids	15
Oil and Grease	10

(2) For the purposes of determining compliance with and enforcing subsection (1), non-compliance with respect to a Concentration Limit is deemed to have occurred when any single sample analyzed for a parameter named in Column 1 of subsection (1) is greater than the corresponding maximum concentration set out in Column 2 of subsection (1).

6. EFFLUENT - VISUAL OBSERVATIONS

Notwithstanding any other condition in this certificate, the Owner shall ensure that the effluent from the works is essentially free of floating and settleable solids and does not contain oil or any other substance in amounts sufficient to create a visible film, sheen or foam on the receiving waters.

7. EFFLUENT MONITORING AND RECORDING

The Owner shall, upon commencement of operation of the sewage works, carry out the following monitoring program:

(1) All samples and measurements taken for the purposes of this certificate are to be taken at a time and in a location characteristic of the quality and quantity of the effluent stream over the time period being monitored.

(2) Samples shall be collected of the contents of the decant pond prior to each discharge with samples analyzed for each parameter listed in Table 2:

Table 2 - Effluent Monitoring	
Frequency	Once each day of discharge
Sample Type	Grab
Parameters	Total Suspended Solids, Oil and Grease, Chloride, Sulphate, Boron, Iron and Zinc

(3) The methods and protocols for sampling, analysis and recording shall conform to the methods and protocols specified in the Ministry's publication "Protocol for the Sampling and Analysis of Industrial/Municipal Wastewater" (August 1994), ISBN 0-7778-1880-9, as amended from time to time by more recently published editions.

(4) A continuous flow measuring device shall be installed and maintained to measure the flowrate of the effluent from the sewage works, with an accuracy to within plus or minus 15 per cent of the actual flowrate for the entire design range of the flow measuring device and the Owner shall measure, record and calculate the flowrate for each effluent stream on each day of sampling.

(5) The Owner shall retain for a minimum of three (3) years from the date of their creation, all records and information related to or resulting from the monitoring activities required by this certificate.

8. REPORTING

(1) One week prior to the start up of the operation of the works, the Owner shall notify the District Manager (in writing) of the pending start up date.

(2) In addition to the obligations under Part X of the *Environmental Protection Act* , the Owner shall, within 10 working days of the occurrence of any reportable spill as defined in Ontario Regulation 675/98, bypass or loss of any product, by-product, intermediate product, oil, solvent, waste material or any other polluting substance into the environment, submit a full written report of the occurrence to the District Manager describing the cause and discovery of the spill or loss, clean-up and recovery measures taken, preventative measures to be taken and schedule of implementation.

(3) The Owner shall prepare and submit a performance report to the District Manager on an annual basis within ninety (90) days following the end of the period being reported upon. The first such report shall cover the first annual period following the commencement of operation of the works and subsequent reports shall be submitted to cover successive annual periods following thereafter. The reports shall contain, but shall not be limited to, the following information:

(a) a summary and interpretation of all monitoring data and a comparison to the effluent limits outlined in Condition 4, including an overview of the success and adequacy of the sewage works;

(b) a description of any operating problems encountered and corrective actions taken;

(c) a summary of all maintenance carried out on any major structure, equipment, apparatus, mechanism or thing forming part of the sewage works;

(d) a summary of any effluent quality assurance or control measures undertaken in the reporting period;

(e) a summary of the calibration and maintenance carried out on all effluent monitoring equipment.

The reasons for the imposition of these terms and conditions are as follows:

1. Condition 1 is imposed to ensure that the works are built and operated in the manner in which they were described for review and upon which approval was granted. This condition is also included to emphasize the precedence of Conditions in the Certificate and the practice that the Approval is based on the most current document, if several conflicting documents are submitted for review.

2. Condition 2 is included to ensure that the Ministry records are kept accurate and current with respect to approved works and to ensure that subsequent owners of the works are made aware of the certificate and continue to operate the works in compliance with it.

3. Condition 3 is included to ensure that a comprehensive operations manual governing all significant areas of operation, maintenance and repair is prepared, implemented and kept up-to-date by the owner and made available to the Ministry. Such a manual is an integral part of the operation of the works. Its compilation and use should assist the owner in staff training, in proper plant operation and in identifying and planning for contingencies during possible abnormal conditions. The manual will also act as a benchmark for Ministry staff when reviewing the owner's operation of the work.

4. Conditions 4, 5 and 6 are imposed to ensure that the effluent discharged from the works and meets the Ministry's effluent quality requirements thus minimizing environmental impact on the receiver.

6. Condition 7 is included to require the owner to demonstrate on a continual basis that the quality of the effluent from the approved works is consistent with the effluent limits specified in the certificate and that the approved works does not cause any impairment to the receiving watercourse.

7. Condition 8 is included to provide a performance record for future references and to ensure that the Ministry is made aware of problems as they arise, so that the Ministry can work with the Owner in resolving the problems in a timely manner.

In accordance with Section 100 of the Ontario Water Resources Act, R.S.O. 1990, Chapter 0.40, as amended, you may by written notice served upon me and the Environmental Review Tribunal and in accordance with Section 47 of the Environmental Bill of Rights, S.O. 1993, Chapter 28, the Environmental Commissioner, within 15 days after receipt of this Notice, require a hearing by the Tribunal. The Environmental Commissioner will place notice of your appeal on the Environmental Registry. Section 101 of the Ontario Water Resources Act, R.S.O. 1990, Chapter 0.40, provides that the Notice requiring the hearing shall state:

1. The portions of the approval or each term or condition in the approval in respect of which the hearing is required, and;
2. The grounds on which you intend to rely at the hearing in relation to <u>each</u> portion appealed.

The Notice should also include:

3. The name of the appellant;
4. The address of the appellant;
5. The Certificate of Approval number;
6. The date of the Certificate of Approval;
7. The name of the Director;
8. The municipality within which the works are located;

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary*
Environmental Review Tribunal
2300 Yonge St., Suite 1700
P.O. Box 2382
Toronto, Ontario
M4P 1E4

<u>AND</u>

The Environmental Commissioner
1075 Bay Street, 6th Floor
Suite 605
Toronto, Ontario
M5S 2B1

<u>AND</u>

The Director
Section 53, *Ontario Water Resources Act*
Ministry of the Environment
2 St. Clair Avenue West, Floor 12A
Toronto, Ontario
M4V 1L5

*** Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 314-4600, Fax: (416) 314-4506 or www.ert.gov.on.ca**

This instrument is subject to Section 38 of the <u>Environmental Bill of Rights</u>, that allows residents of Ontario to seek leave to appeal the decision on this instrument. Residents of Ontario may seek leave to appeal within 15 days from the date this decision is placed on the Environmental Registry. By accessing the Environmental Registry at www.ene.gov.on.ca, you can determine when the leave to appeal period ends.

The above noted sewage works are approved under Section 53 of the Ontario Water Resources Act.

DATED AT TORONTO this 4th day of February, 2008

Mansoor Mahmood, P.Eng.
Director
Section 53, *Ontario Water Resources Act*

RC/
c: District Manager, MOE Halton-Peel
Robert J. Long, Long Environmental Consultants Inc.

APPENDIX B

Borehole Logs

PROJECT: 021-1228

RECORD OF DRILLHOLE: MW1

SHEET 1 OF 5

LOCATION: Refer to Plan
DRILLING DATE: Oct.1-3, 2002
DATUM:
INCLINATION: -90°   AZIMUTH: ---
DRILL RIG: CME 75
DRILLING CONTRACTOR: ALL TERRAIN DRILLING

FR/FX-FRACTURE F-FAULT SM-SMOOTH FL-FLEXURED BC-BROKEN CORE
CL-CLEAVAGE J-JOINT R-ROUGH UE-UNEVEN MB-MECH. BREAK
SH-SHEAR P-POLISHED ST-STEPPED W-WAVY B-BEDDING
VN-VEIN S-SLICKENSIDED PL-PLANAR C-CURVED

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	ELEV. DEPTH (m)	RUN No.	DISCONTINUITY DATA TYPE AND SURFACE DESCRIPTION	NOTES WATER LEVELS INSTRUMENTATION
		GROUND SURFACE	163.80			
0	Overburden	One inch of grass sod overlying a rooty, moist SILT, trace clay, trace cobble, firm. (OH)	0.00			
		Compositional change: Firm/compact, fine SAND and SILT, brown, moist, rooty, occ. cobbles, rounded to sub-rounded. (TILL) (ML)	163.50 0.30			BENTONITE SEAL
1		TILL, Grades to very hard clay till, moist to slightly moist (almost dry), trace silt, trace gravel, no roots. Colour is mottled brown (more silty) and blue-grey (more clayey). (ML-CL)	162.66 1.14			
2						
3		Grades to firm-hard, dark grey to brown grey CLAY and SILT TILL. Slightly less firm than above, trace gravel. (ML-CL)	160.22 3.58			
4		Change to a moist, firm/hard clayey fine sand till (grey coloured). (ML-SM)	159.38 4.42			
		Dry, crumbly, gravelly silt and clay till.	159.08 4.72			SAND
5		Grey, firm-hard, moist SILT and CLAY TILL, gravelly, occ. cobble. (GM-ML)	4.88			
		Brown, moist-dry, fine to firm-hard CLAY and SILT TILL.	158.08 5.72			
6		Brown, moist-dry, fine to firm-hard SILTY SAND TILL.	157.75 6.05			
		Brown-grey, moist-dry, hard CLAY TILL, occ. cobbles, gravelly. (GM-CL) Basal TILL	157.44 6.36			
7		Brown-grey, dry, cobbly SANDY TILL, very hard, dry. (SM)	156.56 7.24			
8		Light brown-grey, dry, hard SANDY SILT TILL, occ. cobbles. (SM)	155.65 8.15			BENTONITE SEAL
9						
	RQ Core	Very weak to weak, moderate to highly weathered red SHALE.	154.25 9.55	1	B,J BC	
10						

CONTINUED NEXT PAGE

DEPTH SCALE
1 : 50

Golder Associates

LOGGED: MR
CHECKED:

PROJECT: 021-1228

RECORD OF DRILLHOLE: MW1

SHEET 2 OF 5

LOCATION: Refer to Plan

INCLINATION: -90° AZIMUTH: ---

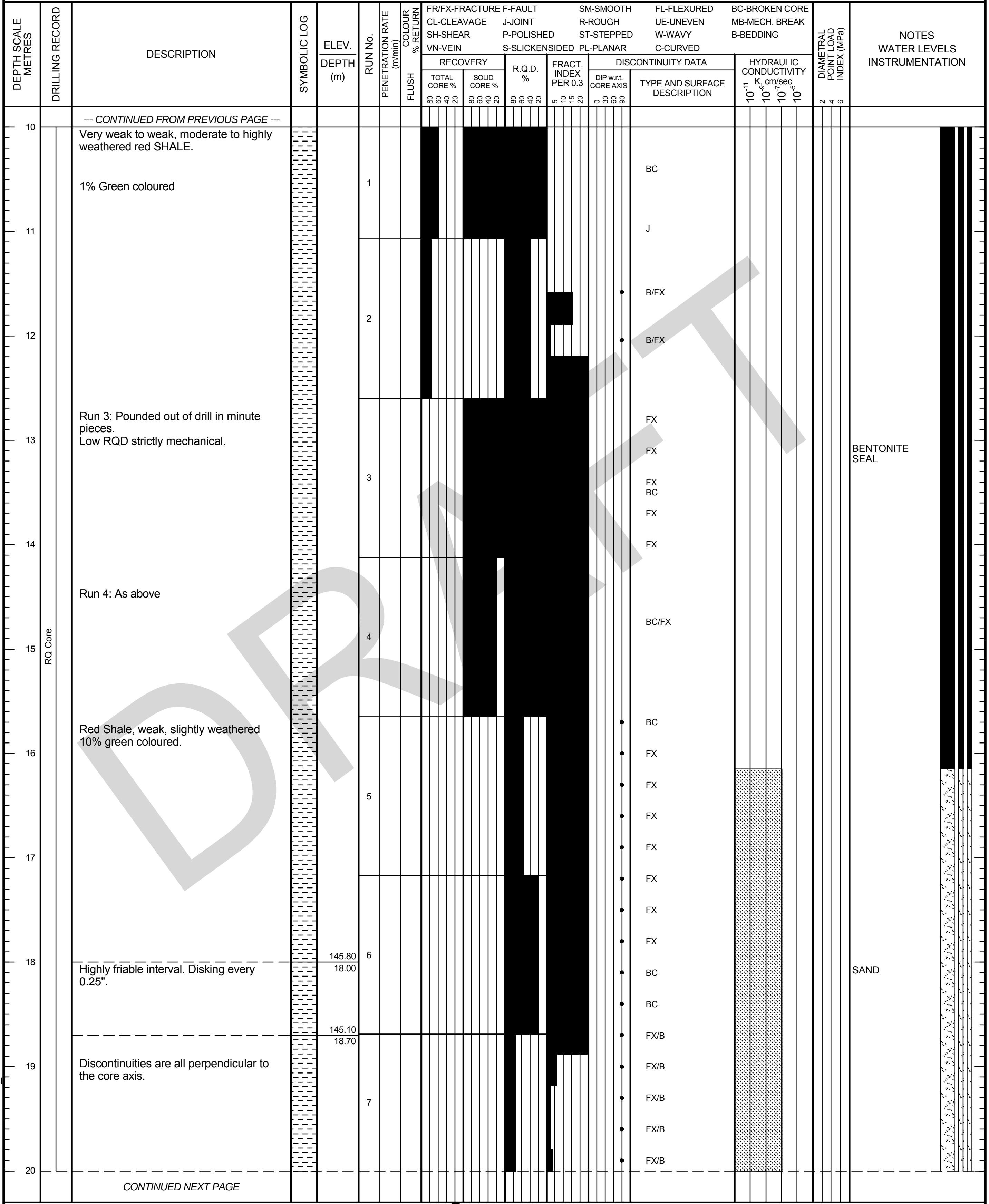
DRILLING DATE: Oct.1-3, 2002

DRILL RIG: CME 75

DRILLING CONTRACTOR: ALL TERRAIN DRILLING

DATUM:

FR/FX-FRACTURE F-FAULT SM-SMOOTH FL-FLEXURED BC-BROKEN CORE
CL-CLEAVAGE J-JOINT R-ROUGH UE-UNEVEN MB-MECH. BREAK
SH-SHEAR P-POLISHED ST-STEPPED W-WAVY B-BEDDING
VN-VEIN S-SLICKENSIDED PL-PLANAR C-CURVED



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DEPTH SCALE METRES	DESCRIPTION	ELEV. DEPTH (m)	RUN No.	TYPE AND SURFACE DESCRIPTION	NOTES WATER LEVELS INSTRUMENTATION
10	Very weak to weak, moderate to highly weathered red SHALE.				
				BC	
	1% Green coloured		1		
11				J	
				B/FX	
			2		
12				B/FX	
	Run 3: Pounded out of drill in minute pieces. Low RQD strictly mechanical.			FX	
13				FX	BENTONITE SEAL
			3	FX BC	
				FX	
14				FX	
	Run 4: As above				
				BC/FX	
15			4		
				BC	
	Red Shale, weak, slightly weathered 10% green coloured.				
16				FX	
				FX	
			5	FX	
17				FX	
				FX	
				FX	
		145.80	6	FX	
18	Highly friable interval. Disking every 0.25".	18.00		BC	SAND
				BC	
		145.10 18.70		FX/B	
19	Discontinuities are all perpendicular to the core axis.			FX/B	
			7	FX/B	
				FX/B	
20				FX/B	

CONTINUED NEXT PAGE

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: MR

CHECKED:

PROJECT: 021-1228

RECORD OF DRILLHOLE: MW1

SHEET 3 OF 5

LOCATION: Refer to Plan

DATUM:

INCLINATION: -90°   AZIMUTH: ---

DRILLING DATE: Oct.1-3, 2002
DRILL RIG: CME 75
DRILLING CONTRACTOR: ALL TERRAIN DRILLING

FR/FX-FRACTURE	F-FAULT	SM-SMOOTH	FL-FLEXURED
BC-BROKEN CORE	CL-CLEAVAGE	J-JOINT	R-ROUGH
UE-UNEVEN	MB-MECH. BREAK	SH-SHEAR	P-POLISHED
ST-STEPPED	W-WAVY	B-BEDDING	VN-VEIN
S-SLICKENSIDED	PL-PLANAR	C-CURVED	

DEPTH SCALE METRES | DRILLING RECORD | DESCRIPTION | SYMBOLIC LOG | ELEV. DEPTH (m) | RUN No. | PENETRATION RATE (m/min) | FLUSH: COLOUR, % RETURN | RECOVERY: TOTAL CORE % (80 60 40 20), SOLID CORE % (80 60 40 20) | R.Q.D. % (80 60 40 20) | FRACT. INDEX PER 0.3 (5 10 15 20) | DISCONTINUITY DATA: DIP w.r.t. CORE AXIS (0 30 60 90), TYPE AND SURFACE DESCRIPTION | HYDRAULIC CONDUCTIVITY K, cm/sec (10^{-11} 10^{-9} 10^{-7} 10^{-5}) | DIAMETRAL POINT LOAD INDEX (MPa) (2 4 6) | NOTES, WATER LEVELS, INSTRUMENTATION

--- CONTINUED FROM PREVIOUS PAGE ---

Depth scale: 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30

Drilling record: RQ Core

Description:

Red shale, slightly weathered, weak to very weak.
10% grey-green coloured bands.

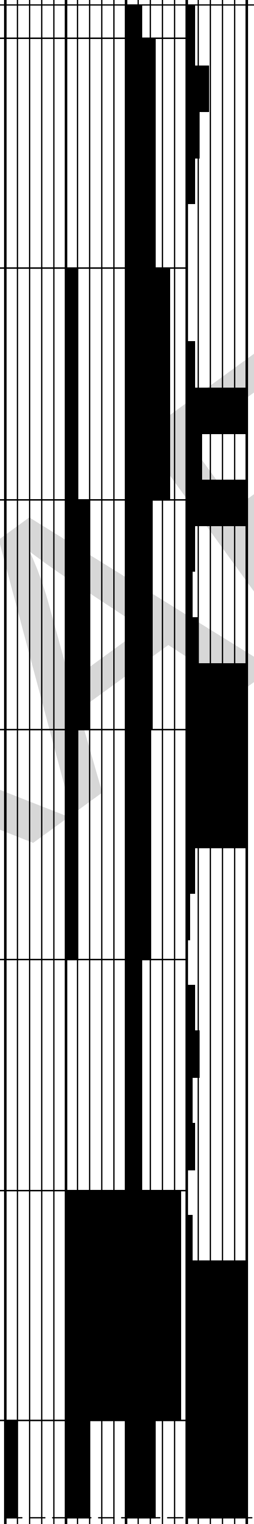
Friable and pitted in intervals of broken core (BC).

Fracture surfaces are planar and smooth to rough.

135.96
27.84

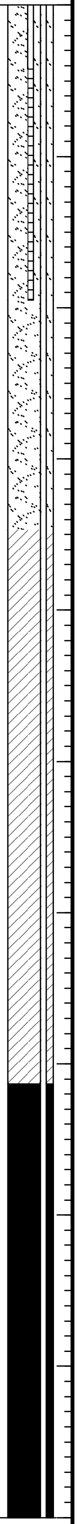
Zone of broken core and increased weathering.
Shale is highly friable, very weak and weathered.

Run No.: 7, 8, 9, 10, 11, 12, 13, 14



Type and surface description:
FX
FX
FX
FX/B
FX/B
BC
FX/B
FX/B
FX/B
FX/B
FX/B
FX/B
FX/B
FX/B
FX/B
FX/B
FX/B
FX/B
FX/B
FX/B
BC/B
BC/B
BC/B
BC/B

Notes:
SAND
SAND
PLUG BRIDGE/ROCK BRIDGE
BENTONITE SEAL



CONTINUED NEXT PAGE

DEPTH SCALE
1 : 50

Golder Associates

LOGGED: MR
CHECKED:

PROJECT: 021-1228

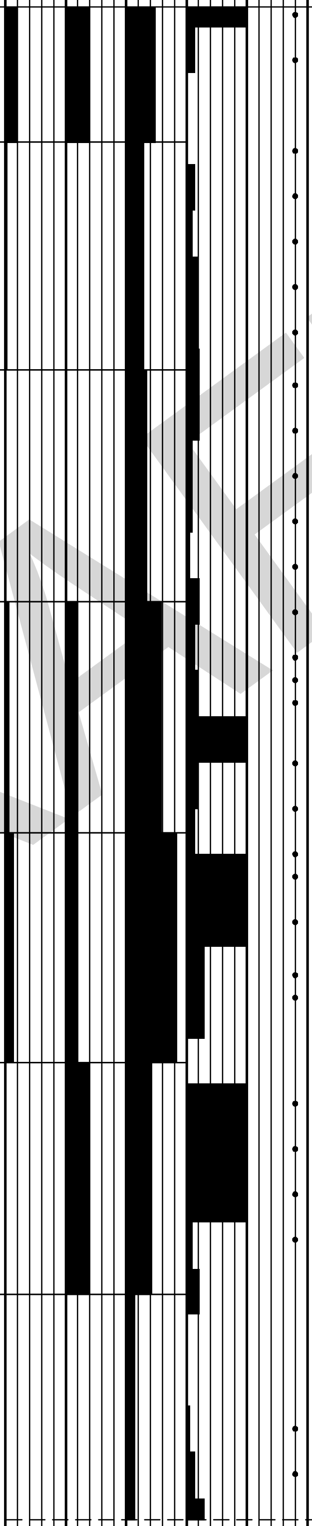
RECORD OF DRILLHOLE: MW1

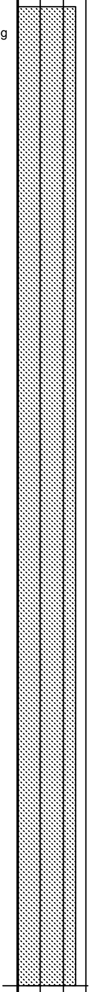
LOCATION: Refer to Plan
INCLINATION: -90° AZIMUTH: ---
DRILLING DATE: Oct.1-3, 2002
DRILL RIG: CME 75
DRILLING CONTRACTOR: ALL TERRAIN DRILLING
DATUM:

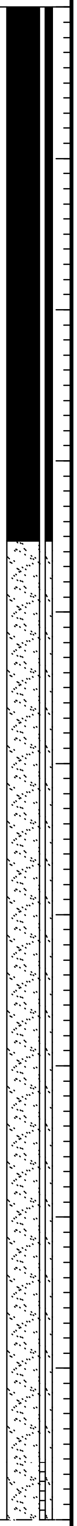
FR/FX-FRACTURE F-FAULT SM-SMOOTH FL-FLEXURED BC-BROKEN CORE
CL-CLEAVAGE J-JOINT R-ROUGH UE-UNEVEN MB-MECH. BREAK
SH-SHEAR P-POLISHED ST-STEPPED W-WAVY B-BEDDING
VN-VEIN S-SLICKENSIDED PL-PLANAR C-CURVED

Other column headings: SYMBOLIC LOG; PENETRATION RATE (m/min); COLOUR % RETURN; FLUSH; RECOVERY (TOTAL CORE % 80 60 40 20, SOLID CORE % 80 60 40 20); R.Q.D. % 80 60 40 20; FRACT. INDEX PER 0.3 (5 10 15 20); DISCONTINUITY DATA (DIP w.r.t. CORE AXIS 0 30 60 90); HYDRAULIC CONDUCTIVITY K, cm/sec 10^{-11} 10^{-9} 10^{-7} 10^{-5}; DIAMETRAL POINT LOAD INDEX (MPa) 2 4 6

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	ELEV. DEPTH (m)	RUN No.	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	NOTES WATER LEVELS INSTRUMENTATION
		--- CONTINUED FROM PREVIOUS PAGE ---				
30		Zone of broken core and increased weathering. Shale is highly friable, very weak and weathered.			FX/B	
					FX/B	
				14		
		Highly weathered and friable.	132.91 30.89		FX/B, gypsum coating first noted.	
31					FX/B	
					FX/B	
				15		
					FX/B	BENTONITE SEAL
32		Red shale, moderately weathered, weak, friable.	131.71 32.09		FX/B	
					FX/B	
					FX/B	
33					FX/B	
				16		
					FX/B	
					FX/B, gypsum coating	
34					FX/B	
					FX/B	
					FX/B	
					FX/B	
				17		
35	RQ Core	Fracture surfaces are planar and smooth to rough.			FX/B	
					FX/B	
					FX/B	
					BC	
36					FX/B	
				18		
					FX/B, gypsum, 4mm	
					FX/B	
37		Extremely friable zone. Discontiniuites	126.70 37.10		FX/B	
					FX/B	
				19		
					FX/B	
38		Red shale, fresh, weak to moderately strong.	125.80 38.00		FX/B	
39						
				20		
					FX/B	
					FX/B	
						SAND
40		*CONTINUED NEXT PAGE*				







DEPTH SCALE
1 : 50

Golder Associates

LOGGED: MR
CHECKED:

PROJECT: 021-1228

RECORD OF DRILLHOLE: MW1

LOCATION: Refer to Plan

INCLINATION: -90° AZIMUTH: ---

DRILLING DATE: Oct.1-3, 2002

DRILL RIG: CME 75

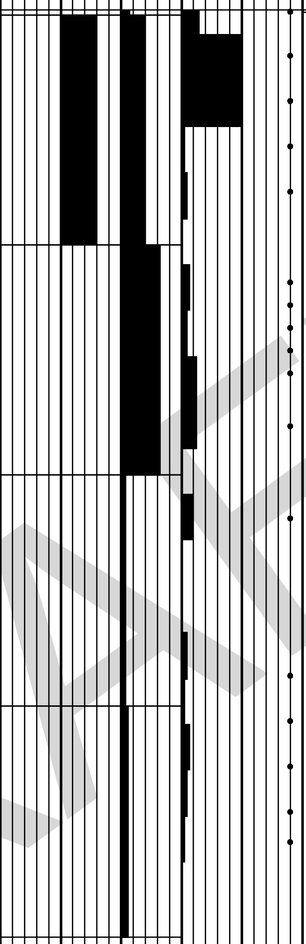
DRILLING CONTRACTOR: ALL TERRAIN DRILLING

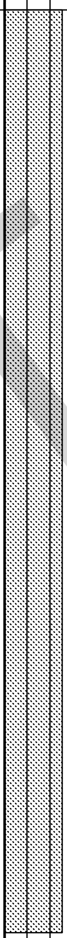
DATUM:

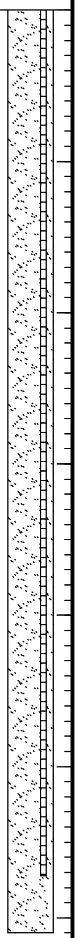
FR/FX-FRACTURE F-FAULT SM-SMOOTH FL-FLEXURED BC-BROKEN CORE
CL-CLEAVAGE J-JOINT R-ROUGH UE-UNEVEN MB-MECH. BREAK
SH-SHEAR P-POLISHED ST-STEPPED W-WAVY B-BEDDING
VN-VEIN S-SLICKENSIDED PL-PLANAR C-CURVED

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	ELEV. DEPTH (m)	RUN No.	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	NOTES WATER LEVELS INSTRUMENTATION
		--- CONTINUED FROM PREVIOUS PAGE ---				
40	RQ Core	Red shale, fresh, weak to moderately strong.		21	B/F BC BC B/FX B/FX	
41		10% grey-green coloured.				
42				22	B/FX BC B/FX BC B/FX B/FX	SAND
43		Red shale, fresh, weak, 10% green coloured.	120.80 43.00	23	B/FX	
44					B/FX	
45				24	B/FX B/FX B/FX B/FX	
46		END OF BOREHOLE	117.67 46.13			
47						
48						
49						
50						

Other column headings: SYMBOLIC LOG; PENETRATION RATE (m/min); COLOUR % RETURN; FLUSH; RECOVERY: TOTAL CORE % (80 60 40 20), SOLID CORE % (80 60 40 20); R.Q.D. % (80 60 40 20); FRACT. INDEX PER 0.3 (5 10 15 20); DIP w.r.t. CORE AXIS (0 30 60 90); HYDRAULIC CONDUCTIVITY K, cm/sec (10^{-11} 10^{-9} 10^{-7} 10^{-5}); DIAMETRAL POINT LOAD INDEX (MPa) (2 4 6)







DEPTH SCALE

1 : 50

Golder Associates

LOGGED: MR

CHECKED:

PROJECT: 021-1228

RECORD OF DRILLHOLE: MW2

SHEET 1 OF 5

LOCATION: Refer to Plan

DRILLING DATE: Sept.26&30, 2002

DATUM:

INCLINATION: -90° AZIMUTH: ---

DRILL RIG: CME 75

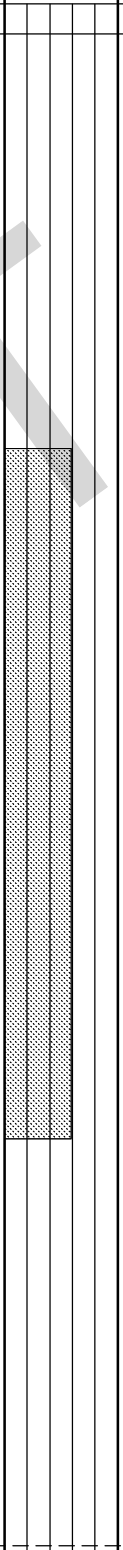
DRILLING CONTRACTOR: ALL TERRAIN DRILLING

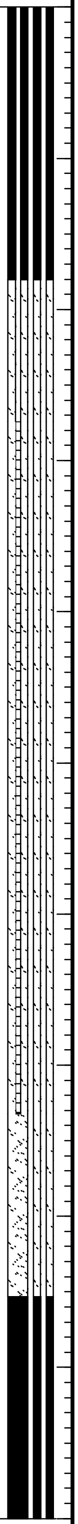
FR/FX-FRACTURE F-FAULT SM-SMOOTH FL-FLEXURED BC-BROKEN CORE
CL-CLEAVAGE J-JOINT R-ROUGH UE-UNEVEN MB-MECH. BREAK
SH-SHEAR P-POLISHED ST-STEPPED W-WAVY B-BEDDING
VN-VEIN S-SLICKENSIDED PL-PLANAR C-CURVED

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	ELEV. DEPTH (m)	NOTES WATER LEVELS INSTRUMENTATION
		GROUND SURFACE	165.90	
0	AUGER	Dark brown soil, moist, loose, roots/organics. (OH)	0.00	
		TILL, brown, moist to slightly moist, firm to hard with depth, CLAYEY SAND and SILT, some gravel, occ. cobble. Coarser material is sub-ang to ang. (ML)	0.15	
1		As above Very dry and crumbly during sampling. (ML)	164.99 0.91	BENTONITE SEAL
2				
3		As above Colour changes to brownish-grey.	162.60 3.30	
4		TILL, grey, firm-hard, moist SILTY CLAY, occ. gravel. (GM-ML)	161.73 4.17	
5				SAND
6				
7		TILL, very hard, dry, brown bouldery CLAY SILT TILL, occ. cobbles. (CM)	158.89 7.01	
8				
9		BEDROCK Red shale, very weak, friable. Fresh, moderately weathered upper 3.05 to 4.57m from bedrock surface recovered as rubble/broken core.	156.86 9.04	BENTONITE SEAL
10				

RUN No. | PENETRATION RATE (m/min) | COLOUR % RETURN | FLUSH | RECOVERY: TOTAL CORE % 80 60 40 20, SOLID CORE % 80 60 40 20 | R.Q.D. % 80 60 40 20 | FRACT. INDEX PER 0.3 5 10 15 20 | DISCONTINUITY DATA: DIP w.r.t. CORE AXIS 0 30 60 90, TYPE AND SURFACE DESCRIPTION | DIAMETRAL POINT LOAD INDEX (MPa) 2 4 6

HYDRAULIC CONDUCTIVITY K, cm/sec





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DEPTH SCALE
1 : 50

Golder Associates

LOGGED: MR
CHECKED:

PROJECT: 021-1228

RECORD OF DRILLHOLE: MW2

SHEET 2 OF 5

LOCATION: Refer to Plan

DRILLING DATE: Sept.26&30, 2002

DATUM:

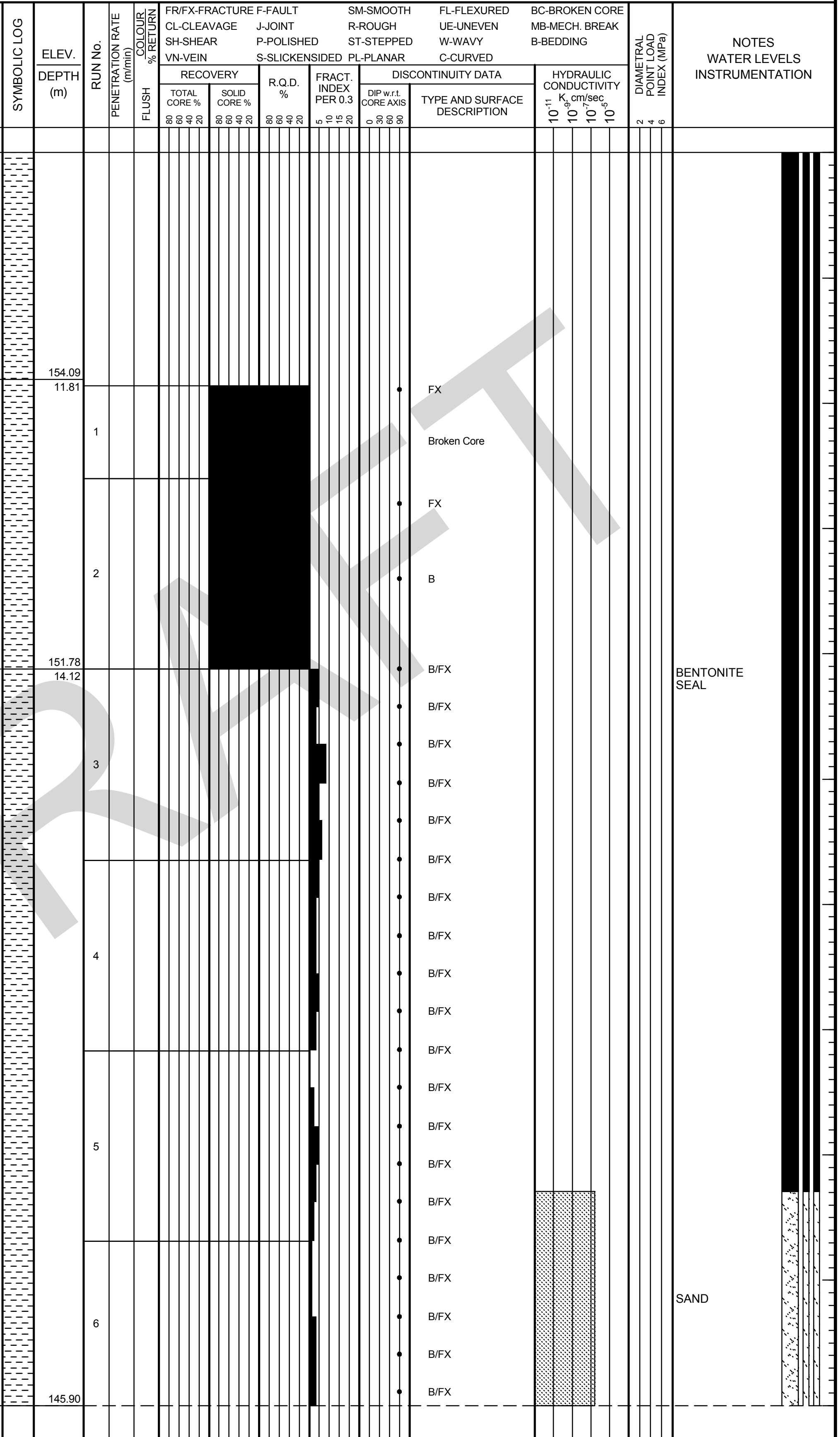
INCLINATION: -90°   AZIMUTH: ---

DRILL RIG: CME 75

DRILLING CONTRACTOR: ALL TERRAIN DRILLING

FR/FX-FRACTURE F-FAULT SM-SMOOTH FL-FLEXURED BC-BROKEN CORE
CL-CLEAVAGE J-JOINT R-ROUGH UE-UNEVEN MB-MECH. BREAK
SH-SHEAR P-POLISHED ST-STEPPED W-WAVY B-BEDDING
VN-VEIN S-SLICKENSIDED PL-PLANAR C-CURVED

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	ELEV. DEPTH (m)
		--- CONTINUED FROM PREVIOUS PAGE ---	
10	AUGER	BEDROCK Red shale, very weak, friable. Fresh, moderately weathered upper 3.05 to 4.57m from bedrock surface recovered as rubble/broken core.	
11			154.09
12	HQ CORE	Red shale with occasional (10%+/-) green coloured bands, weak. This interval recovered as broken core.	11.81
13			
14			151.78
		Intact core begins.	14.12
15–20			145.90
		CONTINUED NEXT PAGE	



DEPTH SCALE
1 : 50

LOGGED: MR
CHECKED:

PROJECT: 021-1228

RECORD OF DRILLHOLE: MW2

SHEET 3 OF 5

LOCATION: Refer to Plan

DATUM:

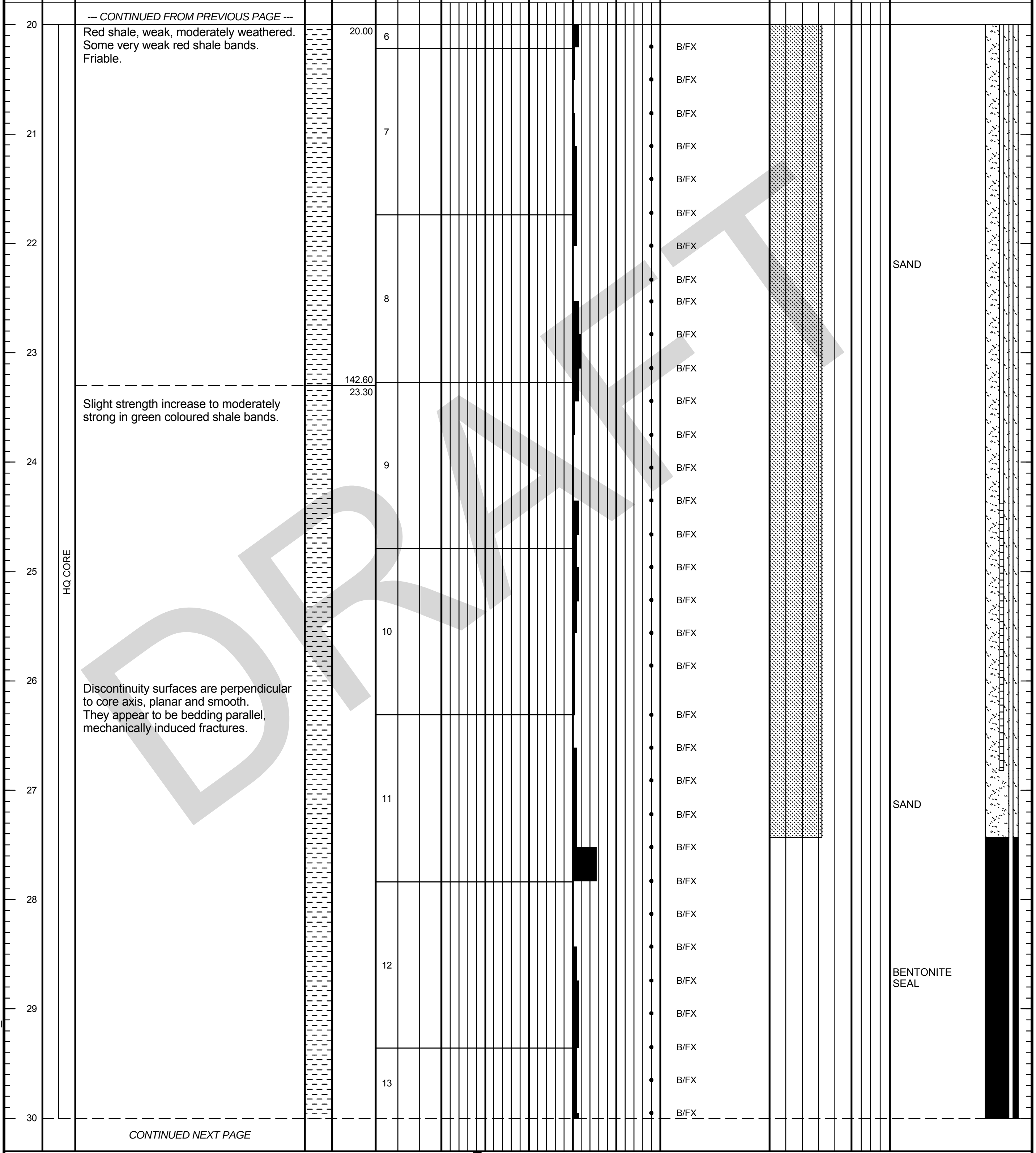
INCLINATION: -90°   AZIMUTH: ---

DRILLING DATE: Sept.26&30, 2002

DRILL RIG: CME 75

DRILLING CONTRACTOR: ALL TERRAIN DRILLING

FR/FX-FRACTURE F-FAULT SM-SMOOTH FL-FLEXURED BC-BROKEN CORE
CL-CLEAVAGE J-JOINT R-ROUGH UE-UNEVEN MB-MECH. BREAK
SH-SHEAR P-POLISHED ST-STEPPED W-WAVY B-BEDDING
VN-VEIN S-SLICKENSIDED PL-PLANAR C-CURVED



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20.00 — Red shale, weak, moderately weathered. Some very weak red shale bands. Friable.

142.60 / 23.30 — Slight strength increase to moderately strong in green coloured shale bands.

Discontinuity surfaces are perpendicular to core axis, planar and smooth. They appear to be bedding parallel, mechanically induced fractures.

Drilling record: HQ CORE

Type and surface description (20 to 30 m): B/FX, B/FX

Notes: SAND; SAND; BENTONITE SEAL

CONTINUED NEXT PAGE

DEPTH SCALE
1 : 50

Golder Associates

LOGGED: MR
CHECKED:

PROJECT: 021-1228

RECORD OF DRILLHOLE: MW2

SHEET 4 OF 5

LOCATION: Refer to Plan

DRILLING DATE: Sept.26&30, 2002

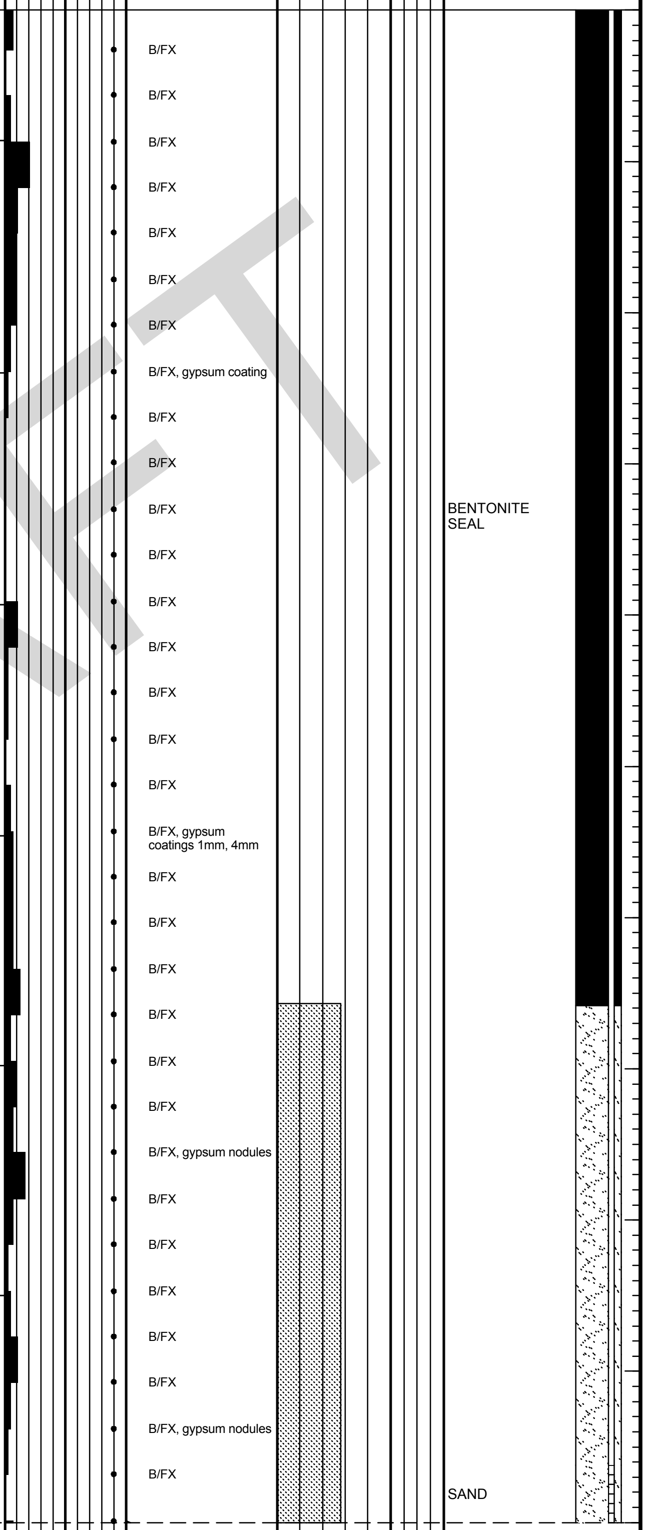
DATUM:

INCLINATION: -90° AZIMUTH: ---

DRILL RIG: CME 75

DRILLING CONTRACTOR: ALL TERRAIN DRILLING

FR/FX-FRACTURE F-FAULT SM-SMOOTH FL-FLEXURED BC-BROKEN CORE
CL-CLEAVAGE J-JOINT R-ROUGH UE-UNEVEN MB-MECH. BREAK
SH-SHEAR P-POLISHED ST-STEPPED W-WAVY B-BEDDING
VN-VEIN S-SLICKENSIDED PL-PLANAR C-CURVED



Columns: DEPTH SCALE METRES; DRILLING RECORD; DESCRIPTION; SYMBOLIC LOG; ELEV. DEPTH (m); RUN No.; PENETRATION RATE (m/min); FLUSH COLOUR % RETURN; RECOVERY TOTAL CORE % 80 60 40 20, SOLID CORE % 80 60 40 20; R.Q.D. % 80 60 40 20; FRACT. INDEX PER 0.3; DISCONTINUITY DATA: DIP w.r.t. CORE AXIS, TYPE AND SURFACE DESCRIPTION; HYDRAULIC CONDUCTIVITY K, cm/sec; DIAMETRAL POINT LOAD INDEX (MPa); NOTES WATER LEVELS INSTRUMENTATION

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	RUN No.	TYPE AND SURFACE DESCRIPTION	NOTES WATER LEVELS INSTRUMENTATION
		--- CONTINUED FROM PREVIOUS PAGE ---			
30		SHALE, Fresh to slightly weathered, weak, pitted and friable. Mainly red coloured, 5% to 10% green coloured bands, up to 10cm thick, spaced every 2 cm to 5 cm.		B/FX	
			13	B/FX	
				B/FX	
31				B/FX	
				B/FX	
			14	B/FX	
32				B/FX	
				B/FX, gypsum coating	
				B/FX	
33				B/FX	
			15	B/FX	BENTONITE SEAL
		First gypsum coatings on joint surfaces noted at 29.18m and 32.10m.		B/FX	
				B/FX	
34				B/FX	
				B/FX	
			16	B/FX	
35	HQ CORE			B/FX	
				B/FX, gypsum coatings 1mm, 4mm	
				B/FX	
36				B/FX	
			17	B/FX	
				B/FX	
				B/FX	
37				B/FX	
		Low RQD zone in red and green shales. Full of gypsum nodules.		B/FX, gypsum nodules	
			18	B/FX	
38				B/FX	
				B/FX	
		As above, increased rock strength to moderately strong.		B/FX	
39				B/FX	
			19	B/FX, gypsum nodules	
				B/FX	SAND
40					

CONTINUED NEXT PAGE

DEPTH SCALE
1 : 50

Golder Associates

LOGGED: MR
CHECKED:

PROJECT: 021-1228

RECORD OF DRILLHOLE: MW2

SHEET 5 OF 5

LOCATION: Refer to Plan

DRILLING DATE: Sept.26&30, 2002

DATUM:

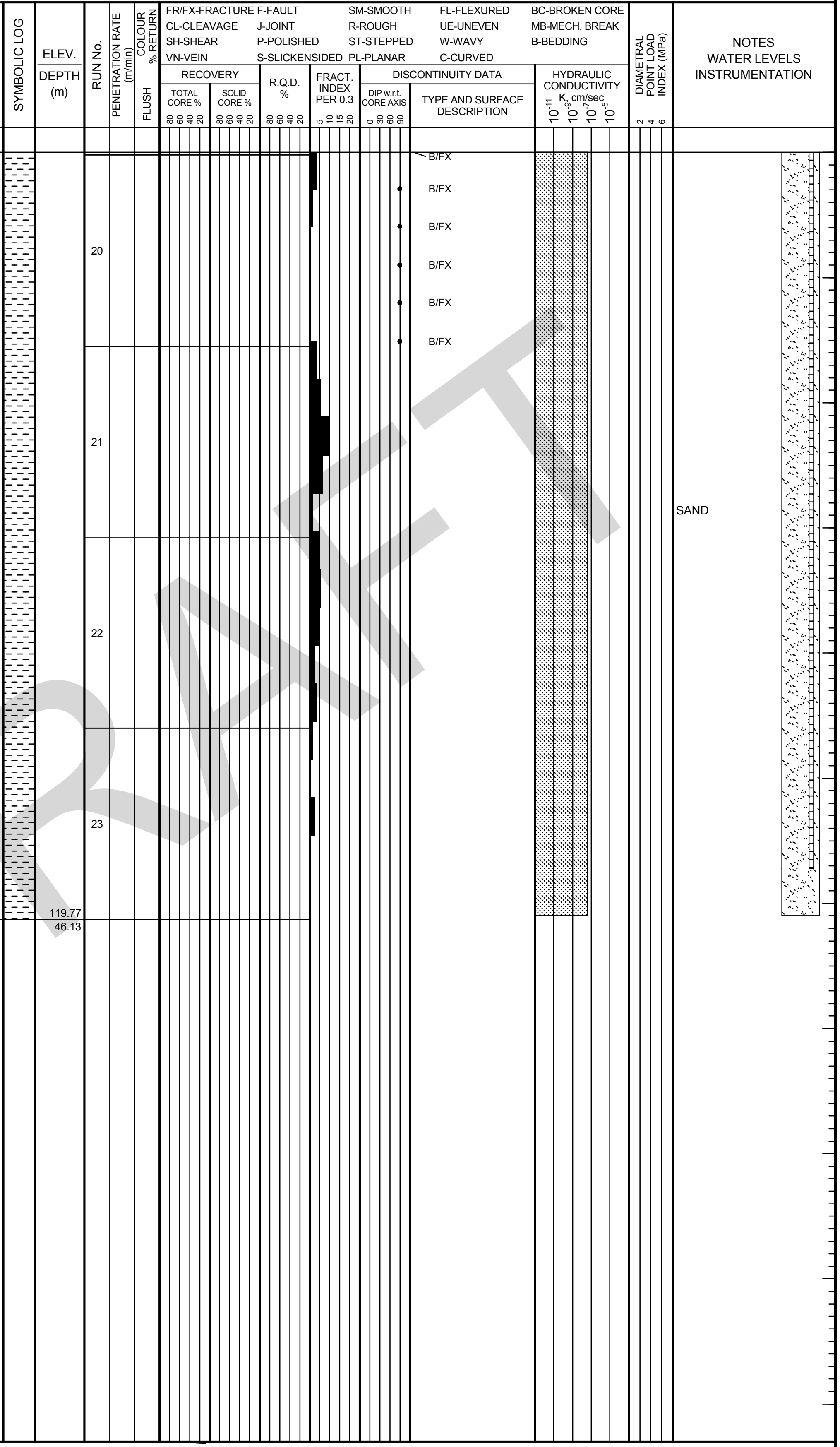
INCLINATION: -90° AZIMUTH: ---

DRILL RIG: CME 75

DRILLING CONTRACTOR: ALL TERRAIN DRILLING

FR/FX-FRACTURE F-FAULT SM-SMOOTH FL-FLEXURED BC-BROKEN CORE
CL-CLEAVAGE J-JOINT R-ROUGH UE-UNEVEN MB-MECH. BREAK
SH-SHEAR P-POLISHED ST-STEPPED W-WAVY B-BEDDING
VN-VEIN S-SLICKENSIDED PL-PLANAR C-CURVED

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	ELEV. DEPTH (m)	RUN No.	NOTES WATER LEVELS INSTRUMENTATION
		--- CONTINUED FROM PREVIOUS PAGE ---			
40	HQ CORE	Red shale, moderately strong, fresh to slightly weathered. Rock is mainly red coloured with green bands (4"-2") every 1' to 2'.		20	
41					
42				21	
43					SAND
		Gypsum coat at 43.5, 3mm thick.		22	
44					
45				23	
46			119.77 46.13		
		END OF BOREHOLE			
47					
48					
49					
50					



DEPTH SCALE
1 : 50

Golder Associates

LOGGED: MR
CHECKED:

PROJECT: 021-1228

RECORD OF DRILLHOLE: MW3

SHEET 1 OF 4

LOCATION: Refer to Plan

DRILLING DATE: July 24 & 25, 2002

DATUM:

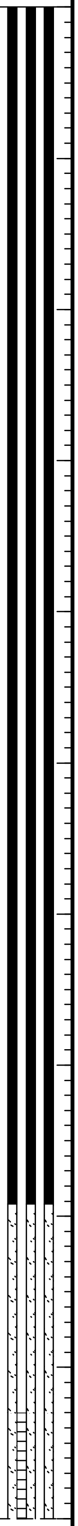
DRILL RIG: CME 75

INCLINATION: -90° AZIMUTH: ---

DRILLING CONTRACTOR: ALL TERRAIN DRILLING

FR/FX-FRACTURE F-FAULT SM-SMOOTH FL-FLEXURED BC-BROKEN CORE
CL-CLEAVAGE J-JOINT R-ROUGH UE-UNEVEN MB-MECH. BREAK
SH-SHEAR P-POLISHED ST-STEPPED W-WAVY B-BEDDING
VN-VEIN S-SLICKENSIDED PL-PLANAR C-CURVED

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	RUN No.	PENETRATION RATE (m/min)	FLUSH	COLOUR % RETURN	RECOVERY TOTAL CORE % (80 60 40 20)	RECOVERY SOLID CORE % (80 60 40 20)	R.Q.D. % (80 60 40 20)	FRACT. INDEX PER 0.3 (5 10 15 20)	DISCONTINUITY DATA DIP w.r.t. CORE AXIS (0 30 60 90)	DISCONTINUITY DATA TYPE AND SURFACE DESCRIPTION	HYDRAULIC CONDUCTIVITY K, cm/sec (10^{-11} 10^{-9} 10^{-7} 10^{-5})	DIAMETRAL POINT LOAD INDEX (MPa) (2 4 6)	NOTES WATER LEVELS INSTRUMENTATION
		GROUND SURFACE		162.20													
0	AUGER	Brown, organic sandy silt (roots), compact.		0.00													
		TILL, moist to slightly moist, firm to hard, rooty first 0.6m, SILTY CLAY with angular cobbles and coarse gravel. (CL)		161.59 0.61													
1																	
2																	
3																	
4																	BENTONITE SEAL
5																	
6		TILL, moist to dry, hard, mainly SILTY CLAY (CL), some sand, gravel and cobbles. Gravel and cobbles are sub-ang to sub-rounded.		156.10 6.10													
7																	
8																	
9																	SAND
10																	



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DEPTH SCALE
1 : 50

Golder Associates

LOGGED: MR
CHECKED:

MISS_ROCK 021-1228.GPJ GLDR_CAN.GDT 15/1/04 PS

PROJECT: 021-1228

RECORD OF DRILLHOLE: MW3

SHEET 2 OF 4

LOCATION: Refer to Plan

DRILLING DATE: July 24 & 25, 2002

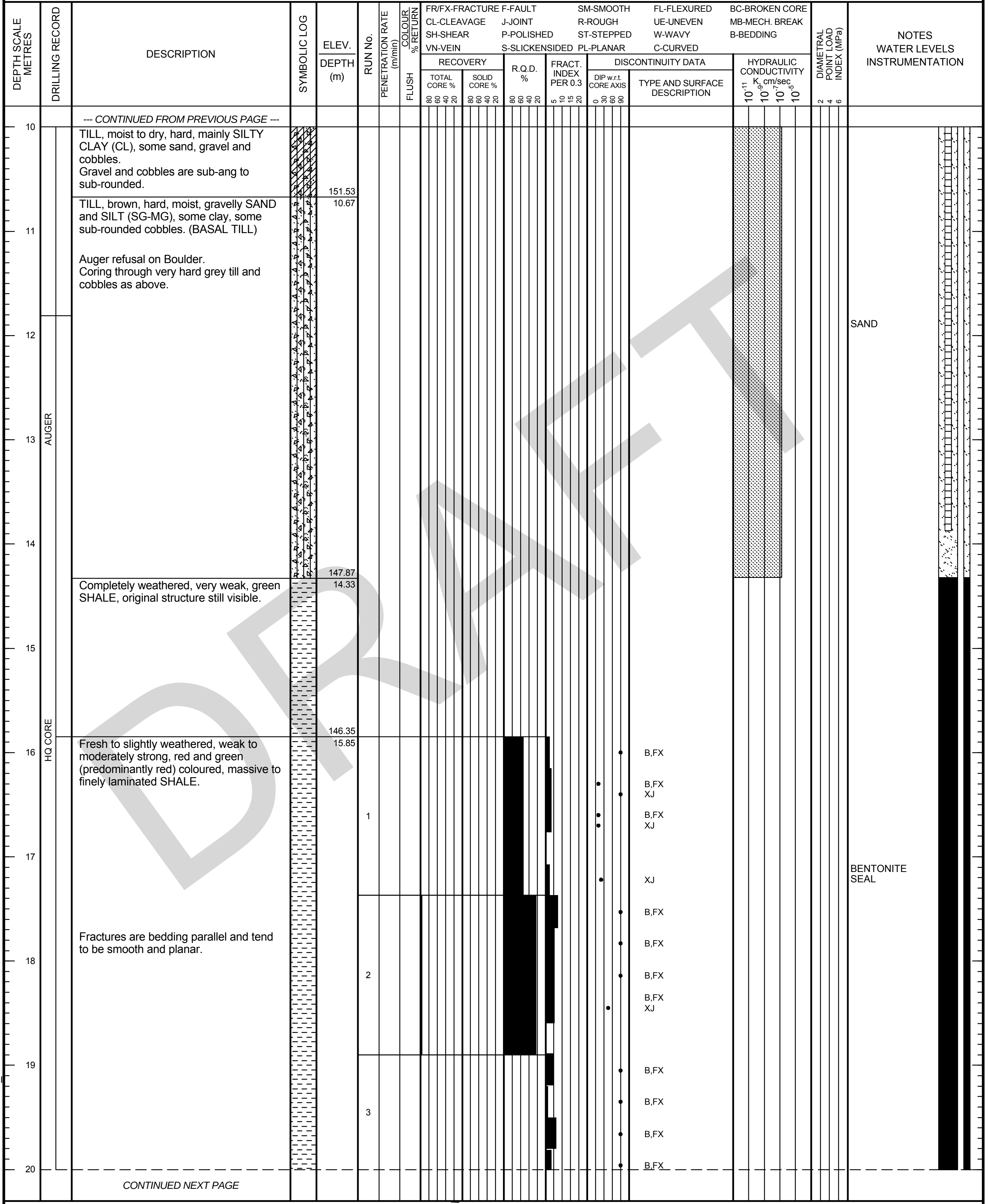
DATUM:

INCLINATION: -90° AZIMUTH: ---

DRILL RIG: CME 75

DRILLING CONTRACTOR: ALL TERRAIN DRILLING

FR/FX-FRACTURE F-FAULT SM-SMOOTH FL-FLEXURED BC-BROKEN CORE
CL-CLEAVAGE J-JOINT R-ROUGH UE-UNEVEN MB-MECH. BREAK
SH-SHEAR P-POLISHED ST-STEPPED W-WAVY B-BEDDING
VN-VEIN S-SLICKENSIDED PL-PLANAR C-CURVED



DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	ELEV. DEPTH (m)	RUN No.	TYPE AND SURFACE DESCRIPTION	NOTES WATER LEVELS INSTRUMENTATION
		--- CONTINUED FROM PREVIOUS PAGE ---				
10		TILL, moist to dry, hard, mainly SILTY CLAY (CL), some sand, gravel and cobbles. Gravel and cobbles are sub-ang to sub-rounded.	151.53 10.67			
11		TILL, brown, hard, moist, gravelly SAND and SILT (SG-MG), some clay, some sub-rounded cobbles. (BASAL TILL) Auger refusal on Boulder. Coring through very hard grey till and cobbles as above.				
12						SAND
13	AUGER					
14			147.87 14.33			
		Completely weathered, very weak, green SHALE, original structure still visible.				
15			146.35 15.85			
16	HQ CORE	Fresh to slightly weathered, weak to moderately strong, red and green (predominantly red) coloured, massive to finely laminated SHALE.			B,FX	
					B,FX XJ	
				1	B,FX XJ	
17					XJ	BENTONITE SEAL
					B,FX	
		Fractures are bedding parallel and tend to be smooth and planar.			B,FX	
18				2	B,FX	
					B,FX XJ	
19					B,FX	
				3	B,FX	
					B,FX	
20					B,FX	
		CONTINUED NEXT PAGE				

DEPTH SCALE
1 : 50

Golder Associates

LOGGED: MR
CHECKED:

PROJECT: 021-1228

RECORD OF DRILLHOLE: MW3

SHEET 3 OF 4

LOCATION: Refer to Plan

INCLINATION: -90° AZIMUTH: ---

DRILLING DATE: July 24 & 25, 2002

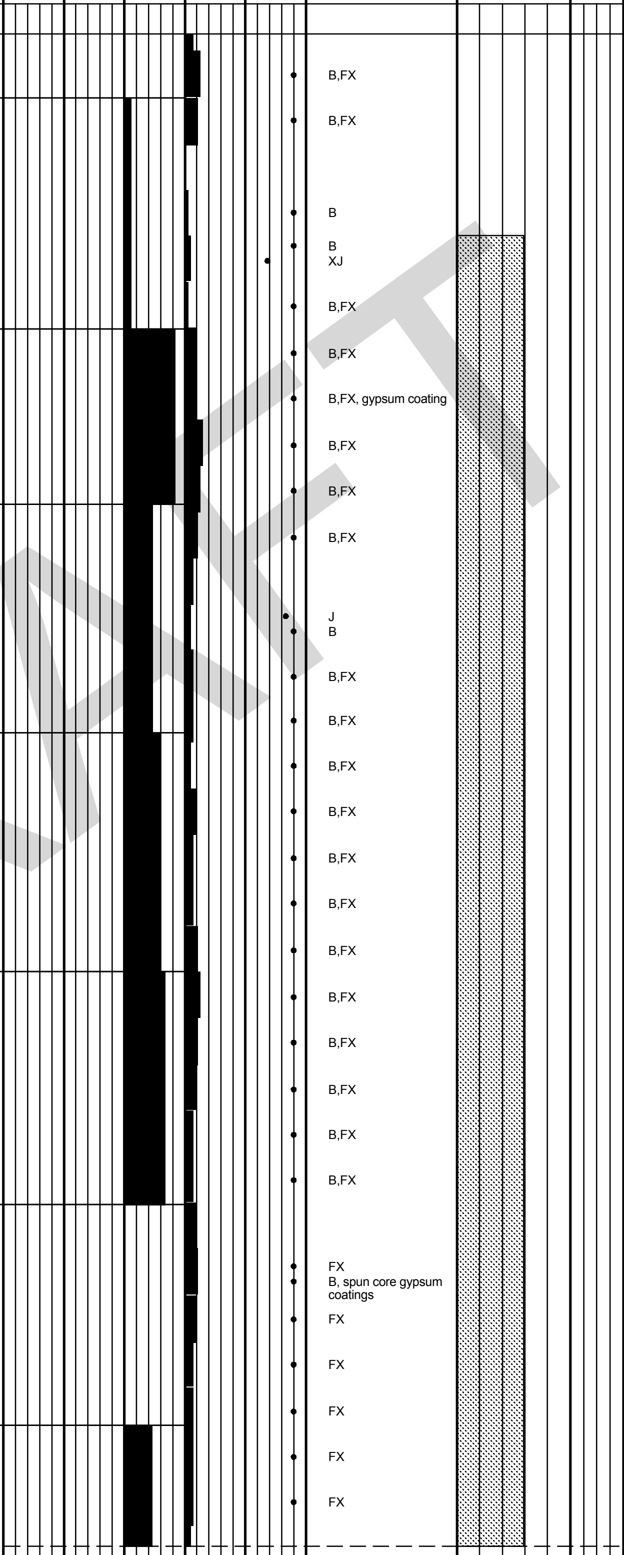
DRILL RIG: CME 75

DRILLING CONTRACTOR: ALL TERRAIN DRILLING

DATUM:

FR/FX-FRACTURE F-FAULT SM-SMOOTH FL-FLEXURED BC-BROKEN CORE
CL-CLEAVAGE J-JOINT R-ROUGH UE-UNEVEN MB-MECH. BREAK
SH-SHEAR P-POLISHED ST-STEPPED W-WAVY B-BEDDING
VN-VEIN S-SLICKENSIDED PL-PLANAR C-CURVED

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	ELEV. DEPTH (m)	RUN No.
		--- CONTINUED FROM PREVIOUS PAGE ---		
20	HQ CORE		141.78 20.42	3
		Fresh to slightly weathered, not friable, moderately strong to weak, mainly red coloured and massive with some green coloured bands. Thinly laminated.		
21				4
22		First noted occurence of gypsum.		5
23				6
24				
25		Possible turbidity flow or debris torrent layer from 10.92m to 26.2m.		7
26				
27			134.46 27.74	8
28		Red SHALE, fresh to slightly weathered, weak to medium strong, occasional green coloured bands. Massive to thinly laminated.		9
29				10
30		Discontinuities are fractures parallel to		
		CONTINUED NEXT PAGE		



DISCONTINUITY DATA – TYPE AND SURFACE DESCRIPTION:

B,FX
B,FX
B
B
XJ
B,FX
B,FX
B,FX, gypsum coating
B,FX
B,FX
B,FX
J
B
B,FX
B,FX
B,FX
B,FX
B,FX
B,FX
B,FX
B,FX
B,FX
B,FX
B,FX
B,FX
FX
B, spun core gypsum coatings
FX
FX
FX
FX
FX

NOTES WATER LEVELS INSTRUMENTATION

BENTONITE SEAL

SAND

DEPTH SCALE
1 : 50

Golder Associates

LOGGED: MR
CHECKED:

PROJECT: 021-1228

RECORD OF DRILLHOLE: MW3

SHEET 4 OF 4

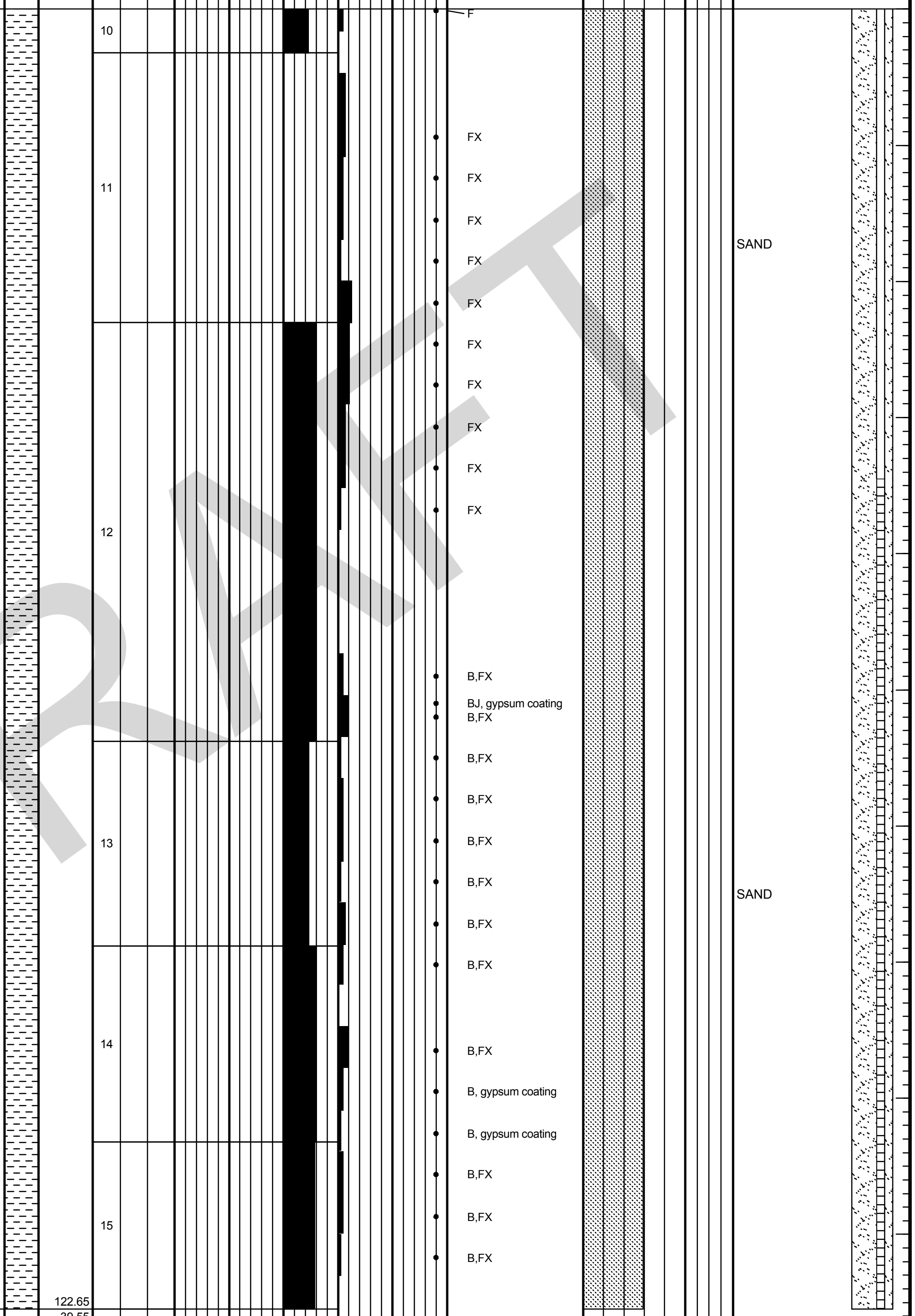
LOCATION: Refer to Plan
INCLINATION: -90° AZIMUTH: ---

DRILLING DATE: July 24 & 25, 2002
DRILL RIG: CME 75
DRILLING CONTRACTOR: ALL TERRAIN DRILLING

DATUM:

FR/FX-FRACTURE	F-FAULT	SM-SMOOTH	FL-FLEXURED	BC-BROKEN CORE
CL-CLEAVAGE	J-JOINT	R-ROUGH	UE-UNEVEN	MB-MECH. BREAK
SH-SHEAR	P-POLISHED	ST-STEPPED	W-WAVY	B-BEDDING
VN-VEIN	S-SLICKENSIDED	PL-PLANAR	C-CURVED	

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	RUN No.	PENETRATION RATE (m/min)	FLUSH COLOUR % RETURN	RECOVERY TOTAL CORE % 80 60 40 20	RECOVERY SOLID CORE % 80 60 40 20	R.Q.D. % 80 60 40 20	FRACT. INDEX PER 0.3 5 10 15 20	DISCONTINUITY DATA DIP w.r.t. CORE AXIS 0 30 60 90	DISCONTINUITY DATA TYPE AND SURFACE DESCRIPTION	HYDRAULIC CONDUCTIVITY K, cm/sec 10^{-11} 10^{-9} 10^{-7} 10^{-5}	DIAMETRAL POINT LOAD INDEX (MPa) 2 4 6	NOTES WATER LEVELS INSTRUMENTATION
		--- CONTINUED FROM PREVIOUS PAGE ---														
30	HQ CORE	bedding. They are mainly mechanically induced. Red SHALE, fresh to slightly weathered, weak to medium strong, occasional green coloured bands. Massive to thinly laminated.		122.65 39.55	10 11 12 13 14 15											SAND SAND
		END OF HOLE														



F
FX
FX
FX
FX
FX
FX
FX
FX
FX
FX
B,FX
BJ, gypsum coating
B,FX
B,FX
B,FX
B,FX
B,FX
B,FX
B,FX
B,FX
B, gypsum coating
B, gypsum coating
B,FX
B,FX
B,FX

DEPTH SCALE
1 : 50

Golder Associates

LOGGED: MR
CHECKED:

PROJECT: 021-1228

RECORD OF DRILLHOLE: MW4

SHEET 1 OF 5

LOCATION: Refer to Plan

DATUM:

INCLINATION: -90° AZIMUTH: ---

DRILLING DATE: July 4-9, 2002

DRILL RIG: CME 75

DRILLING CONTRACTOR: ALL TERRAIN DRILLING

FR/FX-FRACTURE F-FAULT SM-SMOOTH FL-FLEXURED BC-BROKEN CORE
CL-CLEAVAGE J-JOINT R-ROUGH UE-UNEVEN MB-MECH. BREAK
SH-SHEAR P-POLISHED ST-STEPPED W-WAVY B-BEDDING
VN-VEIN S-SLICKENSIDED PL-PLANAR C-CURVED

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	ELEV. DEPTH (m)	RUN No.	PENETRATION RATE (m/min)	FLUSH	COLOUR % RETURN	RECOVERY TOTAL CORE % 80 60 40 20	RECOVERY SOLID CORE % 80 60 40 20	R.Q.D. % 80 60 40 20	FRACT. INDEX PER 0.3 5 10 15 20	DISCONTINUITY DATA DIP w.r.t. CORE AXIS 0 30 60 90	DISCONTINUITY DATA TYPE AND SURFACE DESCRIPTION	ROCK STRENGTH INDEX R4 R3 R2 R1	WEATHERING INDEX W1 W2 W3 W4	NOTES WATER LEVELS INSTRUMENTATION
		GROUND SURFACE	164.70													
0	Overburden	Brown, moist, firm to hard TILL. Soil is a clayey silt, trace sub-rounded cobbles and gravel, some sand. Well-graded. (CL)	0.00													BENTONITE SEAL
1		As above, firm, dry-slightly moist, friable, sandy silt, trace clay. (ML)	163.48 1.22													
2		Reddish brown, firm. Friable, dry-slightly moist, sandy silt and clay till, occ. sub-rounded gravel and cobbles. (CL/ML)	161.96 2.74													
4		Sandy TILL, grey brown, firm, friable silty sand, trace clay, trace gravel. Dry to slightly moist. (ML) Fines to sandy silt till.	160.43 4.27													
5		Gravelly TILL, reddish-brown, dense, moist silty sand to silty gravel, trace cobbles and clay.	158.91 5.79													SAND
6		Brown grey, firm to hard sandy silt, trace clay, trace gravel, moist TILL.	158.30 6.40													
7		Red-brown, moist-wet, gravelly silt, firm-hard 30% rock/cobbles (angular), wet rock (shale) at 7.6m, trace sand TILL. (MG)	157.38 7.32													
9		Inferred top of rock, moist, red-brown (80%) and green (20%), highly weathered, very weak, friable SHALE.	155.56 9.14													BENTONITE SEAL
10		*CONTINUED NEXT PAGE*														

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: MR

CHECKED:

PROJECT: 021-1228

RECORD OF DRILLHOLE: MW4

SHEET 2 OF 5

LOCATION: Refer to Plan

DRILLING DATE: July 4-9, 2002

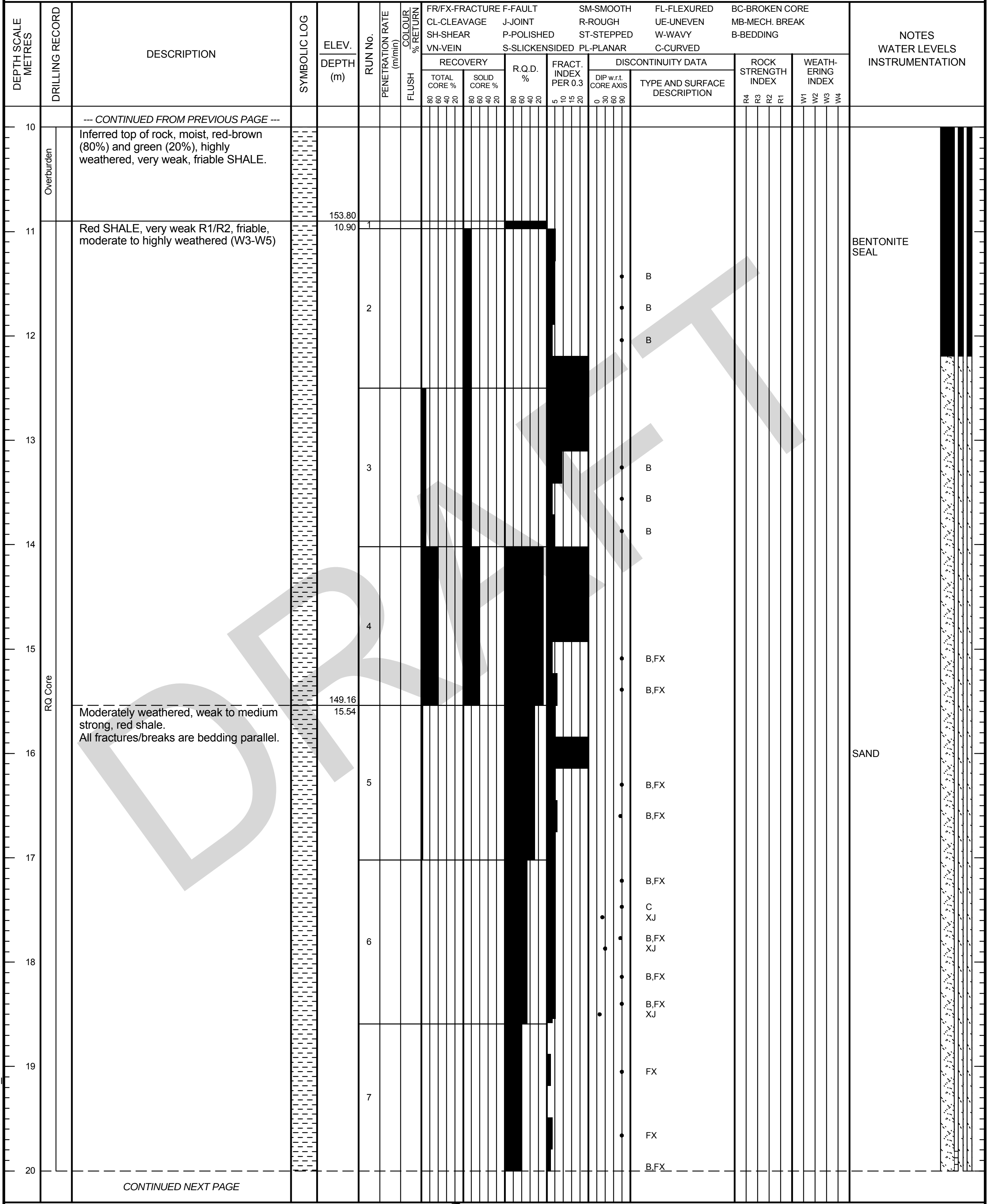
DATUM:

INCLINATION: -90° AZIMUTH: ---

DRILL RIG: CME 75

DRILLING CONTRACTOR: ALL TERRAIN DRILLING

FR/FX-FRACTURE F-FAULT SM-SMOOTH FL-FLEXURED BC-BROKEN CORE
CL-CLEAVAGE J-JOINT R-ROUGH UE-UNEVEN MB-MECH. BREAK
SH-SHEAR P-POLISHED ST-STEPPED W-WAVY B-BEDDING
VN-VEIN S-SLICKENSIDED PL-PLANAR C-CURVED



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DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	ELEV. DEPTH (m)
10	Overburden	Inferred top of rock, moist, red-brown (80%) and green (20%), highly weathered, very weak, friable SHALE.	153.80 10.90
11	RQ Core	Red SHALE, very weak R1/R2, friable, moderate to highly weathered (W3-W5)	
		Moderately weathered, weak to medium strong, red shale. All fractures/breaks are bedding parallel.	149.16 15.54

CONTINUED NEXT PAGE

DEPTH SCALE

1 : 50

LOGGED: MR

CHECKED:

MISS_ROCK 021-1228.GPJ GLDR_CAN.GDT 15/1/04 PS

PROJECT: 021-1228

RECORD OF DRILLHOLE: MW4

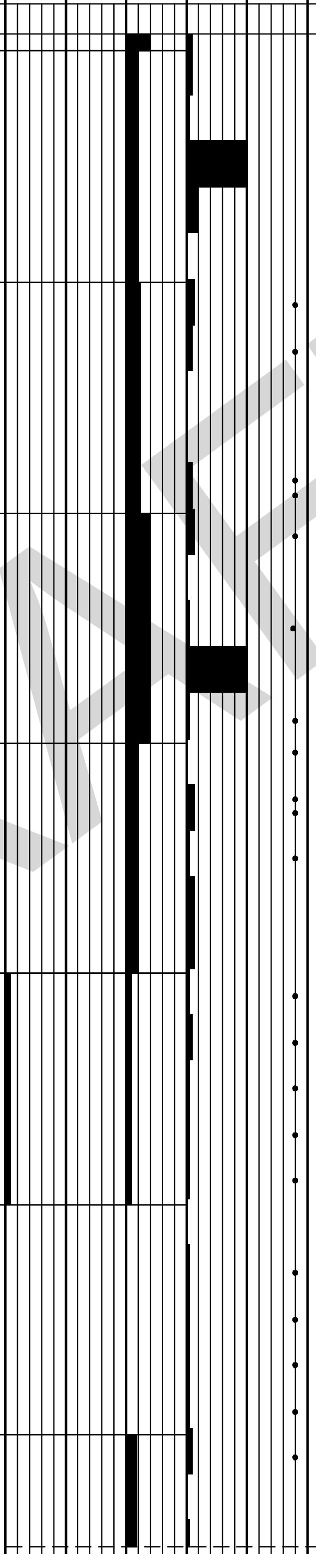
SHEET 3 OF 5

LOCATION: Refer to Plan
INCLINATION: -90° AZIMUTH: ---

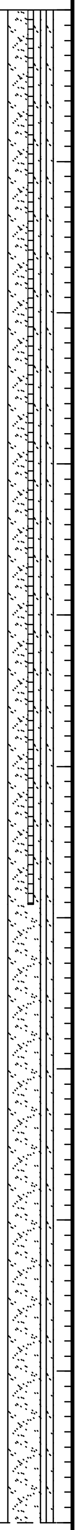
DRILLING DATE: July 4-9, 2002
DRILL RIG: CME 75
DRILLING CONTRACTOR: ALL TERRAIN DRILLING

DATUM:

FR/FX-FRACTURE F-FAULT SM-SMOOTH FL-FLEXURED BC-BROKEN CORE
CL-CLEAVAGE J-JOINT R-ROUGH UE-UNEVEN MB-MECH. BREAK
SH-SHEAR P-POLISHED ST-STEPPED W-WAVY B-BEDDING
VN-VEIN S-SLICKENSIDED PL-PLANAR C-CURVED



DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	RUN No.	PENETRATION RATE (m/min)	FLUSH COLOUR % RETURN	TYPE AND SURFACE DESCRIPTION	ROCK STRENGTH INDEX R4 R3 R2 R1	WEATH-ERING INDEX W1 W2 W3 W4	NOTES WATER LEVELS INSTRUMENTATION
		--- CONTINUED FROM PREVIOUS PAGE ---									
20				144.58	7						
		SHALE, friable, moderately weathered, moderately strong, significantly more competent.		20.12				B,FX			
								B,FX			
					8			BC			
21								B,FX			
				143.06							
		Weak to medium strong, friable, Tends to break along red.green colour contacts.		21.64				B,FX			
22								B,FX			
					9						
23								B,FX B			
								B,FX			
		Fractures/breaks all bedding and smooth.									
24					10			B,FX			
								B,FX			
								B,FX			
25	RQ Core							B,FX B,FX			
					11			B,FX			
26											
								B,FX			
								B,FX			
27					12			B,FX			
								B,FX			
								B,FX			
28											SAND
								B,FX			
					13			B,FX			
								B,FX			
29								B,FX			
				135.44							
		Slightly weathered, red (90%) and green (10%), medium strong, finely laminated SHALE.		29.26				FX,B			
					14						
30											
		CONTINUED NEXT PAGE									



DEPTH SCALE
1 : 50

Golder Associates

LOGGED: MR
CHECKED:

PROJECT: 021-1228

RECORD OF DRILLHOLE: MW4

SHEET 4 OF 5

LOCATION: Refer to Plan

DRILLING DATE: July 4-9, 2002

DATUM:

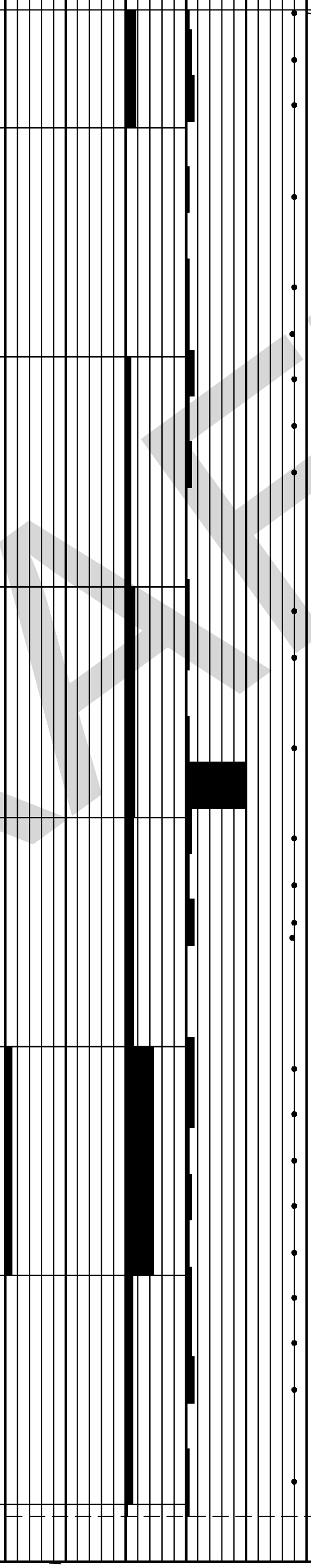
DRILL RIG: CME 75

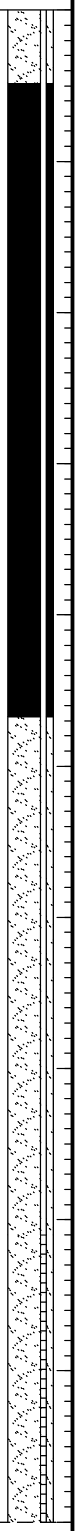
INCLINATION: -90° AZIMUTH: ---

DRILLING CONTRACTOR: ALL TERRAIN DRILLING

FR/FX-FRACTURE F-FAULT SM-SMOOTH FL-FLEXURED BC-BROKEN CORE
CL-CLEAVAGE J-JOINT R-ROUGH UE-UNEVEN MB-MECH. BREAK
SH-SHEAR P-POLISHED ST-STEPPED W-WAVY B-BEDDING
VN-VEIN S-SLICKENSIDED PL-PLANAR C-CURVED

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	ELEV. DEPTH (m)	RUN No.	DISCONTINUITY DATA TYPE AND SURFACE DESCRIPTION	NOTES WATER LEVELS INSTRUMENTATION
		--- CONTINUED FROM PREVIOUS PAGE ---				
30		Slightly weathered, red (90%) and green (10%), medium strong, finely laminated SHALE.		14	FX,B FX,B F,B	SAND
31		This interval not friable.		15	FX,B FX,B	
32					B,J, gypsum B,FX B,FX	BENTONITE SEAL
33		Fractures are all bedding parallel, smooth and planar.		16	B,FX, gypsum	
34	RQ Core	Green portions appear to be stronger.		17	B,FX B,FX B,FX	
35		Red-brown, moderately weathered (red) to slightly weathered (green) shale. Medium strong, (R2), friable (especially one day after recovery).	129.35 35.35		B,FX B,FX	
36				18	B,FX B	
37				19	B,FX B,FX B,FX B	
38					B,FX B,FX B,FX	
39				20	B,FX B,FX	SAND
40		*CONTINUED NEXT PAGE*				





DEPTH SCALE
1 : 50

Golder Associates

LOGGED: MR
CHECKED:

PROJECT: 021-1228

RECORD OF DRILLHOLE: MW4

SHEET 5 OF 5

LOCATION: Refer to Plan

DRILLING DATE: July 4-9, 2002

DATUM:

INCLINATION: -90°

AZIMUTH: ---

DRILL RIG: CME 75

DRILLING CONTRACTOR: ALL TERRAIN DRILLING

FR/FX-FRACTURE	F-FAULT	SM-SMOOTH	FL-FLEXURED	BC-BROKEN CORE
CL-CLEAVAGE	J-JOINT	R-ROUGH	UE-UNEVEN	MB-MECH. BREAK
SH-SHEAR	P-POLISHED	ST-STEPPED	W-WAVY	B-BEDDING
VN-VEIN	S-SLICKENSIDED	PL-PLANAR	C-CURVED	

DEPTH SCALE METRES | DRILLING RECORD | DESCRIPTION | SYMBOLIC LOG | ELEV. DEPTH (m) | RUN No. | PENETRATION RATE (m/min) | FLUSH | COLOUR % RETURN | RECOVERY: TOTAL CORE % (80 60 40 20), SOLID CORE % (80 60 40 20) | R.Q.D. % (80 60 40 20) | FRACT. INDEX PER 0.3 (5 10 15 20) | DISCONTINUITY DATA: DIP w.r.t. CORE AXIS (0 30 60 90), TYPE AND SURFACE DESCRIPTION | ROCK STRENGTH INDEX (R4 R3 R2 R1) | WEATHERING INDEX (W1 W2 W3 W4) | NOTES WATER LEVELS INSTRUMENTATION

--- CONTINUED FROM PREVIOUS PAGE ---

40

Red-brown, moderately weathered (red) to slightly weathered (green) shale. Medium strong, (R2), friable (especially one day after recovery).

41

42

43

RQ Core

44

45

Gypsum blebs/nodules at 45.24-45.24m.

46

118.68
46.02

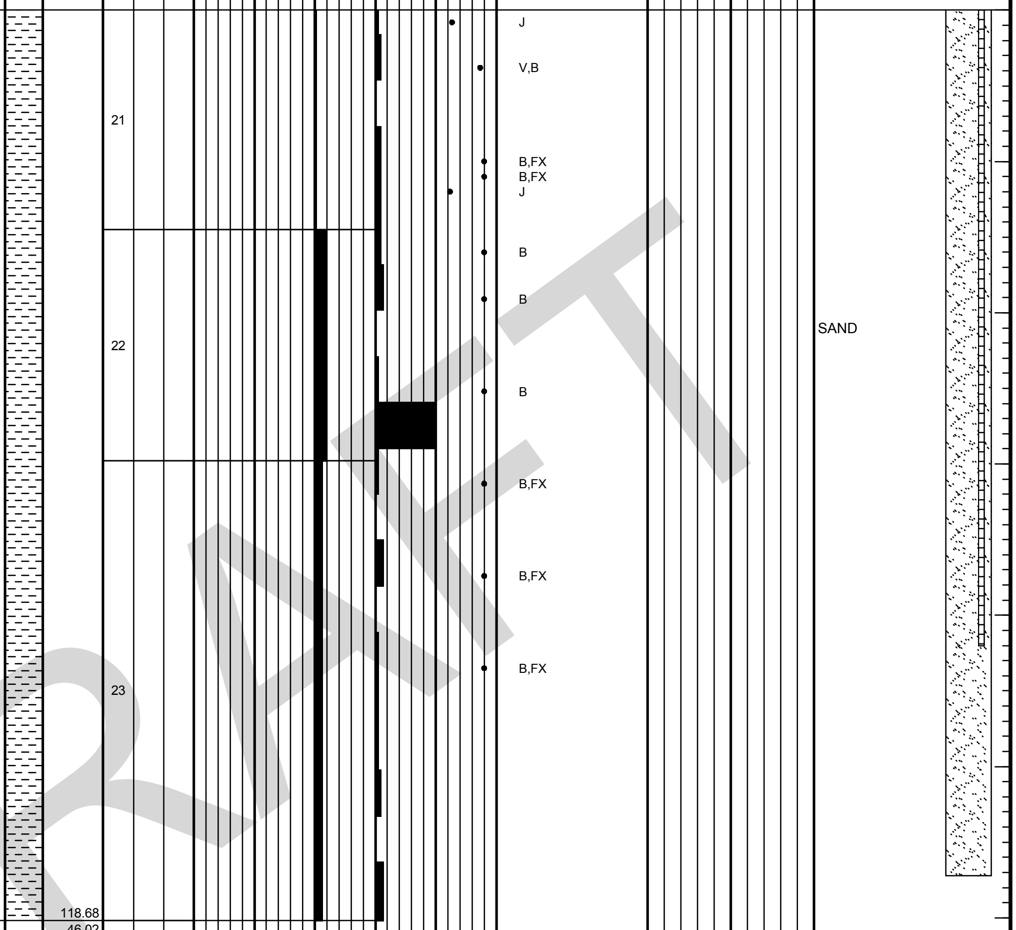
END OF HOLE

47

48

49

50



DEPTH SCALE

1 : 50

Golder Associates

LOGGED: MR

CHECKED:

MISS_ROCK 021-1228.GPJ GLDR_CAN.GDT 15/1/04 PS

PROJECT: 021-1228

RECORD OF DRILLHOLE: MW5

SHEET 1 OF 5

LOCATION: Refer to Plan

DATUM:

INCLINATION: -90° AZIMUTH: ---

DRILLING DATE: July 10-11, 2002

DRILL RIG: CME 75

DRILLING CONTRACTOR: ALL TERRAIN DRILLING

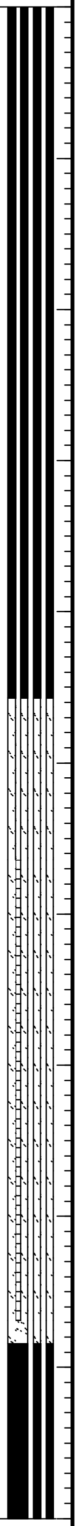
FR/FX-FRACTURE, F-FAULT, SM-SMOOTH, FL-FLEXURED, BC-BROKEN CORE

CL-CLEAVAGE, J-JOINT, R-ROUGH, UE-UNEVEN, MB-MECH. BREAK

SH-SHEAR, P-POLISHED, ST-STEPPED, W-WAVY, B-BEDDING

VN-VEIN, S-SLICKENSIDED, PL-PLANAR, C-CURVED

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	ELEV. DEPTH (m)	NOTES WATER LEVELS INSTRUMENTATION
		GROUND SURFACE	160.50	
0	AUGER	Dry to slightly moist, loose-compact, yellow-brown silty sand to sandy silt, trace cobbles, gravel clay. (SM-ML)	0.00	
		Firm, yellow-brown, moist to slightly moist, silty sand to sandy silt, some 5% gravel. (ML-TILL)	159.59 0.91	BENTONITE SEAL
		Compact, moist, yellow-brown gravelly sand, some silt, trace clay, some cobbles. (TILL) (SG-ML)	158.06 2.44	
		Yellow-brown, moist, compact, cobbley silty sand TILL. (SM)	157.30 3.20	
		Brown, damp, dense silty sand (SM), occ. gravel.	155.78 4.72	
		Brown, moist, dense silty sand to silty gravel. (SM-GM)	155.01 5.49	
		Brown, moist, compact sand, trace some silt, some sub-ang gravel & cobbles, trace clay.	154.25 6.25	SAND
		Brown-yellow brown, wet, very dense sand TILL, some silt, clay, gravel and cobbles. (SM)	152.88 7.62	
		Grey, hard to very hard SILT, some sand, moist to slightly moist, some clay. (ML) Transition from moist to wet soil: water table inferred.	152.12 8.38	BENTONITE SEAL
10				



CONTINUED NEXT PAGE

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: MR

CHECKED:

PROJECT: 021-1228

RECORD OF DRILLHOLE: MW5

SHEET 2 OF 5

LOCATION: Refer to Plan

DRILLING DATE: July 10-11, 2002

DATUM:

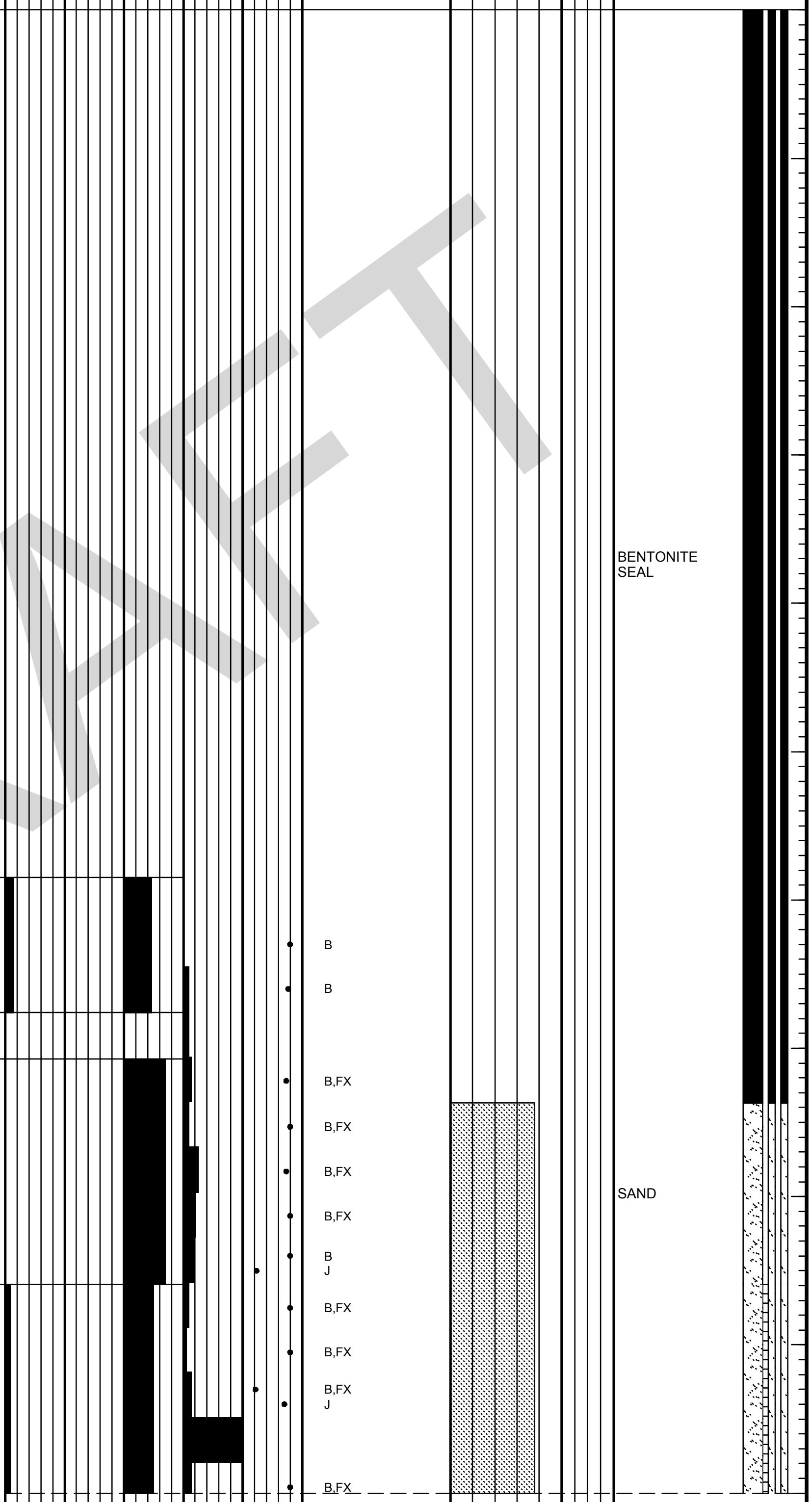
INCLINATION: -90° AZIMUTH: ---

DRILL RIG: CME 75

DRILLING CONTRACTOR: ALL TERRAIN DRILLING

FR/FX-FRACTURE F-FAULT SM-SMOOTH FL-FLEXURED BC-BROKEN CORE
CL-CLEAVAGE J-JOINT R-ROUGH UE-UNEVEN MB-MECH. BREAK
SH-SHEAR P-POLISHED ST-STEPPED W-WAVY B-BEDDING
VN-VEIN S-SLICKENSIDED PL-PLANAR C-CURVED

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	RUN No.	DISCONTINUITY DATA TYPE AND SURFACE DESCRIPTION	NOTES WATER LEVELS INSTRUMENTATION
		--- *CONTINUED FROM PREVIOUS PAGE* ---					
10		Brown, dense, moist silty coarse gravelly sand to silty gravel TILL. (SM-GM)		150.44 10.06			
11		Brown, dense moist SILT, trace gravel.		149.68 10.82			
12		Wet, dense, grey SAND and GRAVEL, some silt. (TILL) (SG-GM)		148.92 11.58			
13	AUGER	Brown, moist, hard, cobbley, gravelly SILT TILL. (SM)		148.16 12.34			BENTONITE SEAL
14		BEDROCK, highly weathered, very weak, friable red shale, easily augered.		146.63 13.87			
15							
16	HQ CORE	Red SHALE, finely laminated, weak to moderately strong, slightly weathered.		144.65 15.85	1	B B	
17							
18		Core is highly discked, reducing RQD.			2	B,FX B,FX B,FX B,FX B J	SAND
19					3	B,FX B,FX B,FX J	
20		*CONTINUED NEXT PAGE*				B,FX	



MISS_ROCK 021-1228.GPJ GLDR_CAN.GDT 15/1/04 PS

DEPTH SCALE
1 : 50

Golder Associates

LOGGED: MR
CHECKED:

PROJECT: 021-1228

RECORD OF DRILLHOLE: MW5

SHEET 3 OF 5

LOCATION: Refer to Plan

DRILLING DATE: July 10-11, 2002

DATUM:

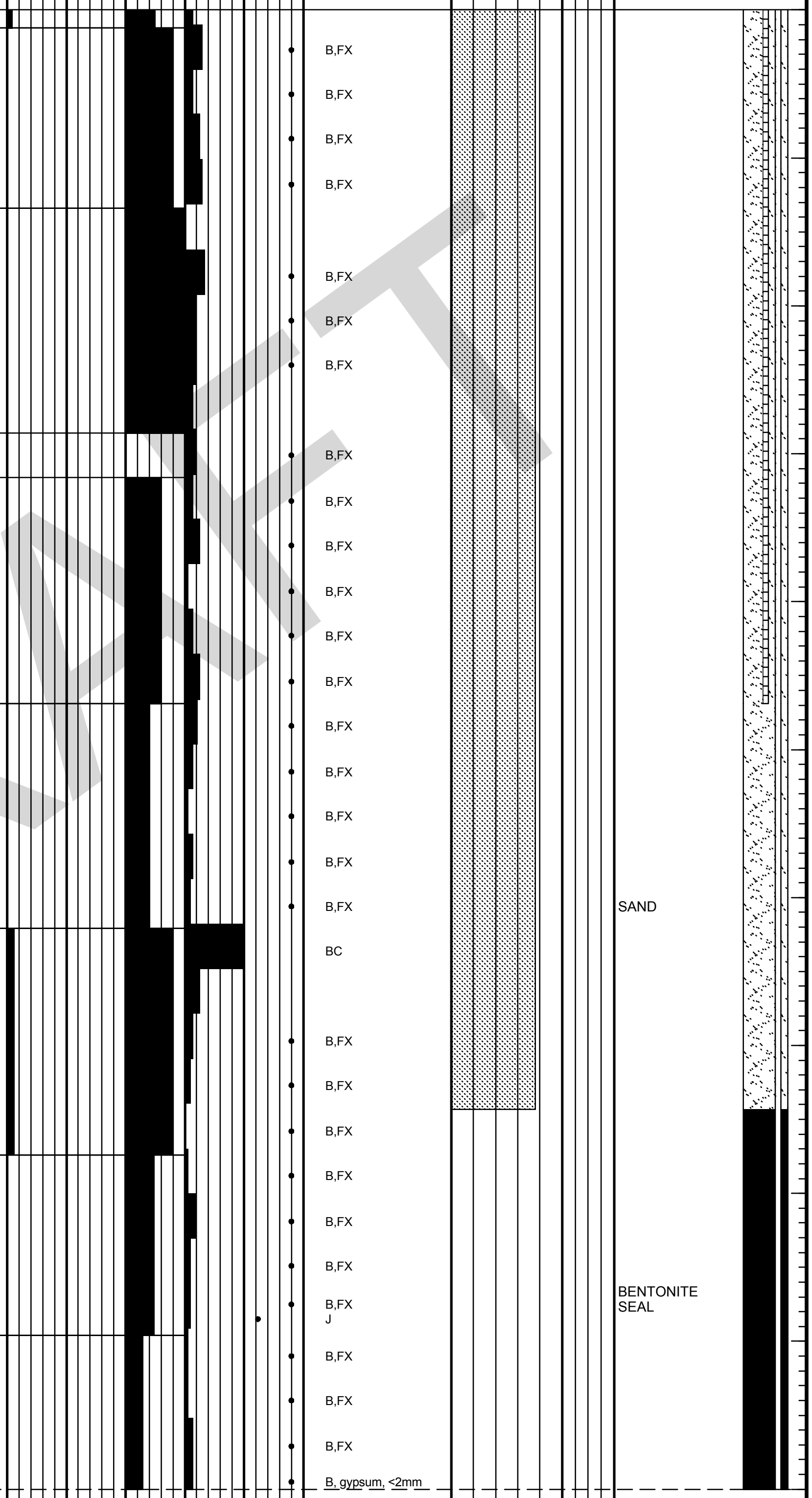
INCLINATION: -90° AZIMUTH: ---

DRILL RIG: CME 75

DRILLING CONTRACTOR: ALL TERRAIN DRILLING

FR/FX-FRACTURE F-FAULT SM-SMOOTH FL-FLEXURED BC-BROKEN CORE
CL-CLEAVAGE J-JOINT R-ROUGH UE-UNEVEN MB-MECH. BREAK
SH-SHEAR P-POLISHED ST-STEPPED W-WAVY B-BEDDING
VN-VEIN S-SLICKENSIDED PL-PLANAR C-CURVED

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	RUN No.	NOTES WATER LEVELS INSTRUMENTATION
		--- CONTINUED FROM PREVIOUS PAGE ---				
20	HQ CORE	Red SHALE, finely laminated, weak to moderately strong, slightly weathered. Green shale bands are slightly stronger than the red shale bands. (Metalic sound when tapped with geologic hammer)			3 4	
21						
22		Run 5: Core wet at about 22.86m below ground. Slight strength decrease and weathering increase at water table.			5	
23						
24					6	
25		Red and green SHALE, moderate to slightly weathered, medium strong, finely laminated, not friable. Rock is up to 10% green coloured.		135.81 24.69	7	
26						SAND
27		Discontinuities are planar and rough to smooth. (DISCKING)			8	
28					9	BENTONITE SEAL
29					10	
30		*CONTINUED NEXT PAGE*				



DEPTH SCALE

1 : 50

Golder Associates

LOGGED: MR

CHECKED:

PROJECT: 021-1228

RECORD OF DRILLHOLE: MW5

SHEET 4 OF 5

LOCATION: Refer to Plan

DRILLING DATE: July 10-11, 2002

DATUM:

INCLINATION: -90° AZIMUTH: ---

DRILL RIG: CME 75

DRILLING CONTRACTOR: ALL TERRAIN DRILLING

FR/FX-FRACTURE	F-FAULT	SM-SMOOTH	FL-FLEXURED	BC-BROKEN CORE
CL-CLEAVAGE	J-JOINT	R-ROUGH	UE-UNEVEN	MB-MECH. BREAK
SH-SHEAR	P-POLISHED	ST-STEPPED	W-WAVY	B-BEDDING
VN-VEIN	S-SLICKENSIDED	PL-PLANAR	C-CURVED	

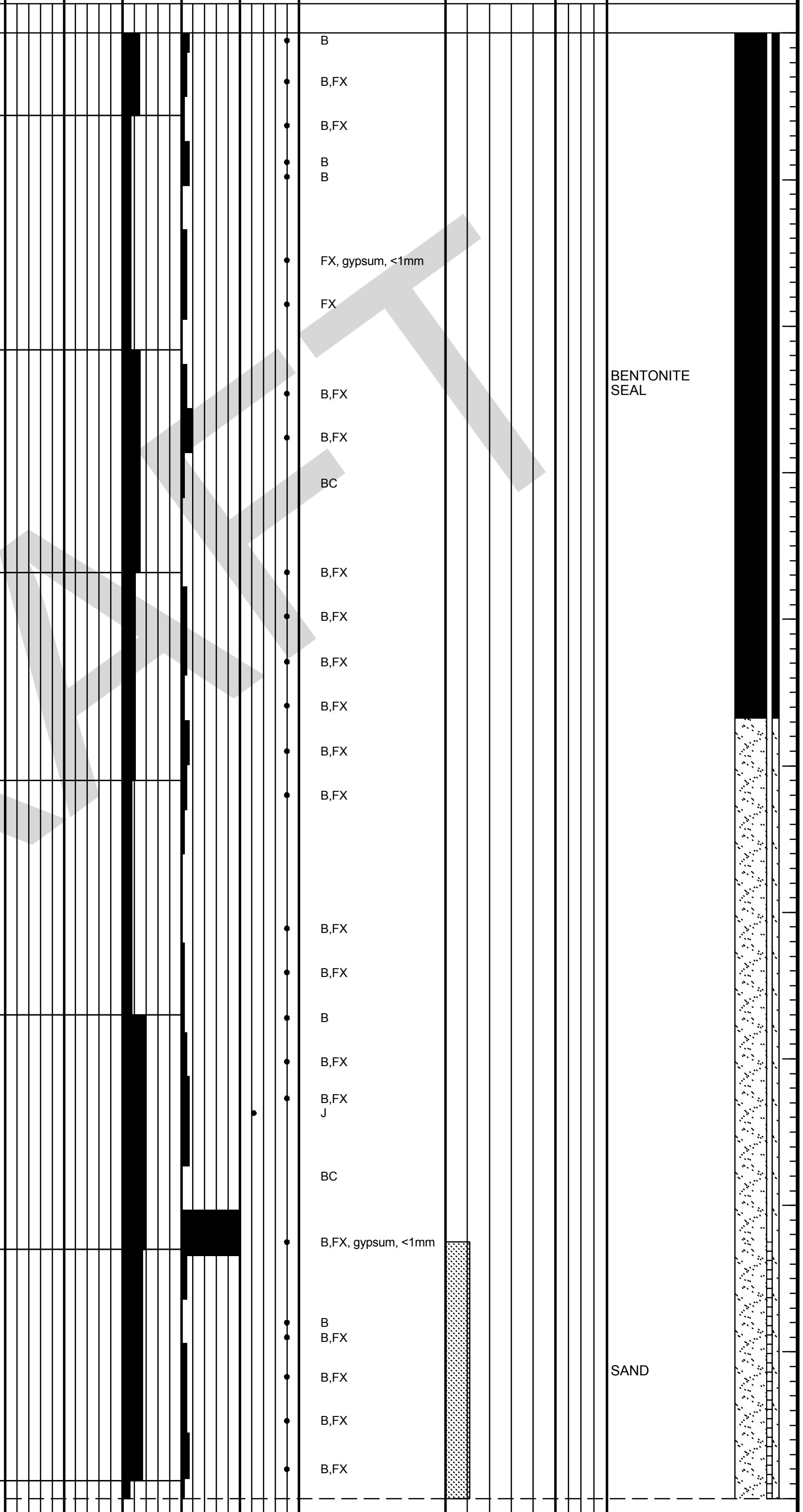
DEPTH SCALE METRES | DRILLING RECORD | DESCRIPTION | SYMBOLIC LOG | ELEV. DEPTH (m) | RUN No. | PENETRATION RATE (m/min) | FLUSH | COLOUR % RETURN | RECOVERY: TOTAL CORE % (80 60 40 20), SOLID CORE % (80 60 40 20) | R.Q.D. % (80 60 40 20) | FRACT. INDEX PER 0.3 (5 10 15 20) | DISCONTINUITY DATA: DIP w.r.t. CORE AXIS (0 30 60 90), TYPE AND SURFACE DESCRIPTION | HYDRAULIC CONDUCTIVITY K, cm/sec (10^{-11} 10^{-9} 10^{-7} 10^{-5}) | DIAMETRAL POINT LOAD INDEX (MPa) (2 4 6) | NOTES WATER LEVELS INSTRUMENTATION

--- CONTINUED FROM PREVIOUS PAGE ---

Drilling record: HQ CORE

Depth scale (m)	Description	Elev. / Depth (m)
30	Red and green SHALE, moderate to slightly weathered, medium strong, finely laminated, not friable. Rock is up to 10% green coloured. * First gypsum coatings noted on fracture surfaces at 30.07m.	
32	Red SHALE, moderately strong, cannot be scratched with knife, slightly weathered. Finely laminated. Friable.	128.50 32.00
36	Discontinuities are planar and smooth to rough. They tend to be perpendicular to the core axis. they are interpreted as bedding/mechanically induced fractures.	
38	Red shale, finely laminated, some debris flow/turbidity bedding. (38.46m-38.55m)	
39	Note that approximately 6%-10% of the recovered core is coloured green.	

Run No.: 10, 11, 12, 13, 14, 15, 16, 17



Notes: BENTONITE SEAL (from about 32 m); SAND (about 39 m)

40

CONTINUED NEXT PAGE

DEPTH SCALE
1 : 50

LOGGED: MR
CHECKED:

PROJECT: 021-1228

RECORD OF DRILLHOLE: MW5

SHEET 5 OF 5

LOCATION: Refer to Plan

INCLINATION: -90° AZIMUTH: ---

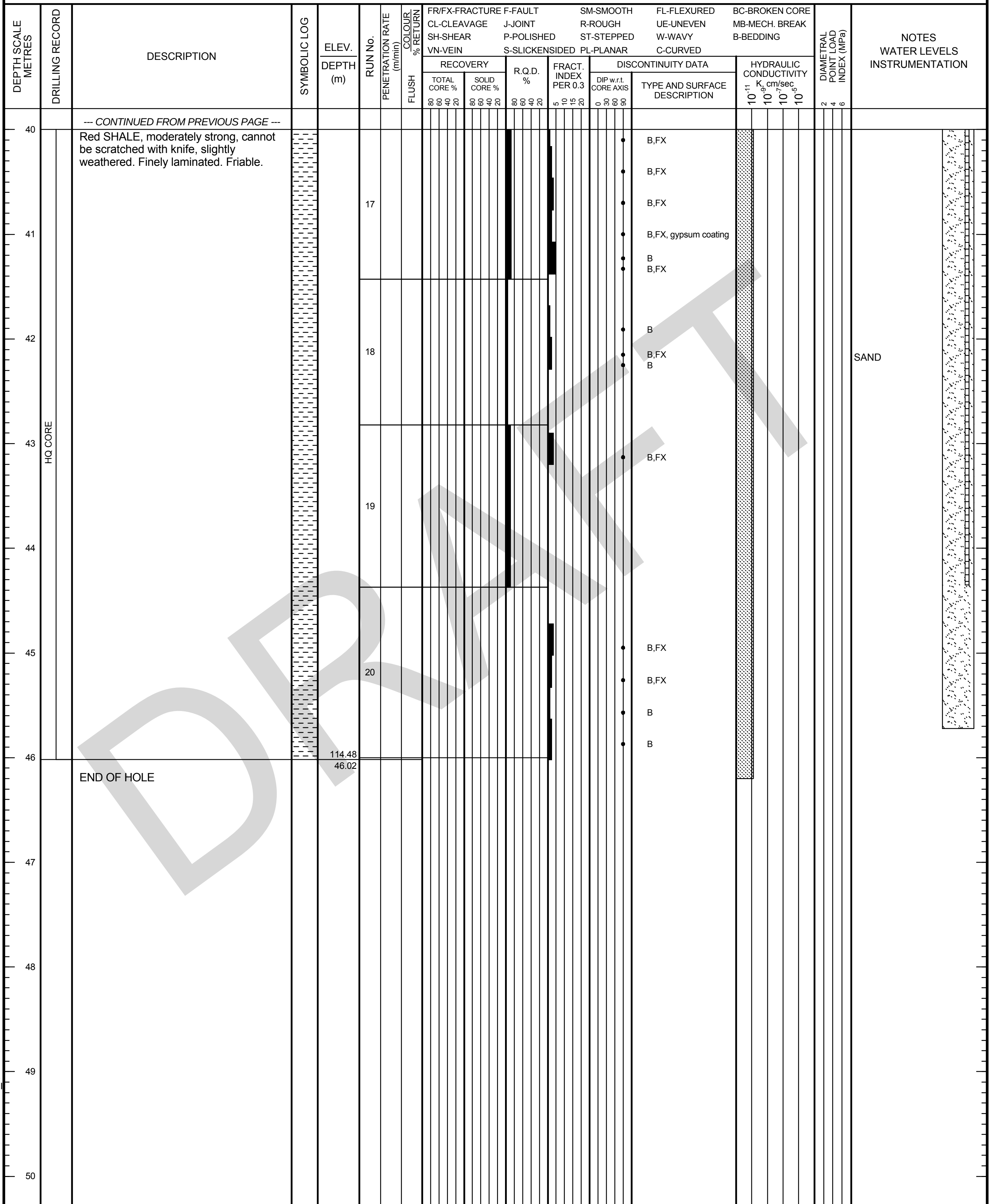
DRILLING DATE: July 10-11, 2002

DRILL RIG: CME 75

DRILLING CONTRACTOR: ALL TERRAIN DRILLING

DATUM:

FR/FX-FRACTURE F-FAULT SM-SMOOTH FL-FLEXURED BC-BROKEN CORE
CL-CLEAVAGE J-JOINT R-ROUGH UE-UNEVEN MB-MECH. BREAK
SH-SHEAR P-POLISHED ST-STEPPED W-WAVY B-BEDDING
VN-VEIN S-SLICKENSIDED PL-PLANAR C-CURVED



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Depth scale (metres)	Drilling record	Description	Elev. / Depth (m)	Run No.	Type and surface description	Notes
40	HQ CORE	Red SHALE, moderately strong, cannot be scratched with knife, slightly weathered. Finely laminated. Friable.		17	B,FX B,FX B,FX B,FX, gypsum coating B B,FX	
42				18	B B,FX B	SAND
43				19	B,FX	
45				20	B,FX B,FX B B	
46		END OF HOLE	114.48 46.02			

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: MR

CHECKED:

PROJECT: 021-1228

RECORD OF DRILLHOLE: MW-05S

SHEET 1 OF 2

LOCATION: N 596134.0 ;E 4808769.0

INCLINATION: -90° AZIMUTH: ---

DRILLING DATE: July 9, 2007

DRILL RIG: CME - 75 Track Mount

DRILLING CONTRACTOR: All-Terrain Drilling Limited

DATUM:

JN - Joint
FLT - Fault
SHR- Shear
VN - Vein
CJ - Conjugate

BD- Bedding
FO- Foliation
CO- Contact
OR- Orthogonal
CL - Cleavage

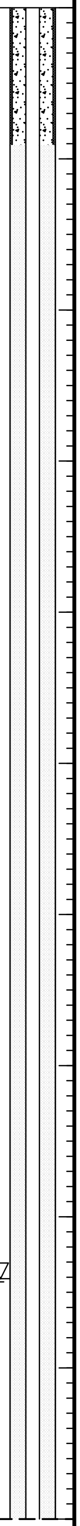
PL - Planar
CU- Curved
UN- Undulating
ST - Stepped
IR - Irregular

PO- Polished
K - Slickensided
SM- Smooth
Ro - Rough
MB- Mechanical Break

BR - Broken Rock

NOTE: For additional abbreviations refer to list of abbreviations & symbols.

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. / DEPTH (m)	RUN No.	PENETRATION RATE min/(m)	FLUSH	COLOUR % RETURN	RECOVERY TOTAL CORE % 80 60 40 20	RECOVERY SOLID CORE % 80 60 40 20	R.Q.D. % 80 60 40 20	FRACT. INDEX PER 0.3 m 5 10 15 20	DISCONTINUITY DATA B Angle 0 90 180 270	DISCONTINUITY DATA DIP w.r.t. CORE AXIS 0 30 60 90	DISCONTINUITY DATA TYPE AND SURFACE DESCRIPTION	Jr	Ja	Jn	HYDRAULIC CONDUCTIVITY K, cm/sec 10^{-6} 10^{-5} 10^{-4} 10^{-3}	Diametral Point Load Index (MPa) 2 4 6	RMC -Q' AVG.	NOTES WATER LEVELS INSTRUMENTATION
		GROUND SURFACE		167.03																		
0		Compact, dry, brown SILT with some clay and trace to some gravel, (0.5 cm to 3.03 cm) subangular to subrounded (TILL)		0.00																		Cement
1																						
2																						
		Occasional cobbles after 2.74 m depth																				
3																						
4				162.83																		
		Compact, moist to wet, brown SANDY SILT with some gravel, and occasional cobble, subrounded to subangular, heterogeneous (TILL)		4.20																		
5																						Grout
6				160.63																		
		Compact, saturated, brown SAND with some gravel and silt		6.40																		
7																						
8				158.87																		
		Compact, wet, brown SILT with some sand and gravel		8.16																		∇
		Silt layer from 28.8 m to 30.5 m																				
9																						
		Becoming clayey at 9.29 m depth																				
10																						



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DEPTH SCALE
1 : 50

Golder Associates

LOGGED: AI
CHECKED: SW

PROJECT: 021-1228

RECORD OF DRILLHOLE: MW-05S

SHEET 2 OF 2

LOCATION: N 596134.0 ;E 4808769.0

INCLINATION: -90° AZIMUTH: ---

DRILLING DATE: July 9, 2007

DRILL RIG: CME - 75 Track Mount

DRILLING CONTRACTOR: All-Terrain Drilling Limited

DATUM:

JN - Joint FLT - Fault SHR- Shear VN - Vein CJ - Conjugate	BD- Bedding FO- Foliation CO- Contact OR- Orthogonal CL - Cleavage	PL - Planar CU- Curved UN- Undulating ST - Stepped IR - Irregular	PO- Polished K - Slickensided SM- Smooth Ro - Rough MB- Mechanical Break
BR - Broken Rock	**NOTE:** For additional abbreviations refer to list of abbreviations & symbols.		

DEPTH SCALE METRES	DESCRIPTION	ELEV. DEPTH (m)
	--- CONTINUED FROM PREVIOUS PAGE ---	
10	Compact, wet, brown SILT with some sand and gravel	156.73 10.30
	Loose, grey, poorly graded, clean, homogeneous fine SAND	155.45 11.58
	Very dense, brown SILTY fine SAND with gravel and cobbles	151.46 15.57
	Slightly weathered, very thinly bedded, brownish red and green SHALE	148.90 18.13
	END OF DRILLHOLE	

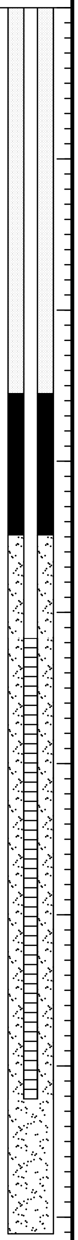
Depth scale: 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20

Column headings: DRILLING RECORD; SYMBOLIC LOG; RUN No.; PENETRATION RATE min/(m); COLOUR % RETURN; FLUSH; RECOVERY: TOTAL CORE % (80 60 40 20), SOLID CORE % (80 60 40 20); R.Q.D. % (80 60 40 20); FRACT. INDEX PER 0.3 m (5 10 15 20); DISCONTINUITY DATA: B Angle (0 90 180 270), DIP w.r.t. CORE AXIS (0 30 60 90), TYPE AND SURFACE DESCRIPTION, Jr, Ja, Jn; HYDRAULIC CONDUCTIVITY K, cm/sec (10^{-6} 10^{-5} 10^{-4} 10^{-3}); Diametral Point Load Index (MPa) (2 4 6); RMC -Q' AVG.

TYPE AND SURFACE DESCRIPTION:

,BD,PL,UE
,BD,SH,UE
,SH, PL,UE,Ro
,SH, BD,UE,Ro
,PL,UE,Ro
,PL,UE,Ro
,SH,BD,Ro
,PL,W,UE
,PL,CU,UE
,PL,UE,VR
,PL,Ro,B.C.

NOTES WATER LEVELS INSTRUMENTATION



Grout

Hole Plug

Sand

Screen

Sand

DEPTH SCALE
1 : 50

Golder Associates

LOGGED: AI
CHECKED: SW

PROJECT: 021-1228

RECORD OF BOREHOLE: MW-06

SHEET 1 OF 4

LOCATION: N 596354.90 ;E 4808896.00

BORING DATE:

DATUM: Geodetic

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLES NUMBER	TYPE	BLOWS/0.3m	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^{-9} 10^{-7} 10^{-5} 10^{-3} WATER CONTENT PERCENT Wp ⊢—○W—⊣ Wl 10 20 30 40	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE									
0		OVERBURDEN (TILL)									
1											
											Hole Plug
2											
3											
4											
5											Sand
6											
7											
8											Screen
9											
		SHALE (BEDROCK)		9.45							Sand
											Hole Plug
10											

CONTINUED NEXT PAGE

DEPTH SCALE
1 : 50

LOGGED:
CHECKED:

PROJECT: 021-1228

RECORD OF BOREHOLE: MW-06

SHEET 2 OF 4

LOCATION: N 596354.90 ;E 4808896.00

BORING DATE:

DATUM: Geodetic

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLES NUMBER	TYPE	BLOWS/0.3m	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^{-9} 10^{-7} 10^{-5} 10^{-3} WATER CONTENT PERCENT Wp W Wl 10 20 30 40	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		--- CONTINUED FROM PREVIOUS PAGE ---									
10		SHALE (BEDROCK)									
11											
12											
13											
14											
15											Hole Plug
16											
17											
18											
19											
20											
		CONTINUED NEXT PAGE									

DEPTH SCALE

1 : 50

Golder Associates

LOGGED:

CHECKED:

PROJECT: 021-1228

RECORD OF BOREHOLE: MW-06

SHEET 3 OF 4

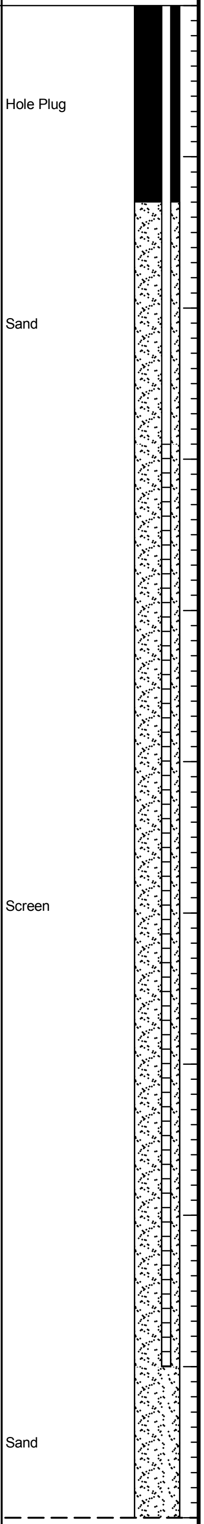
LOCATION: N 596354.90 ;E 4808896.00

BORING DATE:

DATUM: Geodetic

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	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^{-9} 10^{-7} 10^{-5} 10^{-3}); WATER CONTENT PERCENT Wp ⊢—○W—⊣ Wl (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		--- CONTINUED FROM PREVIOUS PAGE ---									
20		SHALE (BEDROCK)									
21											
22											
23											
24											
25											
26											
27											
28											
29											
30		*CONTINUED NEXT PAGE*									



DEPTH SCALE

1 : 50

Golder Associates

LOGGED:

CHECKED:

PROJECT: 021-1228

RECORD OF BOREHOLE: MW-06

SHEET 4 OF 4

LOCATION: N 596354.90 ;E 4808896.00

BORING DATE:

DATUM: Geodetic

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLES NUMBER	SAMPLES TYPE	BLOWS/0.3m	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^{-9} 10^{-7} 10^{-5} 10^{-3}); WATER CONTENT PERCENT Wp ⊢—○W—⊣ Wl (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		--- CONTINUED FROM PREVIOUS PAGE ---									
30		SHALE (BEDROCK)									
31											
32											Sand
33											
34											
		END OF BOREHOLE NOTE: 1. Borehole logging and well completion was not supervised by Golder.		34.67							
35											
36											
37											
38											
39											
40											

DEPTH SCALE
1 : 50

Golder Associates

LOGGED:
CHECKED:

PROJECT: 021-1228

RECORD OF DRILLHOLE: MW-06S

SHEET 1 OF 2

LOCATION: N 596351.0 ;E 4808892.0

INCLINATION: -90° AZIMUTH: ---

DRILLING DATE: July 6 and 10, 2007

DRILL RIG: CME - 75 Track Mount

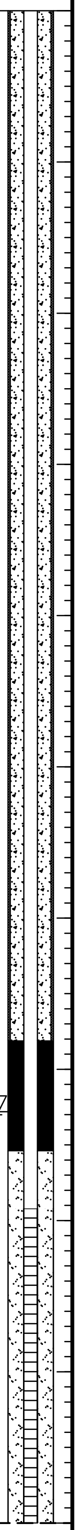
DRILLING CONTRACTOR: All-Terrain Drilling Limited

DATUM:

JN - Joint
FLT - Fault
SHR- Shear
VN - Vein
CJ - Conjugate
BD- Bedding
FO- Foliation
CO- Contact
OR- Orthogonal
CL - Cleavage
PL - Planar
CU- Curved
UN- Undulating
ST - Stepped
IR - Irregular
PO- Polished
K - Slickensided
SM- Smooth
Ro - Rough
MB- Mechanical Break
BR - Broken Rock

NOTE: For additional abbreviations refer to list of abbreviations & symbols.

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	RUN No.	PENETRATION RATE min/(m)	FLUSH COLOUR % RETURN	RECOVERY TOTAL CORE % 80 60 40 20	RECOVERY SOLID CORE % 80 60 40 20	R.Q.D. % 80 60 40 20	FRACT. INDEX PER 0.3 m 5 10 15 20	DISCONTINUITY DATA B Angle 0 90 180 270	DIP w.r.t. CORE AXIS 0 30 60 90	TYPE AND SURFACE DESCRIPTION	Jr	Ja	Jn	HYDRAULIC CONDUCTIVITY K, cm/sec 10^{-6} 10^{-5} 10^{-4} 10^{-3}	Diametral Point Load Index (MPa) 2 4 6	RMC -Q' AVG.	NOTES WATER LEVELS INSTRUMENTATION
		GROUND SURFACE		166.05																	
0		Loose to compact, dry, brown SILT, some clay (TILL)		0.00																	
2		Some gravel from 8.44 m to 2.84 m depth																			
3		Slightly moist, brown SANDY SILT, some clay, cobble/gravel bands (TILL)		162.70 3.35																	Cement
5		Wet, brown SAND and GRAVEL		160.27 5.78																	
7		Silty sand, reddish brown, lens of clay, gravel at 7.32 m depth																			Hole Plug ▽
																					Sand
8		Reddish brown SILT, trace gravel (TILL)		158.13 7.92																	
9		SHALE, reddish, slightly porous, slight weathering, some gravel		156.91 9.14																	Screen
10																					



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DEPTH SCALE
1 : 50

LOGGED: MD
CHECKED: SW

PROJECT: 021-1228

RECORD OF DRILLHOLE: MW-06S

SHEET 2 OF 2

LOCATION: N 596351.0 ;E 4808892.0

INCLINATION: -90° AZIMUTH: ---

DRILLING DATE: July 6 and 10, 2007

DRILL RIG: CME - 75 Track Mount

DRILLING CONTRACTOR: All-Terrain Drilling Limited

DATUM:

JN - Joint
FLT - Fault
SHR- Shear
VN - Vein
CJ - Conjugate

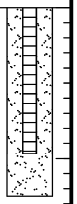
BD- Bedding
FO- Foliation
CO- Contact
OR- Orthogonal
CL - Cleavage

PL - Planar
CU- Curved
UN- Undulating
ST - Stepped
IR - Irregular

PO- Polished
K - Slickensided
SM- Smooth
Ro - Rough
MB- Mechanical Break

BR - Broken Rock

NOTE: For additional abbreviations refer to list of abbreviations & symbols.

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. / DEPTH (m)	RUN No.	PENETRATION RATE min/(m)	FLUSH	COLOUR / % RETURN	RECOVERY TOTAL CORE % 80 60 40 20	RECOVERY SOLID CORE % 80 60 40 20	R.Q.D. % 80 60 40 20	FRACT. INDEX PER 0.3 m 5 10 15 20	DISCONTINUITY DATA B Angle 0 90 180 270	DISCONTINUITY DATA DIP w.r.t. CORE AXIS 0 30 60 90	DISCONTINUITY DATA TYPE AND SURFACE DESCRIPTION	Jr	Ja	Jn	HYDRAULIC CONDUCTIVITY K, cm/sec 10^{-6} 10^{-5} 10^{-4} 10^{-3}	Diametral Point Load Index (MPa) 2 4 6	RMC -Q' AVG.	NOTES WATER LEVELS INSTRUMENTATION
		--- CONTINUED FROM PREVIOUS PAGE ---																				
10		Moderately weathered, thinly bedded, redish brown and green SHALE		156.00 10.05																		 Screen Sand
11				154.80 11.25																		
		END OF DRILLHOLE																				
12																						
13																						
14																						
15																						
16																						
17																						
18																						
19																						
20																						

DEPTH SCALE
1 : 50

Golder Associates

LOGGED: MD
CHECKED: SW

PROJECT: 021-1228

RECORD OF BOREHOLE: MW-07

SHEET 1 OF 5

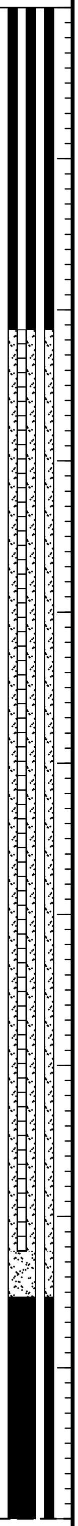
LOCATION: N 596099.40 ;E 4809348.00

BORING DATE:

DATUM: Geodetic

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	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^{-9} 10^{-7} 10^{-5} 10^{-3}); WATER CONTENT PERCENT Wp ⊢—○W—⊣ Wl (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE									
0		OVERBURDEN (TILL)									
1											Hole Plug
2											
3											
4											
5											Screen
6											
7											
8											Sand
9											Hole Plug
10		*CONTINUED NEXT PAGE*									



DEPTH SCALE

1 : 50

Golder Associates

LOGGED:

CHECKED:

PROJECT: 021-1228

RECORD OF BOREHOLE: MW-07

SHEET 2 OF 5

LOCATION: N 596099.40 ;E 4809348.00

BORING DATE:

DATUM: Geodetic

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOWS/0.3m	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^{-9} 10^{-7} 10^{-5} 10^{-3} WATER CONTENT PERCENT Wp ⊢—○W—⊣ Wl 10 20 30 40	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		--- CONTINUED FROM PREVIOUS PAGE ---									
10		OVERBURDEN (TILL)									
		SHALE (BEDROCK)		10.40							
11											
12											
13											
14											
15											Hole Plug
16											
17											
18											
19											
20		*CONTINUED NEXT PAGE*									

DEPTH SCALE
1 : 50

LOGGED:
CHECKED:

PROJECT: 021-1228

RECORD OF BOREHOLE: MW-07

SHEET 3 OF 5

LOCATION: N 596099.40 ;E 4809348.00

BORING DATE:

DATUM: Geodetic

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE			SAMPLES			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^{-9} 10^{-7} 10^{-5} 10^{-3} WATER CONTENT PERCENT Wp ⊢—○W—⊣ Wl 10 20 30 40	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m				
		--- CONTINUED FROM PREVIOUS PAGE ---									
20		SHALE (BEDROCK)									
21											
22											
23											
24											Hole Plug
25											
26											
27											
28											
29											Sand
30											
		CONTINUED NEXT PAGE									

DEPTH SCALE
1 : 50

Golder Associates

LOGGED:
CHECKED:

PROJECT: 021-1228

RECORD OF BOREHOLE: MW-07

SHEET 4 OF 5

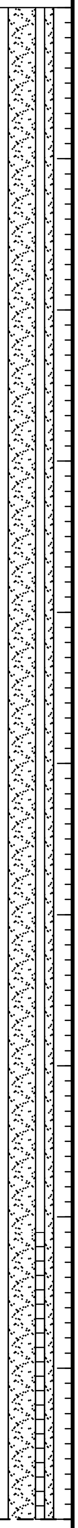
LOCATION: N 596099.40 ;E 4809348.00

BORING DATE:

DATUM: Geodetic

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	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^{-9} 10^{-7} 10^{-5} 10^{-3} / WATER CONTENT PERCENT Wp ⊢—○W—⊣ Wl 10 20 30 40	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		--- CONTINUED FROM PREVIOUS PAGE ---									
30		SHALE (BEDROCK)									
31											
32											
33											
34											Sand
35											
36											
37											
38											
39											Screen
40											
		CONTINUED NEXT PAGE									



DEPTH SCALE
1 : 50

Golder Associates

LOGGED:
CHECKED:

GTA-BHS 001 021-1228.GPJ GAL-MIS.GDT 4/12/12 PS

PROJECT: 021-1228

RECORD OF BOREHOLE: MW-07

SHEET 5 OF 5

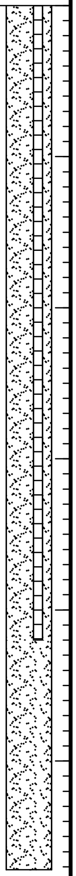
LOCATION: N 596099.40 ;E 4809348.00

BORING DATE:

DATUM: Geodetic

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	SOIL PROFILE: STRATA PLOT	SOIL PROFILE: ELEV. DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	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^{-9} 10^{-7} 10^{-5} 10^{-3}) WATER CONTENT PERCENT Wp ⊢—○W—⊣ Wl (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		--- CONTINUED FROM PREVIOUS PAGE ---									
40		SHALE (BEDROCK)									
41											
42											Screen
43											
44											
45											Sand
		END OF BOREHOLE		45.72							
46		NOTE: 1. Borehole logging and well completion was not supervised by Golder. This hole was originally numbered MW-12.									
47											
48											
49											
50											



DEPTH SCALE

1 : 50

Golder Associates

LOGGED:

CHECKED:

PROJECT: 021-1228

RECORD OF BOREHOLE: MW-08

SHEET 1 OF 5

LOCATION: N 596294.70 ;E 4809190.00

BORING DATE:

DATUM: Geodetic

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	SOIL PROFILE: STRATA PLOT	SOIL PROFILE: ELEV. DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	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^{-9} 10^{-7} 10^{-5} 10^{-3}); WATER CONTENT PERCENT Wp ⊢—○W—⊣ Wl (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE									
0		OVERBURDEN (TILL)									
1											Hole Plug
2											Sand
3											
4											Screen
5											
6		SHALE (BEDROCK)		6.10							Sand
7											
8											Hole Plug
9											
10											

CONTINUED NEXT PAGE

DEPTH SCALE

1 : 50

Golder Associates

LOGGED:

CHECKED:

PROJECT: 021-1228

RECORD OF BOREHOLE: MW-08

SHEET 2 OF 5

LOCATION: N 596294.70 ;E 4809190.00

BORING DATE:

DATUM: Geodetic

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE			SAMPLES			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^{-9}, 10^{-7}, 10^{-5}, 10^{-3}) WATER CONTENT PERCENT Wp ⊢—○W—⊣ Wl (10, 20, 30, 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m				
		--- CONTINUED FROM PREVIOUS PAGE ---									
10		SHALE (BEDROCK)									
11											Hole Plug
12											
13											
14											
15											
16											Sand
17											
18											
19											
20											
		CONTINUED NEXT PAGE									

DEPTH SCALE

1 : 50

Golder Associates

LOGGED:

CHECKED:

PROJECT: 021-1228

RECORD OF BOREHOLE: MW-08

SHEET 3 OF 5

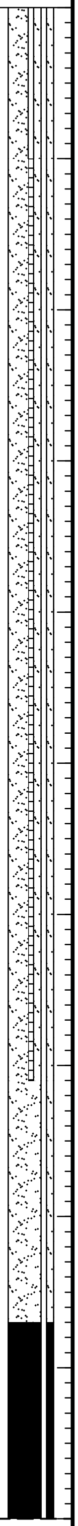
LOCATION: N 596294.70 ;E 4809190.00

BORING DATE:

DATUM: Geodetic

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	SOIL PROFILE: STRATA PLOT	SOIL PROFILE: ELEV. DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	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^{-9} 10^{-7} 10^{-5} 10^{-3}) WATER CONTENT PERCENT Wp ⊢—○W—⊣ Wl (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		--- CONTINUED FROM PREVIOUS PAGE ---									
20		SHALE (BEDROCK)									
											Sand
21											
22											
23											
24											Screen
25											
26											
27											
28											Sand
29											Hole Plug
30											
		CONTINUED NEXT PAGE									



DEPTH SCALE

1 : 50

Golder Associates

LOGGED:

CHECKED:

GTA-BHS 001 021-1228.GPJ GAL-MIS.GDT 4/12/12 PS

PROJECT: 021-1228

RECORD OF BOREHOLE: MW-08

SHEET 4 OF 5

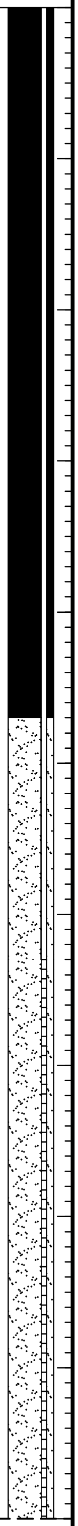
LOCATION: N 596294.70 ;E 4809190.00

BORING DATE:

DATUM: Geodetic

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	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^{-9} 10^{-7} 10^{-5} 10^{-3}); WATER CONTENT PERCENT Wp ⊢—○W—⊣ Wl (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		--- CONTINUED FROM PREVIOUS PAGE ---									
30		SHALE (BEDROCK)									
31											
32											Hole Plug
33											
34											
35											Sand
36											
37											
38											Screen
39											
40		*CONTINUED NEXT PAGE*									



DEPTH SCALE

1 : 50

Golder Associates

LOGGED:

CHECKED:

PROJECT: 021-1228

RECORD OF BOREHOLE: MW-08

SHEET 5 OF 5

LOCATION: N 596294.70 ;E 4809190.00

BORING DATE:

DATUM: Geodetic

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	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^{-9} 10^{-7} 10^{-5} 10^{-3}); WATER CONTENT PERCENT Wp ⊢—○W—⊣ Wl (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		--- CONTINUED FROM PREVIOUS PAGE ---									
40		SHALE (BEDROCK)									
41											
42											
43											Screen
44											
45											
46											
		END OF BOREHOLE NOTE: 1. Borehole logging and well completion was not supervised by Golder.		46.20							
47											
48											
49											
50											

DEPTH SCALE

1 : 50

Golder Associates

LOGGED:

CHECKED:

PROJECT: 021-1228

RECORD OF DRILLHOLE: MW-09

SHEET 1 OF 5

LOCATION: N 596166.0 ;E 4809014.0

INCLINATION: -90° AZIMUTH: ---

DRILLING DATE: July 3 to 5, 2007

DRILL RIG: CME - 75 Track Mount

DRILLING CONTRACTOR: All-Terrain Drilling Limited

DATUM:

JN - Joint
FLT - Fault
SHR- Shear
VN - Vein
CJ - Conjugate

BD- Bedding
FO- Foliation
CO- Contact
OR- Orthogonal
CL - Cleavage

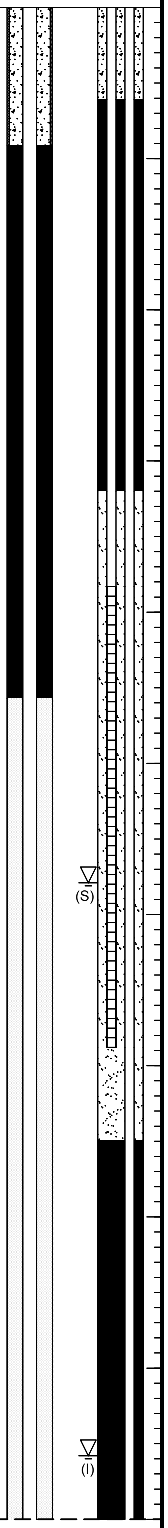
PL - Planar
CU- Curved
UN- Undulating
ST - Stepped
IR - Irregular

PO- Polished
K - Slickensided
SM- Smooth
Ro - Rough
MB- Mechanical Break

BR - Broken Rock

NOTE: For additional abbreviations refer to list of abbreviations & symbols.

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	RUN No.	PENETRATION RATE min/(m)	COLOUR % RETURN	FLUSH	RECOVERY TOTAL CORE % 80 60 40 20	RECOVERY SOLID CORE % 80 60 40 20	R.Q.D. % 80 60 40 20	FRACT. INDEX PER 0.3 m 5 10 15 20	DISCONTINUITY DATA B Angle 0 90 180 270	DISCONTINUITY DATA DIP w.r.t. CORE AXIS 0 30 60 90	DISCONTINUITY DATA TYPE AND SURFACE DESCRIPTION	Jr	Ja	Jn	HYDRAULIC CONDUCTIVITY K, cm/sec 10^{-6} 10^{-5} 10^{-4} 10^{-3}	Diametral Point Load Index (MPa) 2 4 6	RMC -Q' AVG.	NOTES WATER LEVELS INSTRUMENTATION
		GROUND SURFACE		165.53																		
0		Stiff, brown clayey silt till with trace gravel and organics (TOPSOIL)		0.00																		
1																						
		Firm, brown SILT with some clay, sand, semirounded gravel and cobbles (TILL)		164.08 1.45																		
2																						
3																						
4																						
5																						
		Slightly firm, reddish brown CLAYEY SILT with very fine and very course semirounded sand, gravel and cobbles (TILL)		159.75 5.78																		(S)
6																						
7																						
8																						
		Stiff, brown SILTY CLAY with very course sand and cobbles (TILL)		157.00 8.53																		
9																						(I)
		Stiff, reddish brown SILTY CLAY (Weathered Shale)		155.78 9.75																		
10																						



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DEPTH SCALE
1 : 50

Golder Associates

LOGGED: AK
CHECKED: SW

PROJECT: 021-1228

RECORD OF DRILLHOLE: MW-09

SHEET 2 OF 5

LOCATION: N 596166.0 ;E 4809014.0

INCLINATION: -90° AZIMUTH: ---

DRILLING DATE: July 3 to 5, 2007

DRILL RIG: CME - 75 Track Mount

DRILLING CONTRACTOR: All-Terrain Drilling Limited

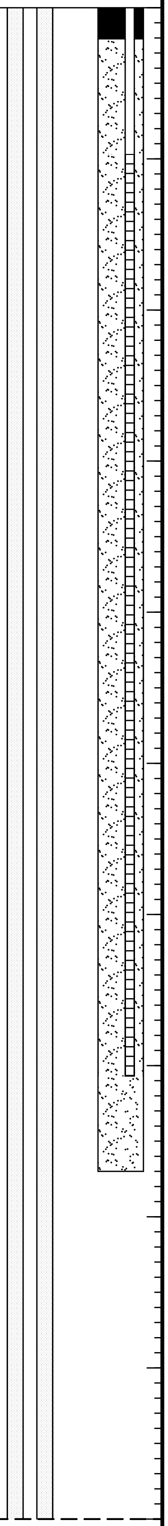
DATUM:

JN - Joint
FLT - Fault
SHR- Shear
VN - Vein
CJ - Conjugate
BD- Bedding
FO- Foliation
CO- Contact
OR- Orthogonal
CL - Cleavage
PL - Planar
CU- Curved
UN- Undulating
ST - Stepped
IR - Irregular
PO- Polished
K - Slickensided
SM- Smooth
Ro - Rough
MB- Mechanical Break
BR - Broken Rock

NOTE: For additional abbreviations refer to list of abbreviations & symbols.

DEPTH SCALE METRES	DESCRIPTION	ELEV. DEPTH (m)	RUN No.	DISCONTINUITY DATA TYPE AND SURFACE DESCRIPTION
	--- CONTINUED FROM PREVIOUS PAGE ---			
10	Stiff, reddish brown SILTY CLAY (Weathered Shale)			
12	Stiff, reddish brown SILTY CLAY with some broken shale (Weathered Shale)	153.34 12.19		
13	Slightly weathered, weak, very thinly to thinly bedded, redish brown and green SHALE	151.81 13.72	1	,JN,IR,Ro ,JN,IR,Ro ,JN,IR,Ro
14			2	,JN,IR,Ro ,FO,IR,Ro ,BD,IR,Ro ,JN,IR,Ro
15			3	,FR,IR,Ro ,JN,IR,Ro ,FO,IR,Ro ,JN,IR,Ro ,JN,ST,Ro ,JN,IR,Ro ,FR,IR,Ro ,JN,IR,Ro ,JN,IR,Ro ,FR,IR,Ro
17			4	,FR,IR,Ro
18			5	,JN,PL,SM
18			6	,JN,IR,Ro ,FO,PL,SM ,FO,IR,Ro ,FO,IR,Ro ,JN,PL,Ro
20	*CONTINUED NEXT PAGE*			

NOTES
WATER LEVELS
INSTRUMENTATION



DEPTH SCALE
1 : 50

Golder Associates

LOGGED: AK
CHECKED: SW

PROJECT: 021-1228

RECORD OF DRILLHOLE: MW-09

SHEET 3 OF 5

LOCATION: N 596166.0 ;E 4809014.0

DRILLING DATE: July 3 to 5, 2007

DATUM:

DRILL RIG: CME - 75 Track Mount

INCLINATION: -90° AZIMUTH: ---

DRILLING CONTRACTOR: All-Terrain Drilling Limited

JN - Joint
FLT - Fault
SHR- Shear
VN - Vein
CJ - Conjugate

BD- Bedding
FO- Foliation
CO- Contact
OR- Orthogonal
CL - Cleavage

PL - Planar
CU- Curved
UN- Undulating
ST - Stepped
IR - Irregular

PO- Polished
K - Slickensided
SM- Smooth
Ro - Rough
MB- Mechanical Break

BR - Broken Rock

NOTE: For additional abbreviations refer to list of abbreviations & symbols.

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	RUN No.	PENETRATION RATE min/(m)	COLOUR % RETURN FLUSH	RECOVERY TOTAL CORE % 80 60 40 20	RECOVERY SOLID CORE % 80 60 40 20	R.Q.D. % 80 60 40 20	FRACT. INDEX PER 0.3 m 5 10 15 20	DISCONTINUITY DATA B Angle 0 90 180 270	DIP w.r.t. CORE AXIS 0 30 60 90	TYPE AND SURFACE DESCRIPTION	Jr	Ja	Jn	HYDRAULIC CONDUCTIVITY K, cm/sec 10^{-6} 10^{-5} 10^{-4} 10^{-3}	Diametral Point Load Index (MPa) 2 4 6	RMC -Q' AVG.	NOTES WATER LEVELS INSTRUMENTATION
		--- CONTINUED FROM PREVIOUS PAGE ---																			
20		Slightly weathered, weak, very thinly to thinly bedded, redish brown and green SHALE			6									,JN,CU,Ro ,JN,IR,Ro ,FO,PL,SM ,FO,IR,Ro							
21					7									,JN,PL,Ro ,FO,IR,Ro ,JN,IR,Ro							
22					8									,BD,PL,Ro ,JN,IR,Ro ,BD,PL,Ro ,FR,IR,Ro ,JN,IR,Ro ,JN,IR,Ro							
23					9									,JN,IR,Ro ,JN,IR,Ro ,FO,IR,SM ,JN,IR,Ro ,FO,IR,Ro ,JN,UE,SM ,FO,IR,Ro ,JN,IR,Ro							
25					10									,FR,IR,VR ,JN,,Ro ,BD,PL,Ro ,JN,PL,SM ,FR,IR,Ro ,JN,IR,Ro ,FR,IR,SM							
26					11									,JN,IR,Ro ,JN,IR,VR ,JN,CU,SM ,JN,PL,SM							
28					12									,JN,CU,SM ,FR,IR,Ro ,JN,IR,Ro ,FR,PL,Ro ,JN,UE,Ro							
29					13																
30		*CONTINUED NEXT PAGE*																			

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: AK

CHECKED: SW

PROJECT: 021-1228

RECORD OF DRILLHOLE: MW-09

SHEET 4 OF 5

LOCATION: N 596166.0 ;E 4809014.0

INCLINATION: -90° AZIMUTH: ---

DRILLING DATE: July 3 to 5, 2007

DRILL RIG: CME - 75 Track Mount

DRILLING CONTRACTOR: All-Terrain Drilling Limited

DATUM:

JN - Joint
FLT - Fault
SHR- Shear
VN - Vein
CJ - Conjugate

BD- Bedding
FO- Foliation
CO- Contact
OR- Orthogonal
CL - Cleavage

PL - Planar
CU- Curved
UN- Undulating
ST - Stepped
IR - Irregular

PO- Polished
K - Slickensided
SM- Smooth
Ro - Rough
MB- Mechanical Break

BR - Broken Rock

NOTE: For additional abbreviations refer to list of abbreviations & symbols.

DEPTH SCALE METRES | DRILLING RECORD | DESCRIPTION | SYMBOLIC LOG | ELEV. DEPTH (m) | RUN No. | PENETRATION RATE min/(m) | COLOUR % RETURN | FLUSH | RECOVERY: TOTAL CORE % (80 60 40 20), SOLID CORE % (80 60 40 20) | R.Q.D. % (80 60 40 20) | FRACT. INDEX PER 0.3 m (5 10 15 20) | DISCONTINUITY DATA: B Angle (0 90 180 270), DIP w.r.t. CORE AXIS (0 30 60 90), TYPE AND SURFACE DESCRIPTION, Jr, Ja, Jn | HYDRAULIC CONDUCTIVITY K, cm/sec (10^{-6} 10^{-5} 10^{-4} 10^{-3}) | Diametral Point Load Index (MPa) (2 4 6) | RMC -Q' AVG. | NOTES WATER LEVELS INSTRUMENTATION

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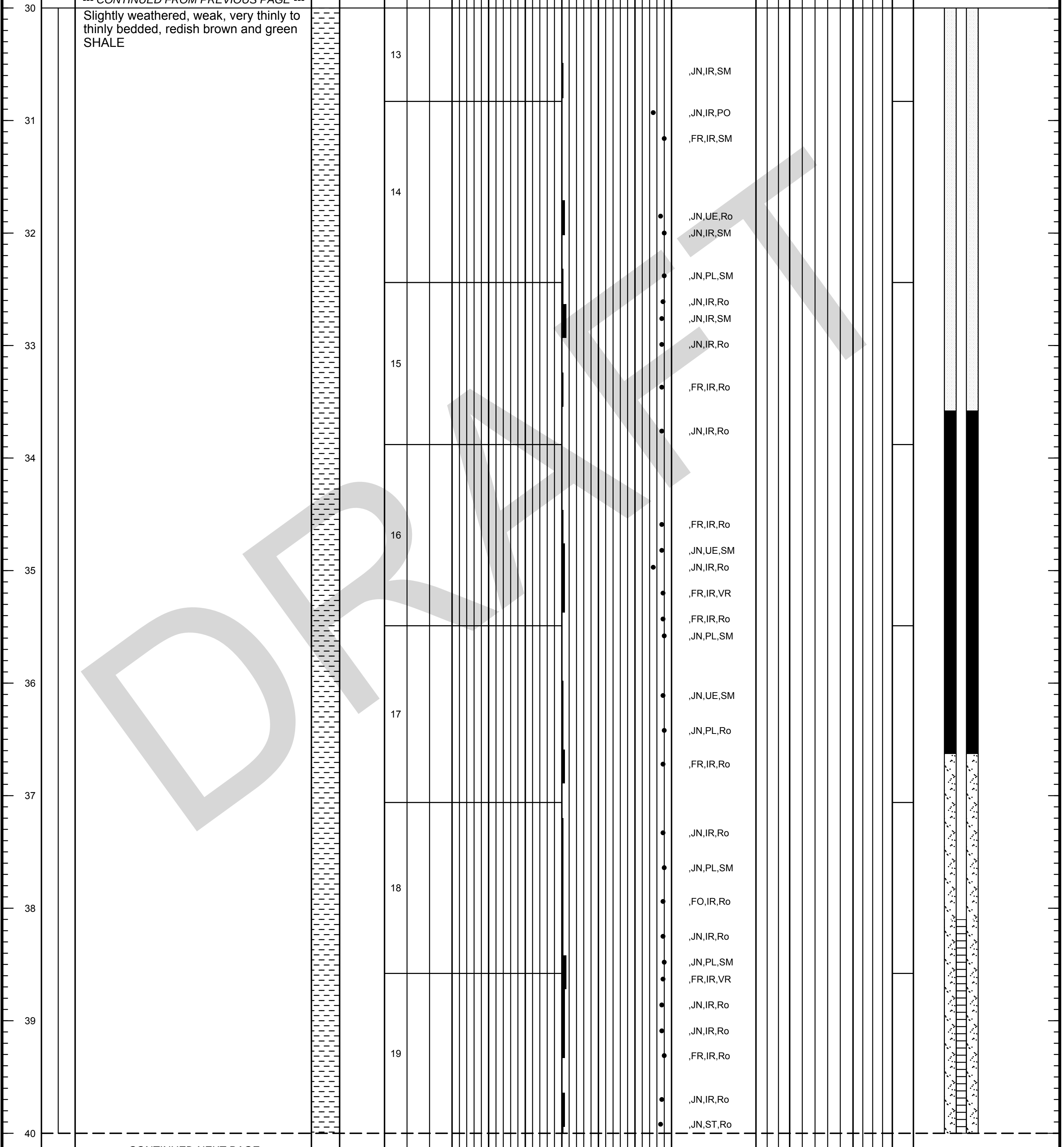


Slightly weathered, weak, very thinly to thinly bedded, redish brown and green SHALE

RUN No.: 13, 14, 15, 16, 17, 18, 19

TYPE AND SURFACE DESCRIPTION:

,JN,IR,SM
,JN,IR,PO
,FR,IR,SM
,JN,UE,Ro
,JN,IR,SM
,JN,PL,SM
,JN,IR,Ro
,JN,IR,SM
,JN,IR,Ro
,FR,IR,Ro
,JN,IR,Ro
,FR,IR,Ro
,JN,UE,SM
,JN,IR,Ro
,FR,IR,VR
,FR,IR,Ro
,JN,PL,SM
,JN,UE,SM
,JN,PL,Ro
,FR,IR,Ro
,JN,IR,Ro
,JN,PL,SM
,FO,IR,Ro
,JN,IR,Ro
,JN,PL,SM
,FR,IR,VR
,JN,IR,Ro
,JN,IR,Ro
,FR,IR,Ro
,JN,IR,Ro
,JN,ST,Ro

CONTINUED NEXT PAGE

DEPTH SCALE
1 : 50

Golder Associates

LOGGED: AK
CHECKED: SW

PROJECT: 021-1228

RECORD OF DRILLHOLE: MW-09

SHEET 5 OF 5

LOCATION: N 596166.0 ;E 4809014.0

INCLINATION: -90° AZIMUTH: ---

DRILLING DATE: July 3 to 5, 2007

DRILL RIG: CME - 75 Track Mount

DRILLING CONTRACTOR: All-Terrain Drilling Limited

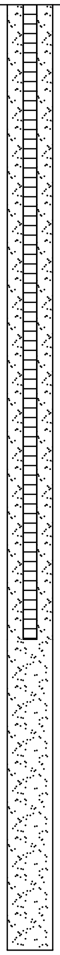
DATUM:

JN - Joint	BD - Bedding	PL - Planar	PO - Polished
FLT - Fault	FO - Foliation	CU - Curved	K - Slickensided
SHR - Shear	CO - Contact	UN - Undulating	SM - Smooth
VN - Vein	OR - Orthogonal	ST - Stepped	Ro - Rough
CJ - Conjugate	CL - Cleavage	IR - Irregular	MB - Mechanical Break

BR - Broken Rock

NOTE: For additional abbreviations refer to list of abbreviations & symbols.

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	RUN No.	PENETRATION RATE min/(m)	COLOUR % RETURN	FLUSH	RECOVERY TOTAL CORE % 80 60 40 20	RECOVERY SOLID CORE % 80 60 40 20	R.Q.D. % 80 60 40 20	FRACT. INDEX PER 0.3 m 5 10 15 20	DISCONTINUITY DATA B Angle 0 90 180 270	DISCONTINUITY DATA DIP w.r.t. CORE AXIS 0 30 60 90	DISCONTINUITY DATA TYPE AND SURFACE DESCRIPTION	Jr	Ja	Jn	HYDRAULIC CONDUCTIVITY K, cm/sec 10^{-6} 10^{-5} 10^{-4} 10^{-3}	Diametral Point Load Index (MPa) 2 4 6	RMC -Q' AVG.	NOTES WATER LEVELS INSTRUMENTATION
		--- CONTINUED FROM PREVIOUS PAGE ---																				
40				125.43	19																	
		Slightly weathered, weak, thinly bedded, redish brown and green SHALE		40.10											,JN,IR,Ro							
															,JN,IR,Ro							
															,JN,PL,SM							
					20																	
41															,JN,IR,Ro							∇ (D)
															,JN,CU,SM							
															,FR,IR,Ro							
42															,JN,IR,Ro							
															,FR,IR,Ro							
															,FR,IR,VR							
					21																	
															,FR,IR,VR							
															,FR,IR,Ro							
															,JN,CU,SM							
43				122.43																		
		Slightly weathered, weak, layered, redish brown and green SHALE		43.10											,JN,IR,Ro							
															,FR,IR,Ro							
															,JN,PL,SM							
					22																	
44																						
															,JN,IR,Ro							
															,FR,IR,SM							
45																						
					23										,JN,PL,SM							
46				119.28																		
		END OF DRILLHOLE		46.25																		
47																						
48																						
49																						
50																						



MIS-RCK 004 021-1228 (2007).GPJ GAL-MISS.GDT 25/9/09 DD

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: AK

CHECKED: SW

RECORD OF DRILLHOLE: MW-10

PROJECT: 021-1228

SHEET 1 OF 5

LOCATION: N 596045.0 ;E 4809002.0

DRILLING DATE: June 20 to 21, 2007

DATUM:

INCLINATION: -90° AZIMUTH: ---

DRILL RIG: CME - 75 Track Mount

DRILLING CONTRACTOR: All-Terrain Drilling Limited

JN - Joint
FLT - Fault
SHR- Shear
VN - Vein
CJ - Conjugate

BD- Bedding
FO- Foliation
CO- Contact
OR- Orthogonal
CL - Cleavage

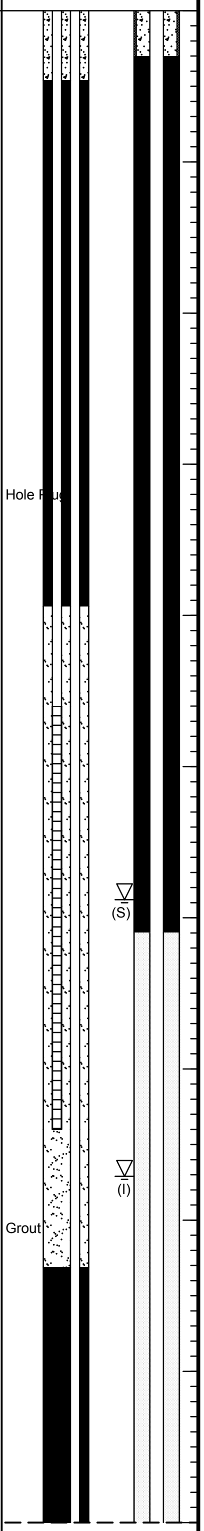
PL - Planar
CU- Curved
UN- Undulating
ST - Stepped
IR - Irregular

PO- Polished
K - Slickensided
SM- Smooth
Ro - Rough
MB- Mechanical Break

BR - Broken Rock

NOTE: For additional abbreviations refer to list of abbreviations & symbols.

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	RUN No.	PENETRATION RATE min/(m)	COLOUR % RETURN	FLUSH	RECOVERY TOTAL CORE %	RECOVERY SOLID CORE %	R.Q.D. %	FRACT. INDEX PER 0.3 m	DISCONTINUITY DATA B Angle	DIP w.r.t. CORE AXIS	TYPE AND SURFACE DESCRIPTION	Jr	Ja	Jn	HYDRAULIC CONDUCTIVITY K, cm/sec	Diametral Point Load Index (MPa)	RMC -Q' AVG.	NOTES WATER LEVELS INSTRUMENTATION
		GROUND SURFACE		166.78																		
0		Soft, brown clayey silt with organics and trace grey silt and gravel (TOPSOIL)																				
		Stiff, brown to grey brown CLAYEY SILT with semiangular gravel (TILL)		0.05																		
4		Very soft, reddish brown very fine SANDY SILT with semirounded gravel and cobbles (TILL)		162.72 4.06																		
		Stiff, reddish brown CLAYEY SILT with trace sand and gravel (TILL)		158.25 8.53																		
9		Soft, grey brown fine SILTY SAND with gravel (TILL)		157.79 8.99																		
		Stiff, grey brown very fine SANDY SILT with coarse sand, gravel and cobble s (TILL)		157.18 9.60																		
10		*CONTINUED NEXT PAGE*																				



DEPTH SCALE
1 : 50

LOGGED: AK
CHECKED: SW

PROJECT: 021-1228

RECORD OF DRILLHOLE: MW-10

SHEET 2 OF 5

LOCATION: N 596045.0 ;E 4809002.0

INCLINATION: -90° AZIMUTH: ---

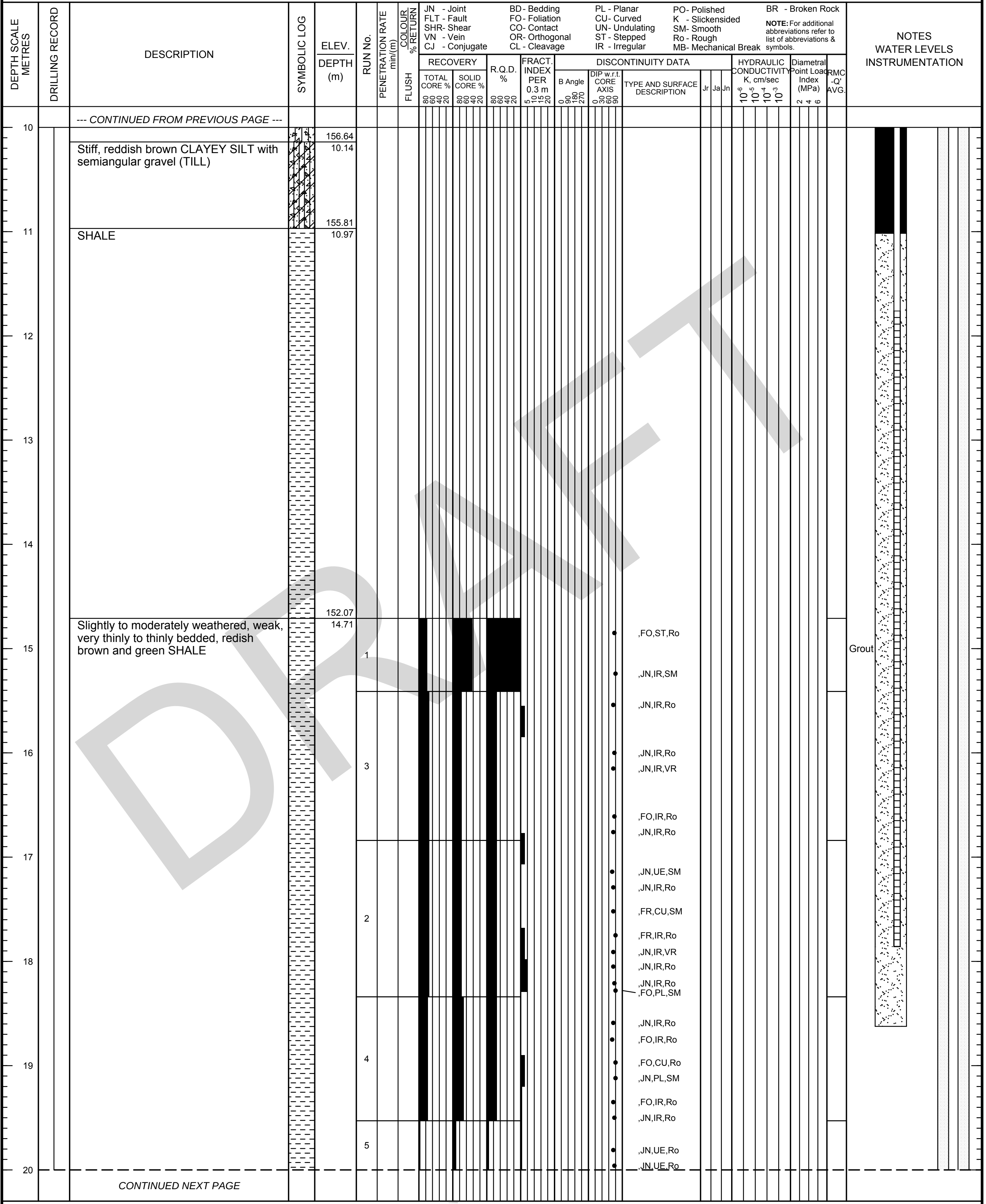
DRILLING DATE: June 20 to 21, 2007

DRILL RIG: CME - 75 Track Mount

DRILLING CONTRACTOR: All-Terrain Drilling Limited

DATUM:

JN - Joint	BD - Bedding	PL - Planar	PO - Polished	BR - Broken Rock
FLT - Fault	FO - Foliation	CU - Curved	K - Slickensided	**NOTE:** For additional abbreviations refer to list of abbreviations & symbols.
SHR - Shear	CO - Contact	UN - Undulating	SM - Smooth	
VN - Vein	OR - Orthogonal	ST - Stepped	Ro - Rough	
CJ - Conjugate	CL - Cleavage	IR - Irregular	MB - Mechanical Break	



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DESCRIPTION	ELEV. / DEPTH (m)
	156.64 10.14
Stiff, reddish brown CLAYEY SILT with semiangular gravel (TILL)	155.81 10.97
SHALE	152.07 14.71
Slightly to moderately weathered, weak, very thinly to thinly bedded, redish brown and green SHALE	

TYPE AND SURFACE DESCRIPTION

,FO,ST,Ro
,JN,IR,SM
,JN,IR,Ro
,JN,IR,Ro
,JN,IR,VR
,FO,IR,Ro
,JN,IR,Ro
,JN,UE,SM
,JN,IR,Ro
,FR,CU,SM
,FR,IR,Ro
,JN,IR,VR
,JN,IR,Ro
,JN,IR,Ro
,FO,PL,SM
,JN,IR,Ro
,FO,IR,Ro
,FO,CU,Ro
,JN,PL,SM
,FO,IR,Ro
,JN,IR,Ro
,JN,UE,Ro
,JN,UE,Ro

CONTINUED NEXT PAGE

DEPTH SCALE

1 : 50

LOGGED: AK

CHECKED: SW

PROJECT: 021-1228

RECORD OF DRILLHOLE: MW-10

SHEET 3 OF 5

LOCATION: N 596045.0 ;E 4809002.0

INCLINATION: -90° AZIMUTH: ---

DRILLING DATE: June 20 to 21, 2007

DRILL RIG: CME - 75 Track Mount

DRILLING CONTRACTOR: All-Terrain Drilling Limited

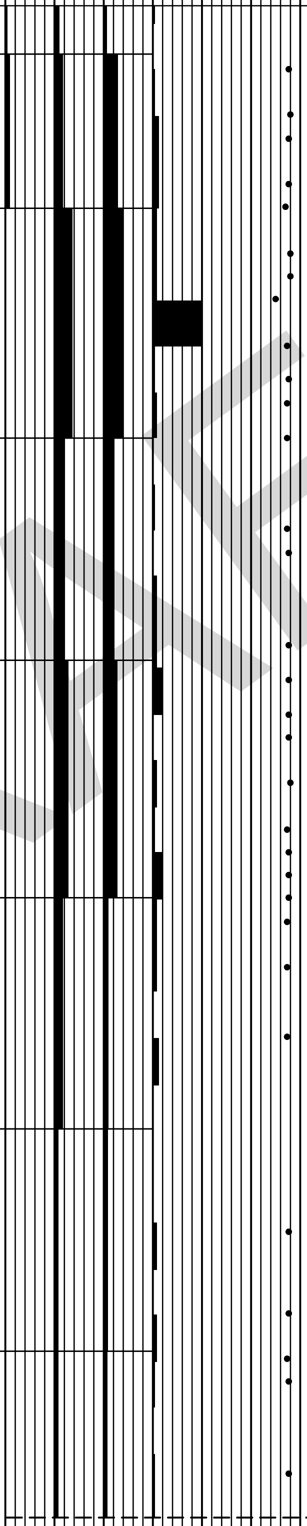
DATUM:

JN - Joint	BD- Bedding	PL - Planar	PO- Polished	BR - Broken Rock
FLT - Fault	FO- Foliation	CU- Curved	K - Slickensided	**NOTE:** For additional abbreviations refer to list of abbreviations & symbols.
SHR- Shear	CO- Contact	UN- Undulating	SM- Smooth	
VN - Vein	OR- Orthogonal	ST - Stepped	Ro - Rough	
CJ - Conjugate	CL - Cleavage	IR - Irregular	MB- Mechanical Break	

Column headings: DEPTH SCALE METRES | DRILLING RECORD | DESCRIPTION | SYMBOLIC LOG | ELEV. DEPTH (m) | RUN No. | PENETRATION RATE min/(m) | COLOUR % RETURN | FLUSH | RECOVERY (TOTAL CORE % 80 60 40 20; SOLID CORE % 80 60 40 20) | R.Q.D. % 80 60 40 20 | FRACT. INDEX PER 0.3 m 5 10 15 20 | DISCONTINUITY DATA (B Angle 0 90 180 270; DIP w.r.t. CORE AXIS 0 30 60 90; TYPE AND SURFACE DESCRIPTION; Jr; Ja; Jn) | HYDRAULIC CONDUCTIVITY K, cm/sec 10^{-6} 10^{-5} 10^{-4} 10^{-3} | Diametral Point Load Index (MPa) 2 4 6 | RMC -Q' AVG. | NOTES WATER LEVELS INSTRUMENTATION

--- CONTINUED FROM PREVIOUS PAGE ---

DEPTH SCALE METRES	DESCRIPTION	ELEV. DEPTH (m)	RUN No.
20	Slightly to moderately weathered, weak, very thinly to thinly bedded, redish brown and green SHALE		5
			6
21		145.48 21.30	
22	Highly weathered, very weak, thinly bedded, redish brown and green SHALE		7
		143.98 22.80	
23	Slightly weathered, weak, redish brown and green SHALE		8
24			
25			9
26			10
27			
28			11
29			12
30			



Discontinuity data (type and surface description):
- ,JN,IR,SM
- ,FO,ST,Ro
- ,FO,PL,SM
- ,BD,IR,Ro
- ,FO,IR,Ro
- ,FO,ST,SM
- ,FO,PL,SM
- ,JN,PL,SM
- ,JN,IR,Ro
- ,JN,IR,Ro
- ,JN,IR,Ro
- ,FO,ST,Ro
- ,JN,IR,Ro
- ,FR,PL,SM
- ,FR,ST,SM
- ,JN,PL,SM
- ,JN,IR,Ro
- ,JN,UE,SM
- ,FR,IR,Ro
- ,JN,IR,Ro
- ,BD,PL,SM
- ,BD,IR,Ro
- ,FO,PL,SM
- ,JN,ST,Ro
- ,FO,IR,SM
- ,JN,PL,SM
- ,JN,PL,SM
- ,FO,IR,Ro
- ,FO,IR,Ro
- ,JN,IR,Ro
- ,FR,IR,Ro
- ,JN,IR,Ro
- ,FO,PL,SM
- ,FO,ST,SM
- ,JN,UE,SM

Notes: Grout

Hole Plug

CONTINUED NEXT PAGE

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: AK

CHECKED: SW

PROJECT: 021-1228

RECORD OF DRILLHOLE: MW-10

SHEET 4 OF 5

LOCATION: N 596045.0 ;E 4809002.0

INCLINATION: -90° AZIMUTH: ---

DRILLING DATE: June 20 to 21, 2007

DRILL RIG: CME - 75 Track Mount

DRILLING CONTRACTOR: All-Terrain Drilling Limited

DATUM:

JN - Joint
FLT - Fault
SHR- Shear
VN - Vein
CJ - Conjugate

BD- Bedding
FO- Foliation
CO- Contact
OR- Orthogonal
CL - Cleavage

PL - Planar
CU- Curved
UN- Undulating
ST - Stepped
IR - Irregular

PO- Polished
K - Slickensided
SM- Smooth
Ro - Rough
MB- Mechanical Break

BR - Broken Rock

NOTE: For additional abbreviations refer to list of abbreviations & symbols.

--- CONTINUED FROM PREVIOUS PAGE ---

Slightly weathered, weak, redish brown and green SHALE

Run No.	Type and surface description
12	,JN,CU,SM ,JN,IR,Ro
13	,FO,IR,Ro ,FO,IR,Ro ,FO,IR,Ro ,JN,PL,SM
14	,JN,UE,SM ,JN,PL,SM ,FR,IR,Ro ,JN,PL,SM ,FR,ST,SM ,FO,IR,Ro
15	,JN,PL,SM ,JN,IR,Ro ,JN,PL,SM ,JN,IR,Ro
16	,JN,IR,Ro ,JN,PL,SM ,FO,IR,Ro ,JN,PL,SM
17	,JN,UE,SM ,FR,IR,Ro ,FR,IR,Ro
18	,JN,IR,Ro ,JN,PL,SM ,FO,IR,Ro
19	

Hole Plug

Sand

Screen

CONTINUED NEXT PAGE

DEPTH SCALE
1 : 50

Golder Associates

LOGGED: AK
CHECKED: SW

PROJECT: 021-1228

RECORD OF DRILLHOLE: MW-10

SHEET 5 OF 5

LOCATION: N 596045.0 ;E 4809002.0

INCLINATION: -90° AZIMUTH: ---

DRILLING DATE: June 20 to 21, 2007

DRILL RIG: CME - 75 Track Mount

DRILLING CONTRACTOR: All-Terrain Drilling Limited

DATUM:

JN - Joint
FLT - Fault
SHR- Shear
VN - Vein
CJ - Conjugate

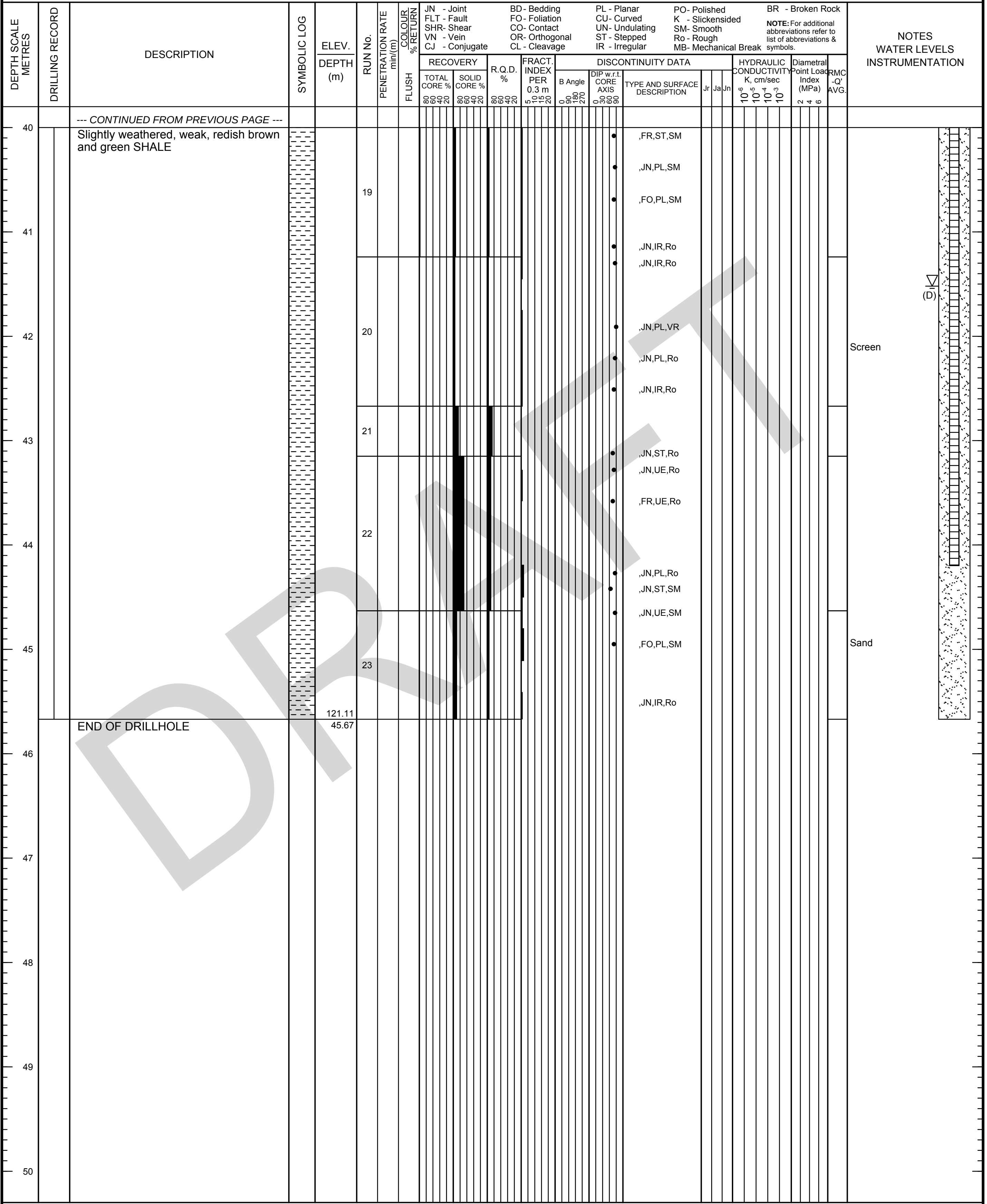
BD- Bedding
FO- Foliation
CO- Contact
OR- Orthogonal
CL - Cleavage

PL - Planar
CU- Curved
UN- Undulating
ST - Stepped
IR - Irregular

PO- Polished
K - Slickensided
SM- Smooth
Ro - Rough
MB- Mechanical Break

BR - Broken Rock

NOTE: For additional abbreviations refer to list of abbreviations & symbols.



--- CONTINUED FROM PREVIOUS PAGE ---

Slightly weathered, weak, redish brown and green SHALE

END OF DRILLHOLE

DEPTH SCALE
1 : 50

Golder Associates

LOGGED: AK
CHECKED: SW

PROJECT: 021-1228

RECORD OF DRILLHOLE: MW-11

SHEET 1 OF 5

LOCATION: N 595870.0 ;E 4808946.0

INCLINATION: -90° AZIMUTH: ---

DRILLING DATE: July 11, 2007

DRILL RIG: CME - 75 Track Mount

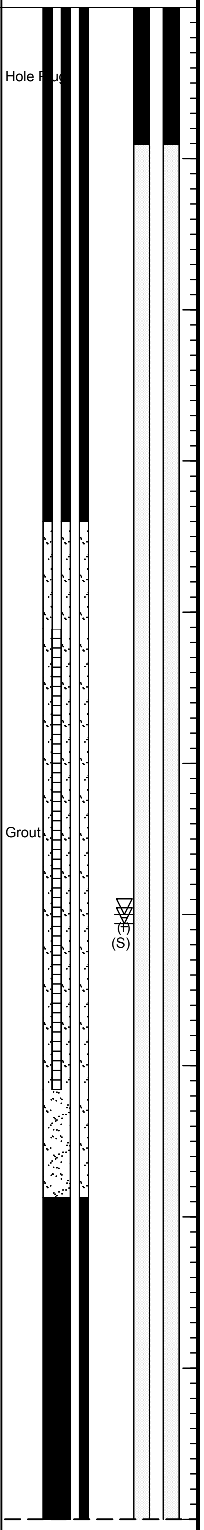
DRILLING CONTRACTOR: All-Terrain Drilling Limited

DATUM:

JN - Joint
FLT - Fault
SHR- Shear
VN - Vein
CJ - Conjugate
BD- Bedding
FO- Foliation
CO- Contact
OR- Orthogonal
CL - Cleavage
PL - Planar
CU- Curved
UN- Undulating
ST - Stepped
IR - Irregular
PO- Polished
K - Slickensided
SM- Smooth
Ro - Rough
MB- Mechanical Break
BR - Broken Rock

NOTE: For additional abbreviations refer to list of abbreviations & symbols.

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	RUN No.	PENETRATION RATE min/(m)	FLUSH COLOUR % RETURN	RECOVERY TOTAL CORE % 80 60 40 20	RECOVERY SOLID CORE % 80 60 40 20	R.Q.D. % 80 60 40 20	FRACT. INDEX PER 0.3 m 5 10 15 20	DISCONTINUITY DATA B Angle 0 90 180 270	DISCONTINUITY DATA DIP w.r.t. CORE AXIS 0 30 60 90	DISCONTINUITY DATA TYPE AND SURFACE DESCRIPTION	Jr	Ja	Jn	HYDRAULIC CONDUCTIVITY K, cm/sec 10^{-6} 10^{-5} 10^{-4} 10^{-3}	Diametral Point Load Index (MPa) 2 4 6	RMC -Q' AVG.	NOTES WATER LEVELS INSTRUMENTATION
		GROUND SURFACE		168.31																	
0		Compact, dry, brown SILT, trace clay (TILL) Loose to compact silty clay till from 1.2 m to 2.4 m depth Damp from 1.8 m to 2.4 m depth		0.00																	Hole Plug
4		Dry, brown to grey SILT, trace gravel/cobbles, angular to subangular gravel (TILL)		164.04 4.27																	Grout
6		Damp, brown to grey SANDY SILT with trace subangular rounded gravel, hetero (TILL)		161.60 6.71																	
8		Soft, grey to brown silty fine SAND (TILL)		159.47 8.84																	
10																					



CONTINUED NEXT PAGE

DEPTH SCALE
1 : 50

LOGGED: MD & AK
CHECKED: SW

PROJECT: 021-1228

RECORD OF DRILLHOLE: MW-11

SHEET 2 OF 5

LOCATION: N 595870.0 ;E 4808946.0

INCLINATION: -90° AZIMUTH: ---

DRILLING DATE: July 11, 2007

DRILL RIG: CME - 75 Track Mount

DRILLING CONTRACTOR: All-Terrain Drilling Limited

DATUM:

JN - Joint
FLT - Fault
SHR- Shear
VN - Vein
CJ - Conjugate

BD- Bedding
FO- Foliation
CO- Contact
OR- Orthogonal
CL - Cleavage

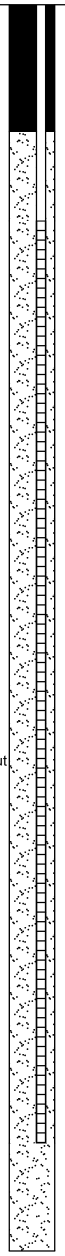
PL - Planar
CU- Curved
UN- Undulating
ST - Stepped
IR - Irregular

PO- Polished
K - Slickensided
SM- Smooth
Ro - Rough
MB- Mechanical Break

BR - Broken Rock

NOTE: For additional abbreviations refer to list of abbreviations & symbols.

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	RUN No.	PENETRATION RATE min/(m)	COLOUR % RETURN	FLUSH	RECOVERY TOTAL CORE % 80 60 40 20	RECOVERY SOLID CORE % 80 60 40 20	R.Q.D. % 80 60 40 20	FRACT. INDEX PER 0.3 m 5 10 15 20	DISCONTINUITY DATA B Angle 0 90 180 270	DISCONTINUITY DATA DIP w.r.t. CORE AXIS 0 30 60 90	DISCONTINUITY DATA TYPE AND SURFACE DESCRIPTION	Jr	Ja	Jn	HYDRAULIC CONDUCTIVITY K, cm/sec 10^{-6} 10^{-5} 10^{-4} 10^{-3}	Diametral Point Load Index (MPa) 2 4 6	RMC -Q' AVG.	NOTES WATER LEVELS INSTRUMENTATION
		--- *CONTINUED FROM PREVIOUS PAGE* ---																				
10		Soft, grey to brown silty fine SAND (TILL)																				
11																						
12																						
13																						
14																						
15		Slightly to moderately weathered, weak, thinly bedded, redish brown and green SHALE		153.43 14.88	1										,JN,IR,Ro ,JN,CU,SM ,JN,IR,Ro							Grout
16					2										,JN,IR,VR ,JN,IR,Ro ,JN,IR,Ro ,JN,IR,SM ,JN,IR,Ro							
17		Moderately to highly weathered, thinly bedded, redish brown SHALE with some thin greyish green beds		151.55 16.76	3										,JN,IR,SM ,JN,IR,SM ,JN,IR,Ro ,JN,IR,SM ,JN,IR,SM ,JN,IR,SM							
18																						
19					4										,JN,IR,Ro ,JN,IR,Ro ,JN,ST,Ro ,JN,IR,SM ,JN,IR,Ro ,JN,IR,SM ,JN,IR,Ro ,JN,IR,Ro ,JN,ST,SM							
20				148.31											,JN,IR,SM							
		CONTINUED NEXT PAGE																				



DEPTH SCALE
1 : 50

Golder Associates

LOGGED: MD & AK
CHECKED: SW

PROJECT: 021-1228

RECORD OF DRILLHOLE: MW-11

SHEET 3 OF 5

LOCATION: N 595870.0 ;E 4808946.0

INCLINATION: -90° AZIMUTH: ---

DRILLING DATE: July 11, 2007

DRILL RIG: CME - 75 Track Mount

DRILLING CONTRACTOR: All-Terrain Drilling Limited

DATUM:

JN - Joint
FLT - Fault
SHR- Shear
VN - Vein
CJ - Conjugate

BD- Bedding
FO- Foliation
CO- Contact
OR- Orthogonal
CL - Cleavage

PL - Planar
CU- Curved
UN- Undulating
ST - Stepped
IR - Irregular

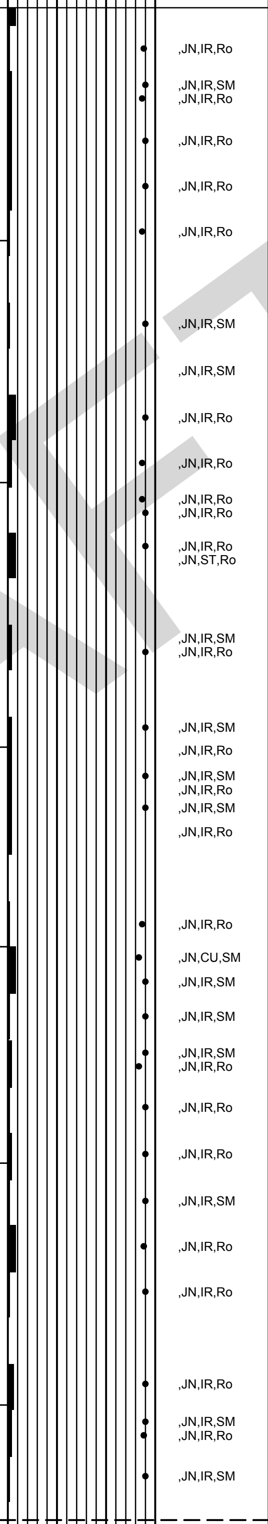
PO- Polished
K - Slickensided
SM- Smooth
Ro - Rough
MB- Mechanical Break

BR - Broken Rock

NOTE: For additional abbreviations refer to list of abbreviations & symbols.

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	RUN No.	NOTES WATER LEVELS INSTRUMENTATION
		--- CONTINUED FROM PREVIOUS PAGE ---				
20		Slightly weathered, thinly bedded, redish brown SHALE with some thin green beds		20.00		
					5	
21						
22					6	
23						
24					7	
25						Grout
					8	
26				142.10 26.21		
		Slightly weathered, very thinly to thinly bedded, weak, redish brown and green SHALE				
27					9	
28					10	
29						
					11	
30		*CONTINUED NEXT PAGE*				

Column headings: PENETRATION RATE min/(m); COLOUR % RETURN; FLUSH; RECOVERY: TOTAL CORE % (80 60 40 20), SOLID CORE % (80 60 40 20); R.Q.D. % (80 60 40 20); FRACT. INDEX PER 0.3 m (5 10 15 20); DISCONTINUITY DATA: B Angle (0 90 180 270), DIP w.r.t. CORE AXIS (0 30 60 90), TYPE AND SURFACE DESCRIPTION, Jr, Ja, Jn; HYDRAULIC CONDUCTIVITY K, cm/sec (10^{-6} 10^{-5} 10^{-4} 10^{-3}); Diametral Point Load Index (MPa) (2 4 6); RMC -Q' AVG.



DEPTH SCALE
1 : 50

Golder Associates

LOGGED: MD & AK
CHECKED: SW

PROJECT: 021-1228

RECORD OF DRILLHOLE: MW-11

SHEET 4 OF 5

LOCATION: N 595870.0 ;E 4808946.0

INCLINATION: -90° AZIMUTH: ---

DRILLING DATE: July 11, 2007

DRILL RIG: CME - 75 Track Mount

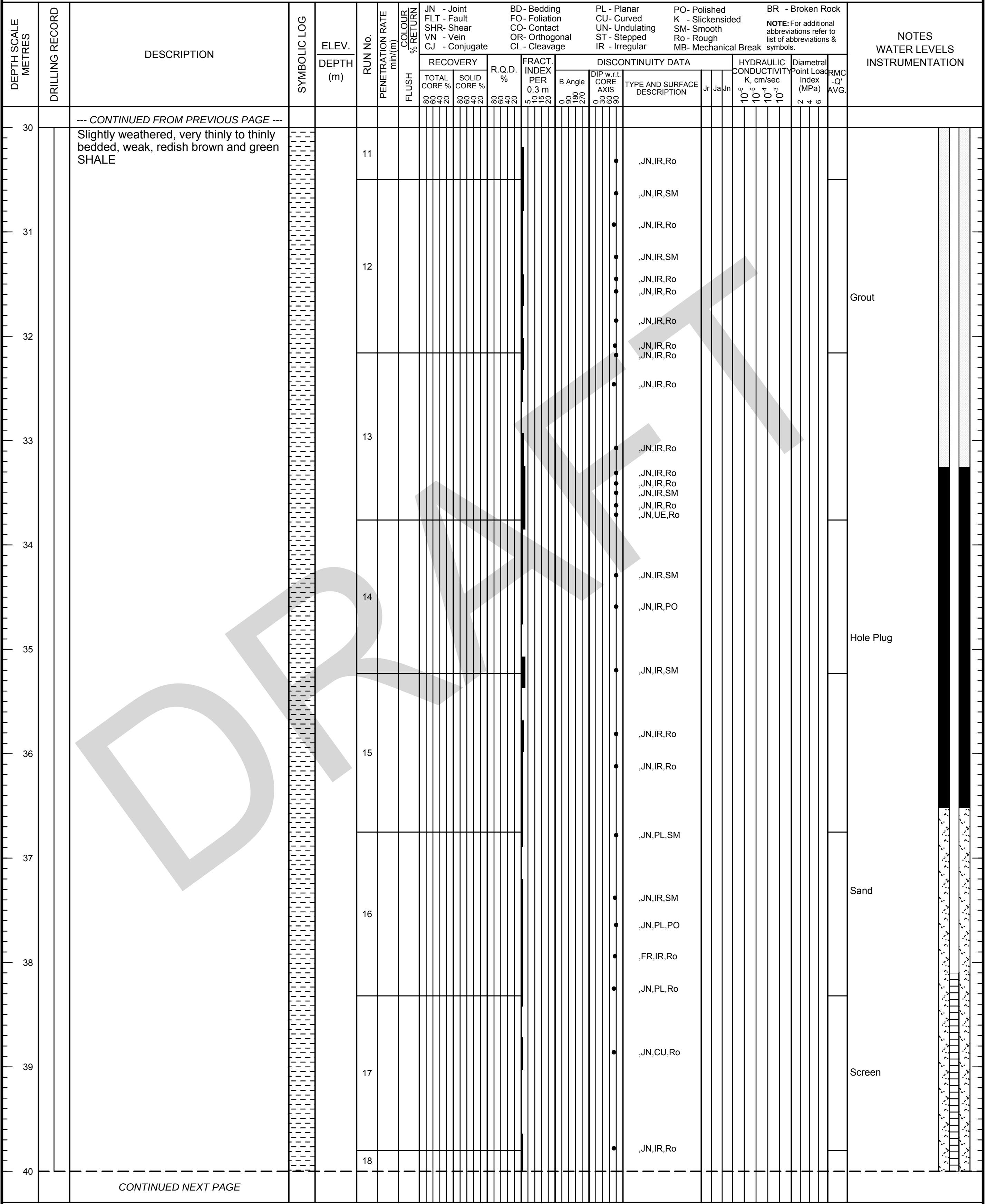
DRILLING CONTRACTOR: All-Terrain Drilling Limited

DATUM:

JN - Joint	BD - Bedding	PL - Planar	PO - Polished
FLT - Fault	FO - Foliation	CU - Curved	K - Slickensided
SHR - Shear	CO - Contact	UN - Undulating	SM - Smooth
VN - Vein	OR - Orthogonal	ST - Stepped	Ro - Rough
CJ - Conjugate	CL - Cleavage	IR - Irregular	MB - Mechanical Break

BR - Broken Rock

NOTE: For additional abbreviations refer to list of abbreviations & symbols.



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Slightly weathered, very thinly to thinly bedded, weak, redish brown and green SHALE

CONTINUED NEXT PAGE

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: MD & AK

CHECKED: SW

PROJECT: 021-1228

RECORD OF DRILLHOLE: MW-11

SHEET 5 OF 5

LOCATION: N 595870.0 ;E 4808946.0

INCLINATION: -90° AZIMUTH: ---

DRILLING DATE: July 11, 2007

DRILL RIG: CME - 75 Track Mount

DRILLING CONTRACTOR: All-Terrain Drilling Limited

DATUM:

JN - Joint
FLT - Fault
SHR- Shear
VN - Vein
CJ - Conjugate

BD- Bedding
FO- Foliation
CO- Contact
OR- Orthogonal
CL - Cleavage

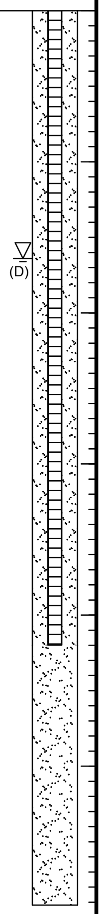
PL - Planar
CU- Curved
UN- Undulating
ST - Stepped
IR - Irregular

PO- Polished
K - Slickensided
SM- Smooth
Ro - Rough
MB- Mechanical Break

BR - Broken Rock

NOTE: For additional abbreviations refer to list of abbreviations & symbols.

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	RUN No.	PENETRATION RATE min/(m)	COLOUR % RETURN	FLUSH	RECOVERY TOTAL CORE % 80 60 40 20	RECOVERY SOLID CORE % 80 60 40 20	R.Q.D. % 80 60 40 20	FRACT. INDEX PER 0.3 m 5 10 15 20	DISCONTINUITY DATA B Angle 0 90 180 270	DISCONTINUITY DATA DIP w.r.t. CORE AXIS 0 30 60 90	DISCONTINUITY DATA TYPE AND SURFACE DESCRIPTION	Jr	Ja	Jn	HYDRAULIC CONDUCTIVITY K, cm/sec 10^{-6} 10^{-5} 10^{-4} 10^{-3}	Diametral Point Load Index (MPa) 2 4 6	RMC -Q' AVG.	NOTES WATER LEVELS INSTRUMENTATION
		--- CONTINUED FROM PREVIOUS PAGE ---																				
40		Slightly weathered, very thinly to thinly bedded, weak, redish brown and green SHALE													,JN,IR,VR							
															,JN,PL,PO							
					18										,FR,IR,VR							
41															,FR,UE,Ro							
															,JN,IR,SM							
															,JN,IR,Ro							
															,JN,PL,Ro							(D)
															,JN,IR,Ro							
					19										,JN,PL,Ro							
42																						Screen
															,FR,ST,Ro							
															,JN,UE,Ro							
															,JN,IR,Ro ,JN,IR,Ro							
43															,JN,FL,Ro							
					20										,FR,PL,SM							
															,JN,CU,PO							
44																						
															,JN,UE,SM							
															,JN,IR,Ro							
					21										,FR,IR,SM							
45															,JN,IR,Ro							Sand
															,JN,IR,Ro							
															,JN,ST,Ro							
					22										,JN,FL,Ro							
				122.39											,JN,IR,Ro ,JN,UE,Ro							
46		END OF DRILLHOLE		45.92																		
47																						
48																						
49																						
50																						



DEPTH SCALE

1 : 50

Golder Associates

LOGGED: MD & AK

CHECKED: SW

PROJECT: 021-1228

RECORD OF BOREHOLE: TW1

SHEET 1 OF 2

LOCATION: N 4808946.0 ;E 595581.0

BORING DATE: August 29, 2007

DATUM:

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE			SAMPLES			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—⊣ Wl 10 20 30 40	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m				
		GROUND SURFACE		167.64							
0	Air Rotary Drilling 152.4 mm Diameter	Dense, brown, fine grained SILT (TILL) (HALTON TILL)		0.00							
4											∇ Sept. 14/07
6		Dense, brown, fine grained SILT, some gravel , trace clay (TILL) (HALTON TILL)		161.54 6.10							
10		*CONTINUED NEXT PAGE*									

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: MD

CHECKED: SMD

PROJECT: 021-1228

RECORD OF BOREHOLE: TW1

SHEET 2 OF 2

LOCATION: N 4808946.0 ;E 595581.0

BORING DATE: August 29, 2007

DATUM:

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

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—⊣ Wl 10 20 30 40

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE DESCRIPTION	ELEV. DEPTH (m)	SAMPLES NUMBER	TYPE	BLOWS/0.3m	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		--- CONTINUED FROM PREVIOUS PAGE ---						
10	Air Rotary Drilling 152.4 mm Diameter	Dense, brown, fine grained SILT, some gravel , trace clay (TILL) (HALTON TILL)						
11								
12								
13								
14								
15			151.66 15.98					
16		Weathered red SHALE						Casing ends at 15.98m depth Open hole to 18.29m depth
17								
18			149.35 18.29					
		END OF BOREHOLE						
19								
20								

DEPTH SCALE
1 : 50

Golder Associates

LOGGED: MD
CHECKED: SMD

PROJECT: 021-1228

RECORD OF BOREHOLE: TW2

SHEET 1 OF 4

LOCATION: N 4810362.0 ;E 595617.0

BORING DATE: August 29, 2007

DATUM:

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOWS/0.3m	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—⊣ Wl 10 20 30 40	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		176.33							
0	Air Rotary Drilling 152.4 mm Diameter	Dense, brown/grey fine grained SILT, trace gravel (TILL) (HALTON TILL)		0.00							
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											
		CONTINUED NEXT PAGE									

DEPTH SCALE
1 : 50

Golder Associates

LOGGED: MD
CHECKED: SMD

PROJECT: 021-1228

RECORD OF BOREHOLE: TW2

SHEET 2 OF 4

LOCATION: N 4810362.0 ;E 595617.0

BORING DATE: August 29, 2007

DATUM:

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	SOIL PROFILE: STRATA PLOT	SOIL PROFILE: ELEV. DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	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—⊣ Wl (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		--- CONTINUED FROM PREVIOUS PAGE ---									
10 11 12 13 14 15 16 17 18	Air Rotary Drilling 152.4 mm Diameter	Dense, brown/grey fine grained SILT, trace gravel (TILL) (HALTON TILL)									
19 20		Dense, reddish brown fine grained SILT, some gravel (TILL) (HALTON TILL)		158.03 18.30							Casing ends at 18.3m depth Open hole to 32.01m depth
		CONTINUED NEXT PAGE									

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: MD

CHECKED: SMD

PROJECT: 021-1228

RECORD OF BOREHOLE: TW2

SHEET 3 OF 4

LOCATION: N 4810362.0 ;E 595617.0

BORING DATE: August 29, 2007

DATUM:

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	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—⊣ Wl (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		--- CONTINUED FROM PREVIOUS PAGE ---									
20	Air Rotary Drilling 152.4 mm Diameter	Dense, reddish brown fine grained SILT, some gravel (TILL) (HALTON TILL)									
21											
22											
23											
24											
25											
26											
27											
28											
29											
30		*CONTINUED NEXT PAGE*									

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: MD

CHECKED: SMD

PROJECT: 021-1228

RECORD OF BOREHOLE: TW2

SHEET 4 OF 4

LOCATION: N 4810362.0 ;E 595617.0

BORING DATE: August 29, 2007

DATUM:

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	SOIL PROFILE: STRATA PLOT	SOIL PROFILE: ELEV. DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	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—⊣ Wl 10 20 30 40	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		--- CONTINUED FROM PREVIOUS PAGE ---									
30	Air Rotary Drilling 152.4 mm Diameter	Dense, reddish brown fine grained SILT, some gravel (TILL) (HALTON TILL)									
31											
32		END OF BOREHOLE		144.32 32.01							
33											
34											
35											
36											
37											
38											
39											
40											

DEPTH SCALE
1 : 50

Golder Associates

LOGGED: MD
CHECKED: SMD

PROJECT: 021-1228

RECORD OF BOREHOLE: TW3

SHEET 1 OF 3

LOCATION: N 4810005.0 ;E 596410.0

BORING DATE: August 29, 2007

DATUM:

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOWS/0.3m	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—⊣ Wl 10 20 30 40	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		166.85							
0	Air Rotary Drilling 152.4 mm Diameter	Dense, brown fine grained SILT, trace gravel (TILL) (HALTON TILL)		0.00							
6		Dense, brown fine grained SILT, some gravel (TILL) (HALTON TILL)		160.76 6.09							
10		*CONTINUED NEXT PAGE*									

DEPTH SCALE

1 : 50

LOGGED: MD

CHECKED: SMD

PROJECT: 021-1228

RECORD OF BOREHOLE: TW3

SHEET 2 OF 3

LOCATION: N 4810005.0 ;E 596410.0

BORING DATE: August 29, 2007

DATUM:

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLES NUMBER	TYPE	BLOWS/0.3m	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—⊣ Wl 10 20 30 40	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		--- CONTINUED FROM PREVIOUS PAGE ---									
10	Air Rotary Drilling 152.4 mm Diameter	Dense, brown fine grained SILT, some gravel (TILL) (HALTON TILL)									
12		Dense, brownish grey, fine grained SILT, trace gravel, trace weathered shalt throughout (TILL) (HALTON TILL)		154.65 12.20							
13.5											▽ Sept. 14/07
19.82		Red SHALE		147.03 19.82							
20		*CONTINUED NEXT PAGE*									

DEPTH SCALE
1 : 50

Golder Associates

LOGGED: MD
CHECKED: SMD

PROJECT: 021-1228

RECORD OF BOREHOLE: TW3

SHEET 3 OF 3

LOCATION: N 4810005.0 ;E 596410.0

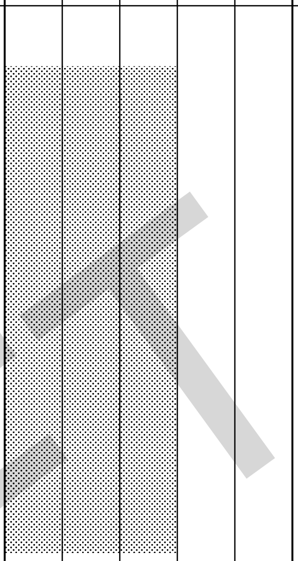
BORING DATE: August 29, 2007

DATUM:

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLES NUMBER	TYPE	BLOWS/0.3m	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—⊣ Wl 10 20 30 40	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		--- CONTINUED FROM PREVIOUS PAGE ---									
20	Air Rotary Drilling 152.4 mm Diameter	Red SHALE									Casing ends at 20.4m depth Open hole to 23.62m depth
21											
22											
23				143.23 23.62							
		END OF BOREHOLE									
24											
25											
26											
27											
28											
29											
30											



DEPTH SCALE
1 : 50

Golder Associates

LOGGED: MD
CHECKED: SMD

Ontario Ministry of the Environment

Well Tag A 036659 mber below)

A036659

Bekkers Well Record

Regulation 903 Ontario Water Resources Act

page ___ of ___

Instructions for Completing Form

- For use in the **Province of Ontario** only. This document is a permanent **legal** document. Please retain for future reference.
- All Sections **must** be completed in full to avoid delays in processing. Further instructions and explanations are available on the back of this form.
- Questions regarding completing this application can be directed to the Water Well Management Coordinator at 416-235-6203.
- **All metre measurements shall be reported to 1/10th of a metre.**
- Please print clearly in blue or black ink only.

Ministry Use Only

MUN ☐☐☐☐ CON ☐☐☐☐☐☐☐☐☐☐ LOT ☐☐☐

Well Owner's Information and Location of Well Information

First Name: BEKKERS
Last Name: WINCREST KENNELS
Mailing Address (Street Number/Name, RR,Lot,Concession): 2012 DUNDAS ST WEST
County/District/Municipality: HALTON
Township/City/Town/Village: OAKVILLE
Province: Ontario
Postal Code: L6Y 4Z3
Telephone Number (include area code):
Address of Well Location (County/District/Municipality): HALTON
Township: TRAFALGAR.
Lot: 35
Concession: 1
RR#/Street Number/Name: 3451 TREMAINE RD
City/Town/Village: OAKVILLE
Site/Compartment/Block/Tract etc.:
GPS Reading NAD 83 Zone 17 Easting 596446 Northing 4809920
Unit Make/Model:
Mode of Operation: ☐ Undifferentiated ☐ Averaged ☐ Differentiated, specify ______

Log of Overburden and Bedrock Materials (see instructions)

General Colour	Most common material	Other Materials	General Description	Depth Metres From	Depth Metres To
BROWN	TOP-SOIL			0	.3
BROWN	CLAY		HARD	.3	5.18
GREY	CLAY	SILT		5.18	13.71
GREY	CLAY	SAND		13.71	16.76
GREY	CLAY	STONES	HARD	16.76	21.33
RED	SHALE			21.33	22.86

SHALE IN BOTTOM FAR AS COULD BORE

Hole Diameter

Depth Metres From	Depth Metres To	Diameter Centimetres
0	22.86	121.92

Water Record

Water found at Metres	Kind of Water
5.18 m	☐ Gas ☐ Fresh ☐ Salty ☐ Sulphur ☐ Minerals ☐ Other:
13.71 m	☐ Gas ☐ Fresh ☐ Salty ☐ Sulphur ☐ Minerals ☐ Other:
21.33 m	☐ Gas ☐ Fresh ☐ Salty ☐ Sulphur ☐ Minerals ☐ Other:

After test of well yield, water was
☐ Clear and sediment free
☐ Other, specify ______

Chlorinated ☐ Yes ☐ No

Construction Record

Inside diam centimetres	Material	Wall thickness centimetres	Depth Metres From	Depth Metres To
Casing				
91.44	☐ Steel ☐ Fibreglass ☐ Plastic ☑ Concrete ☐ Galvanized	7.62	0	22.86
	☐ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete ☐ Galvanized			
	☐ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete ☐ Galvanized			
Screen				
Outside diam	☐ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete ☐ Galvanized	Slot No.		
No Casing or Screen				
	☐ Open hole			

Test of Well Yield

Pumping test method	Draw Down Time min	Draw Down Water Level Metres	Recovery Time min	Recovery Water Level Metres
Pump intake set at - (metres)	Static Level			
Pumping rate - (litres/min)	1		1	
Duration of pumping ______hrs + ______ min	2		2	
Final water level end of pumping ______metres	3		3	
Recommended pump type. ☐ Shallow ☐ Deep	4		4	
Recommended pump depth 21.33 metres	5		5	
Recommended pump rate. 18.92 (litres/min)	10		10	
	15		15	
If flowing give rate - (litres/min)	20		20	
	25		25	
If pumping discontinued, give reason DRY HOLE ON COMPLETION	30		30	
	40		40	
	50		50	
	60		60	

Plugging and Sealing Record ☑ Annular space ☐ Abandonment

Depth set at - Metres From	Depth set at - Metres To	Material and type (bentonite slurry, neat cement slurry) etc.	Volume Placed (cubic metres)
0	2.45	BENSEAL	
2.45	22.86	FILTER SAND	

Method of Construction

☐ Cable Tool
☐ Rotary (conventional)
☐ Rotary (reverse)
☐ Rotary (air)
☐ Air percussion
☑ Boring
☐ Diamond
☐ Jetting
☐ Driving
☐ Digging
☐ Other ______

Water Use

☑ Domestic
☐ Stock
☐ Irrigation
☐ Industrial
☐ Commercial
☐ Municipal
☐ Public Supply
☐ Not used
☐ Cooling & air conditioning
☐ Other ______

Final Status of Well

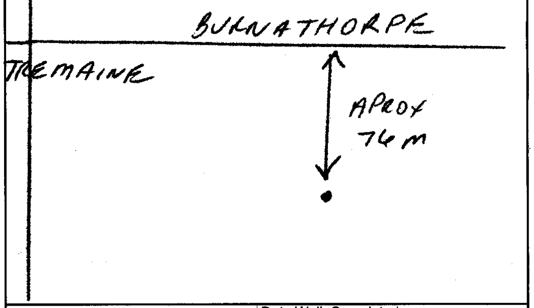
☑ Water Supply
☐ Observation well
☐ Test Hole
☐ Recharge well
☐ Abandoned, insufficient supply
☐ Abandoned, poor quality
☐ Unfinished
☐ Dewatering
☐ Replacement well
☐ Abandoned, (Other) ______

Well Contractor/Technician Information

Name of Well Contractor: JOHNSON & BAETZ
Well Contractor's Licence No.: 3030
Business Address (street name, number, city etc.): 19 MACBRIDE COURT BRANTFORD
Name of Well Technician (last name, first name): BAETZ JOHN
Well Technician's Licence No.:
Signature of Technician/Contractor: X
Date Submitted YYYY MM DD

Location of Well

In diagram below show distances of well from road, lot line, and building. Indicate north by arrow.



Audit No. Z 40625
Date Well Completed YYYY 2006 MM 3 DD 7
Was the well owner's information package delivered? ☐ Yes ☐ No
Date Delivered YYYY MM DD

Ministry Use Only

Data Source:
Contractor: 3030
Date Received: APR 2 5 2006
Date of Inspection YYYY MM DD
Remarks:
Well Record Number:

0506E (09/03) Contractor's Copy ☐ Ministry's Copy ☐ Well Owner's Copy ☐ *Cette formule est disponible en français*

Featherstone

30 m | 5F

MINISTRY OF THE ENVIRONMENT

The Ontario Water Resources Act

WATER WELL RECORD

Ontario

B

2804215

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11

MUNICIP. 28602 CON. DS N C 02

COUNTY OR DISTRICT Halton	TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE ~~Burlington~~ Town of Milton (Nelson)	CON., BLOCK, TRACT, SURVEY, ETC. 2ND.S	LOT 25-27 001
[redacted] NCASTER.			DATE COMPLETED 48-53 DAY 18 MO ~~July~~ 07 YR 73
09476	RC. 4	ELEVATION 0560	RC 4 BASIN CODE 24

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET FROM	DEPTH - FEET TO
brown	clay			0	12
Grey	silty clay			12	31
Grey	clay	gravel		31	53
silty blue	clay			53	59
red	clay			59	66
red	shale			66	82

OWRC

P-9

31 | 0012605T | 0031260506 | 0053120511 | 0059130506 | 0067705T | 0082717

32

41 WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER
006.9	1 ☒ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERAL
0074	1 ☒ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERAL
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERAL
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERAL
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERAL

51 CASING & OPEN HOLE RECORD

INSIDE DIAM. INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET FROM	DEPTH - FEET TO
6¼ 06	1 ☒ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE ~~4 ☒ OPEN HOLE~~	188	0 68	068 ~~82~~
06	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☒ OPEN HOLE			0082
	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE			

SCREEN

SIZE(S) OF OPENING (SLOT NO.) 31-33	DIAMETER 34-38 INCHES	LENGTH 39-40 FEET
MATERIAL AND TYPE	DEPTH TO TOP OF SCREEN 41-44 FEET	80

61 PLUGGING & SEALING RECORD

DEPTH SET AT - FEET FROM	DEPTH SET AT - FEET TO	MATERIAL AND TYPE (CEMENT GROUT LEAD PACKER, ETC.)
10-13	14-17	
18-21	22-25	
26-29	30-33	80

71 PUMPING TEST

PUMPING TEST METHOD: 1 ☐ PUMP 2 ☒ BAILER	PUMPING RATE ~~1½~~ 0002 GPM	DURATION OF PUMPING 01 HOURS 30 MINS

STATIC LEVEL	WATER LEVEL END OF PUMPING	WATER LEVELS DURING: 1 ☑ PUMPING 2 ☐ RECOVERY — 15 MINUTES	30 MINUTES	45 MINUTES	60 MINUTES
024 FEET	080 FEET	080 FEET	080 FEET	080 FEET	080 FEET

IF FLOWING, GIVE RATE GPM	PUMP INTAKE SET AT FEET	WATER AT END OF TEST: 1 ☐ CLEAR 2 ☒ CLOUDY
RECOMMENDED PUMP TYPE: ☐ SHALLOW ☒ DEEP	RECOMMENDED PUMP SETTING 080 FEET	RECOMMENDED PUMPING RATE 0002 1½ GPM

FINAL STATUS OF WELL

1 ☒ WATER SUPPLY
2 ☐ OBSERVATION WELL
3 ☐ TEST HOLE
4 ☐ RECHARGE WELL
5 ☐ ABANDONED, INSUFFICIENT SUPPLY
6 ☐ ABANDONED, POOR QUALITY
7 ☐ UNFINISHED

WATER USE 01

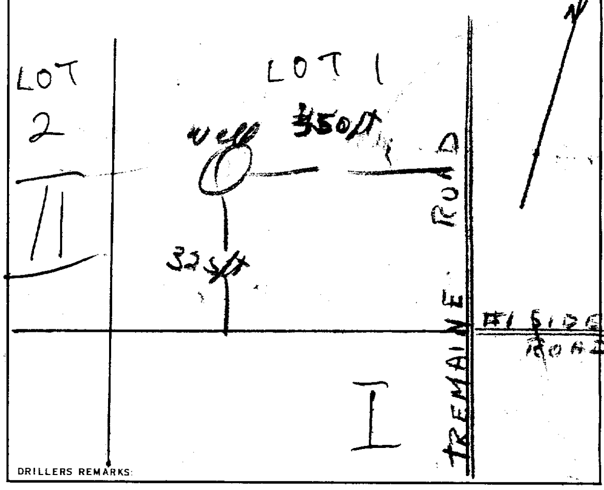
1 ☒ DOMESTIC
2 ☐ STOCK
3 ☐ IRRIGATION
4 ☐ INDUSTRIAL
☐ OTHER
5 ☐ COMMERCIAL
6 ☐ MUNICIPAL
7 ☐ PUBLIC SUPPLY
8 ☐ COOLING OR AIR CONDITIONING
9 ☐ NOT USED

METHOD OF DRILLING

1 ☒ CABLE TOOL
2 ☐ ROTARY (CONVENTIONAL)
3 ☐ ROTARY (REVERSE)
4 ☐ ROTARY (AIR)
5 ☐ AIR PERCUSSION
6 ☐ BORING
7 ☐ DIAMOND
8 ☐ JETTING
9 ☐ DRIVING

LOCATION OF WELL

IN DIAGRAM BELOW SHOW DISTANCES OF WELL FROM ROAD AND LOT LINE. INDICATE NORTH BY ARROW.



DRILLERS REMARKS:

CONTRACTOR

NAME OF WELL CONTRACTOR: Burton Ruttan — LICENCE NUMBER: 4602

ADDRESS: Milton R R 2

NAME OF DRILLER OR BORER: same — LICENCE NUMBER:

SIGNATURE OF CONTRACTOR: Burton Ruttan — SUBMISSION DATE DAY 18 MO July YR 73

OFFICE USE ONLY

DATA SOURCE 1 — CONTRACTOR 4602 — DATE RECEIVED 230773

DATE OF INSPECTION — INSPECTOR

REMARKS: CSS.S8

JP

NISTRY OF THE ENVIRONMENT COPY

FORM 7 07-091

Finucci

Ministry of the Environment
Ontario

The Ontario Water Resources Act

WATER WELL RECORD

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11 | 2807948 | MUNICIP. 28602 | CON. DS N | 01

COUNTY OR DISTRICT	TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE	CON, BLOCK, TRACT, SURVEY ETC	LOT 25-27
Halton	City of Burkington	Conc .1NDS	3

[redacted]

ADDRESS: 333 Warminster Dr., Oakville,L6L-4N1

DATE COMPLETED 48-53: DAY 14 MO 01 YR 92

21 | UTM ZONE | EASTING | NORTHING | RC | ELEVATION | RC | BASIN CODE | II | III | IV

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET FROM	DEPTH - FEET TO
Brown	Clay	Sand	Loose	0	32
Brown	Clay	Sand & Boulders	Loose	32	34
Red	Clay	Sand	Loose	34	39
Red	Shale		Hard	39	55

31

32

41 WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER
39	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS

51 CASING & OPEN HOLE RECORD

INSIDE DIAM INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET FROM	DEPTH - FEET TO
6¼"	1 ☒ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE 5 ☐ PLASTIC	.188	+1	39
	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☒ OPEN HOLE 5 ☐ PLASTIC		39	55
	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE 5 ☐ PLASTIC			

SCREEN

SIZE(S) OF OPENING (SLOT NO.):
DIAMETER: INCHES
LENGTH: FEET
MATERIAL AND TYPE:
DEPTH TO TOP OF SCREEN: FEET

61 PLUGGING & SEALING RECORD

DEPTH SET AT - FEET FROM	DEPTH SET AT - FEET TO	MATERIAL AND TYPE (CEMENT GROUT, LEAD PACKER, ETC.)

71 PUMPING TEST

PUMPING TEST METHOD: 1 ☐ PUMP 2 ☒ BAILER
PUMPING RATE: 4.5 GPM
DURATION OF PUMPING: 1 HOURS 0 MINS

STATIC LEVEL	WATER LEVEL END OF PUMPING	15 MINUTES	30 MINUTES	45 MINUTES	60 MINUTES
19 FEET	50 FEET	50 FEET	50 FEET	50 FEET	50 FEET

WATER LEVELS DURING: 1 ☒ PUMPING 2 ☐ RECOVERY
IF FLOWING, GIVE RATE: GPM
PUMP INTAKE SET AT: FEET
WATER AT END OF TEST: 1 ☐ CLEAR 2 ☒ CLOUDY
RECOMMENDED PUMP TYPE: ☐ SHALLOW ☒ DEEP
RECOMMENDED PUMP SETTING: FEET
RECOMMENDED PUMPING RATE: 4.0 GPM

FINAL STATUS OF WELL

1 ☒ WATER SUPPLY
2 ☐ OBSERVATION WELL
3 ☐ TEST HOLE
4 ☐ RECHARGE WELL
5 ☐ ABANDONED, INSUFFICIENT SUPPLY
6 ☐ ABANDONED, POOR QUALITY
7 ☐ UNFINISHED
☐ DEWATERING

WATER USE

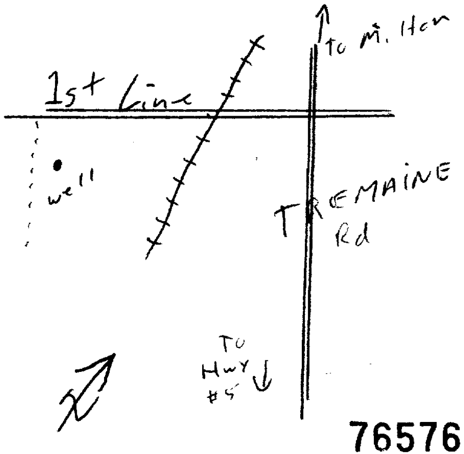
1 ☒ DOMESTIC
2 ☐ STOCK
3 ☐ IRRIGATION
4 ☐ INDUSTRIAL
☐ OTHER
5 ☐ COMMERCIAL
6 ☐ MUNICIPAL
7 ☐ PUBLIC SUPPLY
8 ☐ COOLING OR AIR CONDITIONING
9 ☐ NOT USED

METHOD OF CONSTRUCTION

1 ☒ CABLE TOOL
2 ☐ ROTARY (CONVENTIONAL)
3 ☐ ROTARY (REVERSE)
4 ☐ ROTARY (AIR)
5 ☐ AIR PERCUSSION
6 ☐ BORING
7 ☐ DIAMOND
8 ☐ JETTING
9 ☐ DRIVING
☐ DIGGING
☐ OTHER

LOCATION OF WELL

IN DIAGRAM BELOW SHOW DISTANCES OF WELL FROM ROAD AND LOT LINE. INDICATE NORTH BY ARROW.



76576

DRILLERS REMARKS

CONTRACTOR

NAME OF WELL CONTRACTOR: O'Connor Well Drilling Ltd.
WELL CONTRACTOR'S LICENCE NUMBER: 4005
ADDRESS: RR#1 Millgrove,Ont., LOR-1W0
NAME OF WELL TECHNICIAN: W. Howe
WELL TECHNICIAN'S LICENCE NUMBER: T-0518
SIGNATURE OF TECHNICIAN/CONTRACTOR:
SUBMISSION DATE: DAY ____ MO. ____ YR. ____

OFFICE USE ONLY

DATA SOURCE:
CONTRACTOR: 4005
DATE RECEIVED: JAN 20 1992
DATE OF INSPECTION:
INSPECTOR:
REMARKS:

MINISTRY OF THE ENVIRONMENT COPY

FORM NO. 0506 (11/86) FORM 9

J.B

Hendervale House or Hendervale Cottage

TM. 1 7 Z 5 9 5 6 2 0 Con I DSN

4 R 4 8 0 8 6 3 5 CODED Lot 3

lev. 5 R 0 5 5 0

24

The Ontario Water Resources Commission Act

2802793

3 3

WATER RESOURCES
DEC 18 1968
ONTARIO WATER RESOURCES COMMISSION

WATER WELL RECORD

County or District HALTON ~~Township, Village~~, Town ~~or City~~ BURLINGTON

Con. ONE DSN Lot 3 Date completed 12 (day) NOV. (month) 1968 (year)

[redacted] ress R. R # 6 MILTON

Casing and Screen Record

Inside diameter of casing 30"

Total length of casing 26'

Type of screen —

Length of screen —

Depth to top of screen —

Diameter of finished hole 30"

Pumping Test

Static level 8'

RECOVERY ~~Test-pumping~~ rate 2 G.P.M.

Pumping level ~~24'~~

Duration of test pumping ~~ONE HOUR~~

Water clear or cloudy at end of test CLEAR

Recommended pumping rate 5 G.P.M.

with pump setting of 24' feet below ground surface

Well Log / Water Record

Overburden and Bedrock Record	From ft.	To ft.	Depth(s) at which water(s) found	Kind of water (fresh, salty, sulphur)
TOPSOIL	0	1	21	FRESH
BROWN CLAY	1	12		
HARDPAN	12	21		
SAND & GRAVEL	21	27		

For what purpose(s) is the water to be used? DOMESTIC

Is well on upland, in valley, or on hillside? UPLAND

Drilling or Boring Firm MILTON WELL BORING

Address 6751 WALKERS LINE
R. R. # 2 MILTON

Licence Number 156

Name of Driller or Borer M. PELTIER

Address SAME AS ABOVE

Date DEC 3, 1968

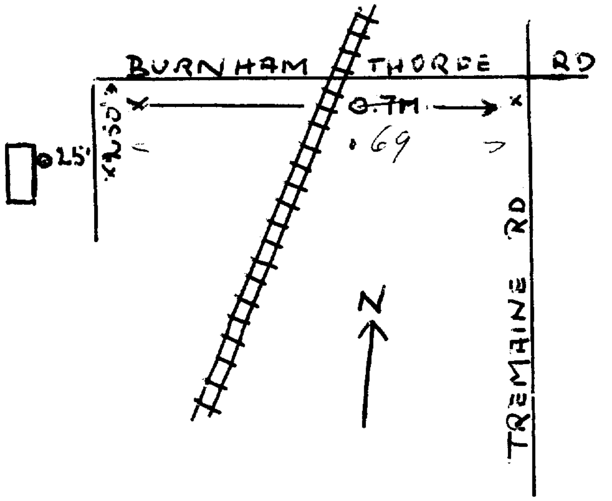
(Signature of Licensed Drilling or Boring Contractor)

Form 7 15M-60-4138

OWRC COPY

Location of Well

In diagram below show distances of well from road and lot line. Indicate north by arrow.



CSS.S8

Ministry of the Environment
Ontario

WELL # 1.

The Ontario Water Resources Act

WATER WELL RECORD

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11 2808537 MUNICIP 28001 CON. CON. 01

COUNTY OR DISTRICT	TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE	CON., BLOCK, TRACT, SURVEY, ETC.	LOT 25-27
HALTON	HALTON HILLS	CON.1	1&2

OWNER (SURNAME FIRST) 28-47: HENDERVALE STABLES
ADDRESS: #1 SIDE RD MILTON ONT.
DATE COMPLETED 48-53: DAY 05 MO 07 YR 96

21 ZONE EASTING NORTHING RC ELEVATION RC BASIN CODE II III IV

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET FROM	DEPTH - FEET TO
BROWN	CLAY			0	14
GRAY	CLAY			14	43
RED	SHALE			43	100

31

32

41 WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER
95	1 ☒ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS

51 CASING & OPEN HOLE RECORD

INSIDE DIAM INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET FROM	DEPTH - FEET TO
6¼	1 ☒ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE 5 ☐ PLASTIC	.188	+1	49
6¼	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☒ OPEN HOLE 5 ☐ PLASTIC	---	49	100
	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE 5 ☐ PLASTIC			

SCREEN
SIZE(S) OF OPENING (SLOT NO.)
DIAMETER INCHES
LENGTH FEET
MATERIAL AND TYPE
DEPTH TO TOP OF SCREEN FEET

61 PLUGGING & SEALING RECORD

DEPTH SET AT - FEET FROM	DEPTH SET AT - FEET TO	MATERIAL AND TYPE (CEMENT GROUT, LEAD PACKER, ETC.)

71 PUMPING TEST

PUMPING TEST METHOD: 1 ☐ PUMP 2 ☒ BAILER
PUMPING RATE: 12 GPM
DURATION OF PUMPING: 2 HOURS ____ MINS
WATER LEVELS DURING: 1 ☒ PUMPING 2 ☐ RECOVERY

STATIC LEVEL	WATER LEVEL END OF PUMPING	15 MINUTES	30 MINUTES	45 MINUTES	60 MINUTES
39 FEET	82 FEET	64 FEET	75 FEET	82 FEET	82 FEET

IF FLOWING, GIVE RATE: ---------- GPM
PUMP INTAKE SET AT: ---------- FEET
WATER AT END OF TEST: 1 ☒ CLEAR 2 ☐ CLOUDY
RECOMMENDED PUMP TYPE: ☐ SHALLOW ☒ DEEP
RECOMMENDED PUMP SETTING: 95 FEET
RECOMMENDED PUMPING RATE: 10 GPM

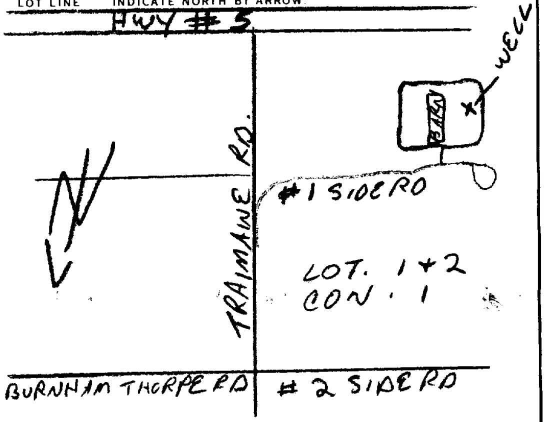
FINAL STATUS OF WELL
1 ☒ WATER SUPPLY
2 ☐ OBSERVATION WELL
3 ☐ TEST HOLE
4 ☐ RECHARGE WELL
5 ☐ ABANDONED, INSUFFICIENT SUPPLY
6 ☐ ABANDONED POOR QUALITY
7 ☐ UNFINISHED
☐ DEWATERING

WATER USE
1 ☒ DOMESTIC
2 ☐ STOCK
3 ☐ IRRIGATION
4 ☐ INDUSTRIAL
☐ OTHER
5 ☐ COMMERCIAL
6 ☐ MUNICIPAL
7 ☐ PUBLIC SUPPLY
8 ☐ COOLING OR AIR CONDITIONING
9 ☐ NOT USED

METHOD OF CONSTRUCTION
1 ☒ CABLE TOOL
2 ☐ ROTARY (CONVENTIONAL)
3 ☐ ROTARY (REVERSE)
4 ☐ ROTARY (AIR)
5 ☐ AIR PERCUSSION
6 ☐ BORING
7 ☐ DIAMOND
8 ☐ JETTING
9 ☐ DRIVING
☐ DIGGING
☐ OTHER

LOCATION OF WELL

IN DIAGRAM BELOW SHOW DISTANCES OF WELL FROM ROAD AND LOT LINE. INDICATE NORTH BY ARROW.



74931

DRILLERS REMARKS

CONTRACTOR
NAME OF WELL CONTRACTOR: CORE'S WELL DRILLING
WELL CONTRACTOR'S LICENCE NUMBER: 1660
ADDRESS: 264 BRONTE ST. UNIT #10 MILTON ONT.
NAME OF WELL TECHNICIAN: ROD CORE
WELL TECHNICIAN'S LICENCE NUMBER: TO-479
SIGNATURE OF TECHNICIAN/CONTRACTOR: R. Core
SUBMISSION DATE: DAY ____ MO ____ YR ____

OFFICE USE ONLY
DATA SOURCE
CONTRACTOR: 1660
DATE RECEIVED: MAY 0 8 1997
DATE OF INSPECTION
INSPECTOR
REMARKS
CSS. S

MINISTRY OF THE ENVIRONMENT COPY

FORM NO. 0506 (11/86) FORM 9

Hendervale ABC Barn or Hendervale XYZ Barn

Ministry of the Environment
Ontario

WELL # 2

The Ontario Water Resources Act

WATER WELL RECORD

1. PRINT ONLY IN SPACES PROVIDED
2. CHECK ☒ CORRECT BOX WHERE APPLICABLE

11 | 2808540 | MUNICIP. 28005 | CON. CON 01

COUNTY OR DISTRICT	TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE	CON, BLOCK, TRACT, SURVEY, ETC.	LOT
HALTON	HALTON HILLS	CON. 1	1&2

OWNER (SURNAME FIRST)	ADDRESS	DATE COMPLETED
HENDERVALE STABLES	#1 SIDE RD MILTON ONT.	DAY 15 MO 08 YR 96

21 | ZONE | EASTING | NORTHING | RC | ELEVATION | RC | BASIN CODE | II | III | IV

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET FROM	TO
BROWN	CLAY			0	12
GRAY	CLAY			12	40
RED	SHALE			40	106

31

32

41 WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER
103	1 ☐ FRESH 2 ☒ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS

51 CASING & OPEN HOLE RECORD

INSIDE DIAM INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET FROM	TO
6¼	1 ☒ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE 5 ☐ PLASTIC	.188	+1	47
6¼	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☒ OPEN HOLE 5 ☐ PLASTIC	---	47	106
	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE 5 ☐ PLASTIC			

SCREEN

SIZE(S) OF OPENING (SLOT NO.)	DIAMETER INCHES	LENGTH FEET

MATERIAL AND TYPE	DEPTH TO TOP OF SCREEN FEET

61 PLUGGING & SEALING RECORD

DEPTH SET AT - FEET FROM	TO	MATERIAL AND TYPE (CEMENT GROUT, LEAD PACKER, ETC.)

71 PUMPING TEST

PUMPING TEST METHOD: 1 ☐ PUMP 2 ☒ BAILER	PUMPING RATE: 8 GPM	DURATION OF PUMPING: 1 HOURS --- MINS		
STATIC LEVEL: 44 FEET	WATER LEVEL END OF PUMPING: 95 FEET	WATER LEVELS DURING 1 ☐ PUMPING 2 ☐ RECOVERY		
		15 MINUTES: 60 FEET	30 MINUTES: 78 FEET	45 MINUTES: 95 FEET
				60 MINUTES: 95 FEET
IF FLOWING, GIVE RATE: ---------- GPM	PUMP INTAKE SET AT: ---------- FEET	WATER AT END OF TEST: 1 ☒ CLEAR 2 ☐ CLOUDY		
RECOMMENDED PUMP TYPE: ☐ SHALLOW ☒ DEEP	RECOMMENDED PUMP SETTING: 101 FEET	RECOMMENDED PUMPING RATE: 8 GPM		

FINAL STATUS OF WELL

1 ☒ WATER SUPPLY
2 ☐ OBSERVATION WELL
3 ☐ TEST HOLE
4 ☐ RECHARGE WELL
5 ☐ ABANDONED, INSUFFICIENT SUPPLY
6 ☐ ABANDONED, POOR QUALITY
7 ☐ UNFINISHED
☐ DEWATERING

WATER USE

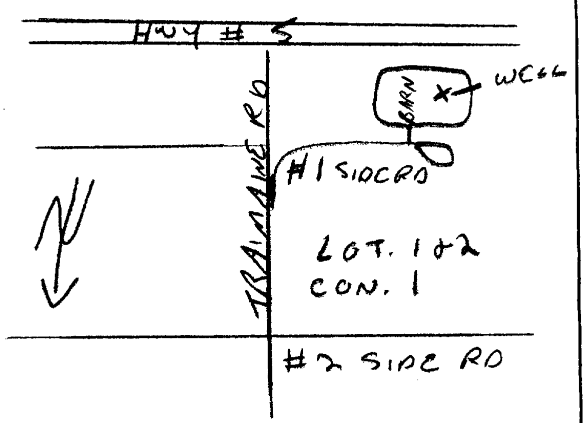
1 ☒ DOMESTIC
2 ☐ STOCK
3 ☐ IRRIGATION
4 ☐ INDUSTRIAL
☐ OTHER
5 ☐ COMMERCIAL
6 ☐ MUNICIPAL
7 ☐ PUBLIC SUPPLY
8 ☐ COOLING OR AIR CONDITIONING
9 ☐ NOT USED

METHOD OF CONSTRUCTION

1 ☒ CABLE TOOL
2 ☐ ROTARY (CONVENTIONAL)
3 ☐ ROTARY (REVERSE)
4 ☐ ROTARY (AIR)
5 ☐ AIR PERCUSSION
6 ☐ BORING
7 ☐ DIAMOND
8 ☐ JETTING
9 ☐ DRIVING
☐ DIGGING
☐ OTHER

LOCATION OF WELL

IN DIAGRAM BELOW SHOW DISTANCES OF WELL FROM ROAD AND LOT LINE. INDICATE NORTH BY ARROW.



74934

DRILLERS REMARKS

CONTRACTOR

NAME OF WELL CONTRACTOR: CORE'S WELL DRILLING
WELL CONTRACTOR'S LICENCE NUMBER: 1660
ADDRESS: 264 BRONTE ST .UNIT #10 MILTON ONT.
NAME OF WELL TECHNICIAN: ROD CORE& ART CLARK
WELL TECHNICIAN'S LICENCE NUMBER: TO-479
SIGNATURE OF TECHNICIAN/CONTRACTOR: R. Core
SUBMISSION DATE: DAY ____ MO. ____ YR. ____

OFFICE USE ONLY

DATA SOURCE
CONTRACTOR: 1660
DATE RECEIVED: MAY 08 1997
DATE OF INSPECTION
INSPECTOR
REMARKS

CSS. S

MINISTRY OF THE ENVIRONMENT COPY

FORM NO. 0506 (11/86) FORM 9

Hendervale Main Barn

Ministry of the Environment
Ontario

The Ontario Water Resources Act

WATER WELL RECORD

1. PRINT ONLY IN SPACES PROVIDED
2. CHECK ☒ CORRECT BOX WHERE APPLICABLE

11 | 2808781 | MUNICIP 28001 | CON. CON 01

COUNTY OR DISTRICT	TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE	CON BLOCK, TRACT, SURVEY, ETC	LOT 25-27
HALTON	HALTON HILLS	CON.1	1&2

OWNER (SURNAME FIRST) 28-47	ADDRESS	DATE COMPLETED 48-53
HENDERVALE STABLES	5244 #1 SIDE RD MILTON ONT. L9T-2Y1	DAY 10 MO 04 YR 97

21 | UTM ZONE | EASTING | NORTHING | RC. | ELEVATION | RC. | BASIN CODE | II | III | IV

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET FROM	DEPTH - FEET TO
BROWN	CLAY			0	4
BROWN	CLAY AND STONES			4	18
RED	CLAY			18	22
RED	SHALE			22	54

31

32

41 WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER
50	1 ☒ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS

51 CASING & OPEN HOLE RECORD

INSIDE DIAM INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET FROM	DEPTH - FEET TO
6¼	1 ☒ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE 5 ☐ PLASTIC	.188	+1	27
6¼	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☒ OPEN HOLE 5 ☐ PLASTIC		27	54
	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE 5 ☐ PLASTIC			

SCREEN

SIZE(S) OF OPENING (SLOT NO.)	DIAMETER INCHES	LENGTH FEET

MATERIAL AND TYPE	DEPTH TO TOP OF SCREEN FEET

61 PLUGGING & SEALING RECORD

DEPTH SET AT - FEET FROM	TO	MATERIAL AND TYPE (CEMENT GROUT LEAD PACKER, ETC.)

71 PUMPING TEST

PUMPING TEST METHOD	PUMPING RATE	DURATION OF PUMPING
1 ☐ PUMP 2 ☒ BAILER	7 GPM	1 HOURS — MINS

STATIC LEVEL	WATER LEVEL END OF PUMPING	WATER LEVELS DURING 1 ☒ PUMPING 2 ☐ RECOVERY: 15 MINUTES	30 MINUTES	45 MINUTES	60 MINUTES
16 FEET	47 FEET	30 FEET	47 FEET	47 FEET	47 FEET

IF FLOWING, GIVE RATE	PUMP INTAKE SET AT	WATER AT END OF TEST
GPM	FEET	1 ☒ CLEAR 2 ☐ CLOUDY

RECOMMENDED PUMP TYPE	RECOMMENDED PUMP SETTING	RECOMMENDED PUMPING RATE
☐ SHALLOW ☒ DEEP	50 FEET	6-7 GPM

FINAL STATUS OF WELL

- 1 ☒ WATER SUPPLY
- 2 ☐ OBSERVATION WELL
- 3 ☐ TEST HOLE
- 4 ☐ RECHARGE WELL
- 5 ☐ ABANDONED, INSUFFICIENT SUPPLY
- 6 ☐ ABANDONED, POOR QUALITY
- 7 ☐ UNFINISHED
- ☐ DEWATERING

WATER USE

- 1 ☒ DOMESTIC
- 2 ☐ STOCK
- 3 ☐ IRRIGATION
- 4 ☐ INDUSTRIAL
- ☐ OTHER
- 5 ☐ COMMERCIAL
- 6 ☐ MUNICIPAL
- 7 ☐ PUBLIC SUPPLY
- 8 ☐ COOLING OR AIR CONDITIONING
- 9 ☐ NOT USED

METHOD OF CONSTRUCTION

- 1 ☒ CABLE TOOL
- 2 ☐ ROTARY (CONVENTIONAL)
- 3 ☐ ROTARY (REVERSE)
- 4 ☐ ROTARY (AIR)
- 5 ☐ AIR PERCUSSION
- 6 ☐ BORING
- 7 ☐ DIAMOND
- 8 ☐ JETTING
- 9 ☐ DRIVING
- ☐ DIGGING
- ☐ OTHER

CONTRACTOR

NAME OF WELL CONTRACTOR	WELL CONTRACTOR'S LICENCE NUMBER
CORE'S WELL DRILLING	1660

ADDRESS: 264 BRONTE ST. UNIT#10 MILTON ONT.

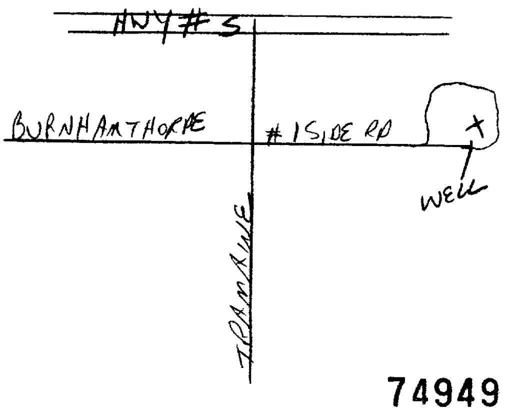
NAME OF WELL TECHNICIAN	WELL TECHNICIAN'S LICENCE NUMBER
ROD CORE ART CLARK	TO-479

SIGNATURE OF TECHNICIAN/CONTRACTOR

SUBMISSION DATE DAY ____ MO ____ YR ____

LOCATION OF WELL

IN DIAGRAM BELOW SHOW DISTANCES OF WELL FROM ROAD AND LOT LINE. INDICATE NORTH BY ARROW.



74949

DRILLERS REMARKS

OFFICE USE ONLY

DATA SOURCE	CONTRACTOR	DATE RECEIVED
	1660	JUN 17 1998

DATE OF INSPECTION	INSPECTOR

REMARKS: CSS. S9

MINISTRY OF THE ENVIRONMENT COPY

FORM NO. 0506 (11/86) FORM 9

Sicard

The Ontario Water Resources Commission Act

WATER WELL RECORD

30m/5

Water management in Ontario

1. PRINT ONLY IN SPACES PROVIDED
2. CHECK ☒ CORRECT BOX WHERE APPLICABLE

11

2803908

MUNICIP. 28602

CON. DS N C 01

COUNTY OR DISTRICT: [redacted]

TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE: BURLINGTON

CON., BLOCK, TRACT, SURVEY, ETC.: 1 N.D.S.

LOT: 001

DATE COMPLETED: DAY 04 MO. 09 YR. 72

[redacted]63 DUNDAS ST. (#5 HWY)

[redacted]08770 RC. 4 ELEVATION 0520 RC. 6 BASIN CODE 24

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH – FEET FROM	DEPTH – FEET TO
	TOPSOIL			0	3
BROWN	CLAY			3	15
RED	CLAY			15	21
RED	SHALE			21	52

31 0003 02 0015695 0021705 0052717

32

41 WATER RECORD

WATER FOUND AT – FEET	KIND OF WATER
0030	1 ☒ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ ~~MINERAL~~
0051	1 ☐ ~~FRESH~~ 2 ☐ SALTY 3 ☐ SULPHUR 4 ☒ MINERAL
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERAL
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERAL
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERAL

51 CASING & OPEN HOLE RECORD

INSIDE DIAM. INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH – FEET FROM	DEPTH – FEET TO
06 ~~64~~	1 ☒ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE	188	0	~~22~~ 0022
06	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☒ OPEN HOLE		22	0052 ~~52~~
	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE			

SCREEN

SIZE(S) OF OPENING (SLOT NO.)

DIAMETER INCHES

LENGTH FEET

MATERIAL AND TYPE

DEPTH TO TOP OF SCREEN FEET

61 PLUGGING & SEALING RECORD

DEPTH SET AT – FEET FROM	DEPTH SET AT – FEET TO	MATERIAL AND TYPE (CEMENT GROUT, LEAD PACKER, ETC.)

71 PUMPING TEST

PUMPING TEST METHOD: 1 ☐ PUMP 2 ☒ BAILER

PUMPING RATE: 0002 ~~1½~~ GPM.

DURATION OF PUMPING: 02 HOURS 00 MINS.

1 ☒ PUMPING 2 ☐ RECOVERY

STATIC LEVEL	WATER LEVEL END OF PUMPING	15 MINUTES	30 MINUTES	45 MINUTES	60 MINUTES
~~44~~ 044 FEET	048 ~~484~~ FEET	048 ~~484~~ FEET	048 ~~484~~ FEET	048 ~~484~~ FEET	~~484~~ 048 FEET

IF FLOWING, GIVE RATE: GPM.

PUMP INTAKE SET AT: 49 ~~3~~ FEET

WATER AT END OF TEST: 1 ☒ CLEAR 2 ☐ CLOUDY

RECOMMENDED PUMP TYPE: ☐ SHALLOW ☑ DEEP

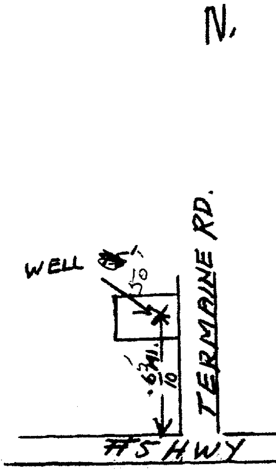
RECOMMENDED PUMP SETTING: 049 FEET

RECOMMENDED PUMPING RATE: 0002 ~~1½~~ GPM.

0005 GPM./FT. SPECIFIC CAPACITY

LOCATION OF WELL

IN DIAGRAM BELOW SHOW DISTANCES OF WELL FROM ROAD AND LOT LINE. INDICATE NORTH BY ARROW.



DRILLERS REMARKS:

FINAL STATUS OF WELL
1 ☒ WATER SUPPLY
2 ☐ OBSERVATION WELL
3 ☐ TEST HOLE
4 ☐ RECHARGE WELL
5 ☐ ABANDONED, INSUFFICIENT SUPPLY
6 ☐ ABANDONED, POOR QUALITY
7 ☐ UNFINISHED

WATER USE 01
1 ☒ DOMESTIC
2 ☐ STOCK
3 ☐ IRRIGATION
4 ☐ INDUSTRIAL
☐ OTHER
5 ☐ COMMERCIAL
6 ☐ MUNICIPAL
7 ☐ PUBLIC SUPPLY
8 ☐ COOLING OR AIR CONDITIONING
9 ☐ NOT USED

METHOD OF DRILLING
1 ☒ CABLE TOOL
2 ☐ ROTARY (CONVENTIONAL)
3 ☐ ROTARY (REVERSE)
4 ☐ ROTARY (AIR)
5 ☐ AIR PERCUSSION
6 ☐ BORING
7 ☐ DIAMOND
8 ☐ JETTING
9 ☐ DRIVING

CONTRACTOR

NAME OF WELL CONTRACTOR: Peter Spotuck Well Drilling LICENCE NUMBER 1815

ADDRESS: 2442 Marywale Ct, Burlington

NAME OF DRILLER OR BORER: Ed Doyle LICENCE NUMBER 1815

SIGNATURE OF CONTRACTOR: G.J. Carmichael

SUBMISSION DATE DAY ___ MO. ___ YR. ___

OFFICE USE ONLY

DATA SOURCE 1 CONTRACTOR 1815 DATE RECEIVED 110972

DATE OF INSPECTION INSPECTOR

REMARKS: CSS.S8

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OWRC COPY

Simms

MINISTRY OF THE ENVIRONMENT

The Ontario Water Resources Act

WATER WELL RECORD

30 M 5F

Ontario

1. PRINT ONLY IN SPACES PROVIDED
2. CHECK ☒ CORRECT BOX WHERE APPLICABLE

2804679

28602 DS_N_C 02

COUNTY OR DISTRICT	TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE	CON., BLOCK, TRACT, SURVEY, ETC.	LOT
HALTON	~~[illegible]~~ Town of Milton (Nelson	II NDS	001 4

OWNER (SURNAME FIRST)	ADDRESS	DATE COMPLETED
ACHILLE FARMS	RR 6 MILTON	DAY 8 MO. NOV YR. 74

2804679 17 595308 4809884 4 590 4 24 NOV 07, 1975 55

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET FROM	DEPTH - FEET TO
BROWN	TOPSOIL			0	1
"	CLAY		HARD PACKED	1	22
GREY	"	BLUE CLAY, SAND LAYERS	MIXED	22	63
BROWN	SAND	STONES	HARD PACKED	63	72
RED	SHALE	GREEN SHALE	HARD	72	90

WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER
63	☒ FRESH ☐ SULPHUR ☐ SALTY ☐ MINERAL
85	☒ FRESH ☐ SULPHUR ☐ SALTY ☐ MINERAL
	☐ FRESH ☐ SULPHUR ☐ SALTY ☐ MINERAL
	☐ FRESH ☐ SULPHUR ☐ SALTY ☐ MINERAL
	☐ FRESH ☐ SULPHUR ☐ SALTY ☐ MINERAL

CASING & OPEN HOLE RECORD

INSIDE DIAM. INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET FROM	DEPTH - FEET TO
30	☐ STEEL ☐ GALVANIZED ☒ CONCRETE ☐ OPEN HOLE	2½	0	67½
2''	☐ STEEL ☒ GALVANIZED ☐ CONCRETE ☐ OPEN HOLE	16ga	66	90
	☐ STEEL ☐ GALVANIZED ☐ CONCRETE ☐ OPEN HOLE			

SCREEN

SIZE(S) OF OPENING (SLOT NO.)	DIAMETER	LENGTH
	INCHES	FEET

MATERIAL AND TYPE	DEPTH TO TOP OF SCREEN
GRAVEL PIT	FEET

PLUGGING & SEALING RECORD

DEPTH SET AT - FEET FROM	DEPTH SET AT - FEET TO	MATERIAL AND TYPE (CEMENT GROUT, LEAD PACKER, ETC.)

PUMPING TEST

PUMPING TEST METHOD ☐ PUMP ☒ BAILER	PUMPING RATE GPM	DURATION OF PUMPING HOURS MINS

STATIC LEVEL	WATER LEVEL END OF PUMPING	WATER LEVELS DURING ☐ PUMPING ☐ RECOVERY 15 MINUTES	30 MINUTES	45 MINUTES	60 MINUTES
FEET	FEET	FEET	FEET	FEET	FEET

200 GALLONS

IF FLOWING, GIVE RATE 1/4 GPM	PUMP INTAKE SET AT 86 FEET	~~WATER AT END OF TEST~~ CLEARING ☐ CLEAR ☒ CLOUDY
RECOMMENDED PUMP TYPE ☐ SHALLOW ☒ DEEP	RECOMMENDED PUMP SETTING 86 FEET	RECOMMENDED PUMPING RATE 2 GPM

FINAL STATUS OF WELL

☒ WATER SUPPLY
☐ OBSERVATION WELL
☐ TEST HOLE
☐ RECHARGE WELL
☐ ABANDONED, INSUFFICIENT SUPPLY
☐ ABANDONED, POOR QUALITY
☐ UNFINISHED

WATER USE

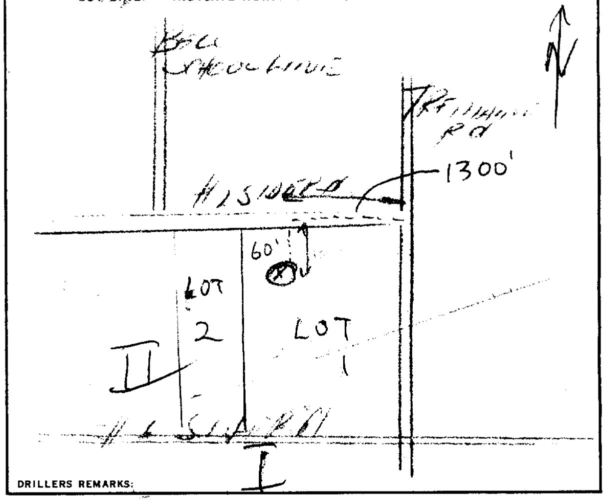
☒ DOMESTIC
☐ STOCK
☐ IRRIGATION
☐ INDUSTRIAL
☐ OTHER
☐ COMMERCIAL
☐ MUNICIPAL
☐ PUBLIC SUPPLY
☐ COOLING OR AIR CONDITIONING
☐ NOT USED

METHOD OF DRILLING

☐ CABLE TOOL
☐ ROTARY (CONVENTIONAL)
☐ ROTARY (REVERSE)
☐ ROTARY (AIR)
☐ AIR PERCUSSION
☒ BORING
☐ DIAMOND
☐ JETTING
☐ DRIVING

LOCATION OF WELL

IN DIAGRAM BELOW SHOW DISTANCES OF WELL FROM ROAD AND LOT LINE. INDICATE NORTH BY ARROW.



DRILLERS REMARKS:

CONTRACTOR

NAME OF WELL CONTRACTOR	LICENCE NUMBER
MILTON WELL BORING	3637
ADDRESS 6751 WALKERS LINE RR2 MILTON	
NAME OF DRILLER OR BORER MARCEL PELTIER	LICENCE NUMBER 3637
SIGNATURE OF CONTRACTOR	SUBMISSION DATE DAY 13 MO. NOV YR. 74

OFFICE USE ONLY

110275.

J.B

CSS.S8

JP

FORM 7 07-091

OWNER'S COPY

Sugiyama

Ministry of the Environment
Ontario

The Ontario Water Resources Act
WATER WELL RECORD

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11 2807647 MUNICIP. 28605 CON. DS N 01

COUNTY OR DISTRICT	TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE	CON., BLOCK, TRACT, SURVEY, ETC	LOT 25-27
HALTON	TOWN OF OAKVILLE	CON.1 N.D.S.	35

OWNER (SURNAME FIRST) 28-47	ADDRESS	DATE COMPLETED 48-53
FUJI MACHINE SHOP	~~811 MAC PHEARSON RD.~~ OAKVILLE,ONT. L6J 4Z3	DAY 31 MO 8 YR 90

21 ZONE EASTING NORTHING RC. ELEVATION RC. BASIN CODE I II III IV

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET FROM	DEPTH - FEET TO
BROWN	CLAY		LOOSE	0	12 ~~1X~~
RED	CLAY		LOOSE	12 ~~17~~	18 ~~20~~
RED	SHALE		HARD	18 ~~20~~	50

31

32

41 WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER
10-13 48	14 1 ☐ FRESH 2 ☒ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
15-18	19 1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
20-23	24 1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
25-28	29 1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
30-33	34 80 1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS

51 CASING & OPEN HOLE RECORD

INSIDE DIAM INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET FROM	DEPTH - FEET TO
10-11 6¼	12 1 ☒ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE 5 ☐ PLASTIC	.188	+1	13-16 25
17-18	19 1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☒ OPEN HOLE 5 ☐ PLASTIC		25	20-23 50
24-25	26 1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE 5 ☐ PLASTIC			27-30

SCREEN

SIZE(S) OF OPENING (SLOT NO.) 31-33	DIAMETER 34-38	LENGTH 39-40
	INCHES	FEET

MATERIAL AND TYPE	DEPTH TO TOP OF SCREEN 41-44	30
	FEET	

61 PLUGGING & SEALING RECORD

DEPTH SET AT - FEET FROM	DEPTH SET AT - FEET TO	MATERIAL AND TYPE (CEMENT GROUT LEAD PACKER, ETC.)
10-13	14-17	
18-21	22-25	
26-29	30-33	80

71 PUMPING TEST

PUMPING TEST METHOD 10	PUMPING RATE 11-14	DURATION OF PUMPING
1 ☐ PUMP 2 ☒ BAILER	2 GPM	15-16 1 HOURS 17-18 MINS

STATIC LEVEL	WATER LEVEL END OF PUMPING	25 WATER LEVELS DURING 1 ☒ PUMPING 2 ☐ RECOVERY			
		15 MINUTES	30 MINUTES	45 MINUTES	60 MINUTES
19-21 17 FEET	22-24 46 FEET	26-28 46 FEET	29-31 46 FEET	32-34 46 FEET	35-37 46 FEET

IF FLOWING, GIVE RATE 38-41	PUMP INTAKE SET AT	WATER AT END OF TEST 42
GPM	FEET	1 ☐ CLEAR 2 ☒ CLOUDY

RECOMMENDED PUMP TYPE	RECOMMENDED PUMP SETTING 43-45	RECOMMENDED PUMPING RATE 46-49
☐ SHALLOW ☒ DEEP	48 FEET	2 GPM

50-53

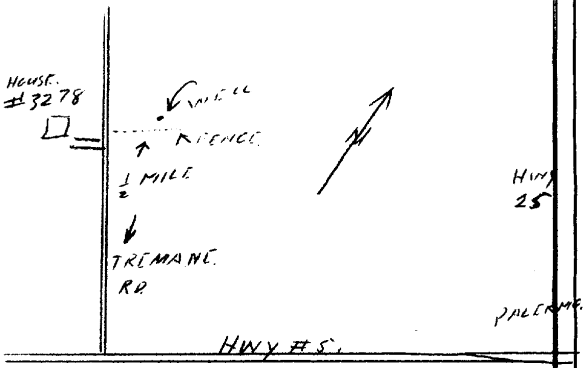
FINAL STATUS OF WELL
54
- 1 ☒ WATER SUPPLY
- 2 ☐ OBSERVATION WELL
- 3 ☐ TEST HOLE
- 4 ☐ RECHARGE WELL
- 5 ☐ ABANDONED, INSUFFICIENT SUPPLY
- 6 ☐ ABANDONED POOR QUALITY
- 7 ☐ UNFINISHED
- ☐ DEWATERING

WATER USE
55-56
- 1 ☒ DOMESTIC
- 2 ☐ STOCK
- 3 ☐ IRRIGATION
- 4 ☐ INDUSTRIAL
- ☐ OTHER
- 5 ☐ COMMERCIAL
- 6 ☐ MUNICIPAL
- 7 ☐ PUBLIC SUPPLY
- 8 ☐ COOLING OR AIR CONDITIONING
- 9 ☐ NOT USED

METHOD OF CONSTRUCTION
57
- 1 ☒ CABLE TOOL
- 2 ☐ ROTARY (CONVENTIONAL)
- 3 ☐ ROTARY (REVERSE)
- 4 ☐ ROTARY (AIR)
- 5 ☐ AIR PERCUSSION
- 6 ☐ BORING
- 7 ☐ DIAMOND
- 8 ☐ JETTING
- 9 ☐ DRIVING
- ☐ DIGGING
- ☐ OTHER

LOCATION OF WELL

IN DIAGRAM BELOW SHOW DISTANCES OF WELL FROM ROAD AND LOT LINE. INDICATE NORTH BY ARROW.



76398

DRILLERS REMARKS

CONTRACTOR

NAME OF WELL CONTRACTOR	WELL CONTRACTOR'S LICENCE NUMBER
OCONNOR WELL DRILLING LTD.	4005

ADDRESS
RR # 1 MILLGROVE,ONT. LOR 1VO

NAME OF WELL TECHNICIAN	WELL TECHNICIAN'S LICENCE NUMBER
W.HOWE	T-0518

SIGNATURE OF TECHNICIAN/CONTRACTOR	SUBMISSION DATE
JB. O'Connor	DAY ___ MO. ___ YR. ___

OFFICE USE ONLY

DATA SOURCE 58	CONTRACTOR 59-62	DATE RECEIVED 63-68	80
	4005	SEP 12 1990	

DATE OF INSPECTION	INSPECTOR

REMARKS

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FORM NO. 0506 (11/86) FORM 9

Wettlaufer

Ministry of the Environment
Ontario

The Ontario Water Resources Act

WATER WELL RECORD

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11 | 2807684 | MUNICIP 28602 | CON. DS N 02

COUNTY OR DISTRICT	TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE	CON., BLOCK, TRACT, SURVEY, ETC	LOT 25-27
[redacted]	CITY OF BURLINGTON	CON.2 N.D.S.	2

5364 #2 SIDE RD.
TON,ONT. L9T 2Y1

DATE COMPLETED 48-53 DAY 12 MO 10 YR 90

ING | RC. | ELEVATION | RC | BASIN CODE | II | III | IV

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET FROM	DEPTH - FEET TO
BROWN	CLAY		LOOSE	0	8
BROWN	SAND		LOOSE	8	15
BROWN	CLAY	SAND	LOOSE	15	43
RED	CLAY		LOOSE	43	45
RED	SHALE		HARD	45	60

31
32

41 WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER
57 (10-13)	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS (14)
(15-18)	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS (19)
(20-23)	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS (24)
(25-28)	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS (29)
(30-33)	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS (34) 80

51 CASING & OPEN HOLE RECORD

INSIDE DIAM INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET FROM	DEPTH - FEET TO
6¼ (10-11)	1 ☒ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE 5 ☐ PLASTIC (12)	.188	+1	45 (13-16)
(17-18)	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☒ OPEN HOLE 5 ☐ PLASTIC (19)		45	60 (20-23)
(24-25)	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE 5 ☐ PLASTIC (26)			(27-30)

SCREEN

SIZE(S) OF OPENING (SLOT NO.) 31-33	DIAMETER 34-38 INCHES	LENGTH 39-40 FEET

MATERIAL AND TYPE	DEPTH TO TOP OF SCREEN 41-44 FEET	30

61 PLUGGING & SEALING RECORD

DEPTH SET AT - FEET FROM	DEPTH SET AT - FEET TO	MATERIAL AND TYPE (CEMENT GROUT, LEAD PACKER, ETC.)
10-13	14-17	
18-21	22-25	
26-29	30-33	80

71 PUMPING TEST

PUMPING TEST METHOD 10: 1 ☐ PUMP 2 ☒ BAILER

PUMPING RATE 11-14: 2 GPM

DURATION OF PUMPING: 1 HOURS (15-16) 30 MINS (17-18)

STATIC LEVEL	WATER LEVEL END OF PUMPING	WATER LEVELS DURING 25: 1 ☒ PUMPING 2 ☐ RECOVERY			
		15 MINUTES	30 MINUTES	45 MINUTES	60 MINUTES
18 FEET (19-21)	57 FEET (22-24)	57 FEET (26-28)	57 FEET (29-31)	57 FEET (32-34)	57 FEET (35-37)

IF FLOWING, GIVE RATE 38-41: GPM

PUMP INTAKE SET AT: FEET

WATER AT END OF TEST 42: 1 ☐ CLEAR 2 ☒ CLOUDY

RECOMMENDED PUMP TYPE: ☐ SHALLOW ☐ DEEP

RECOMMENDED PUMP SETTING 43-45: FEET

RECOMMENDED PUMPING RATE 46-49: GPM

50-53

FINAL STATUS OF WELL (54)

- 1 ☒ WATER SUPPLY
- 2 ☐ OBSERVATION WELL
- 3 ☐ TEST HOLE
- 4 ☐ RECHARGE WELL
- 5 ☐ ABANDONED, INSUFFICIENT SUPPLY
- 6 ☐ ABANDONED, POOR QUALITY
- 7 ☐ UNFINISHED
- ☐ DEWATERING

WATER USE (55-56)

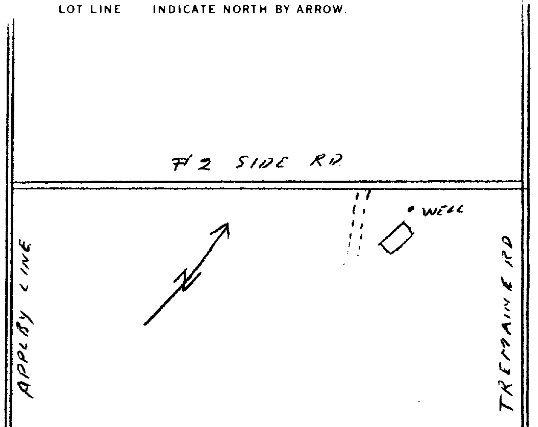
- 1 ☒ DOMESTIC
- 2 ☐ STOCK
- 3 ☐ IRRIGATION
- 4 ☐ INDUSTRIAL
- ☐ OTHER
- 5 ☐ COMMERCIAL
- 6 ☐ MUNICIPAL
- 7 ☐ PUBLIC SUPPLY
- 8 ☐ COOLING OR AIR CONDITIONING
- 9 ☐ NOT USED

METHOD OF CONSTRUCTION (57)

- 1 ☒ CABLE TOOL
- 2 ☐ ROTARY (CONVENTIONAL)
- 3 ☐ ROTARY (REVERSE)
- 4 ☐ ROTARY (AIR)
- 5 ☐ AIR PERCUSSION
- 6 ☐ BORING
- 7 ☐ DIAMOND
- 8 ☐ JETTING
- 9 ☐ DRIVING
- ☐ DIGGING
- ☐ OTHER

LOCATION OF WELL

IN DIAGRAM BELOW SHOW DISTANCES OF WELL FROM ROAD AND LOT LINE. INDICATE NORTH BY ARROW.



76418

DRILLERS REMARKS

CONTRACTOR

NAME OF WELL CONTRACTOR: OCONNOR WELL DRILLING LTD.
WELL CONTRACTOR'S LICENCE NUMBER: 4005
ADDRESS: RR # 1 MILLGROVE,ONT.LOR 1VO
NAME OF WELL TECHNICIAN: W.HOWE
WELL TECHNICIAN'S LICENCE NUMBER: T-0513
SIGNATURE OF TECHNICIAN/CONTRACTOR: JB. O'Connor
SUBMISSION DATE: DAY ____ MO. ____ YR. ____

OFFICE USE ONLY

DATA SOURCE 58
CONTRACTOR 59-62: 4005
DATE RECEIVED 63-68: NOV 08 1990
80
DATE OF INSPECTION
INSPECTOR
REMARKS

MINISTRY OF THE ENVIRONMENT COPY

FORM NO. 0506 (11/86) FORM 9

Wiggins

The Ontario Water Resources Commission Act

WATER WELL RECORD

30m/5f:

Water management in Ontario

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11 (1 2) | 2803806 | MUNICIP. 28602 (10 14) | CON. DS N C 02 (15 22 23 24)

COUNTY OR DISTRICT	TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE	CON., BLOCK, TRACT, SURVEY, ETC.	LOT 25-27
Halton	Burlington	2 N. D. S.	001

[redacted] Grove Park, Burlington

DATE COMPLETED 48-53: DAY 24 MO. ~~Jan~~ 01 YR. 72

09380 (24) RC. 4 (25) ELEVATION 0555 (26) RC. 5 (30) BASIN CODE 24 (31) … 47

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH – FEET FROM	DEPTH – FEET TO
Brown	Clay			0	10
Grey	Clay			10	50
Red	Shale			50	62

31: 0010605 | 0050205 | 0062717

32: (10, 14 15, 21, 32, 43, 54, 65, 75, 80)

41 WATER RECORD

WATER FOUND AT – FEET	KIND OF WATER
10-13: 0060	1 ☒ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERAL (14)
15-18	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERAL (19)
20-23	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERAL (24)
25-28	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERAL (29)
30-33	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERAL (34) 80

51 CASING & OPEN HOLE RECORD

INSIDE DIAM. INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH – FEET FROM	DEPTH – FEET TO
10-11: 06 ~~6 1/4~~	1 ☒ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE (12)	.188	0	13-16: ~~53~~ 0053
17-18	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☒ OPEN HOLE (19)		53	20-23: 0062 ~~62~~
24-25	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE (26)			27-30

SCREEN

SIZE(S) OF OPENING (SLOT NO.) 31-33	DIAMETER 34-38 INCHES	LENGTH 39-40 FEET

MATERIAL AND TYPE	DEPTH TO TOP OF SCREEN 41-44 FEET	80

61 PLUGGING & SEALING RECORD

DEPTH SET AT – FEET FROM	DEPTH SET AT – FEET TO	MATERIAL AND TYPE (CEMENT GROUT, LEAD PACKER, ETC.)
10-13	14-17	
18-21	22-25	
26-29	30-33	80

71 PUMPING TEST

PUMPING TEST METHOD (10): 1 ☐ PUMP 2 ☒ BAILER

PUMPING RATE (11-14): 0011 GPM.

DURATION OF PUMPING: 01 HOURS (15-16) 30 MINS. (17-18)

STATIC LEVEL (19-21)	WATER LEVEL END OF PUMPING (22-24)	15 MINUTES (26-28)	30 MINUTES (29-31)	45 MINUTES (32-34)	60 MINUTES (35-37)
025 FEET	049 FEET	049 FEET	049 FEET	049 FEET	049 FEET

25 WATER LEVELS DURING: 1 ☒ PUMPING 2 ☐ RECOVERY

IF FLOWING, GIVE RATE (38-41): GPM.

PUMP INTAKE SET AT: FEET

WATER AT END OF TEST (42): 1 ☒ CLEAR 2 ☐ CLOUDY

RECOMMENDED PUMP TYPE: ☐ SHALLOW ☒ DEEP

RECOMMENDED PUMP SETTING (43-45): 050 FEET

RECOMMENDED PUMPING RATE (46-49): 0005 GPM.

50-53: 000.5 GPM./FT. SPECIFIC CAPACITY

FINAL STATUS OF WELL (54)

1 ☒ WATER SUPPLY
2 ☐ OBSERVATION WELL
3 ☐ TEST HOLE
4 ☐ RECHARGE WELL
5 ☐ ABANDONED, INSUFFICIENT SUPPLY
6 ☐ ABANDONED, POOR QUALITY
7 ☐ UNFINISHED

WATER USE (55-56) 01

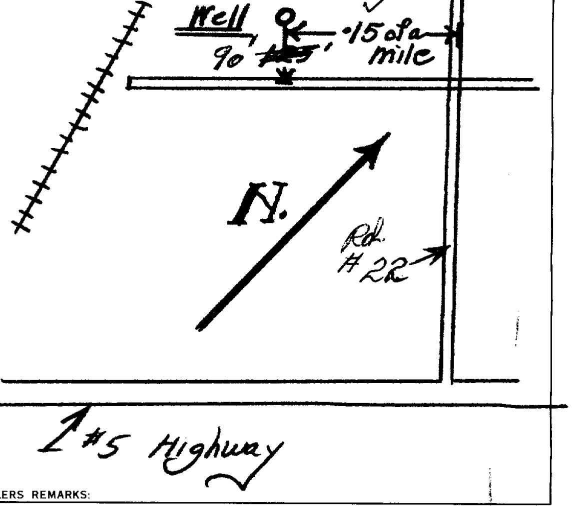
1 ☒ DOMESTIC
2 ☐ STOCK
3 ☐ IRRIGATION
4 ☐ INDUSTRIAL
☐ OTHER
5 ☐ COMMERCIAL
6 ☐ MUNICIPAL
7 ☐ PUBLIC SUPPLY
8 ☐ COOLING OR AIR CONDITIONING
9 ☐ NOT USED

METHOD OF DRILLING (57)

1 ☒ CABLE TOOL
2 ☐ ROTARY (CONVENTIONAL)
3 ☐ ROTARY (REVERSE)
4 ☐ ROTARY (AIR)
5 ☐ AIR PERCUSSION
6 ☐ BORING
7 ☐ DIAMOND
8 ☐ JETTING
9 ☐ DRIVING

LOCATION OF WELL

IN DIAGRAM BELOW SHOW DISTANCES OF WELL FROM ROAD AND LOT LINE. INDICATE NORTH BY ARROW.



DRILLERS REMARKS:

CONTRACTOR

NAME OF WELL CONTRACTOR: G.J. Wallis — LICENCE NUMBER: 5417

ADDRESS: RR#2 Stoney Creek

NAME OF DRILLER OR BORER: Same — LICENCE NUMBER:

SIGNATURE OF CONTRACTOR: George J Wallis — SUBMISSION DATE: DAY 18 MO. 4 YR. 72

OFFICE USE ONLY

DATA SOURCE (58)	CONTRACTOR (59-62)	DATE RECEIVED (63-68)	80
1	5417	240472	

DATE OF INSPECTION: — INSPECTOR:

REMARKS: CSS.S8

P

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OWRC COPY

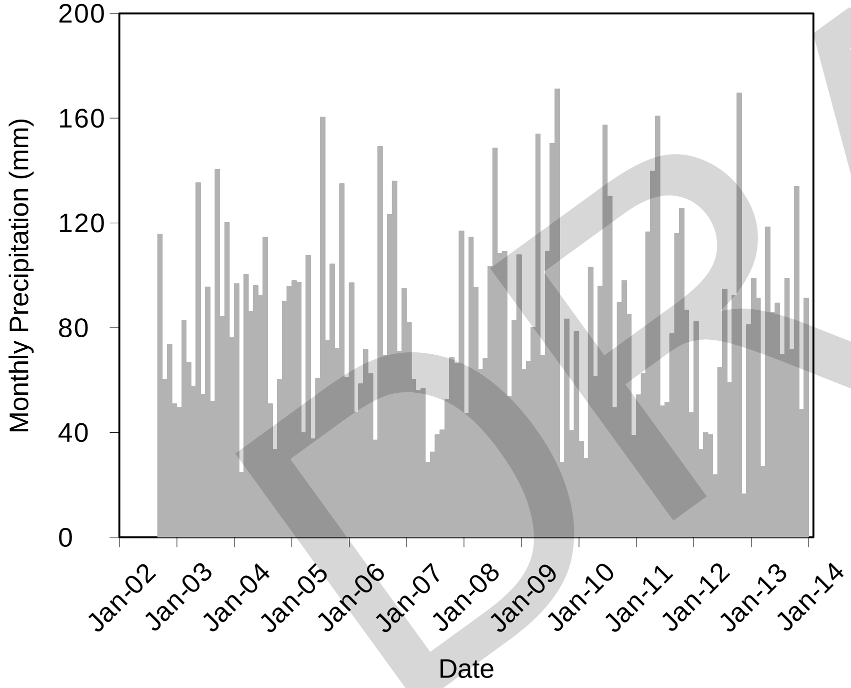
APPENDIX C

Groundwater Level Hydrographs

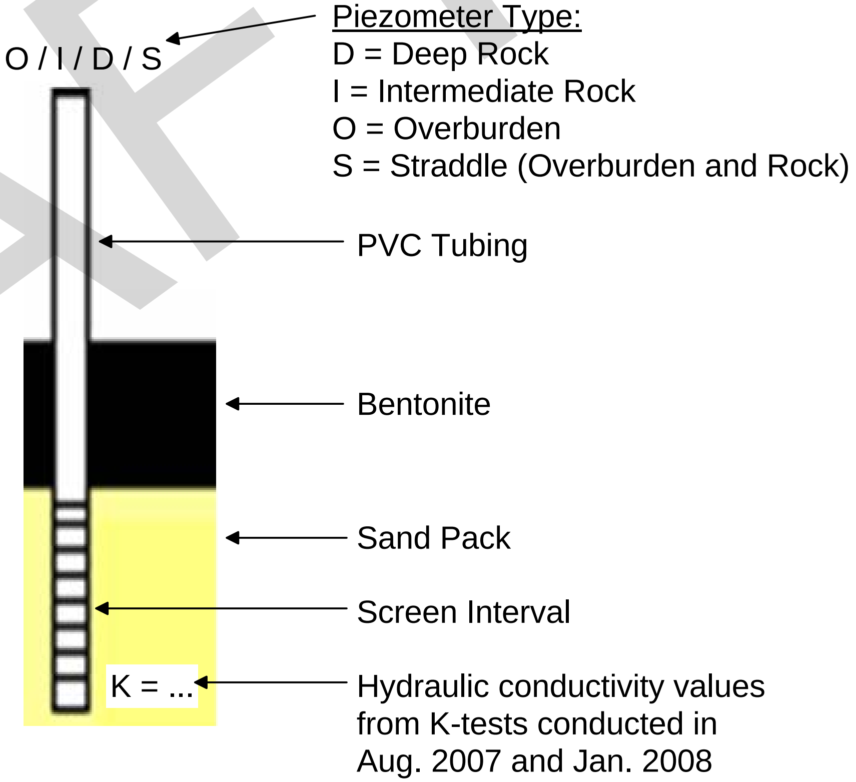
Appendix C Hydrograph Details
Tansley Quarry - Hanson Brick Ltd.

Rainfall Data

Rainfall data from September 2002 to April 2006 obtained from the Millgrove Station (now discontinued). Data from May 2006 to December 2013 is from Hamilton Airport.



Well Completion Legend



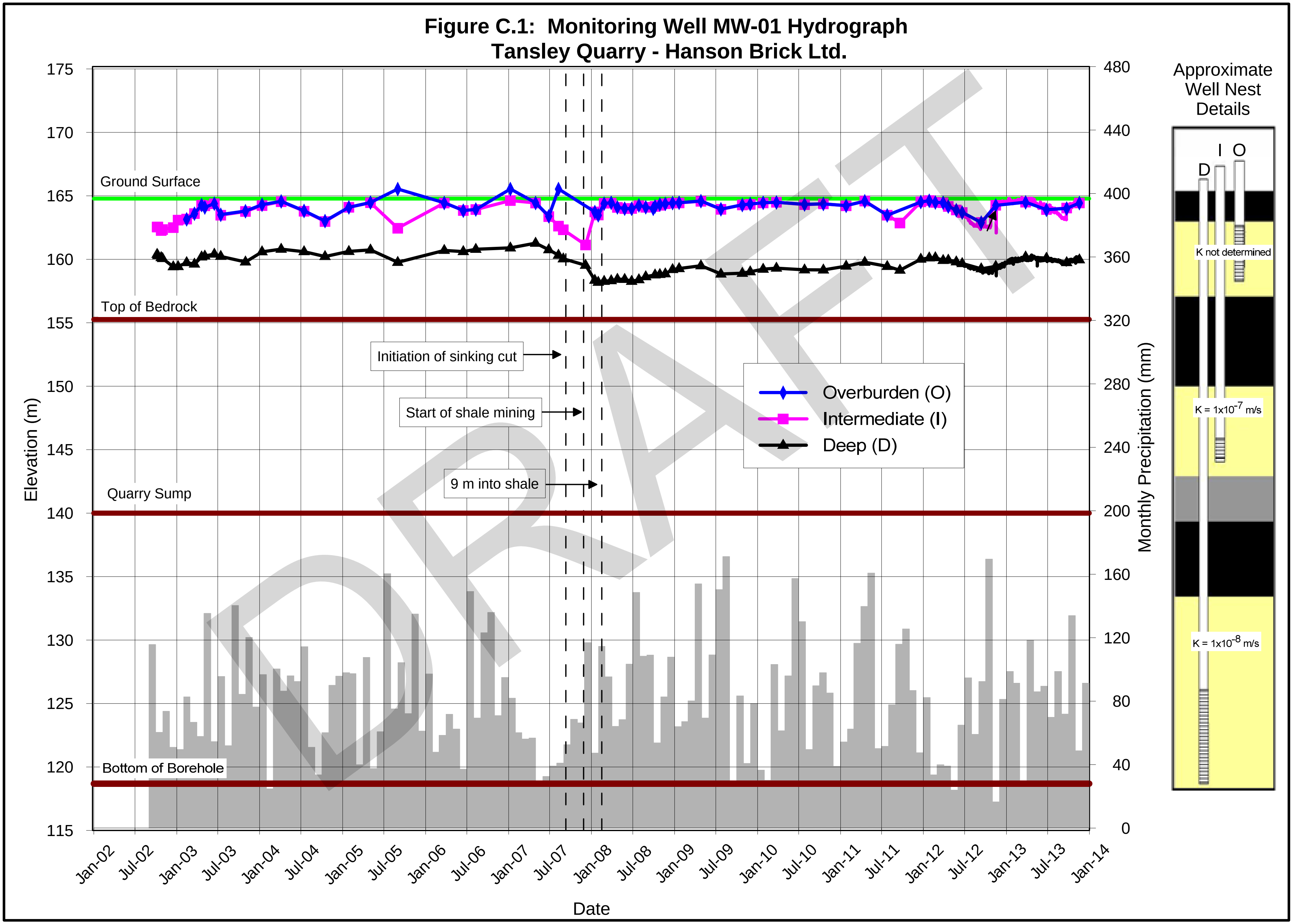
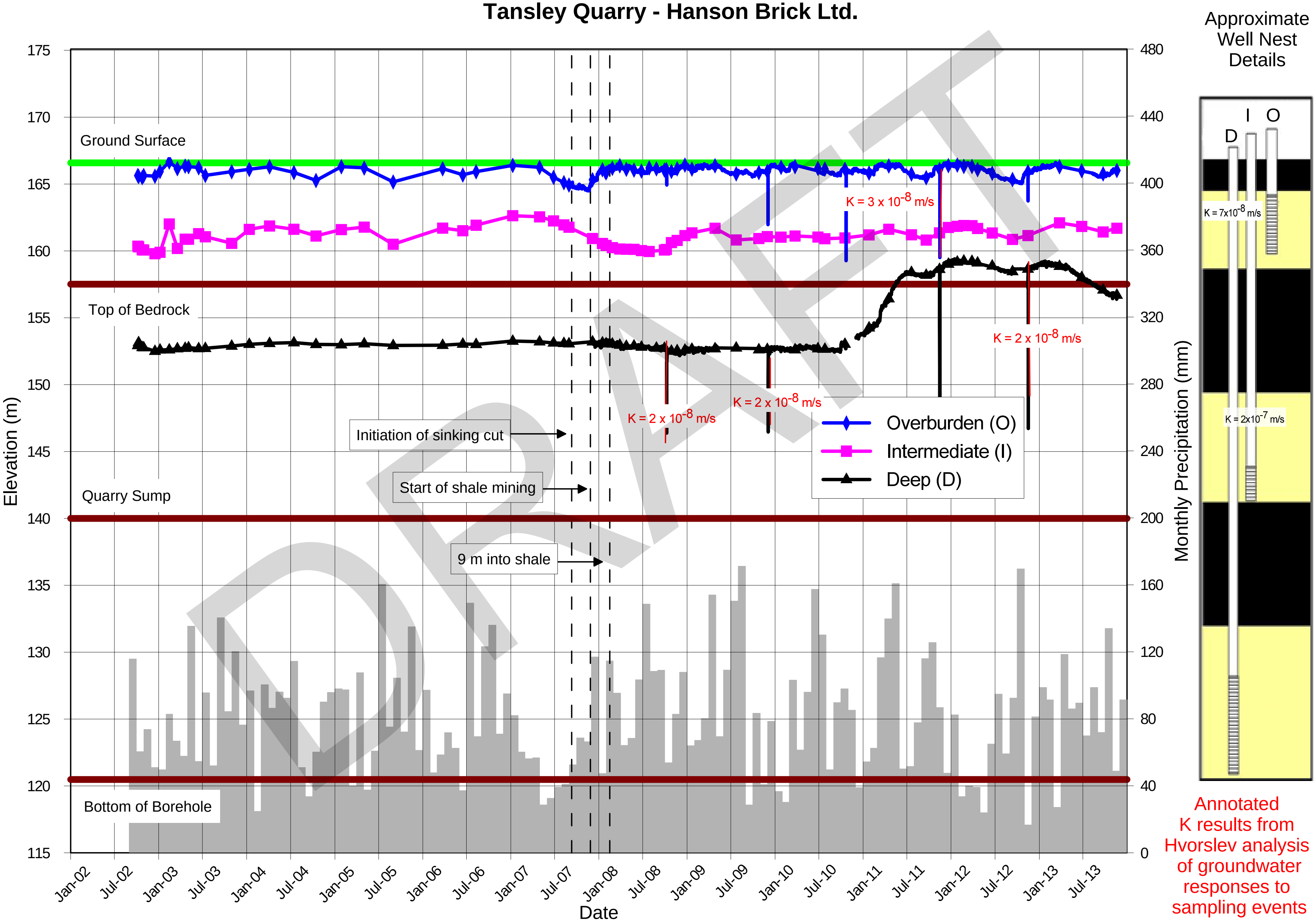


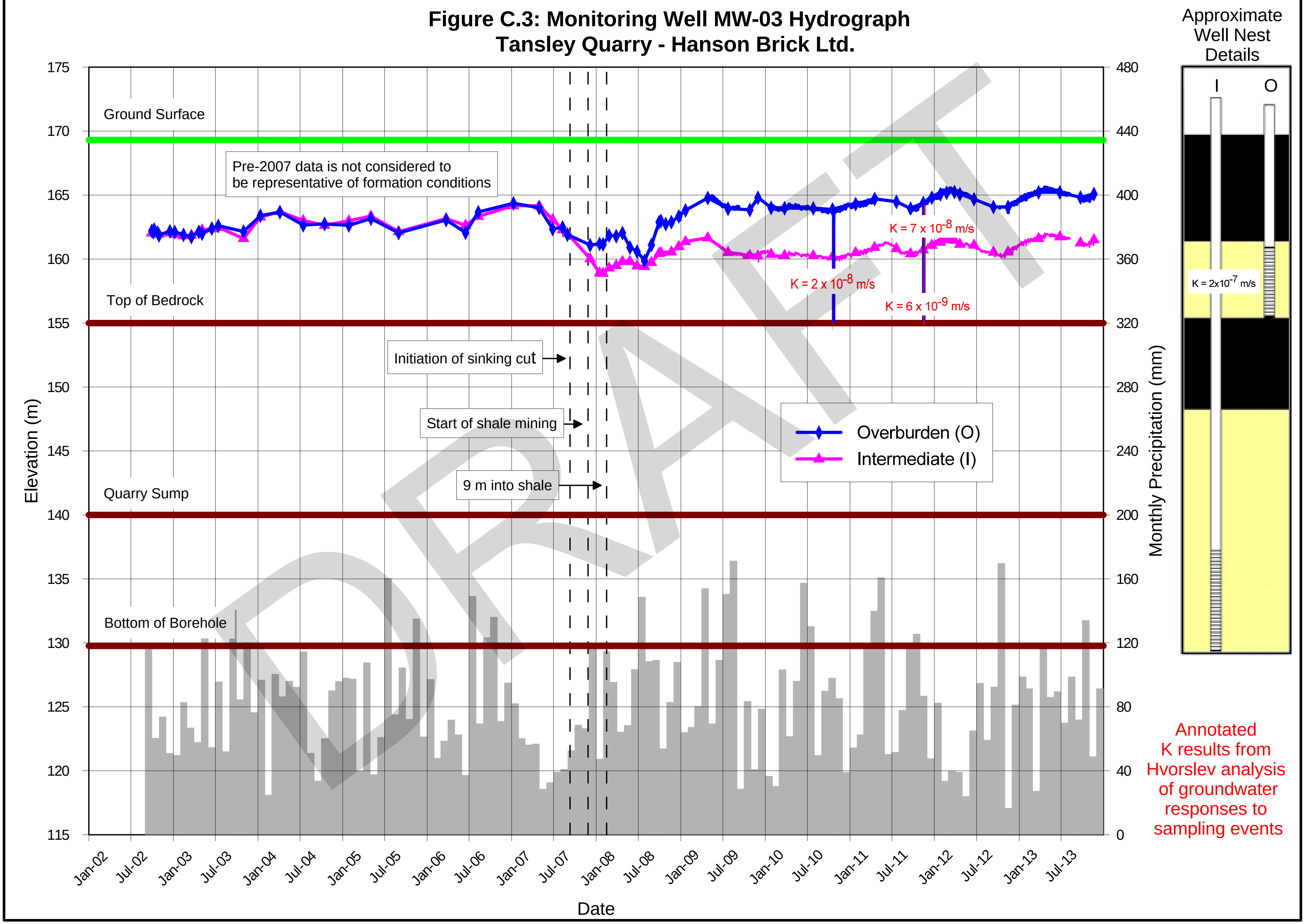
Figure C.1: Monitoring Well MW-01 Hydrograph
Tansley Quarry - Hanson Brick Ltd.
Elevation (m)
175
170
165
160
155
150
145
140
135
130
125
120
115
Monthly Precipitation (mm)
480
440
400
360
320
280
240
200
160
120
80
40
0
Ground Surface
Top of Bedrock
Quarry Sump
Bottom of Borehole
Initiation of sinking cut
Start of shale mining
9 m into shale
Overburden (O)
Intermediate (I)
Deep (D)
Date
Jan-02
Jul-02
Jan-03
Jul-03
Jan-04
Jul-04
Jan-05
Jul-05
Jan-06
Jul-06
Jan-07
Jul-07
Jan-08
Jul-08
Jan-09
Jul-09
Jan-10
Jul-10
Jan-11
Jul-11
Jan-12
Jul-12
Jan-13
Jul-13
Jan-14
Approximate Well Nest Details
D
I
O
K not determined
K = 1x10-7 m/s
K = 1x10-8 m/s

Figure C.2: Monitoring Well MW-02 Hydrograph
Tansley Quarry - Hanson Brick Ltd.



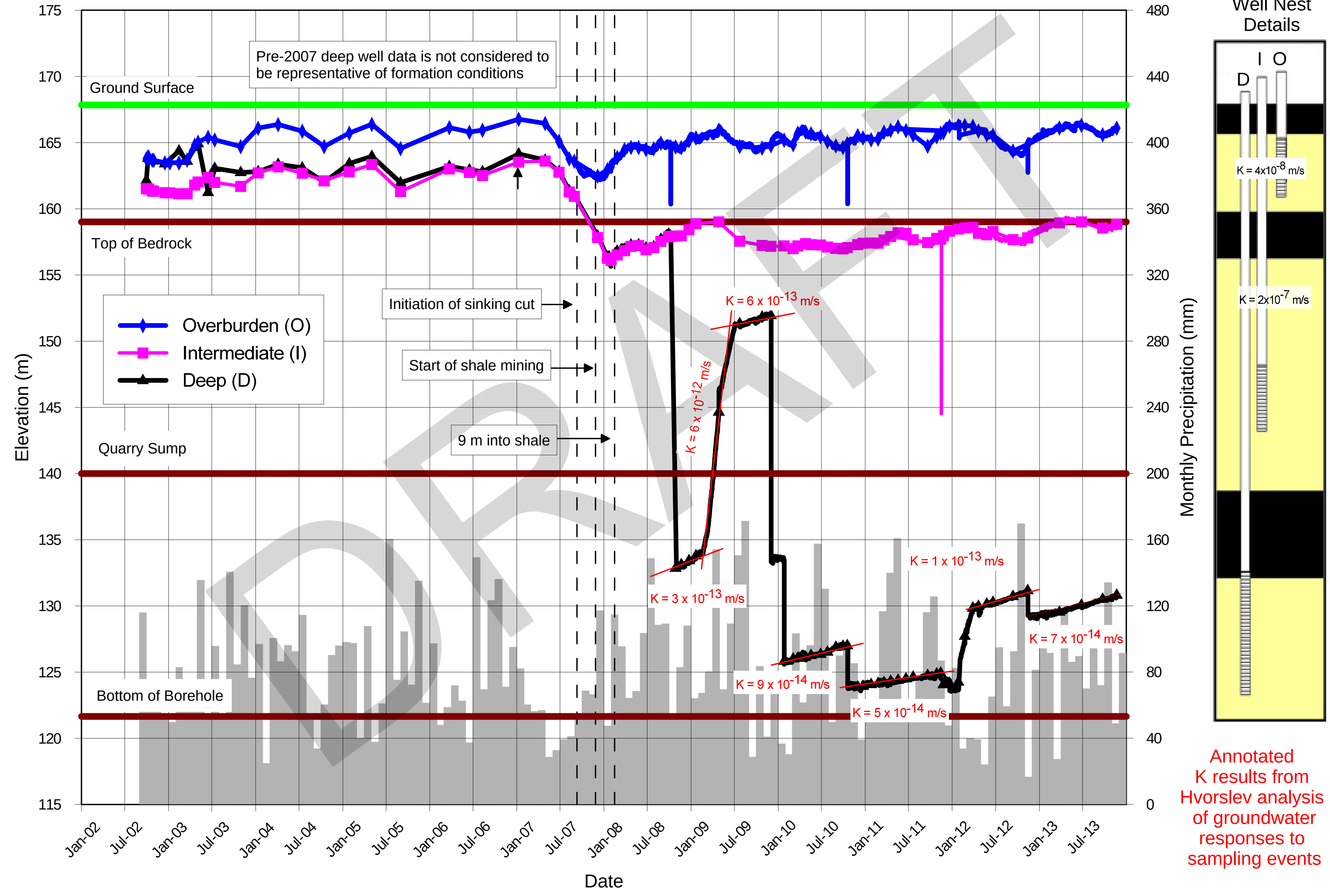
Annotated K results from Hvorslev analysis of groundwater responses to sampling events

Figure C.3: Monitoring Well MW-03 Hydrograph
Tansley Quarry - Hanson Brick Ltd.



Annotated K results from Hvorslev analysis of groundwater responses to sampling events

Figure C.4: Monitoring Well MW-04 Hydrograph
Tansley Quarry - Hanson Brick Ltd.



Annotated K results from Hvorslev analysis of groundwater responses to sampling events

Figure C.5: Monitoring Well MW-05 Hydrograph
Tansley Quarry - Hanson Brick Ltd.

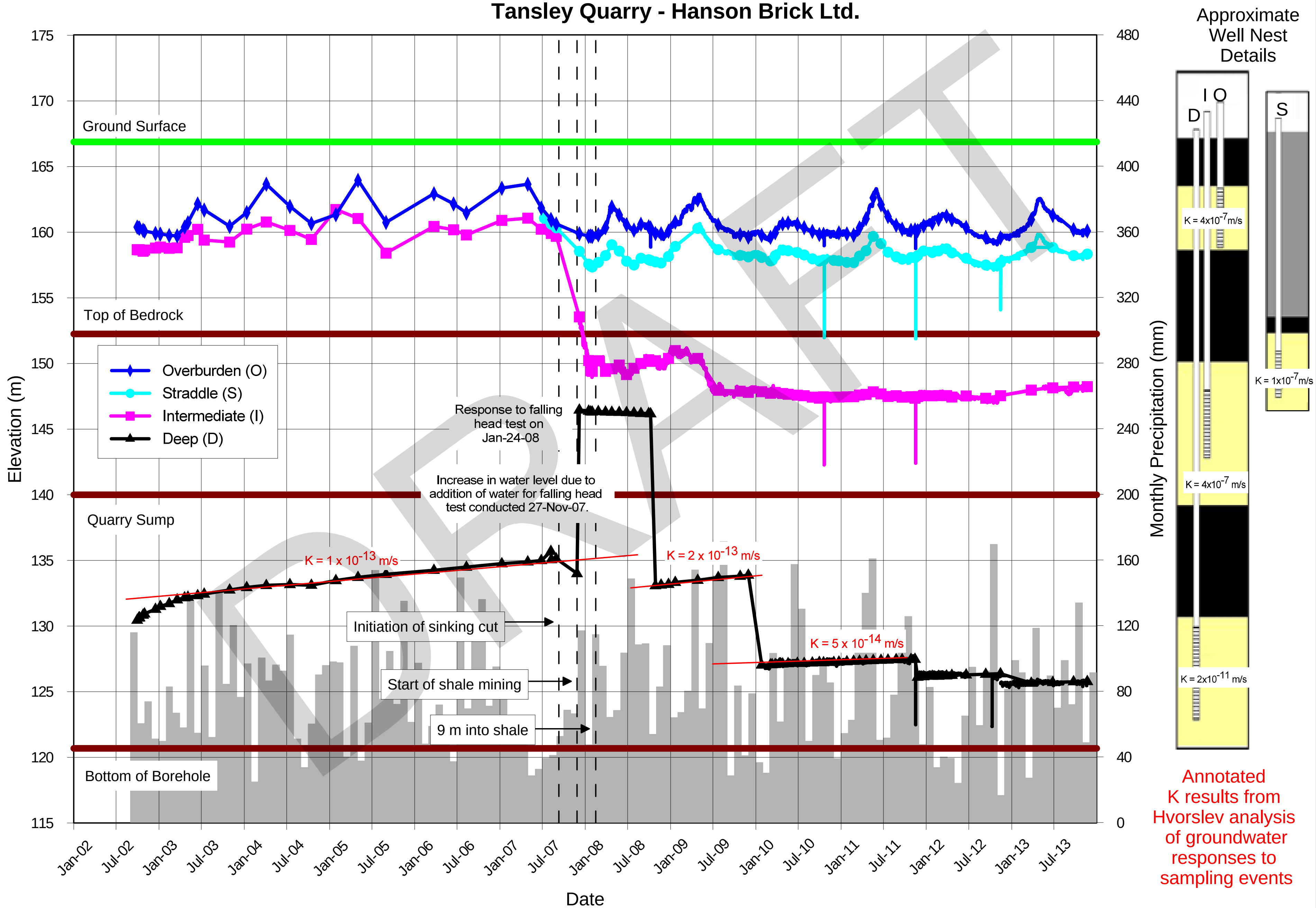


Figure C.6: Monitoring Well MW-06 Hydrograph
Tansley Quarry - Hanson Brick Ltd.

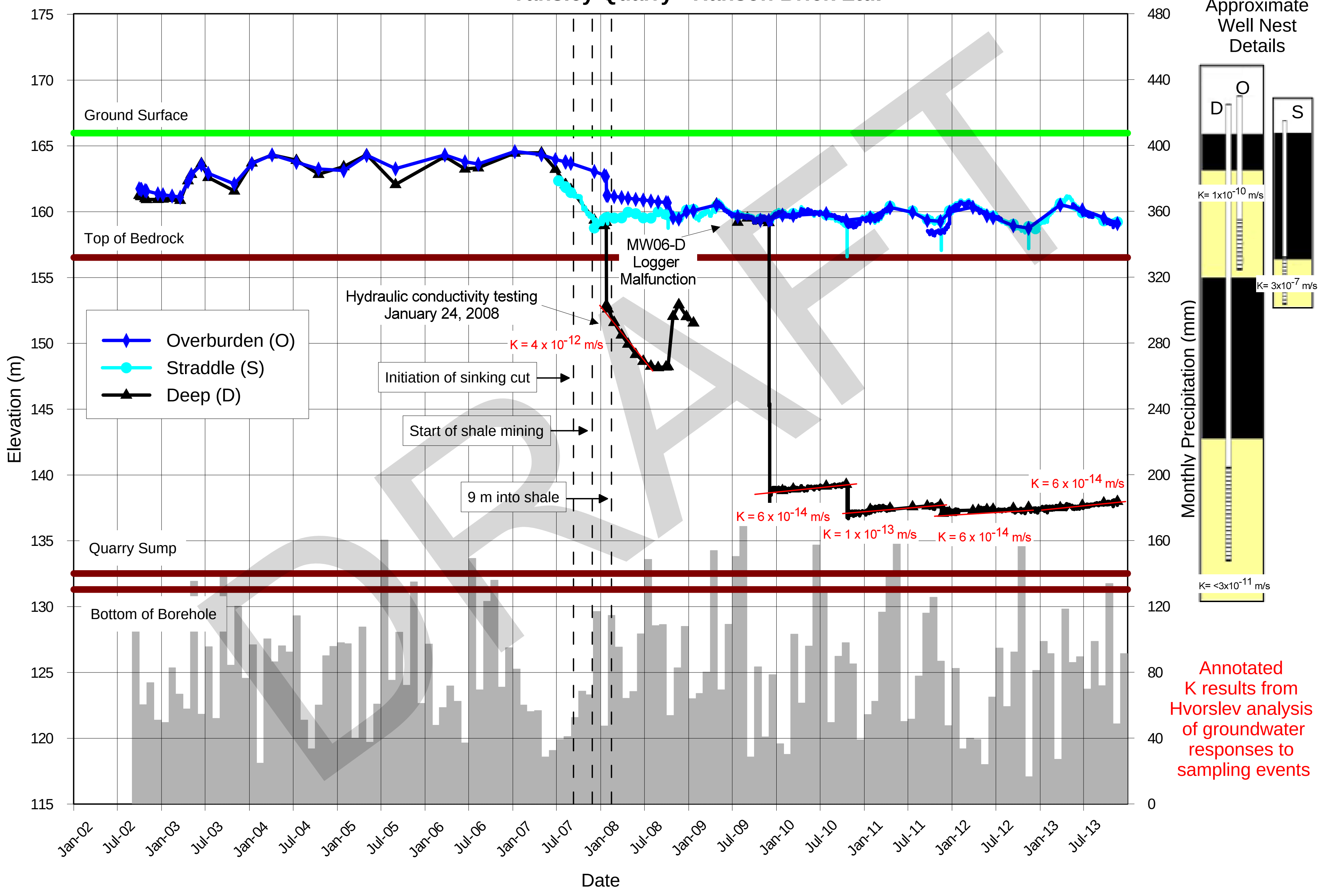
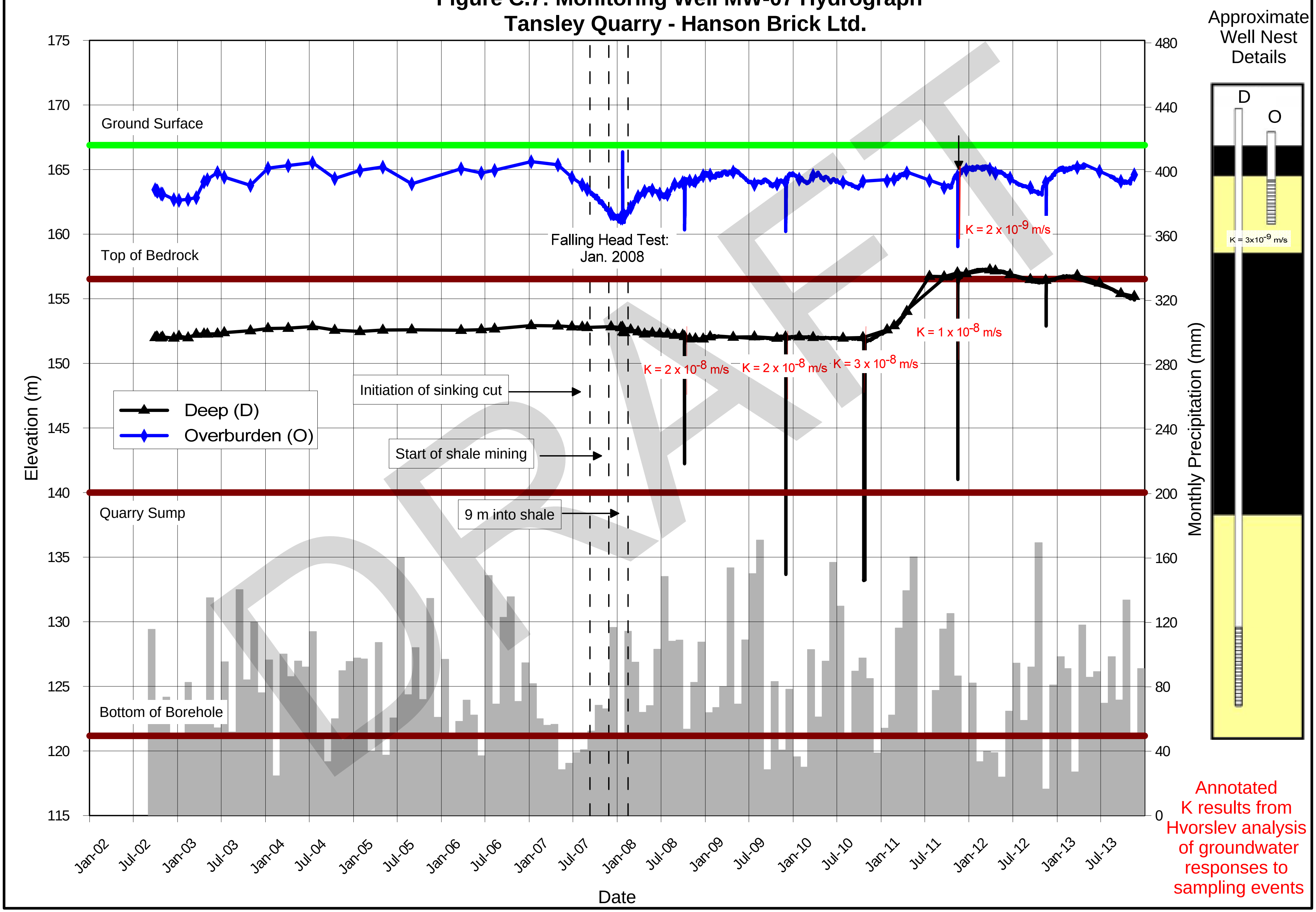


Figure C.7: Monitoring Well MW-07 Hydrograph
Tansley Quarry - Hanson Brick Ltd.



Annotated K results from Hvorslev analysis of groundwater responses to sampling events

Figure C.8: Monitoring Well MW-08 Hydrograph
Tansley Quarry - Hanson Brick Ltd.

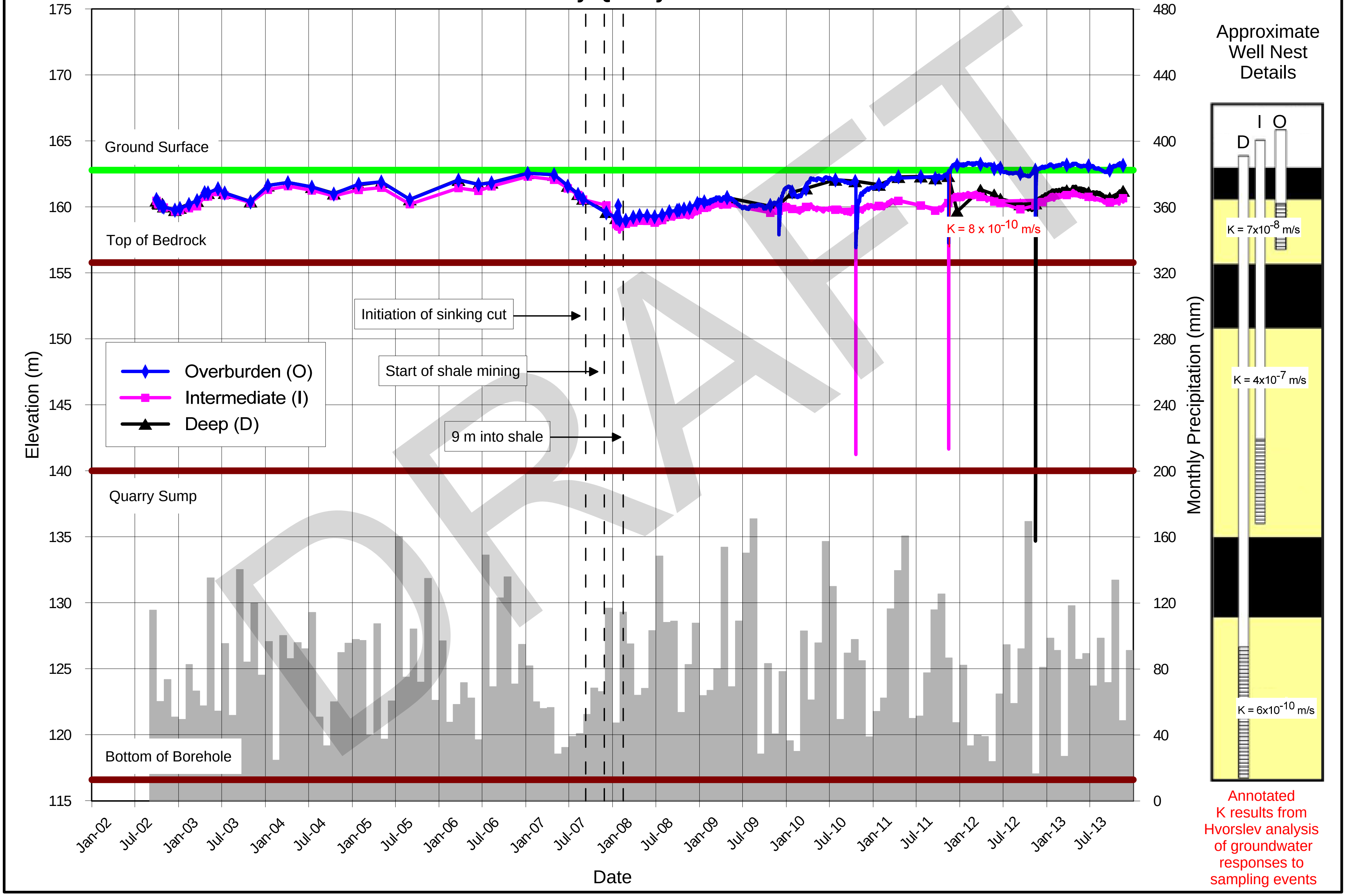
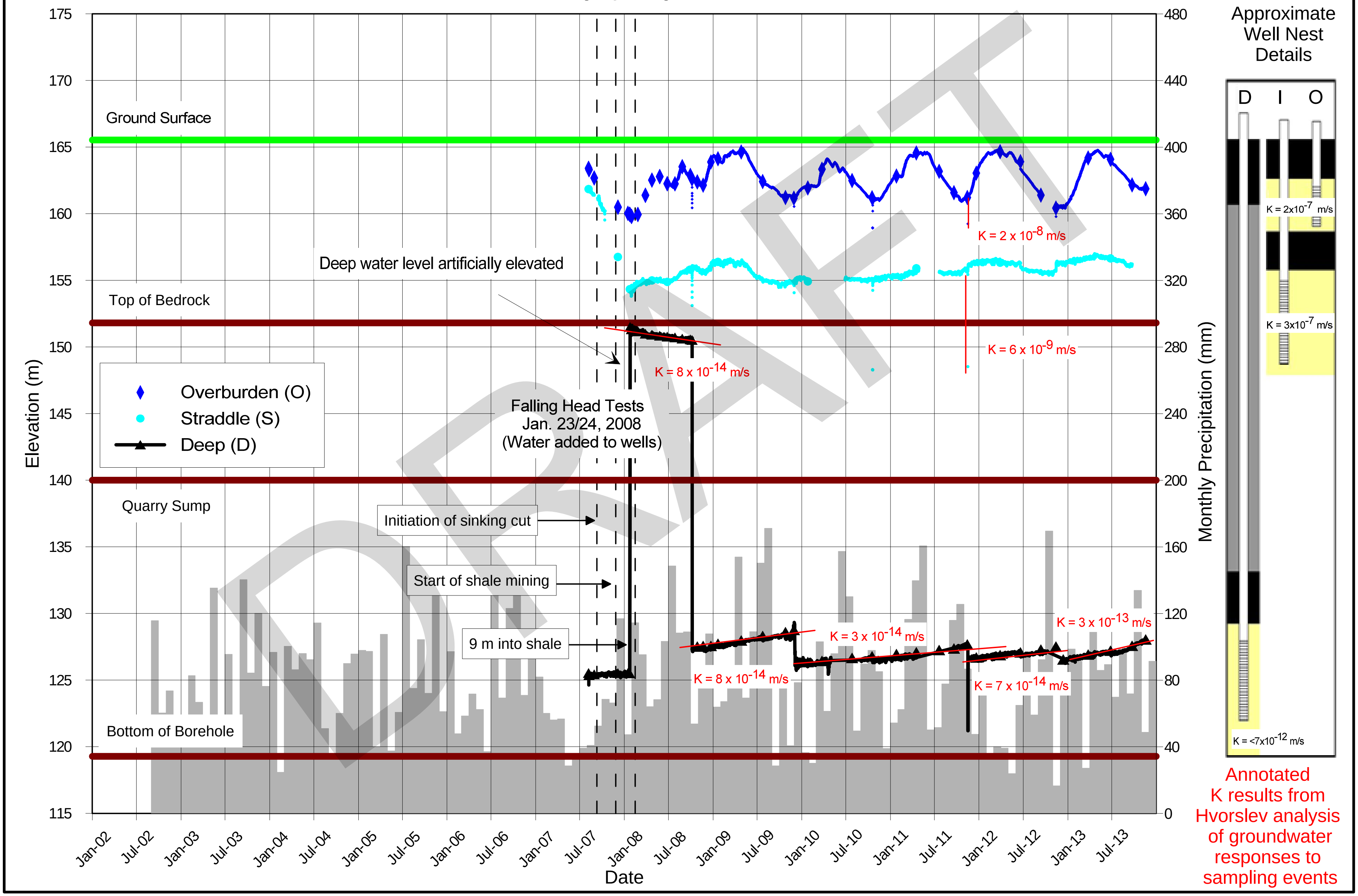


Figure C.9: Monitoring Well MW-09 Hydrograph
Tansley Quarry - Hanson Brick Ltd.



Annotated K results from Hvorslev analysis of groundwater responses to sampling events

Figure C.10: Monitoring Well MW-10 Hydrograph
Tansley Quarry - Hanson Brick Ltd.

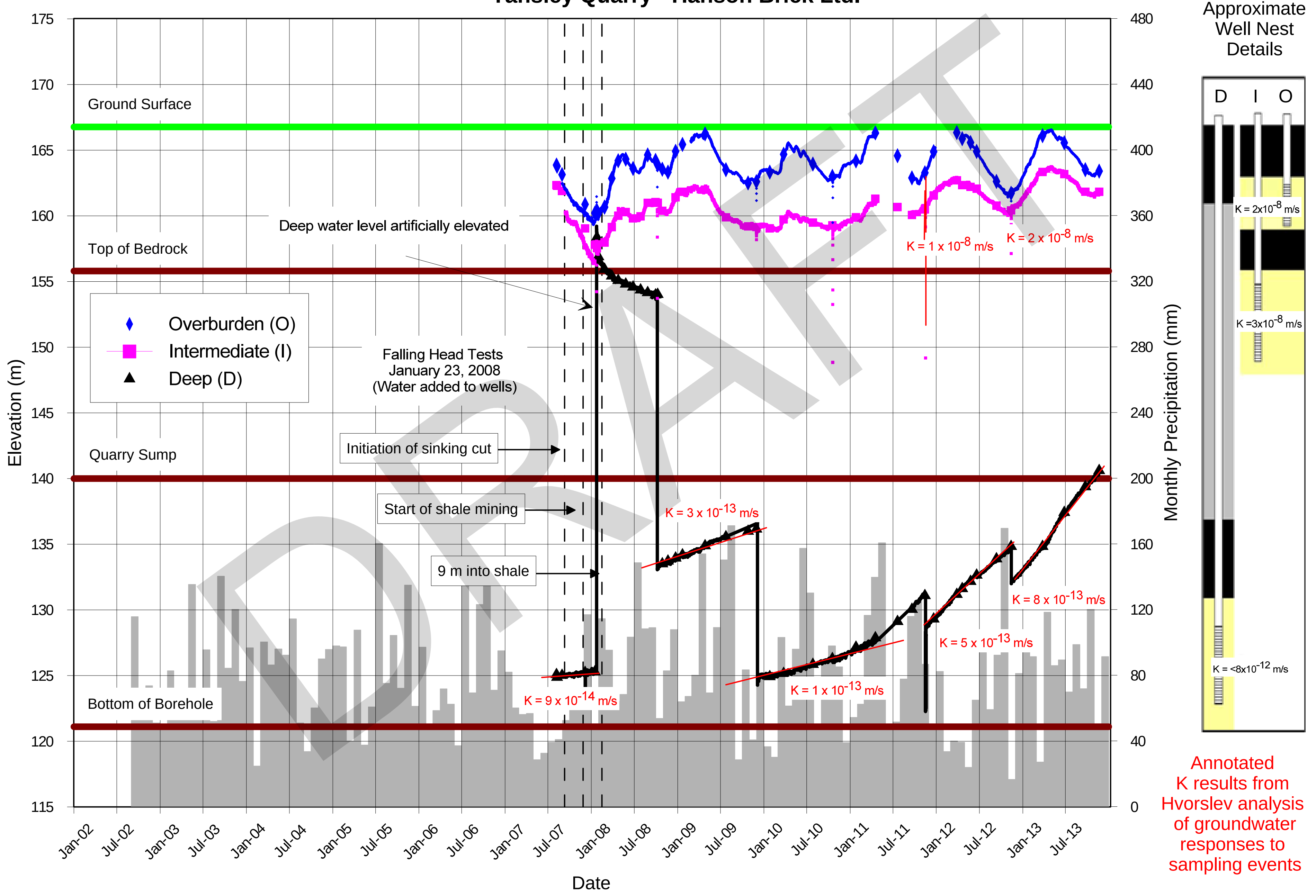


Figure C.11: Monitoring Well MW-11 Hydrograph
Tansley Quarry - Hanson Brick Ltd.

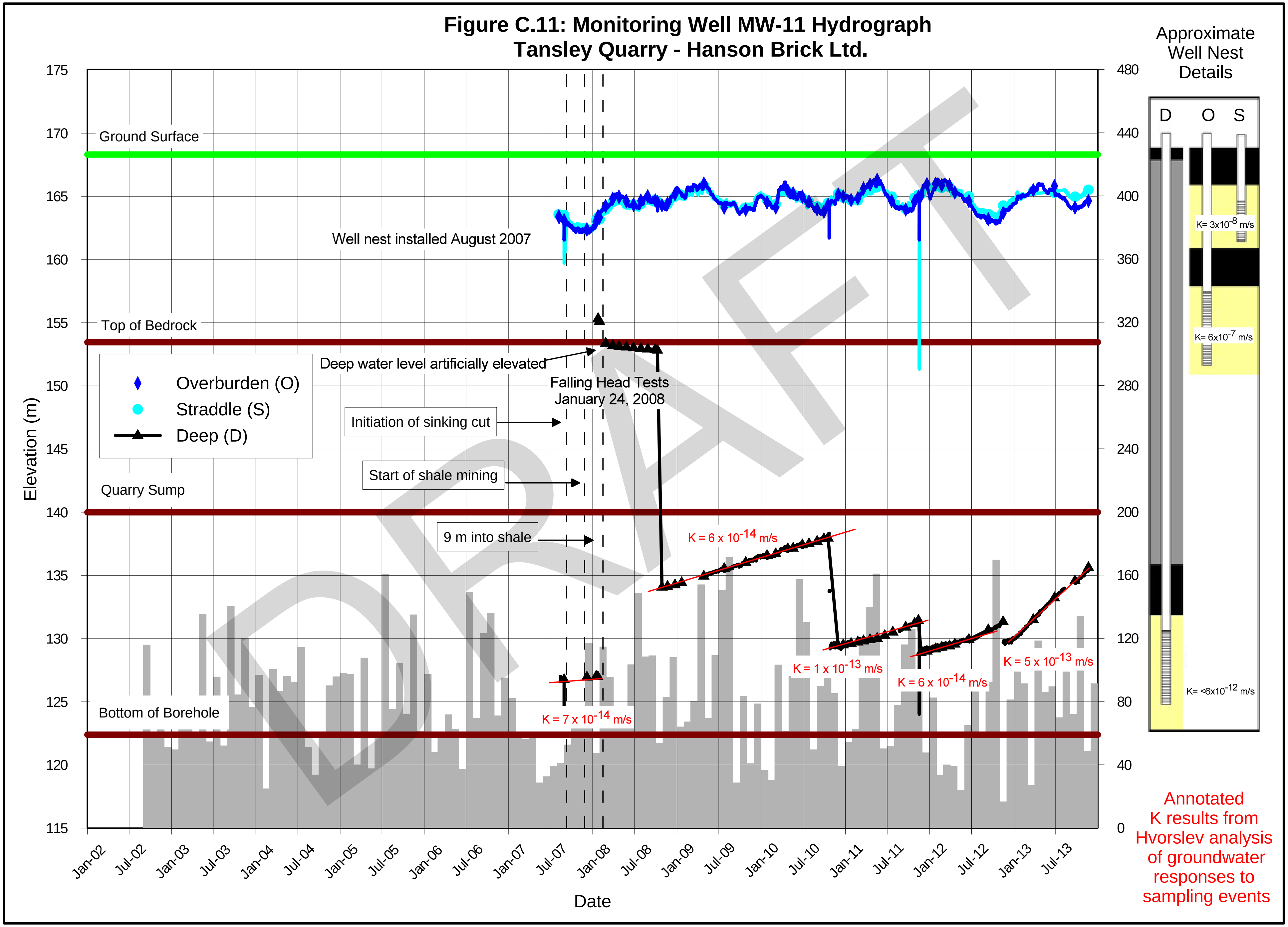


Figure C.12: Monitoring Well TW-1 Hydrograph
Tansley Quarry - Hanson Brick Ltd.

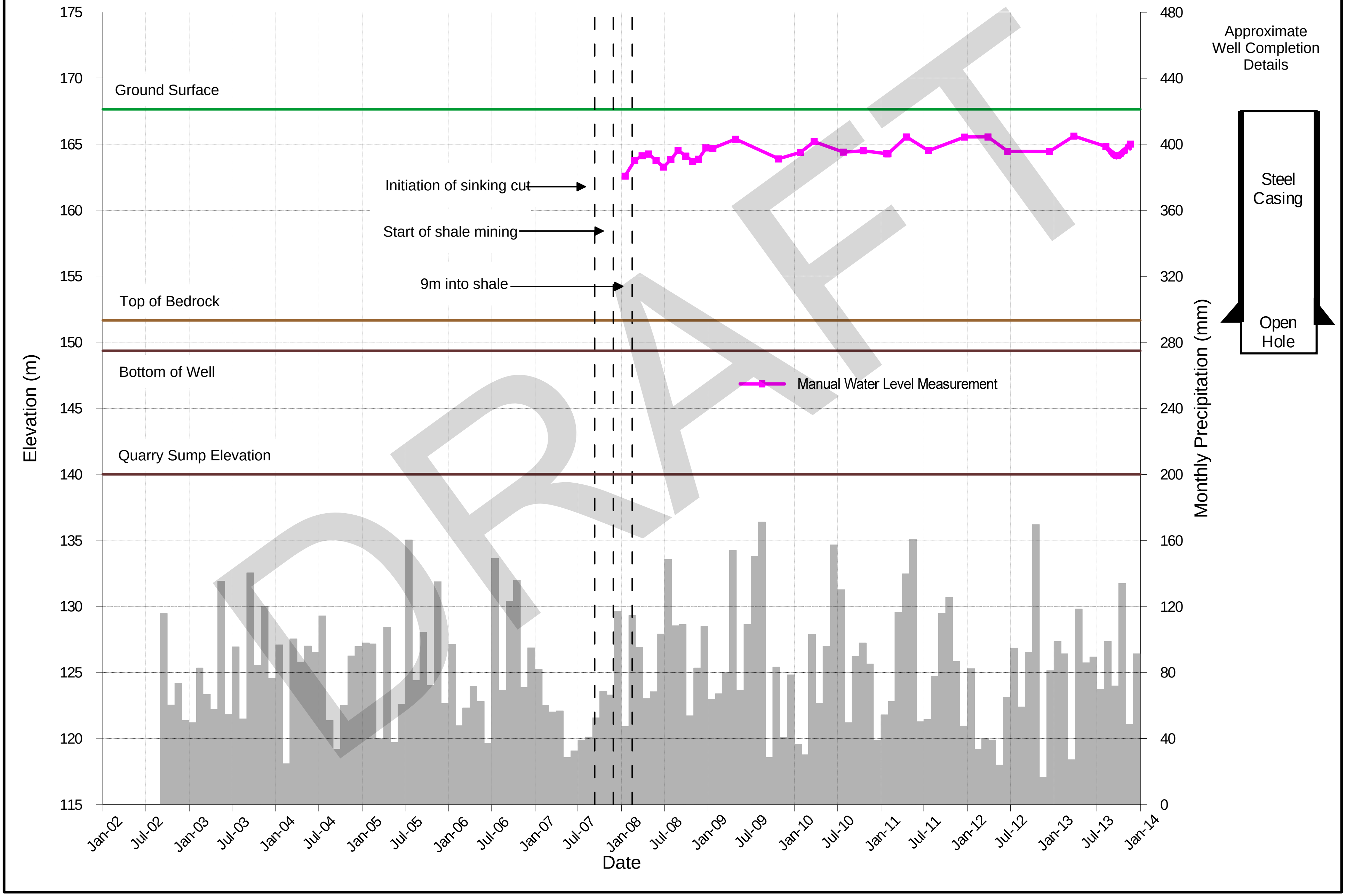


Figure C.13: Monitoring Well TW-2 Hydrograph
Tansley Quarry - Hanson Brick Ltd.

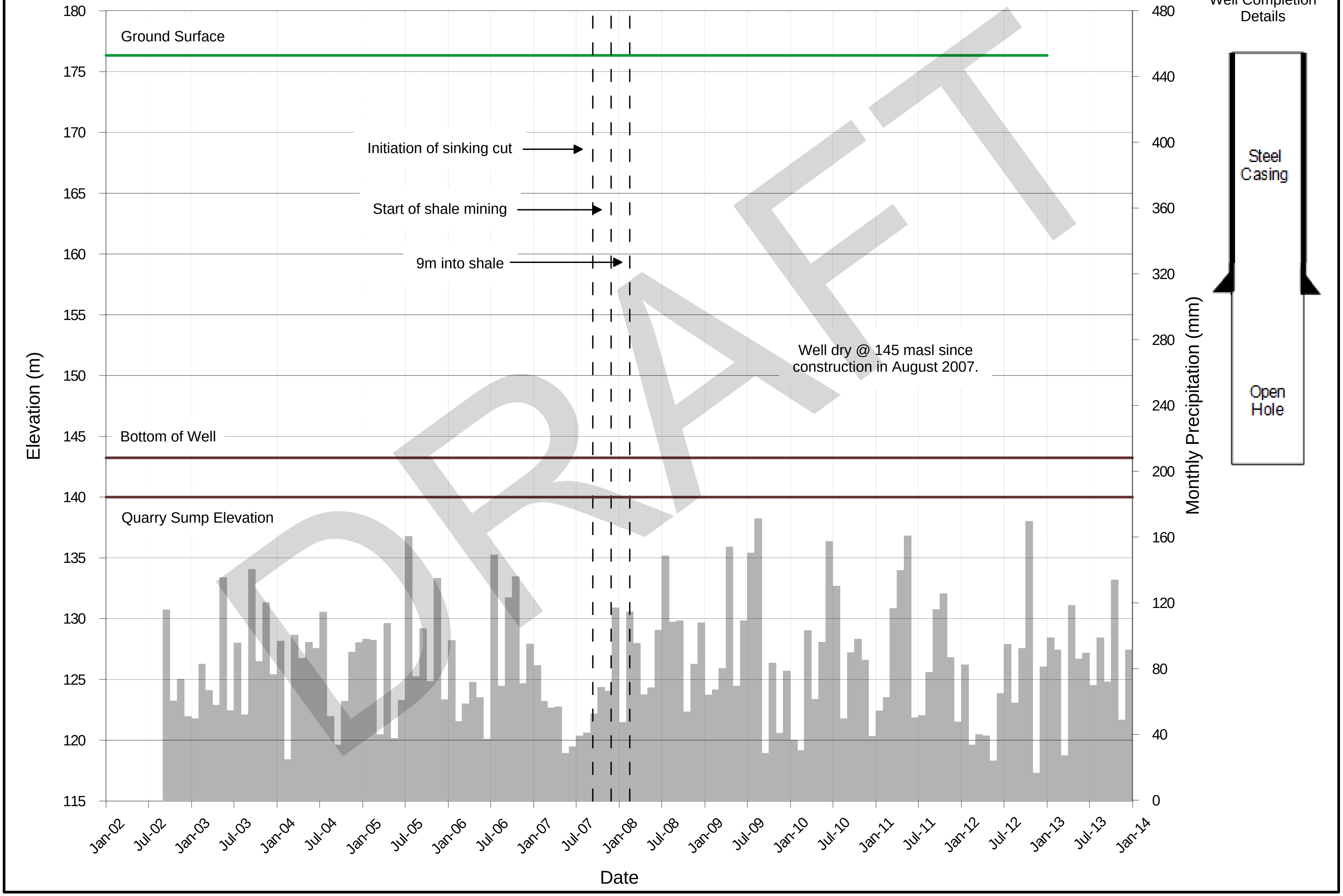


Figure C.14: Monitoring Well TW-3 Hydrograph
Tansley Quarry - Hanson Brick Ltd.

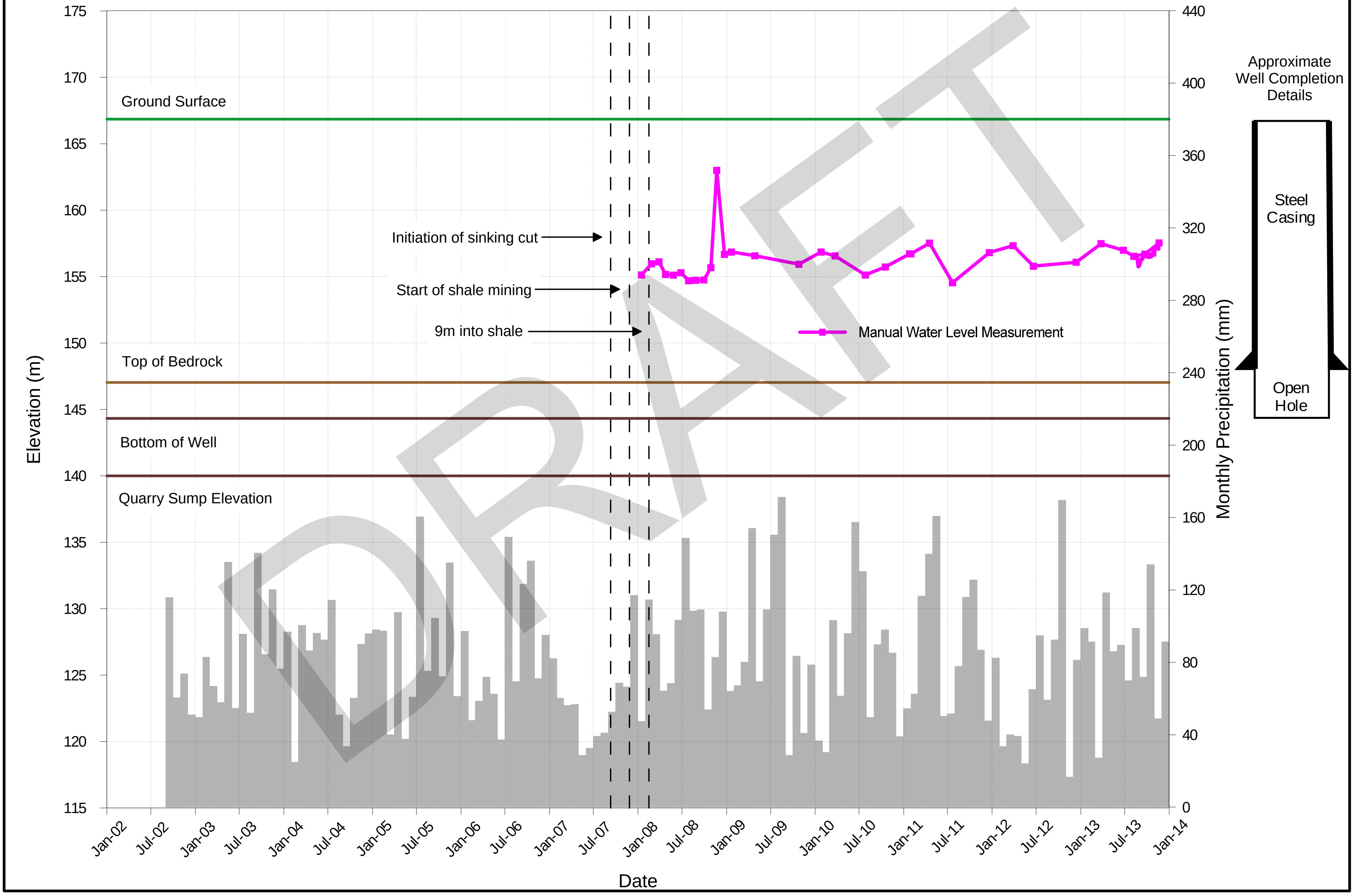


Figure C.15: Featherstone Well
Tansley Quarry - Hanson Brick Ltd.

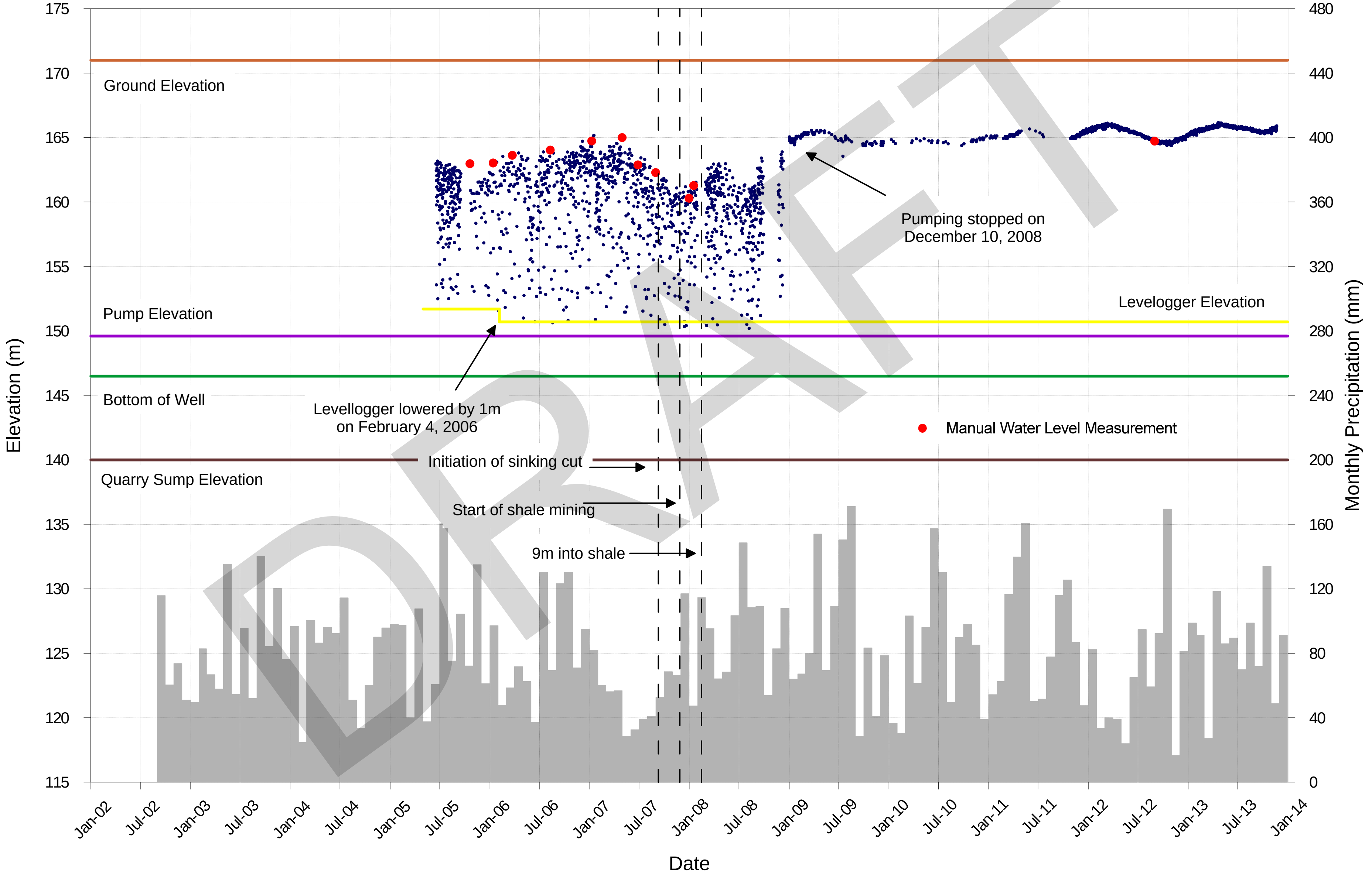


Figure C.16: Finucci Well
Tansley Quarry - Hanson Brick Ltd.

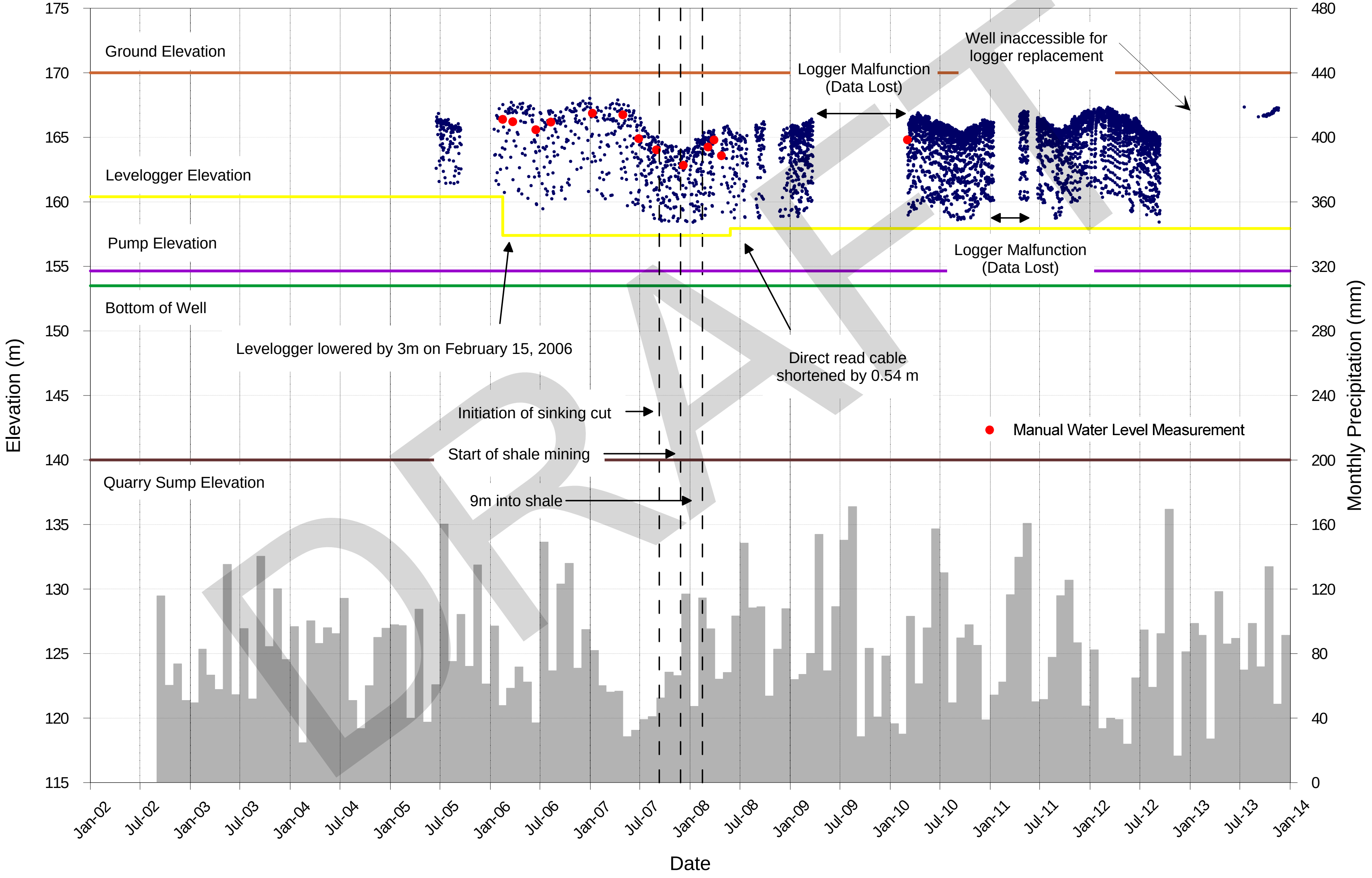


Figure C.17: Hendervale Main Barn Well
Tansley Quarry - Hanson Brick Ltd.

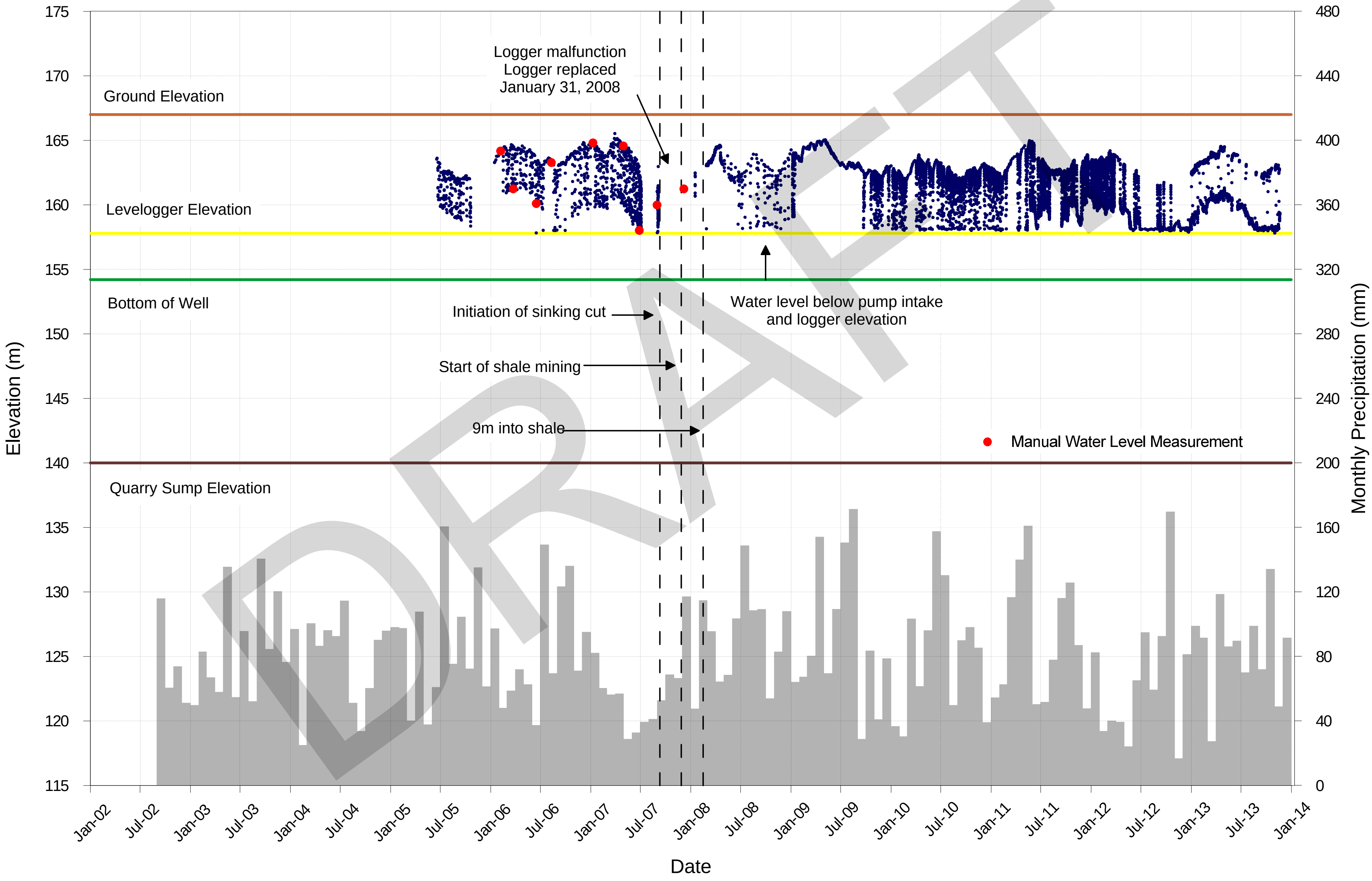


Figure C.18: Hendervale Cottage Well
Tansley Quarry - Hanson Brick Ltd.

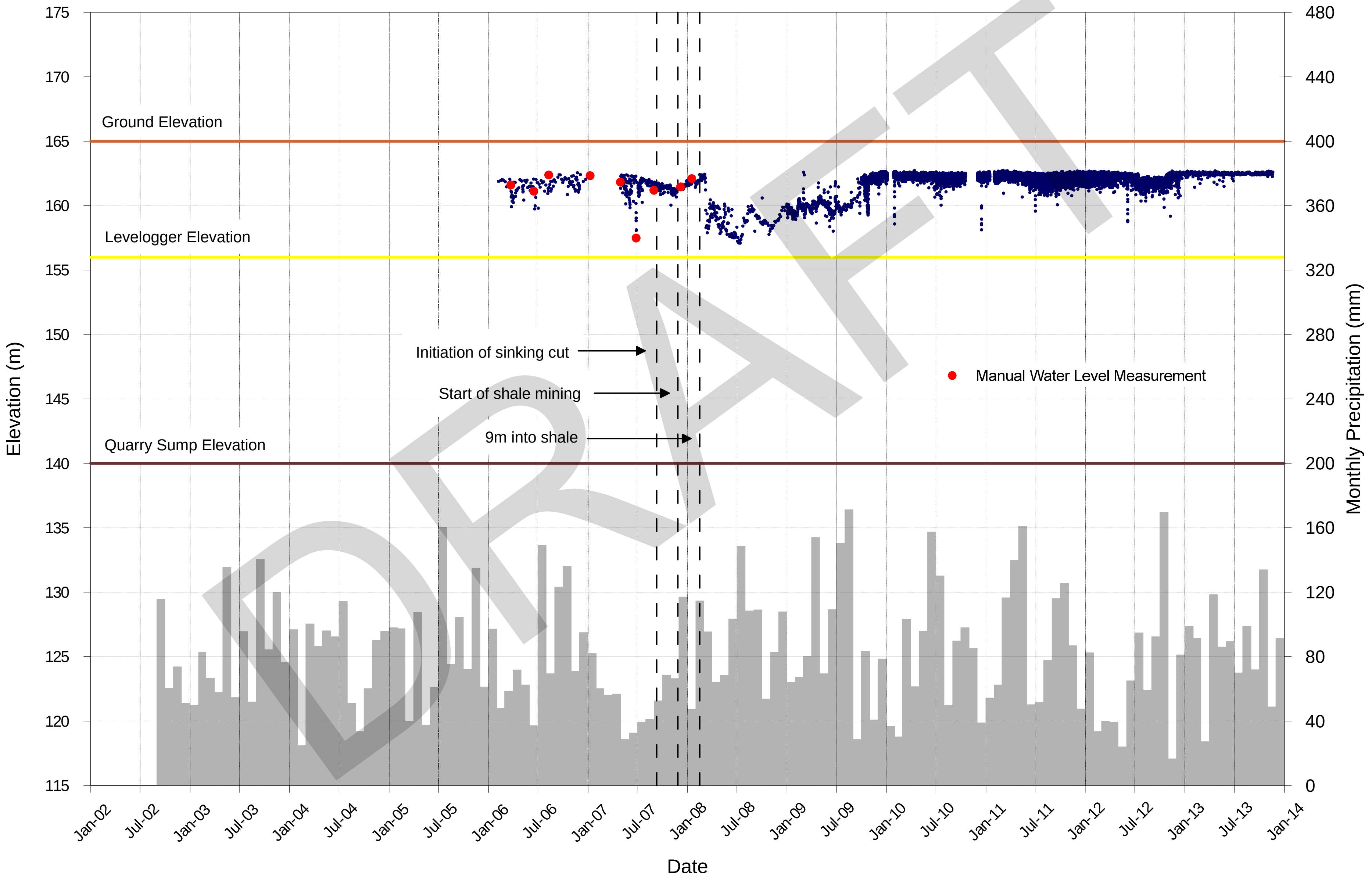
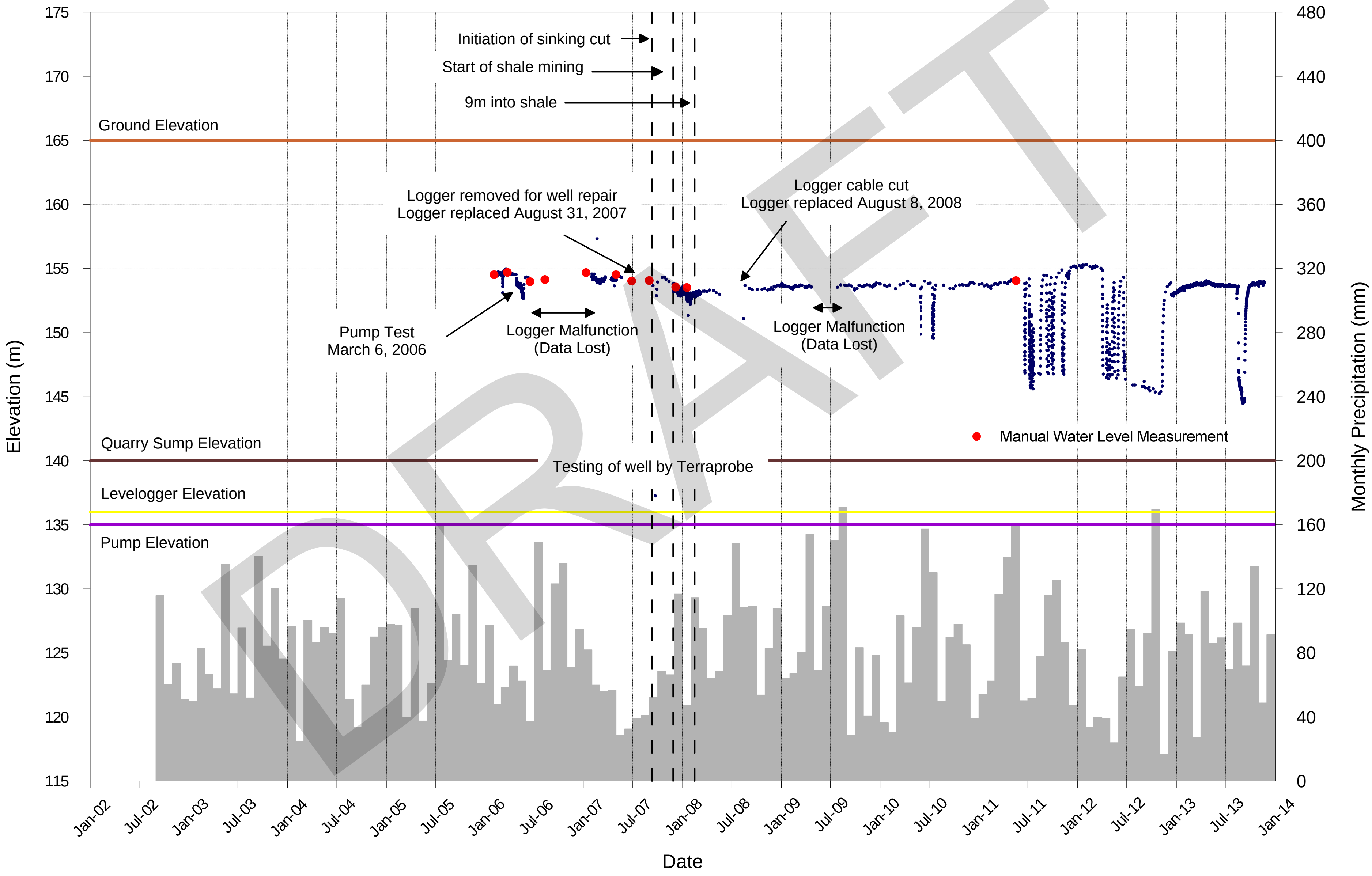


Figure C.19: Hendervale ABC Barn Well
Tansley Quarry - Hanson Brick Ltd.



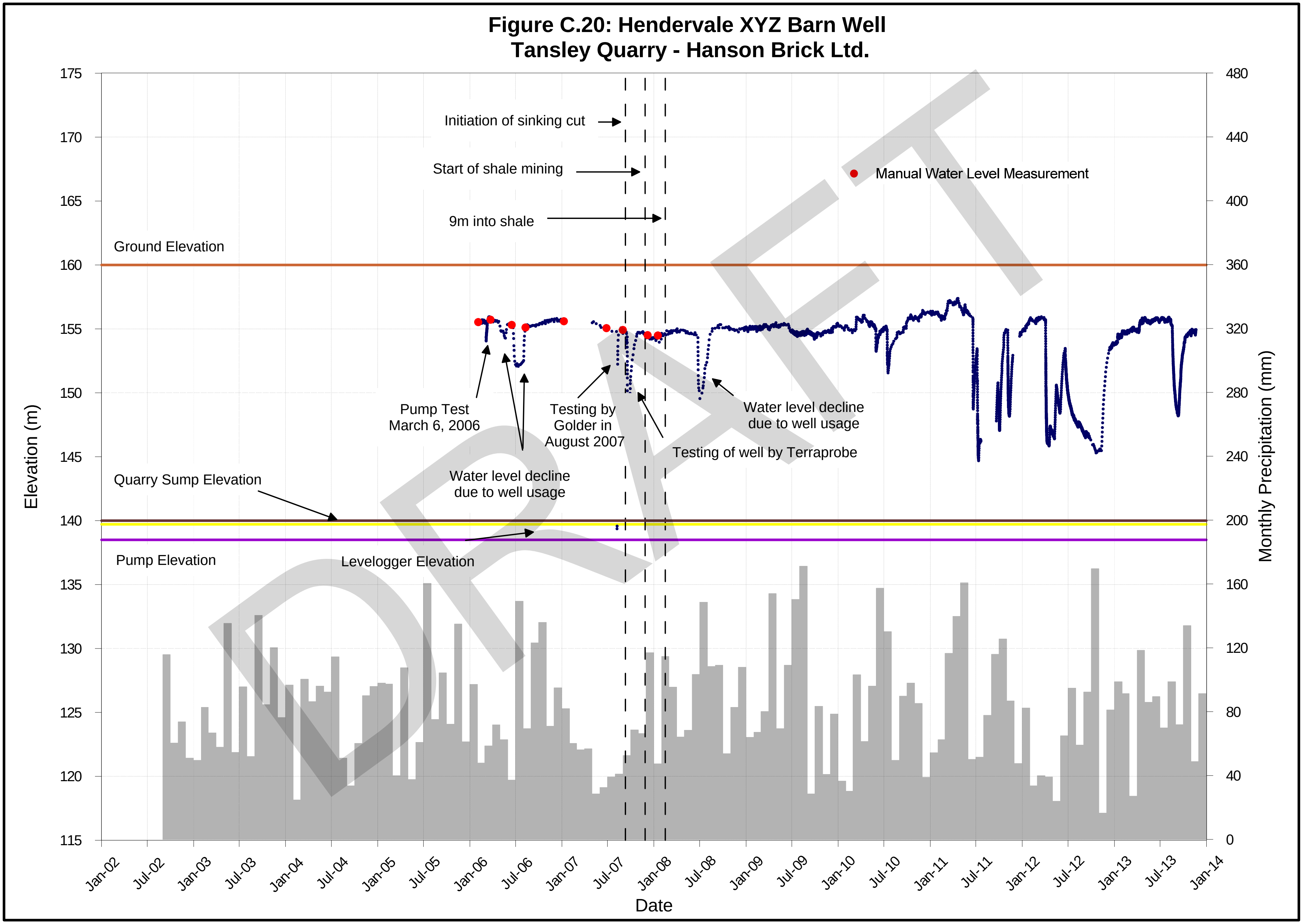


Figure C.20: Hendervale XYZ Barn Well
Tansley Quarry - Hanson Brick Ltd.
Initiation of sinking cut
Start of shale mining
9m into shale
Manual Water Level Measurement
Ground Elevation
Pump Test
March 6, 2006
Testing by
Golder in
August 2007
Water level decline
due to well usage
Testing of well by Terraprobe
Water level decline
due to well usage
Quarry Sump Elevation
Pump Elevation
Levelogger Elevation
Elevation (m)
Monthly Precipitation (mm)
175
170
165
160
155
150
145
140
135
130
125
120
115
480
440
400
360
320
280
240
200
160
120
80
40
0
Jan-02
Jul-02
Jan-03
Jul-03
Jan-04
Jul-04
Jan-05
Jul-05
Jan-06
Jul-06
Jan-07
Jul-07
Jan-08
Jul-08
Jan-09
Jul-09
Jan-10
Jul-10
Jan-11
Jul-11
Jan-12
Jul-12
Jan-13
Jul-13
Jan-14
Date

Figure C.21: Hendervale House Well
Tansley Quarry - Hanson Brick Ltd.

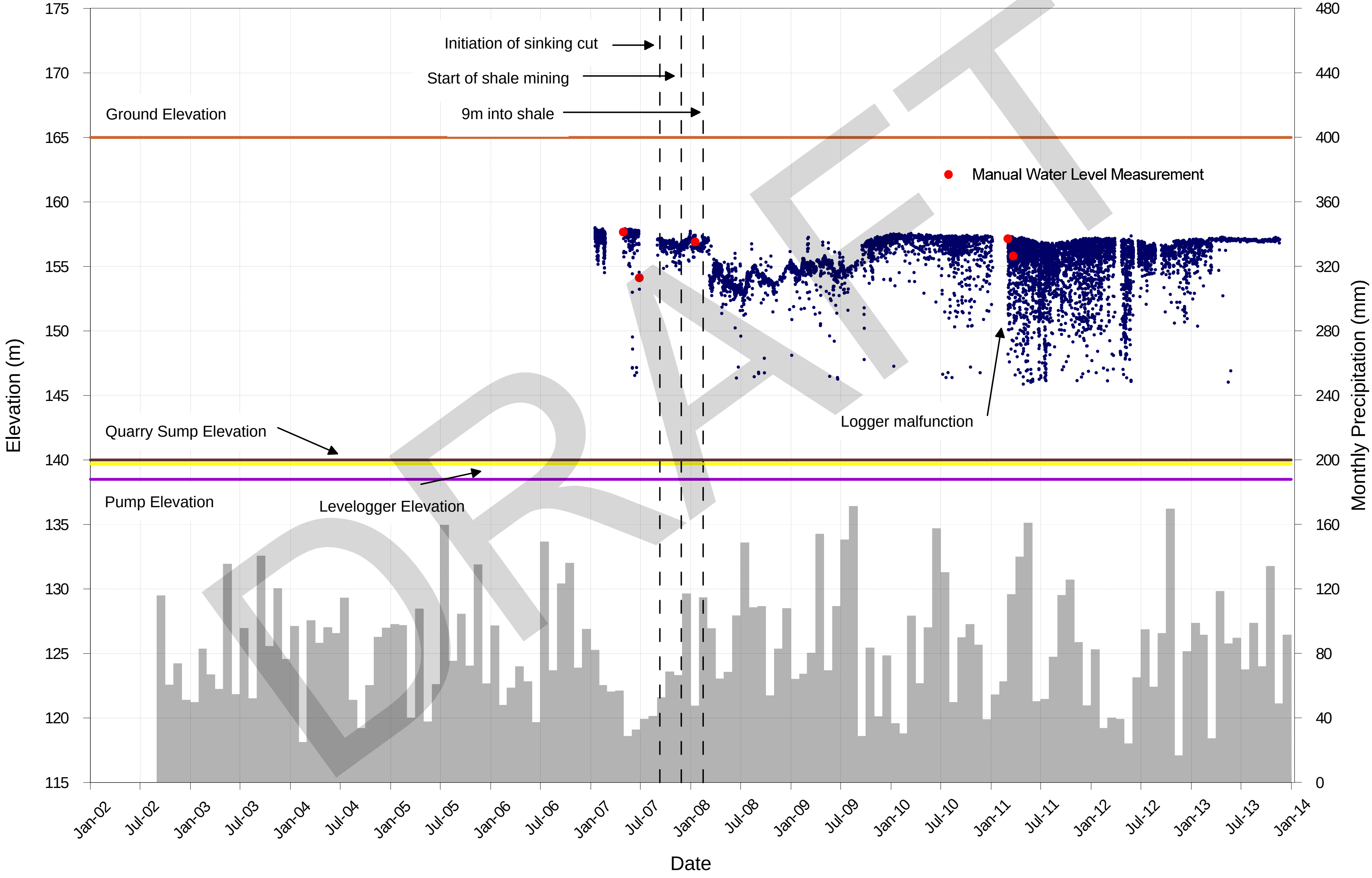


Figure C.22: Simms Well
Tansley Quarry - Hanson Brick Ltd.

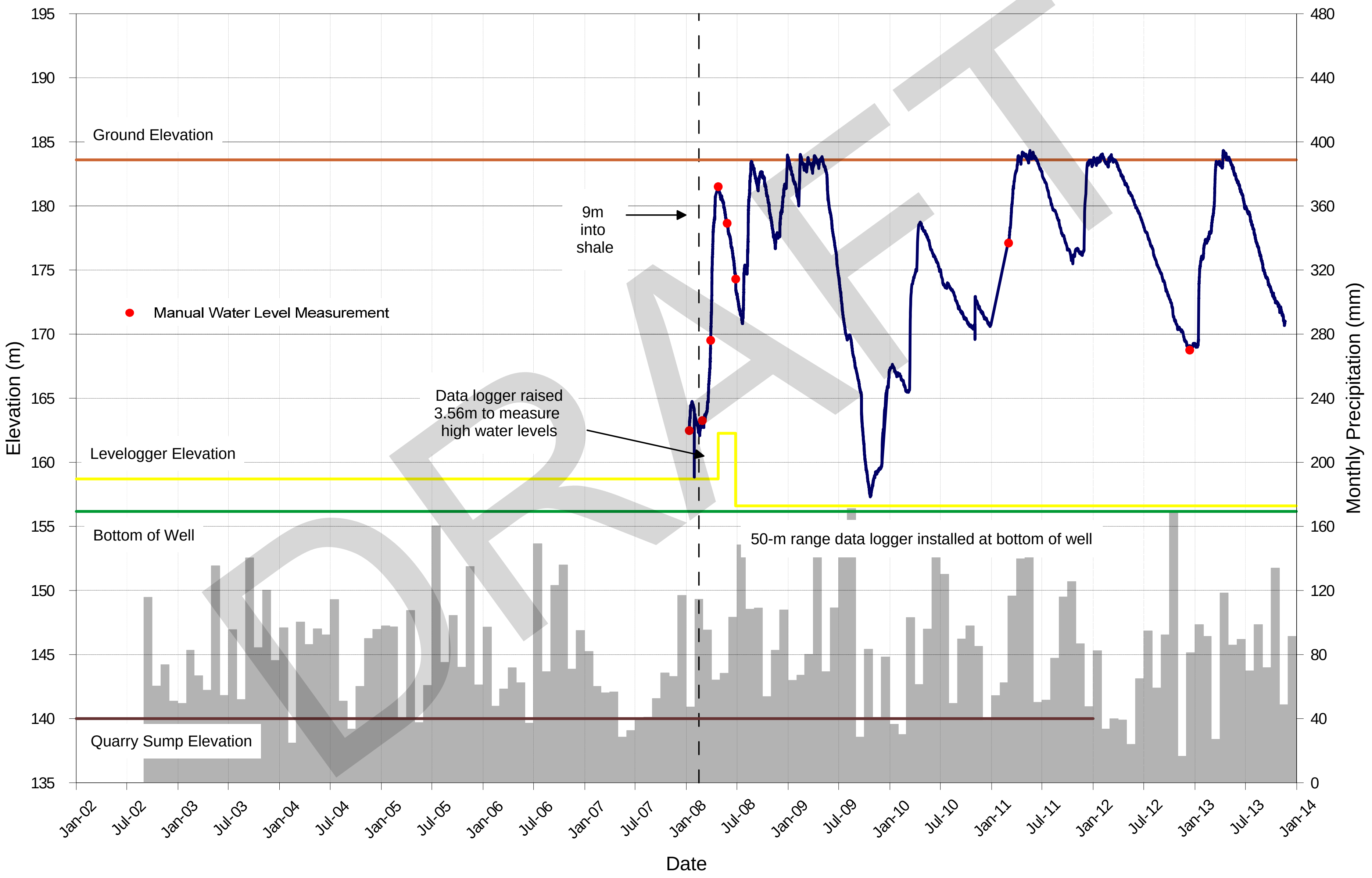


Figure C.23: Wettlaufer Well
Tansley Quarry - Hanson Brick Ltd.

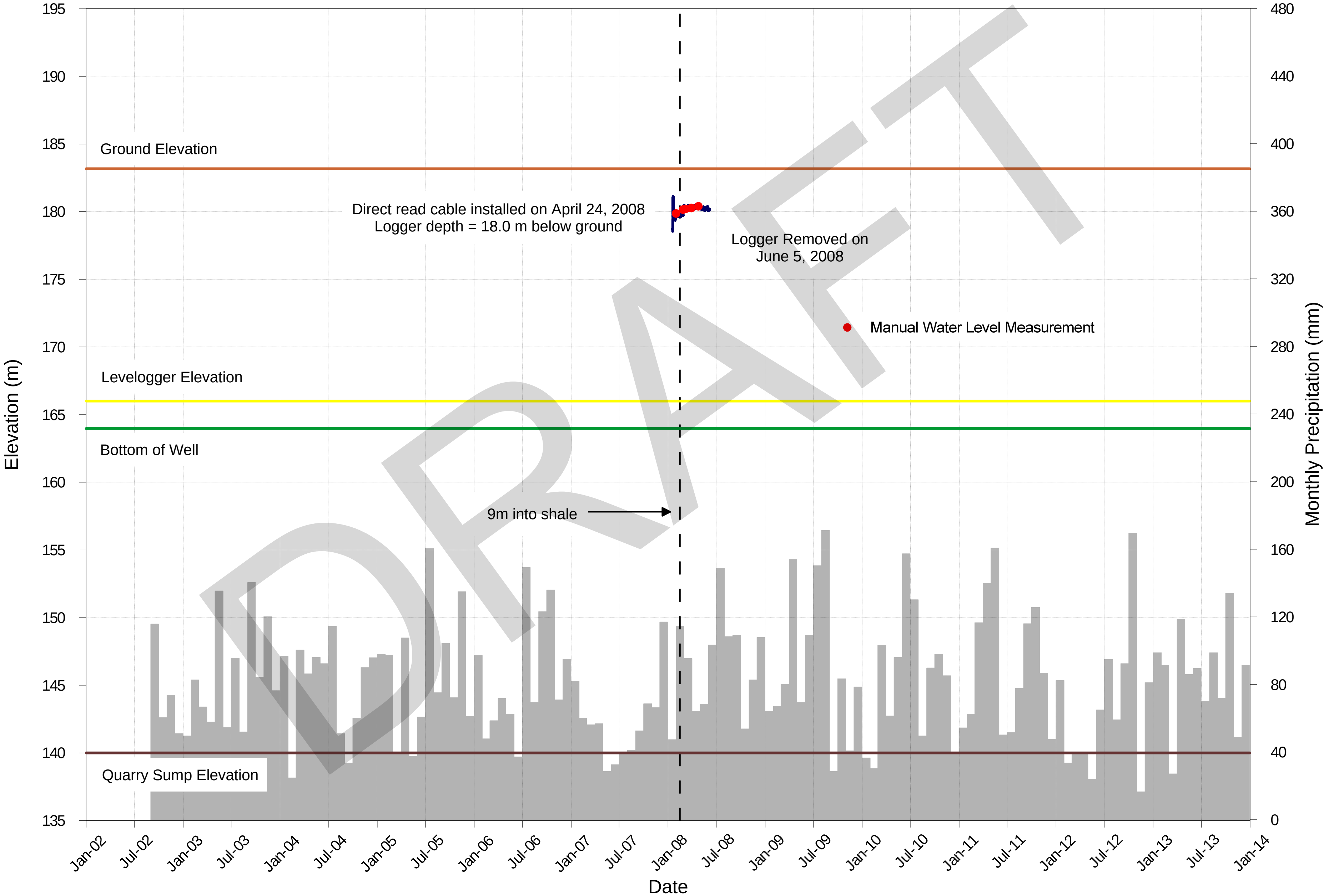


Figure C.24: Wiggins Well
Tansley Quarry - Hanson Brick Ltd.

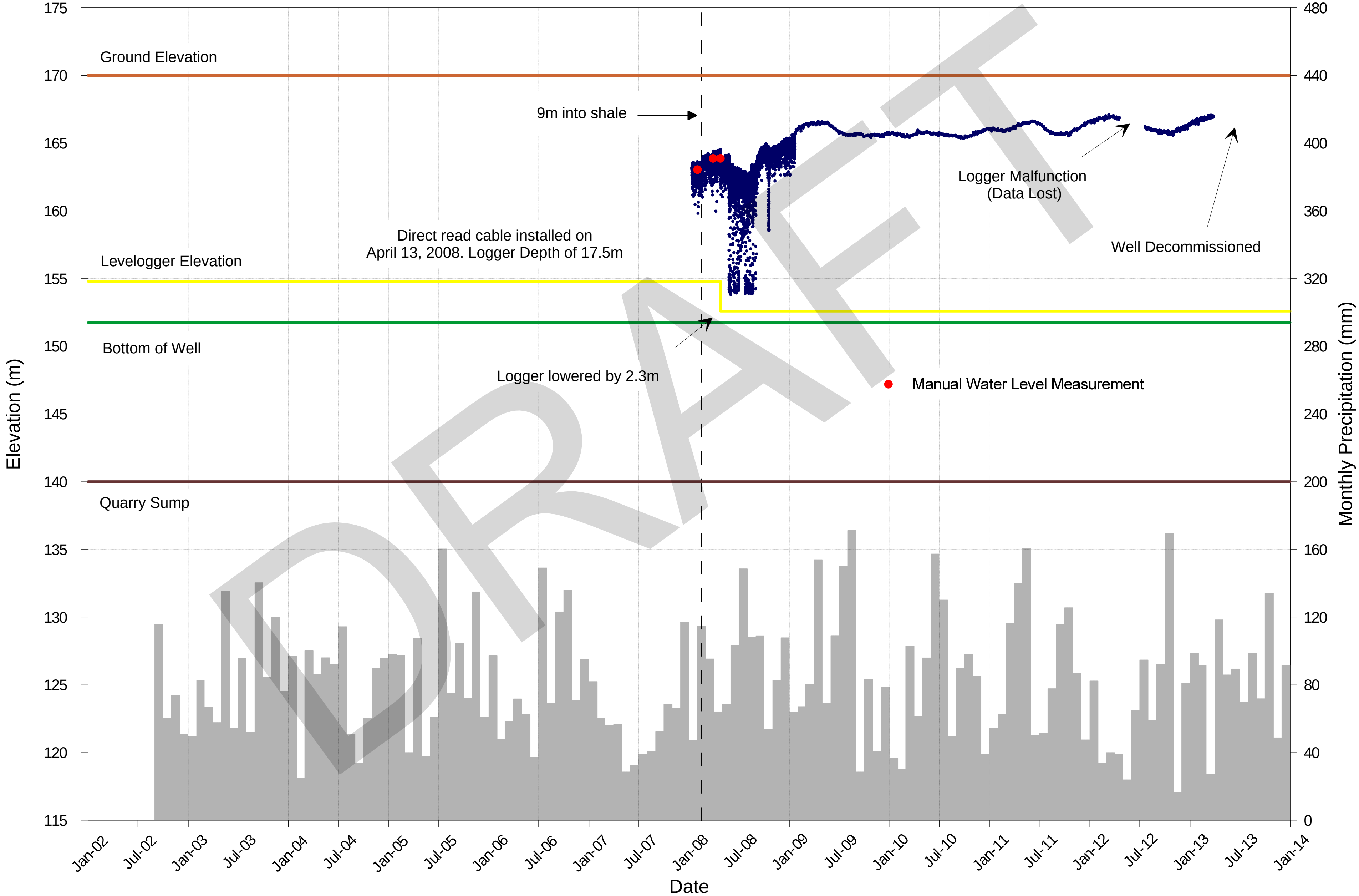


Figure C.25: Bekkers Well
Tansley Quarry - Hanson Brick Ltd.

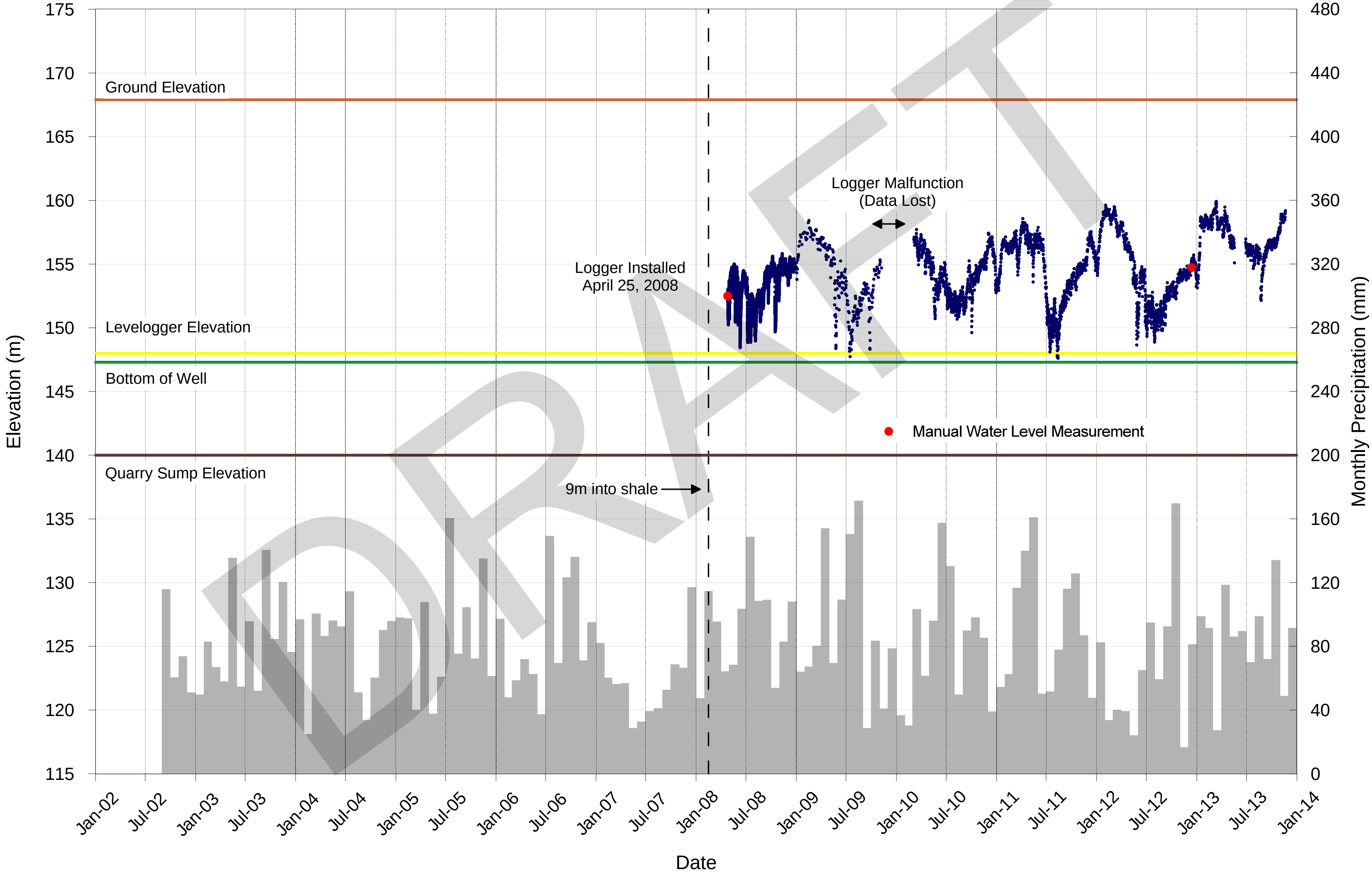
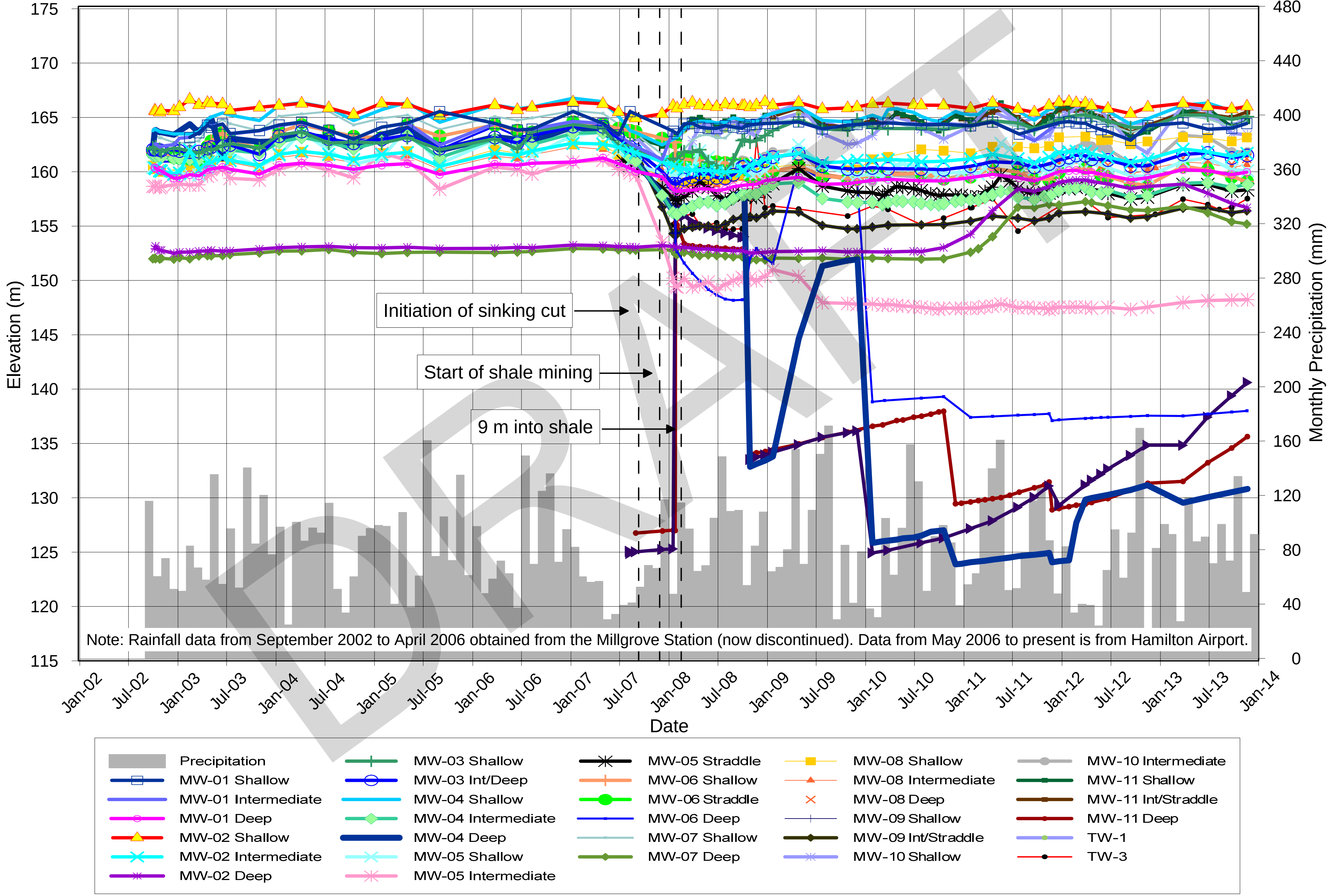


Figure C.26: Combined Static Water Levels and Precipitation with Time
Tansley Quarry - Hanson Brick Ltd.



APPENDIX D

Groundwater Quality Results

TABLE D.1
Summary of Groundwater Quality in On-Site Monitoring Wells
Tansley Quarry, Burlington, Ontario

Parameter	Units	ODWS (June 2006)	PWQO (July 1994)	MW-01 shallow				MW-01 intermediate									MW-01 deep									
				Oct-10	Nov-11	Nov-12	Nov-13	Nov-02	May-03	Jan-07	Oct-08	Dec-09	Oct-10	Nov-11	Nov-12	Nov-13	Nov-02	May-03	Jan-07	Oct-08	Dec-09	Oct-10	Oct- 10 DUP 2	Nov-11	Nov-12	Nov-13
aluminum	mg/L	0.1	[0.075] a	NOT SAMPLED	0.068	NOT SAMPLED	NOT SAMPLED	0.039	0.075	**0.11**	NOT SAMPLED	0.063	0.074	**0.14**	0.053	<0.005	< 0.05	< 0.05	< 0.3	< 0.5	< 0.1	**0.1**	< 0.1	< 0.05	<0.05	<0.05
alkalinity	mg CaCO$_3$/L	30-500	-		366			376	487	508		459	452	443	410	440	125	49	34	33	36	34	33	35	99	40
ammonia as N	mg/L	-	-		< 0.05			0.36	0.14	0.23		0.16	0.05	0.13	0.24	<0.050	7.5	14.2	23	21	22	20	20	18	21	18
antimony	mg/L	-	[0.02]		< 0.0005			< 0.0005	0.0011	< 0.001		0.0005	< 0.0005	< 0.0005	<0.0005	<0.0005	< 0.005	< 0.005	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01	< 0.005	<0.005	<0.005
arsenic	mg/L	0.025	[0.005]		< 0.001			0.003	0.003	< 0.001		0.001	< 0.001	< 0.001	<0.001	<0.001	< 0.02	< 0.02	< 0.05	< 0.1	< 0.02	**0.031**	**0.027**	< 0.02	<0.02	<0.02
barium	mg/L	1	-		0.038			0.026	0.020	0.017		0.014	0.015	0.016	0.026	0.016	0.066	< 0.05	< 0.3	< 0.5	< 0.1	< 0.1	< 0.1	0.022	0.023	0.024
beryllium	mg/L	-	1.1		< 0.0005			< 0.001	< 0.001	< 0.0005		< 0.0005	< 0.0005	< 0.0005	<0.0005	<0.0005	< 0.01	< 0.01	< 0.03	< 0.05	< 0.01	< 0.01	< 0.01	< 0.005	<0.005	<0.005
bismuth	mg/L	-	-		< 0.001			< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	<0.001	<0.001	< 0.01	< 0.01	< 0.05	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	<0.01	<0.01
boron	mg/L	5	0.2		0.057			**0.223**	0.127	0.15		0.16	0.14	0.11	0.06	0.14	**3.26**	**5.16**	**4.2**	**6.8**	**5.7**	**6.1**	**5.8**	**5.5**	**5.6**	**6.3**
bromide	mg/L	-	-		< 1			< 0.5	< 0.5	< 1.0		< 1	< 1	< 1	<1.0	<1.0	47	124	202	214	192	160	169	138	140	150
cadmium	mg/L	0.005	0.0005		< 0.0001			< 0.0001	< 0.0001	< 0.0001		< 0.0001	< 0.0001	< 0.0001	<0.0001	<0.0001	< 0.001	< 0.001	< 0.005	< 0.01	< 0.002	< 0.002	< 0.002	< 0.001	<0.001	<0.001
calcium	mg/L	-	-		64			137	110	110		120	110	98	71	74	789	1720	2400	2600	2400	2500	2700	2000	1700	1900
chloride	mg/L	250	-		183			35	61.1	111		157	214	183	120	95	4690	11600	19400	19800	16700	16300	17200	13000	13000	13000
chromium	mg/L	0.05	-		< 0.005			< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	<0.005	<0.005	< 0.05	< 0.05	< 0.3	< 0.5	< 0.1	< 0.1	< 0.1	< 0.05	<0.05	<0.05
cobalt	mg/L	-	0.0009		**0.005**			0.0009	0.0007	**0.018**		**0.013**	**0.0046**	**0.0043**	<0.0005	<0.0005	**0.0018**	< 0.001	< 0.03	< 0.05	< 0.01	< 0.01	< 0.01	< 0.005	<0.005	<0.005
copper	mg/L	1	[0.005] b		0.001			< 0.0005	0.0005	< 0.001		< 0.001	< 0.001	0.002	<0.001	0.0014	< 0.005	< 0.005	< 0.05	< 0.1	< 0.02	< 0.02	< 0.02	< 0.05	<0.01	<0.01
fluoride	mg/L	1.5 - 2.4	-		0.6			0.3	0.2	0.2		0.3	0.2	0.3	0.46	0.38	0.4	0.3	0.2	0.3	0.3	0.2	< 1 (1)	0.3	0.35	0.32
free cyanide	mg/L	0.2	0.005		< 0.002			< 0.001	< 0.001	< 0.002		< 0.002	< 0.002	< 0.002	<0.0020	<0.0020	< 0.001	< 0.001	< 0.002	< 0.002	< 0.002	< 0.002	0.002	< 0.002	<0.0020	<0.0020
hardness	mg CaCO$_3$/L	80-100	-		740			786	1128	1000		1100	1100	1000	780	770	2650	6124	8400	9300	8400	8800	9600	7200	6100	6700
iron	mg/L	0.3	0.3		< 0.1			**0.56**	**1.29**	0.068		0.2	0.13	0.25	<0.1	<0.1	**0.59**	**6.94**	**9.6**	< 10	**8**	**6.5**	**8.6**	**4.1**	<1	**5**
lead	mg/L	0.01	[0.005] c		< 0.0005			< 0.0005	< 0.0005	< 0.0005		< 0.0005	< 0.0005	< 0.0005	<0.0005	<0.0005	< 0.005	< 0.005	< 0.03	< 0.05	< 0.01	< 0.01	< 0.01	< 0.005	<0.005	<0.005
magnesium	mg/L	-	-		140			107	206	190		200	200	180	150	140	165	442	550	670	580	610	660	530	420	460
manganese	mg/L	0.05	-		0.01			0.63	0.123	0.09		0.058	0.031	0.031	0.0068	0.008	0.516	1.16	1.3	1.6	1	1	2	1.1	1.0	1.1
mercury	mg/L	0.001	0.0002		< 0.0001			< 0.00005	< 0.00005	< 0.0001		0.0002	< 0.0001	< 0.0001	<0.00010	<0.00010	< 0.00005	0.00006	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	<0.00010	<0.00010
molybdenum	mg/L	-	0.04		0.0016			**0.044**	0.004	0.002		0.002	0.002	0.0018	0.0018	0.002	0.036	0.021	< 0.05	< 0.1	**0.05**	< 0.02	< 0.02	0.006	<0.005	0.012
nickel	mg/L	-	0.025		< 0.001			0.003	< 0.001	0.003		0.004	0.002	0.002	0.0018	0.0018	< 0.01	< 0.01	< 0.05	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	<0.01	**0.079**
nitrate as N	mg/L	10	-		1.1			< 0.2	< 0.2	0.1		0.6	0.7	0.6	0.82	0.52	< 0.2	< 0.2	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	<0.10	<0.10
nitrite as N	mg/L	1	-		< 0.01			< 0.2	< 0.2	0.07		< 0.01	0.01	< 0.01	<0.010	0.020	< 20	< 20	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.05	<0.10	<0.010
pH	pH Units	6.5-8.5	6.5-8.5		7.84			7.93	7.86	7.90		7.6	7.88	7.61	7.91	7.87	8	7.27	7.0	7.4	6.9	6.97	7.02	7.12	6.88	6.97
phenol	mg/L	-	0.005		< 0.001			< 0.001	< 0.002	< 0.001		< 0.001	< 0.001	< 0.001	<0.0010	<0.0010	< 0.001	< 0.001	**0.020**	< 0.001	0.001	< 0.001	0.002	**0.008**	**0.062**	**0.019**
phosphate	mg/L	-	-		< 0.01			< 1	< 1	< 0.01		< 0.01	0.01	0.01	<0.010	<0.010	< 1	< 1	< 0.01	< 0.01	< 0.01	< 0.01	0.01	< 0.01	0.096	<0.010
phosphorous	mg/L	-	-		< 0.1			-	-	< 0.05		< 0.1	< 0.1	< 0.1	<0.1	<0.1	-	-	< 3	< 10	< 2	< 2.00	< 2.00	< 1	<1	<1
total phosphorous	mg/L	-	0.01		**0.4**			**8.33**	**11.9**	**5.7**		**14.0**	**3.2**	**5.3**	**0.50**	**1.7**	**0.607**	**0.418**	**0.27**	**0.27**	**0.34**	< 0.1	< 5	< 3	**0.31**	**2.4**
potassium	mg/L	-	-		1.8			8.9	5.5	6.1		6.1	5.5	4.9	2.8	3.3	63.6	108	130	150	140	150	150	130	120	130
selenium	mg/L	0.01	0.1		0.005			< 0.002	< 0.002	< 0.002		0.002	0.003	0.003	0.0067	0.0062	0.023	0.036	< 0.1	< 0.2	< 0.040	0.093	0.058	< 0.04	<0.04	<0.04
silicon	mg/L	-	-		6.8			5.87	6.53	8.4		8.0	7.4	7.4	7.2	6.9	2.18	3.18	< 3	< 5	3	3	3	2.9	2.9	3.2
silver	mg/L	-	0.0001		< 0.0001			< 0.0001	< 0.0001	< 0.0001		< 0.0001	< 0.0001	< 0.0001	<0.0001	<0.0001	< 0.001	< 0.001	< 0.005	< 0.01	< 0.002	< 0.002	< 0.002	< 0.001	<0.001	<0.001
sodium	mg/L	200 d	-		42			76	51.9	54		56	52	52	46	42	2320	5530	6100	8000	6600	7200	7500	5800	5600	5800
strontium	mg/L	-	-		1.1			2.45	2.17	2		2.3	2.1	1.9	1.2	1.4	16.2	35.8	47	55	51	54	59	43	38	40
sulphide	mg/L	0.05	-		< 0.01			0.07	0.02	0.02		0.03	< 0.02	< 0.02	<0.020	<0.020	0.01	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	4	0.048
sulphate	mg/L	500	-		157			501	702	389		496	445	385	-	340	1080	1780	1730	2130	1890	1820	1830	1910	-	1900
thallium	mg/L	-	0.0003		< 0.00005			< 0.00005	< 0.00005	< 0.00005		< 0.00005	< 0.00005	< 0.00005	<0.00005	<0.00005	< 0.0005	< 0.0005	< 0.003	< 0.005	< 0.001	< 0.001	< 0.001	< 0.0005	<0.0005	<0.0005
tin	mg/L	-	-		< 0.001			< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	<0.001	<0.001	< 0.01	< 0.01	< 0.05	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	<0.01	<0.01
titanium	mg/L	-	-		< 0.005			< 0.005	0.008	0.007		< 0.005	< 0.005	0.005	<0.005	<0.005	< 0.05	< 0.05	< 0.3	< 0.5	< 0.1	< 0.1	< 0.1	< 0.05	<0.05	<0.05
TSS	mg/L	-	-	**Note:**	620	**Note:**	**Note:**	6970	20400	15000	**Note:**	20000	4500	2900	1600	1900	1010	375	810	770	610	600	660	560	120	1800
turbidity	NTU	1	-	Insufficient	250	Insufficient	Insufficient	17.3	7.2	11900	Insufficient	16000	2900	77	720	210	16.8	12.5	350	360	280	300	400	170	130	140
uranium	mg/L	0.02	[0.005]	water	**0.0083**	water	water	**0.0202**	**0.0138**	**0.011**	water	**0.012**	**0.011**	**0.0098**	**0.011**	**0.011**	**0.0152**	**0.0053**	< 0.005	< 0.01	< 0.002	< 0.002	< 0.002	< 0.001	<0.001	<0.001
vanadium	mg/L	-	[0.006]		0.0025			0.0038	0.002	< 0.001		< 0.001	0.002	0.0038	0.00091	0.00085	< 0.005	< 0.05	**0.057**	< 0.1	< 0.02	**0.076**	**0.066**	< 0.01	<0.01	<0.01
zinc	mg/L	5	[0.02]		0.005			< 0.005	< 0.005	0.007		< 0.005	< 0.005	< 0.005	<0.005	<0.005	< 0.05	< 0.05	< 0.3	< 0.5	< 0.1	< 0.1	< 0.1	< 0.05	<0.05	<0.05

NOTES:
Shaded area indicates an exceedance of the MOE Ontario Drinking Water Standard (June 2006) for that specific parameter.
Bolded areas indicate an exceedance of the MOE Provincial Water Quality Objectives (July 1994) for that specific parameter.
[ ] indicate interim PWQO concentration
a = interim PWQO at pH > 6.5 to 9.0 measured in clay-free samples.
b = interim PWQO if hardness greater than 20 mg/L.
c = interim PWQO if hardness greater than 80 mg/L.
d = Local Medical Officer of Health should be notified when sodium concentrations exceed 20 mg/L so that this information may be communicated to local physicians for their use with patients on sodium reduced diets.
(1) Sample bottle contained visible sediment. Results may be biased high due to analyte present in sediment.

TABLE D.1
Summary of Groundwater Quality in On-Site Monitoring Wells
Tansley Quarry, Burlington, Ontario

Parameter	Units	ODWS (June 2006)	PWQO (July 1994)	MW-02 shallow									MW-02 intermediate									MW-02 deep							
				Nov-02	May-03	Jan-07	Oct-08	Dec-09	Oct-10	Nov-11	Nov-12	Nov-13	Nov-02	May-03	Jan-07	Oct-08	Dec-09	Oct-10	Nov-11	Nov-12	Nov-13	Nov-02	May-03	Jan-07	Oct-08	Dec-09	Nov-11	Nov-12	Nov-13
aluminum	mg/L	0.1	[0.075] a	0.019	**0.123**	**0.23**	0.053	**0.079**	**0.17**	0.033	0.028	<0.005	**0.1**	0.026	**0.28**	**0.19**	**0.27**	**0.15**	0.006	0.053	0.021	0.056	< 0.05	< 0.3	< 0.3	< 0.5	< 0.3	**0.3**	<0.1
alkalinity	mg CaCO$_3$/L	30-500	-	387	630	738	666	695	700	707	730	730	225	118	133	139	141	129	140	160	150	111	36	36	32	51	35	47	52
ammonia as N	mg/L	-	-	0.38	0.15	0.38	0.38	0.27	< 0.05	0.13	0.5	0.53	1.86	2.82	2.09	1.5	1.6	1.5	1.5	1.7	1.7	7.28	13	16	17	18	16	16	16
antimony	mg/L	-	[0.02]	0.0008	0.0007	< 0.001	0.0008	< 0.0005	< 0.0005	< 0.0005	<0.0005	<0.0005	0.0008	< 0.0005	< 0.001	< 0.0005	< 0.0005	0.0009	< 0.0005	<0.0005	<0.0005	< 0.01	< 0.01	< 0.05	< 0.03	< 0.05	< 0.03	<0.005	<0.01
arsenic	mg/L	0.025	[0.005]	0.005	**0.007**	**0.006**	0.005	0.005	0.002	0.002	0.0017	0.0023	< 0.002	< 0.002	0.003	0.003	0.003	0.003	0.001	0.0031	0.003	< 0.02	< 0.02	< 0.05	< 0.05	< 0.1	< 0.05	<0.02	<0.02
barium	mg/L	1	-	0.043	0.034	0.027	0.02	0.018	0.016	0.015	0.016	0.019	0.042	0.021	0.009	0.008	0.009	0.007	0.007	0.0072	0.0071	< 0.05	< 0.05	< 0.3	< 0.3	< 0.5	< 0.1	0.025	<0.04
beryllium	mg/L	-	1.1	< 0.001	< 0.001	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	<0.0005	<0.0005	< 0.001	< 0.001	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	<0.0005	<0.0005	< 0.01	< 0.01	< 0.03	< 0.03	< 0.05	< 0.03	<0.005	<0.01
bismuth	mg/L	-	-	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	<0.001	<0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	<0.001	<0.001	< 0.01	< 0.01	< 0.05	< 0.05	< 0.1	< 0.05	<0.01	<0.02
boron	mg/L	5	0.2	**0.302**	**0.269**	**0.3**	**0.3**	**0.32**	**0.3**	**0.34**	**0.33**	**0.34**	**2.04**	**2.9**	**1.9**	**1.8**	**1.8**	**2**	**1.8**	**2**	**2.1**	**3.34**	**5.23**	**5.6**	**7.1**	**6**	**5.5**	**5.6**	**6.7**
bromide	mg/L	-	-	< 0.5	< 0.5	< 1	< 1	< 1	< 1	< 1	<10	<5.0	2.2	4.9	3	< 1	1	2	< 10	<10	<5.0	56	124	134	153	148	154	200	170
cadmium	mg/L	0.005	0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	<0.0001	<0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	<0.0001	<0.0001	< 0.001	< 0.001	< 0.005	< 0.005	< 0.01	< 0.005	<0.001	<0.002
calcium	mg/L	-	-	136	154	210	200	220	210	210	170	200	110	272	230	190	200	180	190	200	200	824	1620	2000	2000	2000	1900	1800	1900
chloride	mg/L	250	-	39.4	23.9	25	11	10	11	11	18	14	244	438	182	113	87	147	106	130	140	4920	11200	13000	12900	12400	12500	14000	13000
chromium	mg/L	0.05	-	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	<0.005	<0.005	0.001	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	<0.005	<0.005	< 0.05	< 0.05	< 0.3	< 0.3	< 0.5	< 0.3	<0.05	<0.1
cobalt	mg/L	-	0.0009	0.0008	**0.0010**	**0.015**	**0.023**	**0.0072**	**0.0016**	**0.0068**	0.0007	<0.0005	**0.0029**	< 0.0001	**0.0093**	**0.022**	**0.01**	< 0.0005	< 0.0005	<0.0005	<0.0005	< 0.001	< 0.001	< 0.03	< 0.03	< 0.05	< 0.03	<0.005	<0.01
copper	mg/L	1	[0.005] b	0.0005	< 0.0005	< 0.001	< 0.001	< 0.005	< 0.001	< 0.001	<0.001	<0.002	**0.0065**	< 0.005	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	<0.001	<0.02	< 0.005	< 0.005	< 0.05	< 0.05	< 0.1	< 0.05	<0.01	<0.02
fluoride	mg/L	1.5 - 2.4	-	0.3	0.4	0.3	0.3	0.3	0.2	0.3	0.33	0.26	0.4	0.5	0.3	0.2	0.2	0.2	0.3	0.27	0.24	0.4	0.4	0.3	0.3	0.3	< 1	0.34	0.31
free cyanide	mg/L	0.2	0.005	< 0.001	< 0.001	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	<0.0020	<0.0020	< 0.001	< 0.001	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	<0.0020	<0.0020	< 0.001	< 0.001	< 0.002	< 0.002	< 0.002	< 0.002	<0.0020	<0.0020
hardness	mg CaCO$_3$/L	80-100	-	654	1287	1900	1900	2200	1900	2100	1900	1900	424	1122	1100	990	1000	940	980	1000	990	2780	5831	6700	7200	7100	6500	6400	6500
iron	mg/L	0.3	0.3	**4.03**	**8.09**	**6.9**	**2.9**	**1.6**	**0.96**	**1.6**	**1.7**	**2.3**	0.15	**1.68**	**0.85**	**0.8**	**1.1**	**0.8**	< 0.1	**1.2**	**0.78**	**2.16**	**6.59**	**6.9**	**6.8**	< 10	< 5	**4.1**	**3.7**
lead	mg/L	0.01	[0.005] c	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	<0.0005	<0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	<0.0005	<0.0005	< 0.005	< 0.005	< 0.03	< 0.03	< 0.05	< 0.03	<0.005	<0.01
magnesium	mg/L	-	-	75.9	219	330	340	400	340	370	350	340	36	106	130	130	130	120	120	130	120	176	427	430	510	520	450	440	460
manganese	mg/L	0.05	-	0.838	0.658	0.4	0.34	0.26	0.22	0.46	0.76	0.57	0.228	0.199	0.18	0.17	0.16	0.13	0.13	0.14	0.13	0.575	1.03	1	1.2	1.2	0.98	0.98	1
mercury	mg/L	0.001	0.0002	< 0.00005	< 0.00005	< 0.0001	< 0.0015 (1)	< 0.0001	< 0.0001	< 0.0001	<0.00010	<0.00010	< 0.00005	< 0.00005	< 0.0001	< 0.0015 (1)	< 0.0001	< 0.0001	< 0.0001	<0.00010	<0.00010	< 0.00005	0.00008	< 0.0001	< 0.0001	< 0.0001	< 0.0001	<0.00010	<0.00010
molybdenum	mg/L	-	0.04	**0.059**	0.022	0.008	0.005	0.003	0.003	0.0037	0.0044	0.0034	**0.048**	0.021	0.012	0.009	0.009	0.009	0.0085	0.0095	0.0089	0.024	0.015	< 0.05	< 0.05	< 0.1	< 0.03	0.0057	<0.01
nickel	mg/L	-	0.025	0.004	0.001	0.003	0.004	0.008	0.005	0.002	0.0021	0.001	0.003	< 0.001	0.003	0.002	0.004	< 0.001	< 0.001	<0.001	<0.001	< 0.01	< 0.01	< 0.05	< 0.05	< 0.1	< 0.05	0.016	<0.02
nitrate as N	mg/L	10	-	< 0.2	< 0.2	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	<0.10	<0.10	< 0.2	< 0.2	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	<0.10	<0.10	< 0.2	< 0.2	< 0.1	< 0.1	< 0.1	< 0.1	<0.10	<0.10
nitrite as N	mg/L	1	-	< 0.2	< 0.2	0.02	< 0.01	< 0.01	< 0.01	< 0.01	<0.010	0.013	< 2	< 0.2	< 0.01	< 0.01	0.03	< 0.01	0.03	<0.010	0.010	< 20	< 20	0.02	< 0.01	< 0.01	< 0.1	<0.10	0.012
pH	pH Units	6.5-8.5	6.5-8.5	7.4	7.58	7.9	8.1	7.8	7.57	7.52	7.61	7.40	8.14	7.93	8	8.1	7.9	7.74	7.73	7.43	7.61	7.77	7.23	7.2	7.4	7.2	7.16	6.66	6.93
phenol	mg/L	-	0.005	< 0.001	< 0.002	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0.0013	0.0025	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	<0.0010	<0.0010	< 0.001	< 0.001	**0.011**	< 0.001	0.005	0.001	<0.0010	**0.017**
phosphate	mg/L	-	-	< 1	< 1	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	<0.010	<0.010	< 1	< 1	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	<0.010	<0.010	< 1	< 1	< 0.01	< 0.01	< 0.01	< 0.01	<0.010	<0.010
phosphorous	mg/L	-	-	< 0.05	-	< 0.05	< 0.1	< 0.1	< 0.1	< 0.1	<0.1	<0.1	-	-	< 0.05	< 0.1	< 0.1	< 0.1	< 0.1	<0.1	<0.1	-	-	< 3	< 5	< 10	< 5	<1	<2
total phosphorous	mg/L	-	0.01	**0.217**	**0.124**	**11**	**2.3**	**10.0**	**1.1**	**4.4**	**2.4**	**1.2**	**2.95**	**2.04**	**2.7**	**1.5**	**5.7**	**0.1**	**0.36**	**0.47**	**0.47**	**0.142**	**0.089**	**0.077**	**0.15**	**0.82**	< 2	**1.30**	**0.44 (1)**
potassium	mg/L	-	-	9.1	7.6	10	10	10	9.3	9.5	7.3	9	17.3	26.2	21	19	18	17	17	19	19	60.4	101	120	130	120	110	110	120
selenium	mg/L	0.01	0.1	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	<0.002	<0.002	< 0.002	0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	<0.002	<0.002	0.024	0.032	< 0.1	< 0.1	< 0.2	< 0.1	<0.04	<0.04
silicon	mg/L	-	-	7.12	8.53	11	10	11	9.1	10	10	10	3.51	4.3	5.6	5.5	6.0	5.1	4.7	5.4	5.1	2.18	3.19	< 3	3	< 5	< 3	3.4	2.7
silver	mg/L	-	0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	<0.0001	<0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	<0.0001	<0.0001	< 0.001	< 0.001	< 0.005	< 0.005	< 0.01	< 0.005	<0.001	<0.002
sodium	mg/L	200 d	-	115	117	75	76	85	68	75	74	71	318	546	270	200	180	200	210	240	200	2380	5590	5800	6700	6200	5800	5700	6100
strontium	mg/L	-	-	2.89	3.37	4.2	4.4	4.1	4.4	4.8	3.4	4.1	2.52	7.22	10	12	11	11	11	11	12	16.8	33.800	36	42	41	39	39	39
sulphide	mg/L	0.05	-	0.43	0.07	0.14	< 0.02	< 0.02	< 0.02	< 0.02	0.33	0.18	0.18	0.01	0.05	< 0.02	< 0.02	< 0.02	< 0.02	<0.020	<0.020	0.01	< 0.01	< 0.02	< 0.02	0.25	< 0.02	<0.020	1.6
sulphate	mg/L	500	-	530	797	1070	1160	1410	1410	1320	1300	1300	542	1330	1200	1090	1080	1120	1140	1100	1100	1230	1920	1950	1890	2010	2030	2100	2000
thallium	mg/L	-	0.0003	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	<0.00005	<0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	<0.00005	<0.00005	< 0.0005	< 0.0005	< 0.003	< 0.003	< 0.005	< 0.003	<0.0005	<0.001
tin	mg/L	-	-	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	<0.001	<0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	<0.001	<0.001	< 0.01	< 0.01	< 0.05	< 0.05	< 0.1	< 0.05	<0.01	<0.02
titanium	mg/L	-	-	< 0.005	0.008	0.012	< 0.005	< 0.005	0.018	< 0.005	<0.005	<0.005	< 0.005	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	<0.005	<0.005	< 0.05	< 0.05	< 0.3	< 0.3	0.5	< 0.3	<0.05	<0.1
TSS	mg/L	-	-	100000	49900	24000	47000	14000	1700	7600	2600	1200	5300	3570	32000	2200	6500	360	920	650	730	214	203	240	81	800	540	2900	270
turbidity	NTU	1	-	44	5.2	20100	18000	31000	3600	460	640	550	19.1	2.5	17800	2200	7800	320	480	290	450	4.0	6.8	179	71	720	290	630	110
uranium	mg/L	0.02	[0.005]	**0.0145**	**0.0196**	**0.019**	**0.018**	**0.016**	**0.018**	**0.018**	**0.019**	**0.017**	**0.0153**	0.0028	0.0005	0.0002	0.0004	0.0002	0.0003	0.00052	0.0003	**0.0099**	0.0024	< 0.005	< 0.005	< 0.01	< 0.005	<0.001	<0.002
vanadium	mg/L	-	[0.006]	0.0024	0.0018	< 0.001	0.001	0.004	0.002	< 0.0005	<0.0005	0.00088	0.0024	< 0.0005	< 0.001	< 0.001	0.003	< 0.001	< 0.0005	<0.0005	0.00052	< 0.005	< 0.05	**0.064**	< 0.05	< 0.1	< 0.03	<0.01	**0.028**
zinc	mg/L	5	[0.02]	0.006	0.008	0.008	0.009	< 0.03	< 0.005	< 0.01	<0.01	<0.01	< 0.05	**0.023**	0.005	< 0.005	< 0.005	< 0.01	< 0.025	<0.01	<0.01	< 0.05	< 0.05	< 0.3	< 0.3	< 0.5	< 0.3	<0.05	<0.1

NOTES:
Shaded area indicates an exceedance of the MOE Ontario Drinking Water Standard (June 2006) for that specific parameter.
Bolded areas indicate an exceedance of the MOE Provincial Water Quality Objectives (July 1994) for that specific parameter.
[ ] indicate interim PWQO concentration
a = interim PWQO at pH > 6.5 to 9.0 measured in clay-free samples.
b = interim PWQO if hardness greater than 20 mg/L.
c = interim PWQO if hardness greater than 80 mg/L
d = Local Medical Office of Health should be notified when sodium concentrations exceed 20 mg/L so that this information may be communicated to local physicians for their use with patients on sodium reduced diets.
(1) Sample bottle contained visible sediment. Results may be biased high due to analyte present in sediment.

TABLE D.1
Summary of Groundwater Quality in On-Site Monitoring Wells
Tansley Quarry, Burlington, Ontario

Parameter	Units	ODWS (June 2006)	PWQO (July 1994)	MW-03 shallow									MW-03 Deep									
				Nov-02	May-03	Jan-07	Oct-08	Dec-09	Oct-10	Nov-11	Nov-12	Nov-13	Nov-02	May-03	Jan-07	Oct-08	Dec-09	Oct-10	Nov-11	Nov-11 DUP 3	Nov-12	Nov-13
aluminum	mg/L	0.1	[0.075] a	0.019	**0.456**	**0.15**	**0.11**	**0.14**	0.032	0.006	0.058	<0.005	**0.128**	< 0.050	< 0.05	< 0.3	0.074	**0.11**	< 0.05	< 0.05	0.057	<0.05
alkalinity	mg $CaCO_3$/L	30-500	-	133	104	140	114	110	109	175	170	160	40	29	56	74	88	72	56	53	62	51
ammonia as N	mg/L	-	-	0.61	0.55	1.36	1.20	1.8	1.2	0.89	1.1	1.2	9.2	11.3	13.5	4.7	5.7	7.9	9.6	9.9	10	9.9
antimony	mg/L	-	[0.02]	< 0.0005	< 0.0005	< 0.001	0.0026	< 0.0005	0.0006	< 0.0005	0.00068	<0.0005	< 0.005	< 0.005	< 0.01	< 0.03	< 0.0005	< 0.005	< 0.005	< 0.005	<0.005	<0.005
arsenic	mg/L	0.025	[0.005]	0.004	0.004	0.003	**0.015**	0.004	0.003	0.002	0.0039	0.0042	< 0.02	< 0.02	< 0.01	< 0.05	< 0.005	< 0.01	< 0.01	0.011	<0.01	<0.01
barium	mg/L	1	-	0.038	0.031	0.012	0.011	0.010	0.014	0.008	0.009	0.0095	< 0.05	< 0.05	< 0.05	< 0.3	0.017	< 0.05	0.025	0.025	0.023	0.021
beryllium	mg/L	-	1.1	< 0.001	< 0.001	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	<0.0005	<0.0005	< 0.01	< 0.01	< 0.005	< 0.03	< 0.0005	< 0.005	< 0.005	< 0.005	<0.005	<0.005
bismuth	mg/L	-	-	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	<0.001	<0.001	< 0.01	< 0.01	< 0.01	< 0.05	< 0.001	< 0.01	< 0.01	< 0.01	<0.01	<0.01
boron	mg/L	5	0.2	**0.778**	**0.911**	**1.2**	**1.2**	**1.2**	**1.3**	**0.98**	**1.1**	**1.2**	**5.17**	**5.68**	**3.8**	**3.6**	**4.7**	**4.6**	**4.6**	**5.1**	**4.3**	**5.5**
bromide	mg/L	-	-	< 0.5	< 0.5	6	3	6	7	< 1	1.2	<5.0	70	94	142	37	31	62	< 500	< 500	120	98
cadmium	mg/L	0.005	0.0005	< 0.0001	< 0.0001	0.0003	< 0.0001	< 0.0001	< 0.0001	< 0.0001	<0.0001	<0.0001	< 0.001	< 0.001	< 0.001	< 0.005	< 0.0001	< 0.001	< 0.001	< 0.001	<0.001	<0.001
calcium	mg/L	-	-	125	142	210	180	190	220	140	150	160	1220	1590	1400	540	470	870	1300	1300	1400	1300
chloride	mg/L	250	-	30.5	30.8	492	281	518	574	78	70	82	6720	9780	11500	3220	2440	4980	6480	6470	8200	7600
chromium	mg/L	0.05	-	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	<0.005	<0.005	< 0.05	< 0.05	< 0.05	< 0.3	< 0.005	< 0.05	< 0.05	< 0.05	<0.05	<0.05
cobalt	mg/L	-	0.0009	0.0004	0.0002	**0.015**	**0.021**	**0.011**	**0.0051**	< 0.0005	**0.0023**	<0.0005	< 0.001	< 0.001	**0.005**	< 0.03	**0.0037**	< 0.005	< 0.005	< 0.005	<0.005	<0.005
copper	mg/L	1	[0.005] b	< 0.0005	0.0009	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	<0.001	<0.002	< 0.005	< 0.005	< 0.01	< 0.05	< 0.001	< 0.01	< 0.02	< 0.01	<0.01	<0.01
fluoride	mg/L	1.5 - 2.4	-	0.4	0.3	0.2	0.2	0.2	0.2	0.2	0.19	0.17	0.4	0.4	0.2	0.3	0.4	0.3	0.3	0.3	0.25	0.26
free cyanide	mg/L	0.2	0.005	< 0.001	< 0.001	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	<0.0020	<0.0020	< 0.001	< 0.001	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	<0.0020	<0.0020
hardness	mg $CaCO_3$/L	80-100	-	577	760.5	1100	950	1000	1000	870	880	920	4370	5871	5200	2200	1800	3300	4900	5100	5500	5000
iron	mg/L	0.3	0.3	**0.67**	**1.96**	**0.54**	< 0.1	**0.7**	**1.1**	< 0.1	**0.38**	**0.62**	**3.65**	**4.46**	**4.7**	< 5	**1.2**	**2.8**	**2.3**	**2.5**	**4.5**	**3.4**
lead	mg/L	0.01	[0.005] c	< 0.0005	0.0008	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	<0.0005	<0.0005	< 0.005	< 0.005	< 0.005	< 0.03	< 0.0005	< 0.005	< 0.005	< 0.005	<0.005	<0.005
magnesium	mg/L	-	-	63.8	98.2	150	120	130	120	120	130	130	317	460	380	200	160	280	410	430	470	420
manganese	mg/L	0.05	-	0.189	0.156	0.15	0.13	0.14	0.14	0.1	0.12	0.11	0.575	0.735	0.62	0.27	0.2	0.39	0.52	0.54	0.6	0.58
mercury	mg/L	0.001	0.0002	< 0.00005	0.00006	< 0.0001	< 0.0015 (1)	< 0.0001	< 0.0001	< 0.0001	<0.00010	<0.00010	< 0.00005	< 0.00005	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	<0.00010	<0.00010
molybdenum	mg/L	-	0.04	**0.048**	0.02	0.008	0.013	0.007	0.012	0.006	0.0063	0.0069	0.013	0.012	< 0.01	< 0.05	0.006	< 0.01	0.006	0.006	<0.005	0.007
nickel	mg/L	-	0.025	0.002	< 0.001	0.003	0.002	0.003	< 0.001	< 0.001	<0.001	<0.001	< 0.01	< 0.01	< 0.01	< 0.05	< 0.005	< 0.01	< 0.01	< 0.01	<0.01	<0.01
nitrate as N	mg/L	10	-	< 0.2	< 0.2	< 0.1	< 0.1	0.3	< 0.1	0.6	<0.10	0.37	< 0.2	< 0.2	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	<0.10	<0.10
nitrite as N	mg/L	1	-	< 0.2	< 0.2	< 0.01	0.01	0.14	0.02	0.22	0.02	0.38	< 20	< 20	0.02	< 0.01	0.01	< 0.01	< 0.01	< 0.01	<0.010	<0.010
pH	pH Units	6.5-8.5	6.5-8.5	7.76	7.93	7.90	8.00	7.7	7.76	7.78	7.58	7.80	7.44	7.28	7.30	7.80	7.7	7.45	7.37	7.38	6.96	7.15
phenol	mg/L	-	0.005	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	<0.0010	<0.0010	< 0.001	< 0.001	**0.023**	< 0.001	< 0.001	< 0.001	0.001	0.001	<0.0010	0.0020
phosphate	mg/L	-	-	< 1	< 1	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	<0.010	<0.010	< 1	< 1	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	<0.010	<0.010
phosphorous	mg/L	-	-	< 0.05	-	< 0.05	< 0.1	< 0.1	< 0.1	< 0.1	<0.1	<0.1	-	-	< 0.5	< 5	< 0.1	< 1	< 1	< 1	<1	<1
total phosphorous	mg/L	-	0.01	**0.176**	**10.2**	**8.4**	**6.4**	**30.0**	**5.0**	**0.35**	**2.80**	**16**	**0.278**	**0.076**	**0.21**	**0.12**	**0.04**	**0.10**	< 1	< 0.40	**0.13**	**0.13**
potassium	mg/L	-	-	15.5	12.9	14	13	12	16	9.4	9	9.9	78.1	94.4	80	46	40	61	86	91	85	82
selenium	mg/L	0.01	0.1	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	0.002	< 0.002	<0.002	<0.002	0.033	0.03	< 0.02	< 0.1	0.01	< 0.02	< 0.02	< 0.02	<0.04	<0.02
silicon	mg/L	-	-	5.40	5.99	6.4	6	6.9	6.5	5.5	5.9	6.4	3.19	3.27	2.3	3.5	3.7	4	3.5	3.6	4	3.3
silver	mg/L	-	0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	<0.0001	<0.0001	< 0.001	< 0.001	< 0.001	< 0.005	< 0.0001	< 0.001	< 0.001	< 0.001	<0.001	<0.001
sodium	mg/L	200 d	-	98.4	111	280	210	170	320	130	120	130	2920	4330	3400	1700	1300	2400	3200	3400	3400	3300
strontium	mg/L	-	-	6.86	8.98	11	12	11	13	10	11	11	25.6	32.7	29	13	12	20	30	31	35	31
sulphide	mg/L	0.05	-	0.37	0.31	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	<0.020	0.028	< 0.01	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	<0.020	<0.020
sulphate	mg/L	500	-	651	836	884	813	953	933	900	900	890	1360	1610	1540	1230	1260	1450	1650	1560	1500	1600
thallium	mg/L	-	0.0003	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	<0.00005	<0.00005	< 0.0005	< 0.0005	< 0.0005	< 0.003	< 0.00005	< 0.0005	< 0.0005	< 0.0005	<0.0005	<0.0005
tin	mg/L	-	-	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	<0.001	<0.001	< 0.01	< 0.01	< 0.01	< 0.05	< 0.001	< 0.01	< 0.01	< 0.01	<0.01	<0.01
titanium	mg/L	-	-	< 0.005	0.016	0.007	< 0.005	< 0.005	< 0.005	< 0.005	<0.005	<0.005	< 0.05	< 0.05	< 0.05	< 0.3	< 0.005	< 0.05	< 0.05	< 0.05	<0.05	<0.05
TSS	mg/L	-	-	58400	28300	24000	6500	12000	21000	5800	1100	24000	456	118	140	36	100	190	370	490	450	120
turbidity	NTU	1	-	1.3	5.0	10700	3600	14000	19000	600	590	890	11.1	5.2	105	27	66	100	140	140	250	72
uranium	mg/L	0.02	[0.005]	**0.0059**	0.0015	0.0007	0.0023	0.0005	0.0003	0.0005	0.00049	0.00041	0.0021	< 0.0010	< 0.001	< 0.005	< 0.0001	< 0.001	< 0.001	< 0.001	<0.001	<0.001
vanadium	mg/L	-	[0.006]	0.0014	0.0015	< 0.001	**0.007**	0.003	0.003	0.0006	<0.0005	<0.0005	< 0.05	< 0.05	< 0.01	< 0.05	< 0.005	< 0.01	0.006	0.007	<0.01	<0.01
zinc	mg/L	5	[0.02]	< 0.05	< 0.005	0.018	< 0.005	< 0.005	< 0.005	< 0.025	0.013	<0.01	< 0.05	< 0.05	**0.23**	< 0.3	**0.034**	< 0.05	**0.085**	< 0.05	<0.05	<0.05

NOTES:

Shaded area indicates an exceedance of the MOE Ontario Drinking Water Standard (June 2006) for that specific parameter.

Bolded areas indicate an exceedance of the MOE Provincial Water Quality Objectives (July 1994) for that specific parameter.

[ ] indicate interim PWQO concentration

a = interim PWQO at pH > 6.5 to 9.0 measured in clay-free samples.

b = interim PWQO if hardness greater than 20 mg/L.

c = interim PWQO if hardness greater than 80 mg/L

d = Local Medical Office of Health should be notified when sodium concentrations exceed 20 mg/L so that this information may be communicated to local physicians for their use with patients on sodium reduced diets.

(1) Sample bottle contained visible sediment. Results may be biased high due to analyte present in sediment.

TABLE D.1
Summary of Groundwater Quality in On-Site Monitoring Wells
Tansley Quarry, Burlington, Ontario

Parameter	Units	ODWS (June 2006)	PWQO (July 1994)	MW-04 shallow									MW-04 intermediate									MW-04 deep							
				Nov-02	May-03	Jan-07	Oct-08	Dec-09	Oct-10	Nov-11	Nov-12	Nov-13	Nov-02	May-03	Jan-07	Oct-08	Dec-09	Oct-10	Nov-11	Nov-12	Nov-13	May-03	Jan-07	Oct-08	Dec-09	Oct-10	Nov-11	Nov-12	Nov-13
aluminum	mg/L	0.1	[0.075] a	< 0.005	0.068	**0.28**	**0.2**	**0.32**	0.038	**1.1**	0.068	<0.005	0.006	**0.289**	**0.1**	**0.14**	**0.14**	0.031	0.064	**0.091**	<0.025	< 0.05	< 0.05	< 0.5	**0.5**	NOT SAMPLED	< 0.3	<0.05	<0.25
alkalinity	mg CaCO$_3$/L	30-500	-	385	419	391	413	390	387	384	390	380	55	56	56	51	50	50	55	65	53	172	126	34	66		102	150	160
ammonia as N	mg/L	-	-	0.32	0.25	0.16	< 0.05	0.53	< 0.05	< 0.05	0.13	0.12	4.86	4.97	8.2	5.9	6.3	6	5.7	6.2	6.1	8.7	23.4	25	34		37	19	31
antimony	mg/L	-	[0.02]	< 0.0005	< 0.0005	< 0.001	0.0007	< 0.0005	< 0.0005	< 0.0005	<0.00050	<0.0005	< 0.0005	0.0005	< 0.005	< 0.005	< 0.0005	< 0.0005	< 0.0005	<0.0025	<0.0025	< 0.005	< 0.01	< 0.05	< 0.03		< 0.03	<0.0050	<0.025
arsenic	mg/L	0.025	[0.005]	0.004	**0.006**	< 0.001	< 0.001	< 0.001	< 0.001	0.003	<0.0010	<0.001	< 0.002	< 0.002	< 0.005	< 0.01	< 0.005	< 0.005 (1)	< 0.005	<0.0050	<0.005	< 0.02	< 0.01	< 0.1	< 0.3		**0.059**	<0.02	<0.05
barium	mg/L	1	-	0.083	0.082	0.06	0.065	0.058	0.056	0.096	0.049	0.051	0.013	0.010	< 0.03	< 0.05	0.007	0.007	0.008	<0.01	<0.01	0.087	0.075	< 0.5	< 0.3		< 0.1	0.05	<0.1
beryllium	mg/L	-	1.1	< 0.001	< 0.001	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	<0.00050	<0.0005	< 0.001	< 0.001	< 0.003	< 0.005	< 0.0005	< 0.0005	< 0.0005	<0.0025	<0.0025	< 0.01	< 0.005	< 0.05	< 0.03		< 0.03	<0.0050	<0.025
bismuth	mg/L	-	-	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0.002	< 0.001	<0.0010	<0.001	< 0.001	< 0.001	< 0.005	< 0.01	< 0.001	0.002	< 0.001	<0.0050	<0.005	< 0.01	< 0.01	< 0.1	< 0.05		< 0.05	<0.01	<0.05
boron	mg/L	5	0.2	**0.353**	**0.286**	0.071	0.12	0.11	0.078	0.06	0.11	0.054	**6.46**	**6.99**	**6**	**6.9**	**6.5**	**6.4**	**5.9**	**6.1**	**5.6**	**2.38**	**3.3**	**6.2**	**5.4**		**6.3**	**5.7**	**7.9**
bromide	mg/L	-	-	< 0.5	< 0.5	< 1.0	< 1.0	< 1	< 1	< 1	<1.0	<1.0	11.3	10.3	14	17	21	16	21	21	25	103	183	398	401		572	200	400
cadmium	mg/L	0.005	0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	0.0002	<0.00010	<0.0001	< 0.0001	**0.0006**	< 0.0005	< 0.001	< 0.0001	< 0.0001	< 0.0001	<0.00050	<0.0005	**0.0017**	< 0.001	< 0.01	< 0.005		**0.006**	<0.0010	<0.005
calcium	mg/L	-	-	65.2	64.1	88	84	78	77	130	78	86	433	380	450	530	510	460	480	550	540	1440	3700	6600	5300		7700	2400	4800
chloride	mg/L	250	-	12.2	5.8	8.0	4.0	4	5	4	4.2	3.6	1120	984	1320	1540	1800	1500	1650	2100	2000	9180	16800	34700	32700		45000	16000	33000
chromium	mg/L	0.05	-	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	<0.0050	<0.005	< 0.005	< 0.005	< 0.03	< 0.05	< 0.005	< 0.005	< 0.005	<0.025	<0.025	< 0.05	< 0.05	< 0.5	< 0.3		< 0.3	<0.05	<0.25
cobalt	mg/L	-	0.0009	**0.0011**	0.0009	**0.019**	**0.022**	**0.015**	**0.001**	**0.0076**	**0.00092**	0.00062	0.0008	0.0002	**0.019**	**0.021**	**0.0086**	< 0.0005	< 0.003	<0.0025	<0.0025	< 0.001	< 0.005	< 0.05	< 0.03		< 0.03	<0.0050	<0.025
copper	mg/L	1	[0.005] b	0.0008	< 0.0005	0.001	< 0.001	< 0.001	< 0.001	**0.007**	<0.0010	<0.001	< 0.005	< 0.005	< 0.005	< 0.01	< 0.005	< 0.005 (1)	< 0.001	<0.0050	<0.005	**0.0124**	< 0.01	< 0.1	< 0.05		< 0.1	<0.01	<0.05
fluoride	mg/L	1.5 - 2.4	-	0.4	0.3	0.2	0.2	0.3	0.2	0.2	0.23	0.20	0.6	0.7	0.5	0.6	0.5	0.5	0.6	0.55	0.54	0.3	0.2	0.1	0.1		< 0.1	0.18	<0.10
free cyanide	mg/L	0.2	0.005	< 0.001	< 0.001	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	<0.0020	<0.0020	< 0.001	< 0.001	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	<0.0020	<0.0020	< 0.001	< 0.002	< 0.002	< 0.002		< 0.002	<0.0020	<0.0020
hardness	mg CaCO$_3$/L	80-100	-	353	407.7	490	500	460	450	560	460	470	1600	1405	1600	1900	1900	1700	1700	2000	2000	4915	13000	23000	18000		27000	8400	16000
iron	mg/L	0.3	0.3	< 0.03	**0.52**	0.18	0.11	**0.50**	< 0.1	**3.3**	<0.1	<0.1	0.23	**0.56**	**0.71**	< 1	**0.9**	**0.75**	**0.92**	**0.84**	**0.91**	< 0.3	**17**	**29**	**24**		< 5	<1	**7.7**
lead	mg/L	0.01	[0.005] c	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.0007	< 0.0005	**0.012**	<0.00050	<0.0005	< 0.0005	< 0.0005	< 0.003	< 0.005	< 0.0005	< 0.0005	< 0.0005	<0.0025	<0.0025	< 0.005	< 0.005	< 0.05	< 0.03		< 0.03	<0.0050	<0.025
magnesium	mg/L	-	-	46.1	60.1	66	71	65	62	61	65	63	125	110	130	150	140	130	130	160	150	316	820	1500	1200		1800	560	1100
manganese	mg/L	0.05	-	1.01	0.769	0.28	0.38	0.310	0.180	0.55	0.23	0.18	0.205	0.17	0.21	0.26	0.22	0.19	0.21	0.23	0.23	1.13	2.4	3.7	2.8		5.1	1.6	3
mercury	mg/L	0.001	0.0002	< 0.00005	< 0.00005	< 0.0001	< 0.0015	0.0001	< 0.0001	< 0.0001	<0.00010	<0.00010	< 0.00005	< 0.00005	< 0.0001	< 0.0015 (1)	< 0.0001	< 0.0001	< 0.0001	<0.00010	<0.00010	< 0.00005	0.0001	< 0.0001	< 0.0001		< 0.0001	<0.00010	<0.00010
molybdenum	mg/L	-	0.04	0.024	0.012	0.005	0.007	0.005	0.006	0.0021	0.0039	0.0024	0.011	0.008	0.007	< 0.01	0.008	0.009	0.0087	0.0083	0.0077	0.03	0.012	< 0.1	< 0.05		< 0.03	0.014	<0.025
nickel	mg/L	-	0.025	0.004	0.001	0.003	0.003	0.004	0.001	0.005	0.0011	<0.001	0.007	< 0.001	< 0.005	< 0.01	< 0.005	< 0.005 (1)	< 0.005	<0.0050	<0.005	< 0.01	< 0.01	< 0.1	< 0.05		**0.19**	<0.01	<0.05
nitrate as N	mg/L	10	-	< 0.2	< 0.2	11	0.3	2.5	4.2	4.3	0.98	1.0	< 0.2	< 0.2	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	<0.10	<0.10	0.6	1.4	< 0.1	< 0.1		< 0.1	<0.10	<0.10
nitrite as N	mg/L	1	-	< 0.2	< 0.2	0.1	0.01	0.25	0.11	0.02	0.040	0.021	< 2.0	< 0.2	< 0.01	< 0.01	< 0.01	< 0.01	0.03	<0.010	<0.010	< 20	0.02	< 0.01	0.02		< 0.1	0.029	<0.010
pH	pH Units	6.5-8.5	6.5-8.5	7.79	7.8	8.2	8.4	8.0	7.8	7.81	7.91	7.87	7.67	7.64	7.7	7.8	7.6	7.5	7.48	7.11	7.41	7.42	7.4	7.2	6.8		6.8	7.05	6.82
phenol	mg/L	-	0.005	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	<0.0010	<0.0010	< 0.001	< 0.001	0.001	< 0.001	< 0.001	< 0.001	0.001	**0.01**	0.0044	< 0.001	**0.025**	0.002	0.003		**0.07**	**0.022**	**0.057**
phosphate	mg/L	-	-	< 1	< 1	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	<0.010	<0.010	< 1	< 1	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	<0.010	<0.010	< 1	< 0.01	< 0.01	< 0.01		< 0.01	0.019	<0.010
phosphorous	mg/L	-	-	< 0.05	< 0.05	< 0.05	< 0.1	< 0.1	< 0.1	0.41	<0.1	0.15	< 0.05	< 0.05	< 0.3	< 1	< 0.1	< 0.1	< 0.1	<0.5	<0.5	< 0.5	< 0.5	< 10	< 5		< 5	<1	<5
total phosphorous	mg/L	-	0.01	**0.092**	**12**	**1.6**	**1.7**	**17.0**	**0.9**	**0.85**	**0.15**	**0.12**	**5.45**	**0.96**	**1.4**	**0.47**	< 0.1	**0.05**	**0.14**	<0.5	**0.19**	**0.089**	**0.34**	**0.37**	**2.7**		< 5	<1	**1.1**
potassium	mg/L	-	-	6.6	6.2	5	5.7	5.1	4.9	4.5	4.8	4.3	39.7	38.5	42	48	43	43	43	47	48	76.2	160	260	210		300	130	210
selenium	mg/L	0.01	0.1	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	<0.0020	<0.002	0.009	< 0.002	< 0.01	< 0.02	0.012	< 0.01 (1)	< 0.01	<0.01	<0.01	< 0.02	< 0.02	< 0.2	**0.2**		< 0.2	0.042	<0.1
silicon	mg/L	-	-	6.69	7.66	7.5	6.9	6.7	5.8	7.3	6.6	6.7	3.27	3.64	3	3.7	3.4	3.2	3.4	3.4	3.5	3.41	2.3	< 5	4		3.4	4.1	7.1
silver	mg/L	-	0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	<0.00010	<0.0001	< 0.0001	< 0.0001	< 0.0005	< 0.001	< 0.0001	**0.0002**	< 0.0001	<0.00050	<0.0005	< 0.001	< 0.001	< 0.01	< 0.005		< 0.005	<0.0010	<0.005
sodium	mg/L	200 d	-	49.5	35.9	24	34	28	28	25	24	23	682	609	780	1100	1000	960	1100	1200	1200	3600	8000	15000	12000		17000	6100	11000
strontium	mg/L	-	-	3.25	3.23	1.4	2	1.8	1.5	1.4	1.5	1.3	14.2	11.8	11	13	13	12	13	14	13	29.9	77	130	110		170	53	98
sulphide	mg/L	0.05	-	0.27	0.03	< 0.02	< 0.02	0.06	< 0.02	< 0.02	<0.020	0.069	0.05	0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	0.55	0.94	< 0.01	< 0.02	< 0.02	< 0.02		< 0.02	<0.020	1.4
sulphate	mg/L	500	-	106	70.2	80	122	116	103	116	110	130	1630	1600	1730	1670	1870	1750	1800	1800	1800	762	1070	1250	1340		1540	1700	1400
thallium	mg/L	-	0.0003	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	<0.00005	<0.00005	< 0.00005	< 0.00005	< 0.0003	< 0.0005	< 0.00005	< 0.00005	< 0.00005	<0.00025	<0.00025	< 0.0005	< 0.0005	< 0.005	< 0.003		< 0.003	<0.0005	<0.0025
tin	mg/L	-	-	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	<0.0010	<0.001	< 0.001	< 0.001	< 0.005	< 0.01	< 0.001	< 0.001	< 0.001	<0.0050	<0.005	< 0.01	< 0.01	< 0.1	< 0.05		< 0.05	<0.01	<0.05
titanium	mg/L	-	-	< 0.005	< 0.005	0.012	0.009	0.008	< 0.005	0.009	0.0088	<0.005	< 0.005	-	< 0.03	< 0.05	< 0.005	0.008	< 0.005	<0.025	<0.025	< 0.05	< 0.05	< 0.5	< 0.3		< 0.3	<0.05	<0.25
TSS	mg/L	-	-	74300	30500	2500	2800	21000	750	2500	1300	110	8680	1740	5400	1100	1100	91	380	530	280	501	1000	540	3600		1600	290	1200
turbidity	NTU	1	-	13	50	1710	2600	31000	4300	780	210	160	11.2	24	2440	1100	1100	57	110	120	81	188	518	380	4600		340	66	300
uranium	mg/L	0.02	[0.005]	**0.0074**	0.0041	**0.0058**	**0.0093**	**0.0081**	**0.0078**	**0.0082**	**0.0064**	**0.007**	0.0011	0.0002	< 0.0005	< 0.001	< 0.0001	< 0.0001	0.0004	<0.00050	<0.0005	**0.0075**	0.001	< 0.01	< 0.005		**0.023**	**0.029**	**0.025**
vanadium	mg/L	-	[0.006]	0.002	0.0014	0.002	0.003	0.001	< 0.001	0.004	<0.00050	<0.0005	< 0.0050	< 0.0050	< 0.005	< 0.01	< 0.005	< 0.005 (1)	< 0.003	**0.0063**	<0.0025	< 0.05	< 0.01	< 0.1	< 0.3		< 0.05	<0.02	**0.026**
zinc	mg/L	5	[0.02]	< 0.005	< 0.005	0.008	< 0.005	0.005	< 0.005	0.016	<0.0050	<0.005	< 0.050	0.007	< 0.03	< 0.05	< 0.03	< 0.005	< 0.005	<0.025	<0.025	< 0.05	**0.073**	< 0.5	< 0.3		< 0.3	<0.05	<0.25

NOTES:
Shaded area indicates an exceedance of the MOE Ontario Drinking Water Standard (June 2006) for that specific parameter.
Bolded areas indicate an exceedance of the MOE Provincial Water Quality Objectives (July 1994) for that specific parameter.
[ ] indicate interim PWQO concentration
a = interim PWQO at pH > 6.5 to 9.0 measured in clay-free samples.
b = interim PWQO if hardness greater than 20 mg/L.
c = interim PWQO if hardness greater than 80 mg/L.
d = Local Medical Office of Health should be notified when sodium concentrations exceed 20 mg/L so that this information may be communicated to local physicians for their use with patients on sodium reduced diets.
(1) Sample bottle contained visible sediment. Results may be biased high due to analyte present in sediment.

TABLE D.1
Summary of Groundwater Quality in On-Site Monitoring Wells
Tansley Quarry, Burlington, Ontario

Parameter	Units	ODWS (June 2006)	PWQO (July 1994)	MW-05 shallow									MW-05 straddle						MW-05 intermediate								
				Nov-02	May-03	Jan-07	Oct-08	Dec-09	Oct-10	Nov-11	Nov-12	Nov-13	Oct-08	Dec-09	Oct-10	Nov-11	Nov-12	Nov-13	Nov-02	May-03	Jan-07	Oct-08	Dec-09	Oct-10	Nov-11	Nov-12	Nov-13
aluminum	mg/L	0.1	[0.075] a	0.006	0.059	NOT SAMPLED	0.069	0.067	0.052	0.052	**0.094**	<0.005	**0.34**	**0.32**	0.04	**0.14**	**0.17**	<0.005	0.029	**0.194**	NOT SAMPLED	**0.1**	**0.130**	0.016	0.051	0.032	<0.005
alkalinity	mg $CaCO_3$/L	30-500	-	310	344		326	275	302	300	300	280	271	296	294	285	290	290	179	180		178	264	252	285	290	270
ammonia as N	mg/L	-	-	0.21	0.05		0.1	0.05	< 0.05	0.12	0.096	<0.050	0.51	0.65	0.54	0.75	0.76	0.58	1.99	1.87		1.7	1.8	2.1	1.6	1.6	1.7
antimony	mg/L	-	[0.02]	< 0.0005	< 0.0005		0.001	< 0.0005	< 0.0005	< 0.0005	<0.00050	<0.0005	0.001	< 0.0005	0.0011	< 0.0005	<0.00050	<0.0005	< 0.0005	< 0.0005		0.0005	< 0.0005	< 0.0005	< 0.0005	0.0015	<0.0005
arsenic	mg/L	0.025	[0.005]	< 0.002	< 0.002		< 0.001	< 0.001	< 0.001	< 0.001	<0.0010	<0.001	**0.012**	**0.013**	**0.006**	**0.01**	**0.01**	**0.01**	0.002	< 0.002		0.002	0.002	0.002	< 0.001	0.0011	0.0013
barium	mg/L	1	-	0.07	0.081		0.078	0.061	0.06	0.058	0.061	0.058	0.068	0.077	0.066	0.067	0.061	0.059	0.016	0.022		0.016	0.021	0.019	0.021	0.02	0.019
beryllium	mg/L	-	1.1	< 0.001	< 0.001		< 0.001	< 0.0005	< 0.0005	< 0.0005	<0.00050	<0.0005	< 0.001	< 0.0005	< 0.0005	< 0.0005	<0.00050	<0.0005	< 0.001	< 0.001		< 0.0005	< 0.0005	< 0.0005	< 0.0005	<0.00050	<0.0005
bismuth	mg/L	-	-	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	<0.0010	<0.001	< 0.001	< 0.001	< 0.001	< 0.001	<0.0010	<0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	0.0010	<0.001
boron	mg/L	5	0.2	0.134	0.014		0.025	< 0.01	0.02	0.011	0.013	<0.01	**1.1**	**1.0**	**1.0**	**1.2**	**1.2**	**1**	**3.58**	**3.38**		**4.1**	**3.1**	**2.7**	**2**	**2.1**	**2.3**
bromide	mg/L	-	-	< 0.5	0.5		< 1.000	< 1	< 1	< 1	<1.0	<1.0	< 1	< 1	< 1	< 1	<1.0	<1.0	1.3	4.4		1	< 1	2	< 1	<1.0	1.2
cadmium	mg/L	0.005	0.0005	< 0.0001	< 0.0001		< 0.0001	< 0.0001	< 0.0001	< 0.0001	<0.00010	<0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	<0.00010	<0.0001	< 0.0001	< 0.0001		< 0.0001	< 0.0001	< 0.0001	< 0.0001	0.00012	<0.0001
calcium	mg/L	-	-	98.7	114		120	120	120	120	120	120	63	70	67	58	61	56	88.7	181		67	67	99	80	79	79
chloride	mg/L	250	-	14.6	5.7		13	20	26	31	30	33	8	5	8	9	6.7	7.7	150	406		105	74	176	74	67	110
chromium	mg/L	0.05	-	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	<0.0050	<0.005	< 0.005	< 0.005	< 0.005	< 0.005	<0.0050	<0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	<0.0050	<0.005
cobalt	mg/L	-	0.0009	0.0006	< 0.0001		**0.022**	**0.013**	**0.001**	**0.001**	**0.002**	<0.0005	**0.023**	**0.013**	**0.004**	**0.0058**	**0.0027**	<0.0005	< 0.0001	0.0003		**0.021**	**0.0054**	< 0.0005	**0.0018**	**0.0024**	<0.0005
copper	mg/L	1	[0.005] b	0.0015	0.0009		< 0.001	< 0.001	< 0.001	< 0.001	0.0016	<0.001	< 0.001	0.001	< 0.001	0.001	0.0019	<0.001	0.0006	0.0005		< 0.001	< 0.001	< 0.001	< 0.001	<0.0010	<0.001
fluoride	mg/L	1.5 - 2.4	-	0.2	0.1		0.1	0.1	0.1	0.1	0.11	0.10	0.3	0.3	0.2	0.3	0.28	0.27	0.7	0.7		0.7	0.5	0.4	0.4	0.42	0.43
free cyanide	mg/L	0.2	0.005	< 0.001	< 0.001		< 0.002	< 0.002	< 0.002	< 0.002	<0.0020	<0.0020	< 0.002	< 0.002	< 0.002	< 0.002	<0.0020	<0.0020	< 0.001	< 0.001		< 0.002	< 0.002	< 0.002	< 0.002	<0.0020	<0.0020
hardness	mg $CaCO_3$/L	80-100	-	352	406.4		430	430	430	440	430	440	300	320	300	270	280	270	332	692.2		260	270	390	320	320	320
iron	mg/L	0.3	0.3	< 0.03	0.06		< 0.1	0.1	< 0.1	< 0.1	0.12	<0.1	0.25	**0.60**	< 0.10	**0.49**	**0.50**	0.13	0.13	**0.47**		0.26	0.2	0.27	0.14	<0.1	<0.1
lead	mg/L	0.01	[0.005] c	< 0.0005	0.0010		< 0.001	< 0.0005	< 0.0005	< 0.0005	<0.00050	<0.0005	< 0.001	< 0.0005	< 0.0005	< 0.0005	<0.00050	<0.0005	< 0.0005	< 0.0005		< 0.0005	< 0.0005	< 0.0005	< 0.0005	<0.00050	<0.0005
magnesium	mg/L	-	-	25.6	29.1		32	31	31	32	33	34	34	34	33	29	32	32	26.7	57.6		23	25	35	30	30	30
manganese	mg/L	0.05	-	1.29	0.051		0.038	0.032	0.004	0.003	0.0093	0.0044	0.063	0.078	0.033	0.045	0.038	0.025	0.044	0.072		0.06	0.033	0.036	0.033	0.033	0.031
mercury	mg/L	0.001	0.0002	< 0.00005	< 0.00005		< 0.0015 (1)	< 0.0001	< 0.0001	< 0.0001	<0.00010	<0.00010	< 0.0015 (1)	< 0.0001	< 0.0001	< 0.0001	<0.00010	<0.00010	< 0.00005	< 0.00005		< 0.0001	< 0.0001	< 0.0001	< 0.0001	<0.00010	<0.00010
molybdenum	mg/L	-	0.04	0.016	< 0.001		< 0.001	< 0.001	< 0.001	< 0.0005	<0.00050	<0.0005	0.005	0.004	0.004	0.0047	0.0047	0.005	0.013	0.011		0.009	0.005	0.004	0.0037	0.0039	0.004
nickel	mg/L	-	0.025	0.002	< 0.001		0.002	0.003	< 0.001	< 0.001	<0.0010	<0.001	0.003	0.003	< 0.001	< 0.001	<0.0010	<0.001	< 0.001	< 0.001		0.002	0.001	< 0.001	< 0.001	<0.0010	<0.001
nitrate as N	mg/L	10	-	< 0.2	< 0.2		0.1	< 0.1	< 0.1	< 0.1	<0.10	<0.10	0.1	0.3	< 0.1	0.5	0.27	0.51	< 0.2	< 0.2		< 0.1	0.2	< 0.1	0.6	0.26	0.20
nitrite as N	mg/L	1	-	< 0.2	< 0.2		< 0.01	0.02	< 0.01	< 0.01	<0.010	<0.010	0.03	0.16	0.03	0.04	0.022	0.038	< 1.0	< 0.2		< 0.01	0.22	< 0.01	0.55	0.13	0.27
pH	pH Units	6.5-8.5	6.5-8.5	7.74	7.62		8.1	7.5	7.8	7.75	7.71	7.78	8.3	7.9	7.93	7.9	7.90	7.94	7.85	7.71		8.1	7.9	7.77	7.81	7.73	7.89
phenol	mg/L	-	0.005	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	<0.0010	<0.0010	< 0.001	< 0.001	< 0.001	< 0.001	<0.0010	<0.0010	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	<0.0010	<0.0010
phosphate	mg/L	-	-	< 1	< 1		< 0.01	< 0.01	< 0.01	< 0.01	<0.010	<0.010	< 0.01	< 0.01	< 0.01	< 0.01	<0.010	<0.010	< 1	< 1		< 0.01	< 0.01	< 0.01	< 0.01	<0.010	<0.010
phosphorous	mg/L	-	-	< 0.05	< 0.05		< 0.1	< 0.1	< 0.1	< 0.1	<0.1	<0.1	< 0.1	0.1	< 0.1	< 0.1	<0.1	<0.1	< 0.05	< 0.05		< 0.1	< 0.1	< 0.1	< 0.1	<0.1	<0.1
total phosphorous	mg/L	-	0.01	**0.09**	**6.05**		**6**	**5**	**3**	**14**	**3.7**	**0.58**	**5.2**	**24.0**	**4.0**	**9.6**	**10**	**13**	**1.02**	**1.58**		**0.18**	**0.1**	**0.02**	< 0.1	**0.47**	**0.14**
potassium	mg/L	-	-	5.4	0.7		0.69	0.7	0.7	0.72	0.73	0.72	5.9	5.8	5.7	6.3	6.7	6.4	16.0	19.9		18	17	20	16	17	17
selenium	mg/L	0.01	0.1	< 0.002	< 0.002		< 0.002	< 0.002	0.002	< 0.002	<0.0020	<0.002	< 0.002	< 0.002	< 0.002	< 0.002	<0.0020	<0.002	< 0.002	< 0.002		< 0.002	< 0.002	< 0.002	< 0.002	<0.0020	<0.002
silicon	mg/L	-	-	5.37	5.29		5.7	5.6	5.1	5.1	5.3	5.2	11	11	9.7	8.6	10	9.5	4.03	4.21		5.4	6.0	5.6	5.6	6	5.5
silver	mg/L	-	0.0001	< 0.0001	< 0.0001		< 0.0001	< 0.0001	< 0.0001	< 0.0001	<0.00010	<0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	<0.00010	<0.0001	< 0.0001	< 0.0001		< 0.0001	< 0.0001	< 0.0001	< 0.0001	<0.00010	<0.0001
sodium	mg/L	200 d	-	18.2	5.9		6.1	6.3	6.2	6.2	6.4	6.7	24	22	22	25	27	27	171	362		180	110	110	71	74	81
strontium	mg/L	-	-	1.6	0.244		0.21	0.19	0.19	0.2	0.19	0.21	6	5.5	6	6.6	6.6	6.8	7.02	9.57		6.8	7.8	14	13	13	12
sulphide	mg/L	0.05	-	0.25	0.04		< 0.02	< 0.02	< 0.02	< 0.02	<0.020	<0.020	< 0.02	< 0.02	< 0.02	< 0.02	<0.020	0.049	0.01	< 0.01		< 0.02	< 0.02	< 0.02	< 0.02	<0.020	<0.020
sulphate	mg/L	500	-	103	69.6		80	90	96	111	95	100	38	46	52	52	41	47	270	276		244	136	179	130	120	140
thallium	mg/L	-	0.0003	< 0.00005	< 0.00005		< 0.0001	< 0.00005	< 0.00005	< 0.00005	<0.00005	<0.00005	< 0.0001	< 0.00005	< 0.00005	< 0.00005	<0.00005	<0.00005	< 0.00005	< 0.00005		< 0.00005	< 0.00005	< 0.00005	< 0.00005	<0.000050	<0.00005
tin	mg/L	-	-	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	<0.0010	<0.001	< 0.001	< 0.001	< 0.001	< 0.001	<0.0010	<0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	<0.0010	<0.001
titanium	mg/L	-	-	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	<0.0050	<0.005	0.011	0.006	< 0.005	< 0.005	0.0089	<0.005	< 0.005	0.006		< 0.005	< 0.005	< 0.005	0.006	<0.0050	<0.005
TSS	mg/L	-	-	91100	20800		1900	3300	4000	22000	5700	2300	15000	28000	3600	14000	12000	25000	1230	1750		350	86	< 10	200	600	240
turbidity	NTU	1	-	6.8	48		340	3900	24	2700	1600	520	7000	13000	3400	2700	3500	610	2.4	19.7		130	96	15	210	640	170
uranium	mg/L	0.02	[0.005]	0.0049	0.0019		0.002	0.0019	0.0019	0.0019	0.0018	0.002	0.0004	0.0003	0.0003	0.0002	0.00021	0.00021	0.0010	0.0005		0.0002	0.0002	0.0001	0.0004	0.00047	0.0004
vanadium	mg/L	-	[0.006]	0.0013	0.001		0.001	< 0.001	< 0.001	< 0.0005	0.00065	<0.0005	0.002	0.001	0.002	0.0008	0.00064	<0.0005	0.0008	< 0.005		0.002	< 0.001	< 0.001	< 0.0005	<0.00050	<0.0005
zinc	mg/L	5	[0.02]	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	<0.0050	<0.005	< 0.005	0.006	< 0.005	0.006	<0.0050	<0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	<0.0050	<0.005

NOTES:

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[   ] indicate interim PWQO concentration
a = interim PWQO at pH > 6.5 to 9.0 measured in clay-free samples.
b = interim PWQO if hardness greater than 20 mg/L.
c = interim PWQO if hardness greater than 80 mg/L
d = Local Medical Office of Health should be notified when sodium concentrations exceed 20 mg/L so that this information may be communicated to local physicians for their use with patients on sodium reduced diets.
(1) Sample bottle contained visible sediment. Results may be biased high due to analyte present in sediment.

TABLE D.1
Summary of Groundwater Quality in On-Site Monitoring Wells
Tansley Quarry, Burlington, Ontario

Parameter	Units	ODWS (June 2006)	PWQO (July 1994)	MW-05 deep						MW-06 shallow						MW-06 straddle						MW-06 deep					
				Oct-08	Dec-09	Oct-10	Nov-11	Nov-12	Nov-13	Oct-08	Dec-09	Oct-10	Nov-11	Nov-12	Nov-13	Oct-08	Dec-09	Oct-10	Nov-11	Nov-12	Nov-13	Oct-08	Dec-09	Oct-10	Nov-11	Nov-12	Nov-13
aluminum	mg/L	0.1	[0.075] a		< 0.5		< 0.5	<0.25					< 0.005			**0.16**	**0.71**	**0.46**	0.068	0.035	0.0057						
alkalinity	mg $CaCO_3$/L	30-500	-		32		36	51					309			324	312	315	320	330	320						
ammonia as N	mg/L	-	-		43		39	38					1.1			0.47	0.66	0.48	0.17	0.32	0.21						
antimony	mg/L	-	[0.02]		**0.07**		< 0.05	**0.039**					0.0009			0.0007	< 0.0005	0.0006	< 0.0005	<0.0005	<0.0005						
arsenic	mg/L	0.025	[0.005]		< 0.1		< 0.1	<0.1					0.002			0.005	0.003	0.005	**0.007**	**0.006**	**0.0079**						
barium	mg/L	1	-		< 0.5		< 0.2	0.14					0.12			0.05	0.054	0.062	0.051	0.054	0.044						
beryllium	mg/L	-	1.1		< 0.05		< 0.05	<0.025					< 0.0005			< 0.0005	< 0.0005	< 0.0005	< 0.0005	<0.0005	<0.0005						
bismuth	mg/L	-	-		< 0.1		< 0.1	0.057					< 0.001			< 0.001	< 0.001	< 0.001	< 0.001	<0.001	<0.001						
boron	mg/L	5	0.2		**5**		**6**	**5.3**					0.17			**0.28**	**0.23**	0.18	0.088	0.11	0.068						
bromide	mg/L	-	-		587		747	850					< 1			< 1	< 1	< 1	< 1	<1.0	<1.0						
cadmium	mg/L	0.005	0.0005		**0.01**		< 0.01	<0.0050					< 0.0001			< 0.0001	0.0001	< 0.0001	< 0.0001	<0.0001	0.0001						
calcium	mg/L	-	-		8800		10000	9900					72			71	73	76	90	82	92						
chloride	mg/L	250	-		50200		54800	59000					10			4	6	9	8	9	11						
chromium	mg/L	0.05	-		< 0.5		< 0.5	<0.25					< 0.005			< 0.005	< 0.005	< 0.005	< 0.005	<0.005	<0.005						
cobalt	mg/L	-	0.0009		< 0.05		< 0.05	<0.025					< 0.0005			**0.019**	**0.015**	**0.005**	**0.0013**	**0.00096**	<0.0005						
copper	mg/L	1	[0.005] b		< 0.1		< 0.1	<0.05					< 0.001			< 0.001	< 0.001	0.001	< 0.001	<0.001	0.0016						
fluoride	mg/L	1.5 - 2.4	-	**NOT SAMPLED**	< 0.1	**NOT SAMPLED**	< 0.1	<0.10	**NOT SAMPLED**	**NOT SAMPLED**	**NOT SAMPLED**	**NOT SAMPLED**	0.3	**NOT SAMPLED**	**NOT SAMPLED**	0.2	0.2	0.2	0.1	0.14	0.12	**NOT SAMPLED**	**NOT SAMPLED**	**NOT SAMPLED**	**NOT SAMPLED**	**NOT SAMPLED**	**NOT SAMPLED**
free cyanide	mg/L	0.2	0.005		< 0.002		< 0.002	<0.0020					< 0.002			< 0.002	< 0.002	< 0.002	< 0.002	<0.0020	<0.0020						
hardness	mg $CaCO_3$/L	80-100	-		31000		35000	34000					320			330	350	340	400	370	400						
iron	mg/L	0.3	0.3		**29**		**37**	**14**					< 0.1			**0.39**	**0.6**	**0.7**	**0.8**	**0.54**	**0.69**						
lead	mg/L	0.01	[0.005] c		< 0.05		< 0.05	<0.025					< 0.0005			< 0.0005	< 0.0005	0.0006	< 0.0005	<0.0005	<0.0005						
magnesium	mg/L	-	-		2100		2300	2400					35			37	39	38	43	41	42						
manganese	mg/L	0.05	-		4.7		5.1	5.3					0.15			0.075	0.067	0.056	0.038	0.036	0.037						
mercury	mg/L	0.001	0.0002		< 0.0001		< 0.0001	<0.00010					< 0.0001			< 0.0015 (1)	< 0.0001	< 0.0001	< 0.0001	<0.00010	<0.00010						
molybdenum	mg/L	-	0.04		< 0.1		< 0.05	<0.025					0.019			0.008	0.004	0.003	0.0014	0.0018	0.0012						
nickel	mg/L	-	0.025		< 0.1		< 0.1	<0.05					< 0.001			0.002	0.003	0.002	< 0.001	<0.001	<0.001						
nitrate as N	mg/L	10	-		< 0.1		< 0.1	<0.10					< 0.1			< 0.1	0.4	0.3	< 0.1	<0.10	<0.10						
nitrite as N	mg/L	1	-		< 0.01		< 0.1	<0.10					0.12			< 0.01	0.07	0.03	0.02	0.014	<0.010						
pH	pH Units	6.5-8.5	6.5-8.5		6.5		**6.43**	**6.11**					7.94			8.3	7.8	7.95	7.82	7.87	7.80						
phenol	mg/L	-	0.005		**0.006**		**0.11**	**0.0094**					< 0.001			< 0.001	< 0.001	< 0.001	< 0.001	<0.0010	<0.0010						
phosphate	mg/L	-	-		< 0.01		< 0.01	<0.010					< 0.01			< 0.01	< 0.01	0.01	< 0.01	<0.010	<0.010						
phosphorous	mg/L	-	-		< 10		< 10	<5					< 0.1			< 0.1	< 0.1	< 0.1	< 0.1	<0.1	<0.1						
total phosphorous	mg/L	-	0.01		**1.1**		< 5	**0.42**					**180**			**8.2**	**16**	**7.7**	**0.89**	**0.89**	**0.30**						
potassium	mg/L	-	-		290		300	300					10			7.2	7.1	5.8	3.9	3.9	2.9						
selenium	mg/L	0.01	0.1		< 0.2		< 0.2	<0.2					< 0.002			< 0.002	< 0.002	< 0.002	< 0.002	<0.002	<0.002						
silicon	mg/L	-	-		< 5		< 5	2.9					5.2			8.5	10	9.4	10	9.3	9.5						
silver	mg/L	-	0.0001		< 0.01		< 0.01	**0.0095**					< 0.0001			< 0.0001	< 0.0001	< 0.0001	**0.0002**	<0.0001	<0.0001						
sodium	mg/L	200 d	-		18000		19000	20000					11			21	18	16	13	19	14						
strontium	mg/L	-	-		180		210	210					5.1			5.5	5.1	4.3	2.4	2.8	1.6						
sulphide	mg/L	0.05	-		0.06		0.04	<0.020					0.31			< 0.02	0.05	0.08	< 0.02	<0.020	<0.020						
sulphate	mg/L	500	-		1260		1370	1200					94			49	54	60	63	73	88						
thallium	mg/L	-	0.0003		< 0.005		< 0.005	<0.0025					< 0.00005			< 0.00005	< 0.00005	0.00007	< 0.00005	<0.00005	<0.00005						
tin	mg/L	-	-		< 0.1		< 0.1	<0.05					< 0.001			< 0.001	< 0.001	< 0.001	< 0.001	<0.001	<0.001						
titanium	mg/L	-	-		< 0.5		< 0.5	<0.25					< 0.005			< 0.005	0.018	0.006	< 0.005	0.0084	<0.005						
TSS	mg/L	-	-	**Note:**	1500	**Note:**	3800	1400	**Note:**	**Note:**	**Note:**	**Note:**	290000	**Note:**	**Note:**	19000	24000	17000	1500	1100	97	**Note:**	**Note:**	**Note:**	**Note:**	**Note:**	**Note:**
turbidity	NTU	1	-	Insufficient	530	Insufficient	520	470	Insufficient	Insufficient	Insufficient	Insufficient	32000	Insufficient	Insufficient	11000	23000	18000	670	1100	49	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient
uranium	mg/L	0.02	[0.005]	water	< 0.01	water	< 0.01	**0.0089**	water	water	water	water	**0.0081**	water	water	0.0022	0.0016	0.0011	0.0009	0.00099	0.001	water	water	water	water	water	water
vanadium	mg/L	-	[0.006]		< 0.1		**0.092**	<0.25					< 0.0005			0.001	0.003	0.002	0.0006	<0.0005	<0.0005						
zinc	mg/L	5	[0.02]		< 0.5		< 0.5	<0.25					< 0.005			< 0.005	0.006	0.005	0.007	<0.005	0.014						

NOTES:
Shaded area indicates an exceedance of the MOE Ontario Drinking Water Standard (June 2006) for that specific parameter.
Bolded areas indicate an exceedance of the MOE Provincial Water Quality Objectives (July 1994) for that specific parameter.
[ ] indicate interim PWQO concentration
a = interim PWQO at pH > 6.5 to 9.0 measured in clay-free samples.
b = interim PWQO if hardness greater than 20 mg/L.
c = interim PWQO if hardness greater than 80 mg/L.
d = Local Medical Officer of Health should be notified when sodium concentrations exceed 20 mg/L so that this information may be communicated to local physicians for their use with patients on sodium reduced diets.
(1) Sample bottle contained visible sediment. Results may be biased high due to analyte present in sediment.

TABLE D.1
Summary of Groundwater Quality in On-Site Monitoring Wells
Tansley Quarry, Burlington, Ontario

Parameter	Units	ODWS (June 2006)	PWQO (July 1994)	MW-07 shallow						MW-07 deep					
				Oct-08	Nov-09	Oct-10	Nov-11	Nov-12	Nov-13	Oct-08	Dec-09	Oct-10	Nov-11	Nov-12	Nov-13
aluminum	mg/L	0.1	[0.075] a	**0.1**	**0.38**	**0.94**	0.049	**0.12**	<0.005	< 0.3	< 0.1	< 0.1	< 0.3	**0.13**	<0.1
alkalinity	mg $CaCO_3$/L	30-500	-	502	559	569	569	570	550	33	35	32	33	45	41
ammonia as N	mg/L	-	-	0.65	0.56	0.47	0.32	0.28	0.20	19	18	19	19	22	19
antimony	mg/L	-	[0.02]	0.0009	< 0.0005	0.0008	0.0005	<0.00050	<0.0005	< 0.03	< 0.01	< 0.01	< 0.03	<0.01	<0.01
arsenic	mg/L	0.025	[0.005]	0.005	0.003	0.003	< 0.001	<0.0010	0.0034	< 0.05	< 0.02	< 0.02	< 0.05	<0.04	**0.025**
barium	mg/L	1	-	0.059	0.055	0.066	0.044	0.034	0.034	< 0.3	< 0.1	< 0.1	< 0.1	0.055	0.04
beryllium	mg/L	-	1.1	< 0.0005	< 0.0005	< 0.0005	< 0.0005	<0.00050	<0.0005	< 0.03	< 0.01	< 0.01	< 0.03	<0.01	<0.01
bismuth	mg/L	-	-	< 0.001	< 0.001	< 0.001	< 0.001	<0.0010	<0.001	< 0.05	< 0.02	< 0.02	< 0.05	<0.02	<0.02
boron	mg/L	5	0.2	**3.3**	**4.3**	**4.5**	**4.5**	**5.8**	**7.9**	**7.6**	**6.6**	**6.3**	**6.1**	**6.6**	**8.5**
bromide	mg/L	-	-	< 1	< 1	< 1	< 1	<1.0	<1.0	205	203	182	224	320	210
cadmium	mg/L	0.005	0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0001	<0.00010	<0.0001	< 0.005	< 0.002	< 0.002	< 0.005	<0.0020	<0.002
calcium	mg/L	-	-	70	66	72	65	66	54	3200	3000	2900	2900	3700	3000
chloride	mg/L	250	-	20	23	22	18	23	34	17500	17800	16000	18100	24000	18000
chromium	mg/L	0.05	-	< 0.005	< 0.005	< 0.005	< 0.005	<0.0050	<0.005	< 0.3	< 0.1	< 0.1	< 0.3	<0.1	<0.1
cobalt	mg/L	-	0.0009	**0.026**	**0.013**	**0.005**	**0.0085**	**0.0037**	0.00078	< 0.03	< 0.01	< 0.01	< 0.03	<0.01	<0.01
copper	mg/L	1	[0.005] b	< 0.001	0.001	0.002	< 0.001	<0.0010	<0.001	< 0.05	< 0.02	< 0.02	< 0.05	<0.02	<0.02
fluoride	mg/L	1.5 - 2.4	-	0.4	0.5	0.3	0.3	0.33	0.34	0.2	0.3	0.2	0.2	0.19	0.24
free cyanide	mg/L	0.2	0.005	< 0.002	< 0.002	< 0.002	< 0.002	<0.0020	<0.0020	< 0.002	< 0.002	< 0.002	< 0.002	<0.0020	<0.0020
hardness	mg $CaCO_3$/L	80-100	-	690	630	590	630	610	500	11000	10000	10000	10000	13000	11000
iron	mg/L	0.3	0.3	**1**	**0.8**	**1.6**	0.12	0.11	0.3	**6.5**	**6**	**5.1**	< 5	**5.1**	<2
lead	mg/L	0.01	[0.005] c	< 0.0005	0.0006	0.0014	< 0.0005	<0.00050	<0.0005	< 0.03	< 0.01	< 0.01	< 0.03	<0.01	**0.019**
magnesium	mg/L	-	-	120	110	99	110	110	88	830	750	750	750	940	770
manganese	mg/L	0.05	-	0.22	0.18	0.3	0.16	0.092	0.1	1.6	1.5	1.4	1.4	1.7	1.5
mercury	mg/L	0.001	0.0002	**0.0017 (1)**	**0.0022**	< 0.0015 (1)	< 0.0001		<0.00010	< 0.0001	< 0.0001	< 0.0001	< 0.0001	<0.00010	<0.00010
molybdenum	mg/L	-	0.04	0.011	0.007	0.007	0.0066	0.0062	0.0092	< 0.05	< 0.02	< 0.02	< 0.03	0.018	0.015
nickel	mg/L	-	0.025	0.004	0.003	0.003	0.001	0.0016	<0.001	< 0.05	< 0.02	< 0.02	< 0.05	**0.027**	<0.02
nitrate as N	mg/L	10	-	< 0.1	< 0.1	< 0.1	< 0.1	<0.10	<0.10	< 0.1	< 0.1	< 0.1	< 0.1	<0.10	<0.10
nitrite as N	mg/L	1	-	< 0.01	0.06	0.09	0.01	<0.010	0.023	< 0.01	< 0.01	< 0.01	< 0.1	<0.10	0.017
pH	pH Units	6.5-8.5	6.5-8.5	**8.6**	7.6	7.79	7.7	7.92	7.74	7.4	7.0	7.0	7.0	6.58	6.90
phenol	mg/L	-	0.005	< 0.001	< 0.001	< 0.001	< 0.001	<0.0010	<0.0010	< 0.001	< 0.001	< 0.001	**0.03**	0.0025	**0.035**
phosphate	mg/L	-	-	< 0.01	0.01	0.01	0.01	<0.010	<0.010	< 0.01	< 0.01	< 0.01	< 0.01	<0.010	<0.010
phosphorous	mg/L	-	-	< 0.1	< 0.1	0.12	< 0.1	<0.1	<0.1	< 5	< 2	< 2	< 5	<2	<2
total phosphorous	mg/L	-	0.01	**22**	**32**	**25**	**9.9**	**1.8**	**4.2**	**0.28**	**0.14**	< 0.2 (1)	< 2	<5	**0.32**
potassium	mg/L	-	-	8.1	7.4	7	6.5	6.5	6.2	160	140	140	140	170	150
selenium	mg/L	0.01	0.1	< 0.002	< 0.002	< 0.002	< 0.002	<0.0020	<0.002	< 0.1	< 0.04	< 0.04	< 0.1	<0.08	<0.08
silicon	mg/L	-	-	9.5	9.5	10	8.7	9.3	8.5	4.6	5	5.5	< 3	4.6	4.3
silver	mg/L	-	0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	<0.00010	<0.0001	< 0.005	< 0.002	< 0.002	< 0.005	<0.0020	<0.002
sodium	mg/L	200 d	-	83	70	95	83	90	110	8000	6700	6600	6800	8500	6900
strontium	mg/L	-	-	3.8	3.5	3.6	2.9	2.6	2.7	63	63	60	64	80	64
sulphide	mg/L	0.05	-	< 0.02	0.08	0.1	0.02	0.027	0.036	< 0.02	0.02	< 0.02	< 0.02	<0.020	0.023
sulphate	mg/L	500	-	202	193	181	182	170	160	1470	1550	1620	1560	1500	1500
thallium	mg/L	-	0.0003	< 0.00005	< 0.00005	0.00005	< 0.00005	<0.000050	<0.00005	< 0.003	< 0.001	< 0.001	< 0.003	<0.0010	<0.001
tin	mg/L	-	-	< 0.001	< 0.001	< 0.001	< 0.001	<0.0010	<0.001	< 0.05	< 0.02	< 0.02	< 0.05	<0.02	<0.02
titanium	mg/L	-	-	< 0.005	0.010	0.024	< 0.005	0.013	<0.005	< 0.3	< 0.1	< 0.1	< 0.3	<0.1	<0.1
TSS	mg/L	-	-	46000	84000	91000	10000	2200	5800	400	460	150	310	2100	210
turbidity	NTU	1	-	36000	100000	63000	14000	770	250	310	210	91	330	210	170
uranium	mg/L	0.02	[0.005]	**0.0079**	**0.0059**	**0.01**	**0.0065**	**0.0063**	**0.007**	< 0.005	< 0.002	< 0.002	< 0.005	0.0049	**0.0068**
vanadium	mg/L	-	[0.006]	0.001	0.002	0.004	< 0.0005	0.00059	0.001	< 0.05	< 0.02	< 0.02	< 0.03	<0.02	**0.027**
zinc	mg/L	5	[0.02]	< 0.005	< 0.005	0.005	< 0.005	<0.0050	<0.005	< 0.3	< 0.1	< 0.1	< 0.3	<0.1	<0.1

NOTES:
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Bolded areas indicate an exceedance of the MOE Provincial Water Quality Objectives (July 1994) for that specific parameter.
[ ] indicate interim PWQO concentration
a = interim PWQO at pH > 6.5 to 9.0 measured in clay-free samples.
b = interim PWQO if hardness greater than 20 mg/L.
c = interim PWQO if hardness greater than 80 mg/L
d = Local Medical Office of Health should be notified when sodium concentrations exceed 20 mg/L so that this information may be communicated to local physicians for their use with patients on sodium reduced diets.
(1) Sample bottle contained visible sediment. Results may be biased high due to analyte present in sediment.

TABLE D.1
Summary of Groundwater Quality in On-Site Monitoring Wells
Tansley Quarry, Burlington, Ontario

Parameter	Units	ODWS (June 2006)	PWQO (July 1994)	MW-08 shallow						MW-08 intermediate								MW-08 deep					
				Oct-08	Nov-09	Oct-10	Nov-11	Nov-12	Nov-13	Oct-08	Nov-09	Oct-10	Oct-10 DUP 1	Nov-11	Nov-11 DUP 1	Nov-12	Nov-13	Oct-08	Dec-09	Oct-10	Nov-11	Nov-12	Nov-13
aluminum	mg/L	0.1	[0.075] a	**0.31**	**0.24**	0.042	0.028	**0.15**	<0.005	< 0.05	0.013	0.065	< 0.05	**0.08**	**0.12**	0.057	<0.025	0.005	< 0.005	< 0.3	**0.47**	<0.0050	<0.005
alkalinity	mg $CaCO_3$/L	30-500	-	525	549	545	553	580	570	102	146	139	145	163	168	150	140	414	412	59	67	440	420
ammonia as N	mg/L	-	-	0.87	0.55	0.38	0.09	1.3	0.46	4.5	5.5	5.6	5	6.1	5.8	5.8	5.2	1.9	2.3	39	35	0.10	2.3
antimony	mg/L	-	[0.02]	0.0015	0.0005	0.0007	0.0005	<0.00050	<0.0005	< 0.005	< 0.0005	< 0.005	< 0.005	< 0.005	< 0.005	<0.0025	<0.0025	< 0.0005	< 0.0005	< 0.03	< 0.03	<0.00050	<0.0005
arsenic	mg/L	0.025	[0.005]	0.004	0.002	0.002	0.001	0.0019	0.0013	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	<0.01	**0.0064**	**0.006**	< 0.005	< 0.05	< 0.05	<0.0010	0.0012
barium	mg/L	1	-	0.025	0.019	0.019	0.024	0.051	0.028	< 0.05	0.011	< 0.05	< 0.05	< 0.02	< 0.02	0.023	0.014	0.012	0.013	< 0.3	0.12	0.015	0.014
beryllium	mg/L	-	1.1	< 0.0005	< 0.0005	< 0.0005	< 0.0005	<0.00050	<0.0005	< 0.005	< 0.0005	< 0.005	< 0.005	< 0.005	< 0.005	<0.0025	<0.0025	< 0.0005	< 0.0005	< 0.03	< 0.03	<0.00050	<0.0005
bismuth	mg/L	-	-	< 0.001	< 0.001	< 0.001	< 0.001	<0.0010	<0.001	< 0.01	< 0.001	< 0.01	< 0.01	< 0.01	< 0.01	<0.0050	<0.005	< 0.001	< 0.001	< 0.05	< 0.05	<0.0010	<0.001
boron	mg/L	5	0.2	**2.4**	**1.5**	**1.7**	**1.2**	**1.4**	**1.5**	**6.8**	**6.1**	**6.1**	**6.3**	**6.1**	**6**	**6.3**	**6.3**	**3.7**	**4.5**	**4.7**	**5.3**	**3.4**	**3.5**
bromide	mg/L	-	-	< 1	< 1	< 1	< 1	<5.0	<1.0	23	23	23	29	23	21	60	32	< 1	3	< 500	523	<5.0	3.1
cadmium	mg/L	0.005	0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0001	<0.00010	<0.0001	< 0.001	< 0.0001	< 0.001	< 0.001	< 0.001	< 0.001	<0.00050	<0.0005	< 0.0001	< 0.0001	< 0.005	< 0.005	**0.0021**	**0.00067**
calcium	mg/L	-	-	150	110	120	93	110	100	460	450	530	530	450	440	1100	560	110	290	5300	7900	110	100
chloride	mg/L	250	-	13	13	13	10	16	11	2110	2100	2240	2150	1710	1730	4100	2400	49	213	48500	41500	220	240
chromium	mg/L	0.05	-	< 0.005	< 0.005	< 0.005	< 0.005	<0.0050	0.0052	< 0.05	< 0.005	< 0.05	< 0.05	< 0.05	< 0.05	<0.025	<0.025	< 0.005	< 0.005	< 0.3	< 0.3	<0.0050	<0.005
cobalt	mg/L	-	0.0009	**0.048**	**0.016**	**0.0087**	**0.0069**	**0.0021**	**0.0015**	**0.015**	**0.0077**	< 0.005	< 0.005	< 0.005	< 0.005	<0.0025	<0.0025	**0.0057**	**0.0016**	< 0.03	< 0.03	**0.0017**	<0.0005
copper	mg/L	1	[0.005] b	< 0.001	< 0.001	< 0.001	< 0.001	<0.0010	<0.001	< 0.01	< 0.001	< 0.01	< 0.01	< 0.01	< 0.01	**0.0062**	<0.005	< 0.001	< 0.001	< 0.05	< 0.1	0.0014	<0.001
fluoride	mg/L	1.5 - 2.4	-	0.2	0.3	0.2	0.3	0.24	0.23	0.5	0.4	0.4	0.4	0.4	0.5	0.42	0.45	0.3	0.3	< 0.1	< 0.1	0.28	0.27
free cyanide	mg/L	0.2	0.005	< 0.002	< 0.002	< 0.002	< 0.002	<0.0020	<0.0020	< 0.002	< 0.002	< 0.002	<0.002	< 0.002	< 0.002	<0.0020	<0.0020	< 0.002	< 0.002	< 0.002	< 0.002	<0.0020	<0.0020
hardness	mg $CaCO_3$/L	80-100	-	1100	940	990	880	980	910	1700	1700	2000	2000	1700	1700	4100	2100	620	1300	18000	27000	660	600
iron	mg/L	0.3	0.3	**0.87**	**0.4**	**0.54**	0.21	**1.3**	**0.34**	< 1	**1**	< 1	< 1	< 1	**1.1**	**2.7**	**1.3**	**0.74**	**0.7**	**8**	**18**	<0.1	<0.1
lead	mg/L	0.01	[0.005] c	< 0.0005	< 0.0005	< 0.0005	< 0.0005	<0.00050	<0.0005	< 0.005	< 0.0005	< 0.005	< 0.005	< 0.005	< 0.005	<0.0025	<0.0025	< 0.0005	< 0.0005	< 0.03	< 0.03	<0.00050	<0.0005
magnesium	mg/L	-	-	190	160	170	160	170	160	140	140	160	160	140	140	320	160	86	130	1200	1800	96	85
manganese	mg/L	0.05	-	0.29	0.16	0.17	0.11	0.22	0.21	0.2	0.19	0.21	0.22	0.19	0.19	0.56	0.24	0.1	0.15	2.6	4.2	0.063	0.01
mercury	mg/L	0.001	0.0002	**0.0036 (1)**	**0.002**	0.0001	< 0.0001	<0.00010	<0.00010	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	<0.00010	<0.00010	< 0.0001	< 0.0001	< 0.0015 (1)	< 0.0001	<0.00010	<0.00010
molybdenum	mg/L	-	0.04	0.005	0.005	0.005	0.0044	0.0038	0.0036	< 0.01	0.007	< 0.01	< 0.01	0.006	0.006	0.0056	0.0064	0.004	0.006	< 0.05	< 0.03	0.0048	0.0046
nickel	mg/L	-	0.025	0.006	0.004	0.002	0.002	0.0021	<0.001	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	<0.0050	<0.005	0.003	< 0.001	< 0.05	< 0.05	0.0099	0.0032
nitrate as N	mg/L	10	-	< 0.1	< 0.1	< 0.1	0.3	<0.10	<0.10	< 0.1	< 0.1	< 0.1	0.1	< 0.1	< 0.1	<0.10	<0.10	< 0.1	< 0.1	< 0.1	< 0.1	1.6	1.7
nitrite as N	mg/L	1	-	0.01	< 0.01	0.02	< 0.01	<0.010	0.065	< 0.01	< 0.01	< 0.01	0.01	0.03	0.04	0.038	<0.010	< 0.01	0.01	0.05	< 0.1	0.066	0.035
pH	pH Units	6.5-8.5	6.5-8.5	8.3	7.7	7.69	7.65	7.81	7.71	7.9	7.8	7.55	7.59	7.64	7.58	7.59	7.59	8.1	7.9	6.76	6.75	7.89	8.01
phenol	mg/L	-	0.005	< 0.001	< 0.001	< 0.001	< 0.001	<0.0010	<0.0010	< 0.001	< 0.001	< 0.001	< 0.001	0.005	0.004	<0.0010	0.0030	< 0.001	< 0.001	< 0.001	**0.26**	<0.0010	0.0025
phosphate	mg/L	-	-	< 0.01	< 0.01	< 0.01	< 0.01	<0.010	<0.010	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.01	<0.010	<0.010	< 0.01	< 0.01	< 0.01	< 0.01	<0.010	<0.010
phosphorous	mg/L	-	-	< 0.1	< 0.1	< 0.1	< 0.1	<0.1	<0.1	< 1	< 0.1	< 1	< 1	< 1	< 1	<0.5	<0.5	< 0.1	< 0.1	< 5	< 5	<0.1	<0.1
total phosphorous	mg/L	-	0.01	**76**	**110**	**6.7**	**3.9**	**7.7**	**7.8**	**0.051**	**0.04**	**0.03**	< 0.02	< 0.5	< 0.02	**0.6**	**0.069**	**0.062**	**0.04**	**8**	< 5	**0.035**	**0.099**
potassium	mg/L	-	-	20	16	16	13	15	14	45	44	46	47	42	41	62	47	24	31	190	270	28	25
selenium	mg/L	0.01	0.1	< 0.002	< 0.002	< 0.002	0.003	<0.0020	<0.002	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	<0.02	0.016	< 0.002	< 0.01	**0.14**	< 0.2	<0.0020	<0.002
silicon	mg/L	-	-	9.7	8.0	7.7	7.0	7.7	7.5	4.2	3.8	3.9	4	4	4.9	5	4.2	6.1	5.6	< 3	3.6	6	5.7
silver	mg/L	-	0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	<0.00010	<0.0001	< 0.001	< 0.0001	< 0.001	< 0.001	< 0.001	< 0.001	<0.00050	<0.0005	< 0.0001	< 0.0001	< 0.005	< 0.005	<0.00010	<0.0001
sodium	mg/L	200 d	-	95	92	90	78	84	78	1200	1200	1300	1400	1100	1100	2500	1300	120	620	10000	16000	220	200
strontium	mg/L	-	-	15	10	12	8.1	9.4	9.4	12	12	13	13	12	12	26	15	16	12	110	170	16	16
sulphide	mg/L	0.05	-	0.12	0.31	< 0.02	< 0.02	0.48	0.28	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	<0.020	<0.020	< 0.02	< 0.02	0.13	< 0.02	<0.020	<0.020
sulphate	mg/L	500	-	706	631	576	423	560	550	1040	1040	1010	1010	965	976	1000	1000	413	522	1180	1130	430	430
thallium	mg/L	-	0.0003	< 0.00005	< 0.00005	< 0.00005	< 0.00005	<0.000050	<0.00005	< 0.0005	< 0.00005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	<0.00025	<0.00025	< 0.00005	< 0.00005	< 0.003	< 0.003	<0.000050	<0.00005
tin	mg/L	-	-	< 0.001	< 0.001	< 0.001	< 0.001	<0.0010	<0.001	< 0.01	< 0.001	< 0.01	< 0.01	< 0.01	< 0.01	<0.0050	<0.005	< 0.001	< 0.001	< 0.05	< 0.05	<0.0010	<0.001
titanium	mg/L	-	-	0.011	0.008	< 0.005	< 0.005	0.0065	<0.005	< 0.05	< 0.005	< 0.05	< 0.05	< 0.05	< 0.05	<0.025	<0.025	< 0.005	< 0.005	< 0.3	< 0.3	<0.0050	<0.005
TSS	mg/L	-	-	130000	130000	9000	5700	5200	12000	92	60	27	26	32	29	4000	170	32	22	44000	9100	27	69
turbidity	NTU	1	-	75000	140000	14000	710	2500	1100	64	48	14	22	30	21	1000	73	12	25	96000	1900	29	12
uranium	mg/L	0.02	[0.005]	**0.0056**	**0.01**	**0.008**	**0.011**	**0.0095**	**0.0093**	< 0.001	0.0001	< 0.001	< 0.001	< 0.001	< 0.001	0.0011	<0.0005	0.0025	0.0034	< 0.005	< 0.005	0.00076	0.00096
vanadium	mg/L	-	[0.006]	0.002	< 0.001	< 0.001	0.0007	0.00059	0.0013	< 0.01	< 0.005	< 0.01	< 0.01	< 0.005	< 0.005	<0.0050	**0.0096**	< 0.001	< 0.005	**0.14**	< 0.1	<0.00050	<0.0005
zinc	mg/L	5	[0.02]	< 0.03	< 0.005	< 0.005	< 0.005	<0.0050	0.0094	< 0.05	0.006	< 0.05	< 0.05	< 0.05	< 0.05	<0.025	<0.025	0.006	< 0.005	< 0.3	< 0.3	0.02	0.017

NOTES:

Shaded area indicates an exceedance of the MOE Ontario Drinking Water Standard (June 2006) for that specific parameter.
Bolded areas indicate an exceedance of the MOE Provincial Water Quality Objectives (July 1994) for that specific parameter.
[   ] indicate interim PWQO concentration
a = interim PWQO at pH > 6.5 to 9.0 measured in clay-free samples.
b = interim PWQO if hardness greater than 20 mg/L.
c = interim PWQO if hardness greater than 80 mg/L
d = Local Medical Office of Health should be notified when sodium concentrations exceed 20 mg/L so that this information may be communicated to local physicians for their use with patients on sodium reduced diets.
(1) Sample bottle contained visible sediment. Results may be biased high due to analyte present in sediment.

TABLE D.1
Summary of Groundwater Quality in On-Site Monitoring Wells
Tansley Quarry, Burlington, Ontario

Parameter	Units	ODWS (June 2006)	PWQO (July 1994)	MW-09 shallow						MW-09 intermediate						MW-09 deep					
				Oct-08	Nov-09	Oct-10	Nov-11	Nov-12	Nov-13	Oct-08	Nov-09	Oct-10	Nov-11	Nov-12	Nov-13	Oct-08	Nov-09	Oct-10	Nov-11	Nov-12	Nov-13
aluminum	mg/L	0.1	[0.075] a	**0.16**	0.070	0.020	0.029	0.064	<0.005	0.066	**0.61**	0.056	0.072	**0.12**	<0.005				< 0.3	<0.25	<0.25
alkalinity	mg CaCO$_3$/L	30-500	-	401	438	412	398	390	420	175	305	261	239	220	240				52	52	41
ammonia as N	mg/L	-	-	0.38	0.10	0.17	0.36	0.39	0.20	2	2.5	2.2	1.7	2.6	3.3				40	36	39
antimony	mg/L	-	[0.02]	0.0006	< 0.0005	0.0012	< 0.0005	<0.00050	<0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	<0.00050	<0.0005				< 0.03	<0.025	<0.025
arsenic	mg/L	0.025	[0.005]	0.004	0.001	0.002	0.001	0.0017	0.0017	0.002	0.004	0.003	0.002	0.0030	0.0026				< 0.05	<0.05	<0.1
barium	mg/L	1	-	0.058	0.061	0.061	0.06	0.067	0.064	0.058	0.067	0.04	0.065	0.041	0.05				0.13	0.14	0.12
beryllium	mg/L	-	1.1	< 0.0005	< 0.0005	< 0.0005	< 0.0005	<0.00050	<0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	<0.00050	<0.0005				< 0.03	<0.025	<0.025
bismuth	mg/L	-	-	< 0.001	< 0.001	< 0.001	< 0.001	<0.0010	<0.001	< 0.001	< 0.001	< 0.001	< 0.001	<0.0010	<0.001				< 0.05	<0.05	<0.05
boron	mg/L	5	0.2	**0.46**	**0.48**	**0.54**	**2.6**	**1.3**	**0.53**	**2.8**	**2.5**	**3.4**	**4.8**	**5.1**	**4.4**				**5.9**	**4.9**	**4.9**
bromide	mg/L	-	-	< 1	< 1	< 1	< 1	<1.0	<1.0	2	1	2	3	<10	2.5				696	590	690
cadmium	mg/L	0.005	0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0001	<0.00010	<0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	<0.00010	<0.0001				< 0.005	<0.005	<0.005
calcium	mg/L	-	-	56	60	59	51	51	55	110	85	140	190	140	120				8100	8600	8700
chloride	mg/L	250	-	6	10	10	12	10	6.5	142	115	196	252	290	210				46900	52000	53000
chromium	mg/L	0.05	-	< 0.005	< 0.005	< 0.005	< 0.005	<0.0050	<0.005	< 0.005	< 0.005	< 0.005	< 0.005	<0.0050	<0.005				< 0.3	<0.25	<0.25
cobalt	mg/L	-	0.0009	**0.011**	**0.0098**	**0.0014**	**0.0048**	**0.0013**	<0.0005	**0.022**	**0.014**	**0.0049**	**0.0028**	**0.0024**	<0.0005				< 0.03	<0.025	<0.025
copper	mg/L	1	[0.005] b	< 0.001	< 0.001	< 0.001	< 0.001	<0.0010	<0.001	< 0.001	< 0.001	< 0.001	< 0.001	<0.0010	<0.001				< 0.1	<0.05	<0.05
fluoride	mg/L	1.5 - 2.4	-	0.3	0.2	0.2	0.2	0.27	0.22	0.4	0.5	0.3	0.4	0.44	0.38	**NOT SAMPLED**	**NOT SAMPLED**	**NOT SAMPLED**	< 0.1	<0.10	<0.10
free cyanide	mg/L	0.2	0.005	< 0.002	< 0.002	< 0.002	< 0.002	<0.0020	<0.0020	< 0.002	< 0.002	< 0.002	< 0.002	<0.0020	<0.0020				< 0.002	<0.0020	<0.0020
hardness	mg CaCO$_3$/L	80-100	-	400	420	410	380	380	390	450	390	600	760	600	480				28000	29000	31000
iron	mg/L	0.3	0.3	0.12	< 0.1	< 0.1	0.22	<0.1	<0.1	**0.38**	**1**	**0.58**	**0.64**	**0.77**	0.2				**33**	**24**	**15**
lead	mg/L	0.01	[0.005] c	< 0.0005	< 0.0005	< 0.0005	< 0.0005	<0.00050	<0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	<0.00050	<0.0005				< 0.03	<0.025	<0.025
magnesium	mg/L	-	-	62	67	63	62	61	62	45	42	57	69	58	47				1900	1900	2100
manganese	mg/L	0.05	-	0.066	0.042	0.035	0.051	0.038	0.039	0.088	0.07	0.067	0.079	0.066	0.047				4.6	4.5	4.7
mercury	mg/L	0.001	0.0002	< 0.0015 (1)	< 0.0001	< 0.0001	< 0.0001	<0.00010	<0.00010	< 0.0015 (1)	< 0.0001	< 0.0001	< 0.0001	<0.00010	<0.00010				< 0.0001	<0.00010	<0.00010
molybdenum	mg/L	-	0.04	0.013	0.006	0.007	0.0091	0.0067	0.0054	0.008	0.005	0.007	0.0096	0.0097	0.009				< 0.03	0.038	0.029
nickel	mg/L	-	0.025	0.002	0.002	< 0.001	0.001	<0.0010	<0.001	0.003	0.004	< 0.001	< 0.001	<0.0010	<0.001				< 0.05	<0.05	**0.067**
nitrate as N	mg/L	10	-	0.2	2.1	0.4	0.2	0.13	0.31	< 0.1	< 0.1	< 0.1	1.8	0.14	0.18				< 0.1	<0.10	<0.10
nitrite as N	mg/L	1	-	0.05	< 0.01	0.04	0.03	0.012	0.018	< 0.01	< 0.01	0.02	0.44	0.053	0.070				< 0.1	<0.10	<0.010
pH	pH Units	6.5-8.5	6.5-8.5	8.2	7.9	7.87	7.85	8.01	7.95	8.2	7.8	7.81	7.77	7.84	7.86				6.84	**6.19**	**6.31**
phenol	mg/L	-	0.005	< 0.001	< 0.001	< 0.001	< 0.001	<0.0010	<0.0010	< 0.001	< 0.001	< 0.001	< 0.001	<0.0010	<0.0010				**0.08**	**0.070**	**0.025**
phosphate	mg/L	-	-	< 0.01	< 0.01	0.01	< 0.01	<0.010	<0.010	< 0.01	< 0.01	< 0.01	< 0.01	<0.010	<0.010				< 0.01	<0.010	<0.010
phosphorous	mg/L	-	-	< 0.1	< 0.1	< 0.1	< 0.1	<0.1	<0.1	< 0.1	< 0.1	< 0.1	< 0.1	<0.1	<0.1				< 5	<5	<5
total phosphorous	mg/L	-	0.01	**1.2**	**1.3**	**0.2**	**1.1**	**3.3**	**2.9**	**5.3**	**9**	**1.7**	**1.1**	**2.6**	**3.8**				< 0.1	**0.42**	**0.65 (1)**
potassium	mg/L	-	-	18	13	12	9.9	11	9.8	23	19	23	26	23	21				280	290	300
selenium	mg/L	0.01	0.1	< 0.002	< 0.002	< 0.002	< 0.002	<0.0020	<0.002	< 0.002	< 0.002	< 0.002	< 0.002	<0.0020	<0.002				< 0.2	<0.2	<0.2
silicon	mg/L	-	-	8.9	8.6	8.4	8.4	9.1	7.8	6.4	7.4	5.3	5.1	5.3	5.1				< 3	2.5	<2.5
silver	mg/L	-	0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	<0.00010	<0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	<0.00010	<0.0001				< 0.005	<0.005	<0.005
sodium	mg/L	200 d	-	35	36	35	39	35	33	150	110	210	290	240	180				17000	18000	19000
strontium	mg/L	-	-	7.3	5.2	6.4	5.9	7	6.5	14	14	17	19	18	17				160	180	180
sulphide	mg/L	0.05	-	< 0.02	< 0.02	< 0.02	< 0.02	<0.020	<0.020	< 0.02	0.06	< 0.02	< 0.02	<0.020	<0.020				< 0.02	<0.020	<0.020
sulphate	mg/L	500	-	70	70	68	59	50	67	299	254	385	468	560	400				1470	1300	1200
thallium	mg/L	-	0.0003	< 0.00005	< 0.00005	< 0.00005	< 0.00005	<0.000050	<0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	<0.000050	<0.00005				< 0.003	<0.0025	<0.0025
tin	mg/L	-	-	< 0.001	< 0.001	< 0.001	< 0.001	<0.0010	<0.001	< 0.001	< 0.001	< 0.001	< 0.001	<0.0010	<0.001				< 0.05	<0.05	<0.05
titanium	mg/L	-	-	0.006	< 0.005	< 0.005	< 0.005	0.0089	<0.005	< 0.005	0.012	< 0.005	< 0.005	<0.0050	<0.005				< 0.3	<0.25	<0.25
TSS	mg/L	-	-	1200	560	180	4900	4500	4800	8900	16000	3300	3100	2700	5500	**Note:** Insufficient water	**Note:** Insufficient water	**Note:** Insufficient water	390	260	1000
turbidity	NTU	1	-	3100	2400	330	3200	2000	430	11000	20000	3400	920	470	690				150	38	320
uranium	mg/L	0.02	[0.005]	**0.0052**	0.0035	0.0032	0.0023	0.0021	0.0026	0.0008	0.0003	0.0004	0.0008	0.00078	0.001				< 0.005	**0.011**	**0.019**
vanadium	mg/L	-	[0.006]	0.001	0.001	< 0.001	< 0.0005	0.0011	0.00096	0.002	0.001	< 0.001	< 0.0005	0.0010	0.00054				< 0.05	<0.05	<0.05
zinc	mg/L	5	[0.02]	0.006	0.006	< 0.005	< 0.005	<0.0050	<0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.0057	<0.005				< 0.3	<0.25	**0.43**

NOTES:
Shaded area indicates an exceedance of the MOE Ontario Drinking Water Standard (June 2006) for that specific parameter.
Bolded areas indicate an exceedance of the MOE Provincial Water Quality Objectives (July 1994) for that specific parameter.
[ ] indicate interim PWQO concentration
a = interim PWQO at pH > 6.5 to 9.0 measured in clay-free samples.
b = interim PWQO if hardness greater than 20 mg/L.
c = interim PWQO if hardness greater than 80 mg/L
d = Local Medical Office of Health should be notified when sodium concentrations exceed 20 mg/L so that this information may be communicated to local physicians for their use with patients on sodium reduced diets.
(1) Sample bottle contained visible sediment. Results may be biased high due to analyte present in sediment.

TABLE D.1
Summary of Groundwater Quality in On-Site Monitoring Wells
Tansley Quarry, Burlington, Ontario

Parameter	Units	ODWS (June 2006)	PWQO (July 1994)	MW-10 shallow						MW-10 intermediate						MW-10 deep					
				Oct-08	Nov-09	Oct-10	Nov-11	Nov-12	Nov-13	Oct-08	Nov-09	Oct-10	Nov-11	Nov-12	Nov-13	Oct-08	Dec-09	Oct-10	Nov-11	Nov-12	Nov-13
aluminum	mg/L	0.1	[0.075] a	**1.2**	**0.66**	**0.17**	0.031	0.045	<0.005	**4.8**	**0.41**	0.027	0.008	**0.36**	<0.005	NOT SAMPLED	NOT SAMPLED	NOT SAMPLED	< 0.3	<0.25	**0.46**
alkalinity	mg CaCO$_3$/L	30-500	-	396	475	472	485	490	490	381	394	400	416	410	420				40	66	39
ammonia as N	mg/L	-	-	1.4	0.47	0.43	0.13	0.42	0.13	1.9	1.6	0.92	0.82	0.99	0.96				34	28	34
antimony	mg/L	-	[0.02]	0.0014	0.0007	0.0009	< 0.0005	<0.00050	<0.0005	0.001	< 0.0005	< 0.0005	< 0.0005	<0.0005	<0.0005				< 0.03	<0.025	<0.025
arsenic	mg/L	0.025	[0.005]	0.004	0.003	0.004	0.003	0.0020	0.0023	0.005	0.004	0.004	0.004	0.005	0.0046				< 0.05	<0.05	<0.05
barium	mg/L	1	-	0.088	0.093	0.09	0.044	0.065	0.054	0.073	0.063	0.078	0.068	0.077	0.068				0.12	<0.1	0.11
beryllium	mg/L	-	1.1	< 0.0005	< 0.0005	< 0.0005	< 0.0005	<0.00050	<0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	<0.0005	<0.0005				< 0.03	<0.025	<0.025
bismuth	mg/L	-	-	< 0.001	< 0.001	< 0.001	< 0.001	<0.0010	<0.001	< 0.001	< 0.001	< 0.001	< 0.001	<0.001	<0.001				< 0.05	<0.05	<0.05
boron	mg/L	5	0.2	**0.39**	0.17	0.17	0.11	0.13	0.097	**3.1**	**1.8**	**1.3**	**0.71**	**0.75**	**0.63**				**5.5**	**7.5**	**6.6**
bromide	mg/L	-	-	< 1	< 1	< 1	< 1	<1.0	<1.0	< 1	< 1	< 1	< 1	<1.0	<1.0				0.538	390	540
cadmium	mg/L	0.005	0.0005	< 0.0001	< 0.0001	0.0001	< 0.0001	<0.00010	<0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	<0.0001	<0.0001				< 0.005	<0.005	<0.005
calcium	mg/L	-	-	67	74	67	63	59	61	58	53	58	41	57	53				7100	4900	7500
chloride	mg/L	250	-	3	3	4	16	2.5	2.1	6	7	7	3	3	2.6				41700	36000	44000
chromium	mg/L	0.05	-	< 0.005	< 0.005	< 0.005	< 0.005	<0.0050	<0.005	< 0.005	< 0.005	< 0.005	< 0.005	<0.005	<0.005				< 0.3	<0.25	<0.25
cobalt	mg/L	-	0.0009	**0.025**	**0.027**	**0.0022**	**0.0046**	0.00085	<0.0005	**0.0065**	**0.011**	**0.0033**	< 0.005	0.00074	<0.0005				< 0.03	<0.025	<0.025
copper	mg/L	1	[0.005] b	0.001	0.002	0.001	< 0.001	<0.0010	<0.001	0.001	< 0.001	< 0.001	< 0.001	<0.001	<0.001				< 0.1	<0.05	<0.05
fluoride	mg/L	1.5 - 2.4	-	0.3	0.3	0.2	0.2	0.20	0.16	0.3	0.3	0.2	0.2	0.2	0.19				< 0.1	0.14	<0.10
free cyanide	mg/L	0.2	0.005	< 0.002	< 0.002	< 0.002	< 0.002	<0.0020	<0.0020	< 0.002	< 0.002	< 0.002	< 0.002	<0.0020	<0.0020				< 0.002	<0.0020	<0.0020
hardness	mg CaCO$_3$/L	80-100	-	450	510	480	500	480	480	330	310	370	340	380	360				25000	17000	26000
iron	mg/L	0.3	0.3	**0.97**	**1**	**0.73**	< 0.1	**0.64**	**0.36**	**3.2**	**0.6**	0.3	< 0.1	**0.51**	0.15				**28**	<5	**22**
lead	mg/L	0.01	[0.005] c	< 0.0005	0.0008	< 0.0005	< 0.0005	<0.00050	<0.0005	0.0011	< 0.0005	< 0.0005	< 0.0005	<0.0005	<0.0005				< 0.03	<0.025	<0.025
magnesium	mg/L	-	-	68	79	77	84	82	80	46	43	56	56	58	55				1700	1300	1800
manganese	mg/L	0.05	-	0.15	0.23	0.14	0.073	0.064	0.068	0.071	0.058	0.033	0.002	0.022	0.02				3.8	1.9	4.1
mercury	mg/L	0.001	0.0002	< 0.0015 (1)	< 0.0015	< 0.0001	< 0.0001	<0.00010	<0.00010	< 0.0015 (1)	< 0.0001	< 0.0001	< 0.0001	<0.00010	<0.00010				< 0.0001	<0.00010	<0.00010
molybdenum	mg/L	-	0.04	0.014	0.004	0.004	0.0025	0.0030	0.0022	0.006	0.004	0.003	0.0029	0.0026	0.0025				0.037	**0.24**	**0.078**
nickel	mg/L	-	0.025	0.004	0.006	0.001	< 0.001	<0.0010	<0.001	0.003	0.002	< 0.001	< 0.001	<0.001	<0.001				< 0.05	**0.12**	**0.063**
nitrate as N	mg/L	10	-	0.5	0.4	< 0.1	< 0.1	0.11	<0.10	< 0.1	< 0.1	< 0.1	0.7	0.36	0.72				0.1	<0.10	<0.10
nitrite as N	mg/L	1	-	0.02	0.03	0.05	< 0.01	<0.010	<0.010	< 0.01	0.06	0.08	0.1	0.14	0.14				< 0.1	<0.10	<0.010
pH	pH Units	6.5-8.5	6.5-8.5	8.5	7.8	7.7	7.83	7.98	7.94	8.5	7.7	7.8	7.83	7.96	7.88				6.6	8.22	6.65
phenol	mg/L	-	0.005	< 0.001	< 0.001	< 0.001	< 0.001	<0.0010	<0.0010	< 0.001	< 0.001	< 0.001	< 0.001	<0.0010	<0.0010				**0.05**	0.0022	<0.0010
phosphate	mg/L	-	-	< 0.01	< 0.01	< 0.01	< 0.01	<0.010	<0.010	< 0.01	< 0.01	< 0.01	< 0.01	<0.010	<0.010				< 0.01	<0.010	<0.010
phosphorous	mg/L	-	-	< 0.1	0.2	< 0.1	< 0.1	<0.1	<0.1	< 0.1	< 0.1	< 0.1	< 0.1	<0.1	<0.1				< 5	<5	<5
total phosphorous	mg/L	-	0.01	**64**	**98**	**29**	**11**	**57**	**3.3**	**13**	**10**	**0.4**	**2.4**	**1.8**	**1.6**				< 0.1	<0.10	**1.4**
potassium	mg/L	-	-	18	8.6	9.9	6.8	7.1	6.4	19	15	14	11	12	11				250	210	260
selenium	mg/L	0.01	0.1	< 0.002	< 0.002	< 0.002	< 0.002	<0.0020	<0.002	< 0.002	< 0.002	< 0.002	< 0.002	<0.002	<0.002				< 0.2	<0.1	<0.2
silicon	mg/L	-	-	13	10	9.1	9.3	9.5	8.8	17	7.2	7.4	8.4	9.5	8.5				< 3	<2.5	5.6
silver	mg/L	-	0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	<0.00010	<0.0001	0.0001	< 0.0001	< 0.0001	< 0.0001	<0.0001	<0.0001				< 0.005	<0.005	<0.005
sodium	mg/L	200 d	-	65	26	27	23	23	22	69	49	41	28	30	27				17000	13000	17000
strontium	mg/L	-	-	5.1	2.6	3.1	1.5	1.8	1.5	12	11	12	9.7	11	11				150	110	160
sulphide	mg/L	0.05	-	0.11	0.19	0.23	< 0.02	0.047	0.025	< 0.02	0.03	< 0.02	< 0.02	<0.020	<0.020				< 0.02	<0.020	<0.020
sulphate	mg/L	500	-	83	58	58	58	52	52	50	60	57	39	41	40				1360	1700	1400
thallium	mg/L	-	0.0003	< 0.00005	< 0.00005	0.00005	< 0.00005	<0.000050	<0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	<0.00005	<0.00005				< 0.003	<0.0025	<0.0025
tin	mg/L	-	-	< 0.001	< 0.001	< 0.001	< 0.001	<0.0010	<0.001	< 0.001	< 0.001	< 0.001	< 0.001	<0.001	<0.001				< 0.05	<0.05	<0.05
titanium	mg/L	-	-	0.041	0.011	< 0.005	< 0.005	<0.0050	<0.005	0.22	0.010	< 0.005	< 0.005	0.018	<0.005				< 0.3	<0.25	<0.25
TSS	mg/L	-	-	150000	94000	91000	10000	27000	5800	25000	6500	440	2700	1900	2400	**Note:** Insufficient water	**Note:** Insufficient water	**Note:** Insufficient water	770	150	4300
turbidity	NTU	1	-	50000	87000	94000	1500	1200	1900	9000	7500	340	540	500	440				280	41	260
uranium	mg/L	0.02	[0.005]	**0.011**	0.0044	0.0037	0.0018	0.0018	0.0016	0.0022	0.0011	0.0008	0.0004	0.00031	0.00029				< 0.005	<0.005	**0.017**
vanadium	mg/L	-	[0.006]	0.003	0.002	0.005	< 0.0005	<0.00050	<0.0005	**0.009**	0.001	< 0.001	0.0007	<0.0005	<0.0005				< 0.05	**0.036**	<0.05
zinc	mg/L	5	[0.02]	< 0.005	0.007	< 0.005	0.005	<0.0050	<0.005	0.006	< 0.005	< 0.005	< 0.005	<0.005	<0.005				< 0.3	<0.25	**0.61**

NOTES:
Shaded area indicates an exceedance of the MOE Ontario Drinking Water Standard (June 2006) for that specific parameter.
Bolded areas indicate an exceedance of the MOE Provincial Water Quality Objectives (July 1994) for that specific parameter.
[   ] indicate interim PWQO concentration
a = interim PWQO at pH > 6.5 to 9.0 measured in clay-free samples.
b = interim PWQO if hardness greater than 20 mg/L.
c = interim PWQO if hardness greater than 80 mg/L
d = Local Medical Office of Health should be notified when sodium concentrations exceed 20 mg/L so that this information may be communicated to local physicians for their use with patients on sodium reduced diets.
(1) Sample bottle contained visible sediment. Results may be biased high due to analyte present in sediment.

TABLE D.1
Summary of Groundwater Quality in On-Site Monitoring Wells
Tansley Quarry, Burlington, Ontario

Parameter	Units	ODWS (June 2006)	PWQO (July 1994)	MW-11 shallow						MW-11 intermediate						MW-11 deep					
				Oct-08	Dec-09	Oct-10	Nov-11	Nov-12	Nov-13	Oct-08	Dec-09	Oct-10	Nov-11	Nov-12	Nov-13	Oct-08	Dec-09	Oct-10	Nov-11	Nov-12	Nov-13
aluminum	mg/L	0.1	[0.075] a	**0.7**	**0.36**	**4.8**	0.049	0.068	<0.005	**0.13**	**0.13**	**0.078**	0.059	**0.25**	<0.005	NOT SAMPLED	NOT SAMPLED	< 0.3	< 0.3	<0.25	<0.25
alkalinity	mg CaCO$_3$/L	30-500	-	308	321	322	341	340	350	458	431	453	450	400	410			44	50	55	63
ammonia as N	mg/L	-	-	0.29	0.18	0.21	0.18	0.26	0.082	1.4	1.3	1.3	1.5	1.8	1.7			31	34	35	31
antimony	mg/L	-	[0.02]	< 0.0005	0.0006	0.0011	< 0.0005	0.00050	<0.0005	< 0.0005	< 0.0005	0.0006	< 0.0005	<0.00050	<0.0005			< 0.03	< 0.03	<0.025	<0.025
arsenic	mg/L	0.025	[0.005]	0.002	0.005	0.005	0.003	0.0021	0.0045	**0.012**	**0.01**	**0.012**	**0.011**	**0.0087**	**0.0072**			< 0.05	**0.054**	<0.05	<0.05
barium	mg/L	1	-	0.074	0.054	0.2	0.057	0.052	0.052	0.021	0.020	0.023	0.025	0.021	0.024			< 0.300	0.14	0.17	0.13
beryllium	mg/L	-	1.1	< 0.0005	< 0.0005	< 0.0005	< 0.0005	<0.00050	<0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	<0.00050	<0.0005			< 0.03	< 0.03	<0.025	<0.025
bismuth	mg/L	-	-	< 0.001	< 0.001	< 0.001	< 0.001	<0.0010	<0.001	< 0.001	< 0.001	< 0.001	< 0.001	<0.0010	<0.001			< 0.05	< 0.05	<0.05	<0.05
boron	mg/L	5	0.2	0.17	0.13	0.089	0.085	0.097	0.13	**1.3**	**1.7**	**1.2**	**1.5**	**1.6**	**2.6**			**4.8**	**4.7**	**5.6**	**5.5**
bromide	mg/L	-	-	< 1	< 1	1	< 1	<1.0	<1.0	< 1	< 1	< 1	< 1	<1.0	<1.0			500	500	580	460
cadmium	mg/L	0.005	0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0001	<0.00010	<0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	<0.00010	<0.0001			**0.019**	< 0.005	**0.011**	**0.0067**
calcium	mg/L	-	-	110	73	130	65	61	61	72	69	70	82	72	100			6300	7500	7800	6800
chloride	mg/L	250	-	7	14	3	2	2.6	2.5	9	11	9	10	15	26			35800	40700	47000	38000
chromium	mg/L	0.05	-	< 0.005	< 0.005	0.014	< 0.005	<0.0050	<0.005	< 0.005	< 0.005	< 0.005	< 0.005	<0.0050	<0.005			< 0.3	< 0.3	<0.25	<0.25
cobalt	mg/L	-	0.0009	**0.023**	**0.015**	**0.013**	**0.0021**	**0.0028**	<0.0005	**0.017**	**0.0013**	**0.0039**	**0.001**	<0.00050	<0.0005			< 0.03	< 0.03	<0.025	<0.025
copper	mg/L	1	[0.005] b	0.003	< 0.001	**0.013**	< 0.001	<0.0010	<0.001	< 0.001	< 0.001	< 0.001	< 0.001	<0.0010	<0.001			< 0.05	< 0.1	<0.05	<0.05
fluoride	mg/L	1.5 - 2.4	-	0.3	0.3	0.2	0.1	0.14	0.14	0.2	0.3	0.3	0.3	0.29	0.27			0.1	0.1	0.12	0.15
free cyanide	mg/L	0.2	0.005	< 0.002	< 0.002	< 0.002	< 0.002	<0.0020	<0.0020	< 0.002	< 0.002	< 0.002	< 0.002	<0.0020	<0.0020			< 0.002	< 0.002	<0.0020	<0.0020
hardness	mg CaCO$_3$/L	80-100	-	500	450	550	390	410	390	470	430	450	490	430	600			21000	26000	27000	24000
iron	mg/L	0.3	0.3	**1.4**	**0.7**	**7.6**	**0.63**	**0.42**	**0.51**	**0.86**	**0.8**	**0.83**	**0.69**	**0.84**	**1.1**			**21**	**21**	**12**	**7.1**
lead	mg/L	0.01	[0.005] c	0.0011	< 0.0005	**0.0051**	< 0.0005	<0.00050	<0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	<0.00050	<0.0005			< 0.03	< 0.03	<0.025	<0.025
magnesium	mg/L	-	-	57	65	58	54	62	57	71	62	66	70	61	84			1400	1800	1900	1800
manganese	mg/L	0.05	-	0.32	0.14	0.68	0.074	0.074	0.062	0.056	0.028	0.033	0.033	0.033	0.04			3.1	4	4	3.4
mercury	mg/L	0.001	0.0002	< 0.0015 (1)	**0.0003**	< 0.0001	< 0.0001	<0.00010	<0.00010	< 0.0015 (1)	< 0.0001	< 0.0001	< 0.0001	<0.00010	<0.00010			< 0.0001	< 0.0001	<0.00010	<0.00010
molybdenum	mg/L	-	0.04	0.022	0.009	0.002	0.0045	0.0027	0.0031	0.003	0.003	0.003	0.0035	0.0031	0.0032			< 0.05	< 0.03	**0.057**	**0.063**
nickel	mg/L	-	0.025	0.005	0.005	0.009	< 0.001	0.0011	<0.001		< 0.001	< 0.001	< 0.001	<0.0010	<0.001			< 0.05	< 0.05	**0.2**	**0.25**
nitrate as N	mg/L	10	-	< 0.1	< 0.1	< 0.1	< 0.1	<0.10	<0.10	< 0.1	< 0.1	< 0.1	< 0.1	<0.10	<0.10			< 0.1	< 0.1	<0.10	<0.10
nitrite as N	mg/L	1	-	< 0.01	0.03	0.02	0.02	<0.010	<0.010	< 0.01	< 0.01	< 0.01	< 0.01	<0.010	0.20			< 0.01	< 0.01	<0.10	<0.010
pH	pH Units	6.5-8.5	6.5-8.5	8.2	7.8	7.88	7.95	8.01	7.96	8.2	8.2	7.88	7.95	8.00	7.82			6.62	6.69	**6.14**	7.21
phenol	mg/L	-	0.005	< 0.001	< 0.001	< 0.001	< 0.001	<0.0010	<0.0010	< 0.001	< 0.001	< 0.001	< 0.001	<0.0010	<0.0010			< 0.001	**0.017**	**0.0091**	**0.0070**
phosphate	mg/L	-	-	< 0.01	< 0.01	< 0.01	< 0.01	<0.010	<0.010	< 0.01	< 0.01	< 0.01	< 0.01	<0.010	<0.010			< 0.01	< 0.01	<0.010	<0.010
phosphorous	mg/L	-	-	0.12	< 0.1	0.45	< 0.1	<0.1	<0.1	< 0.1	< 0.1	< 0.1	< 0.1	<0.1	<0.1			< 5	< 5	<5	<5
total phosphorous	mg/L	-	0.01	**50**	**100**	**19**	**2.4**	**2.6**	**7.7**	**3.3**	**0.6**	**0.22**	**1.6**	**10**	**1.6**			< 1 (1)	< 5	<0.20	**0.17**
potassium	mg/L	-	-	14	8.6	7.1	4.4	4.2	4	17	17	16	21	18	21			250	280	290	260
selenium	mg/L	0.01	0.1	< 0.002	< 0.002	< 0.002	< 0.002	<0.0020	<0.002	< 0.002	< 0.002	< 0.002	< 0.002	<0.0020	<0.002			**0.17**	< 0.2	<0.2	<0.1
silicon	mg/L	-	-	8.3	11	17	7.9	9.4	8.6	9.3	8.4	8.6	9.2	8.8	7.5			< 3	3.1	<2.5	<2.5
silver	mg/L	-	0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	<0.00010	<0.0001	< 0.0001	< 0.0001	< 0.0001	0.0001	<0.00010	<0.0001			< 0.005	< 0.005	<0.005	<0.005
sodium	mg/L	200 d	-	53	26	13	21	13	15	62	64	55	76	71	92			13000	16000	17000	16000
strontium	mg/L	-	-	1.2	0.98	1.2	1.1	1.1	1.2	11	10	11	11	10	14			130	150	160	140
sulphide	mg/L	0.05	-	< 0.02	0.16	0.17	0.06	0.042	0.057	< 0.02	< 0.02	< 0.02	< 0.02	0.021	<0.020			0.04	< 0.02	<0.020	<0.020
sulphate	mg/L	500	-	184	92	77	79	71	73	141	148	140	147	160	360			1390	1410	1300	1600
thallium	mg/L	-	0.0003	< 0.00005	< 0.00005	0.00006	< 0.00005	<0.000050	<0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	<0.000050	<0.00005			< 0.003	< 0.003	<0.0025	<0.0025
tin	mg/L	-	-	< 0.001	< 0.001	< 0.001	< 0.001	<0.0010	<0.001	< 0.001	< 0.001	< 0.001	< 0.001	<0.0010	<0.001			< 0.05	< 0.05	<0.05	<0.05
titanium	mg/L	-	-	0.006	0.010	0.160	< 0.005	<0.0050	<0.005	< 0.005	< 0.005	< 0.005	< 0.005	<0.0050	<0.005			< 0.3	< 0.300	<0.25	<0.25
TSS	mg/L	-	-	98000	190000	88000	2300	7100	11000	990	780	240	1900	14000	5900	**Note:** Insufficient water	**Note:** Insufficient water	680	1200	3000	170
turbidity	NTU	1	-	44000	130000	62000	840	1900	4700	510	520	210	410	900	800			760	140	320	15
uranium	mg/L	0.02	[0.005]	**0.011**	0.0046	0.0042	0.0033	0.0028	0.0024	0.0004	0.0003	0.0003	0.0004	0.00032	0.00034			**0.024**	**0.009**	**0.019**	**0.017**
vanadium	mg/L	-	[0.006]	0.002	0.005	**0.01**	0.0008	<0.00050	0.00051	< 0.001	< 0.001	< 0.001	< 0.0005	0.00053	0.00052			**0.11**	< 0.05	<0.05	<0.05
zinc	mg/L	5	[0.02]	0.007	< 0.005	**0.021**	< 0.005	<0.0050	<0.005	< 0.005	< 0.005	< 0.005	< 0.005	<0.0050	<0.005			< 0.3	< 0.3	<0.25	**0.36**

NOTES:
Shaded area indicates an exceedance of the MOE Ontario Drinking Water Standard (June 2006) for that specific parameter.
Bolded areas indicate an exceedance of the MOE Provincial Water Quality Objectives (July 1994) for that specific parameter.
[ ] indicate interim PWQO concentration
a = interim PWQO at pH > 6.5 to 9.0 measured in clay-free samples.
b = interim PWQO if hardness greater than 20 mg/L.
c = interim PWQO if hardness greater than 80 mg/L.
d = Local Medical Office of Health should be notified when sodium concentrations exceed 20 mg/L so that this information may be communicated to local physicians for their use with patients on sodium reduced diets.
(1) Sample bottle contained visible sediment. Results may be biased high due to analyte present in sediment.

TABLE D.2
Groundwater Quality in On-Site Monitoring Wells - Total Metals Analyses
Tansley Quarry Site, Burlington, Ontario

Parameter	Units	ODWS (June 2006)	PWQO (July 1994)	MW-01 shallow				MW-01 intermediate							MW-01 deep						
				Dec-10	Nov-11	Nov-12	Nov-13	Jan-07	Oct-08	Dec-09	Oct-10	Nov-11	Nov-12	Nov-13	Jan-07	Oct-08	Dec-09	Oct-10	Nov-11	Nov-12	Nov-13
aluminum	mg/L	0.1	[0.075] a	NOT SAMPLED **Note:** Insufficient water.	**7.2**	NOT SAMPLED **Note:** Insufficient water.	NOT SAMPLED **Note:** Insufficient water.	**180**	NOT SAMPLED **Note:** Insufficient water.	**360**	**60**	**66**	**15**	**31**	**5.9**	**5.9**	**6**	**6.2**	**3.4**	**0.29**	**57**
alkalinity	mg CaCO$_3$/L	30-500	-		366			-		459	-	443	410	440	-	-	36	-	35	99	40
ammonia as N	mg/L	-	-		< 0.05			-		-	-	0.13	0.24	<0.050	-	-	-	-	18	21	18
antimony	mg/L	-	[0.02]		0.0006			< 0.01		< 0.005	< 0.0005	< 0.003	<0.00050	<0.0005	< 0.05	< 0.005	< 0.01	0.005	< 0.01	<0.0050	<0.005
arsenic	mg/L	0.025	[0.005]		0.004			**0.093**		**0.140**	**0.028**	**0.034**	**0.0082**	0.017	< 0.05	**0.014**	< 0.03	< 0.05	< 0.03	<0.02	**0.045**
barium	mg/L	1	-		0.12			1.6		2.8	0.43	0.53	0.16	0.23	< 0.3	0.081	< 0.1	0.095	0.053	0.028	1
beryllium	mg/L	-	1.1		0.0006			0.012		0.021	0.0031	0.003	0.0012	0.0021	< 0.03	< 0.005	< 0.01	< 0.005	< 0.01	<0.0050	<0.005
bismuth	mg/L	-	-		< 0.001			< 0.01		< 0.01	< 0.001	< 0.005	<0.0010	<0.001	< 0.05	< 0.01	< 0.03	< 0.01	< 0.03	<0.01	<0.01
boron	mg/L	5	0.2		0.059			**0.37**		**0.6**	0.19	**0.22**	0.09	0.2	**5.7**	**6.1**	**5.4**	**6.4**	**6.3**	**6.1**	**6.3**
bromide	mg/L	-	-		< 1			-		< 1	-	< 1	<1.0	<1.0	-	-	192	-	138	140	150
cadmium	mg/L	0.005	0.0005		0.0002			**0.002**		**0.004**	**0.0006**	**0.0011**	**0.00052**	0.00049	< 0.005	**0.003**	< 0.003	< 0.001	< 0.003	**0.002**	**0.008**
calcium	mg/L	-	-		100			1100		2700	520	770	160	290	3500	2600	2400	2800	2000	2000	2700
chromium	mg/L	0.05	-		0.01			0.36		0.6	0.11	0.12	0.027	0.055	< 0.3	< 0.05	< 0.1	< 0.5	< 0.1	0.073	0.83
cobalt	mg/L	-	0.0009		**0.0046**			**0.16**		**0.29**	**0.052**	**0.073**	**0.014**	**0.031**	< 0.03	< 0.01	< 0.01	< 0.005	< 0.01	<0.0050	**0.069**
copper	mg/L	1	[0.005] b		**0.016**			**0.32**		**0.58**	**0.095**	**0.13**	**0.03**	**0.064**	**0.066**	**0.044**	**0.050**	**0.048**	**0.03**	**0.017**	**0.24**
fluoride	mg/L	1.5 - 2.4	-		0.6			-		-	-	0.3	0.46	0.38	-	-	-	-	0.3	0.35	0.32
free cyanide	mg/L	0.2	0.005		< 0.002			-		-	-	< 0.002	<0.0020	<0.0020	-	-	-	-	< 0.002	<0.0020	<0.0020
hardness	mg CaCO$_3$/L	80-100	-		740			-		-	-	1000	780	770	-	-	-	-	7200	6100	6700
iron	mg/L	0.3	0.3		**12**			**360**		**660**	**120**	**130**	**29**	**58**	**27**	**17**	**18**	**20**	**9.6**	**1.4**	**110**
lead	mg/L	0.01	[0.005] c		**0.01**			**0.16**		**0.29**	**0.054**	**0.064**	**0.016**	**0.034**	< 0.03	0.005	< 0.01	**0.009**	< 0.01	<0.0050	**0.13**
magnesium	mg/L	-	-		150			310		620	270	270	160	180	800	660	580	720	500	490	650
manganese	mg/L	0.05	-		0.27			6.7		16	2.7	5	0.65	1.5	2.2	1.7	1.6	1.8	1.3	1.1	4.4
mercury	mg/L	0.001	0.0002		< 0.0001			< 0.0001		0.0002	< 0.0001	< 0.0001	<0.00010	<0.00010	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	<0.00010	<0.00010
molybdenum	mg/L	-	0.04		0.0021			0.024		0.02	0.005	0.006	0.0034	0.0039	< 0.05	0.011	< 0.03	0.011	< 0.01	<0.0050	0.027
nickel	mg/L	-	0.025		0.011			**0.37**		**0.7**	**0.11**	**0.13**	**0.027**	**0.052**	< 0.05	< 0.01	< 0.03	< 0.05	< 0.03	**0.037**	**0.47**
nitrate as N	mg/L	10	-		1.1			-		0.6	-	0.6	0.82	0.52	-	-	< 0.1	-	< 0.1	<0.10	<0.10
nitrite as N	mg/L	1	-		< 0.01			-		< 0.01	-	< 0.01	<0.010	0.020	-	-	< 0.01	-	< 0.05	<0.10	<0.010
pH	pH Units	6.5-8.5	6.5-8.5		7.84			-		-	-	7.61	7.91	7.87	-	-	-	-	7.12	6.88	6.97
phenol	mg/L	-	-		< 0.001			-		-	-	< 0.001	<0.0010	<0.0010	-	-	-	-	0.008	0.062	0.019
phosphate	mg/L	-	-		< 0.01			-		< 0.01	-	0.01	<0.010	<0.010	-	-	< 0.01	-	< 0.01	0.096	<0.010
total phosphorous	mg/L	-	0.01		**0.4**			-		-	**3**	**5.3**	**0.82**	**1.7**	-	-	-	**0.15**	< 3	<1	**2.4**
potassium	mg/L	-	-		4.3			66		100	18	19	7.7	11	170	150	140	160	130	140	150
selenium	mg/L	0.01	0.1		0.004			< 0.02		< 0.02	0.006	< 0.01	0.0068	0.0067	< 0.1	< 0.02	< 0.05	< 0.1	< 0.05	<0.04	<0.04
silicon	mg/L	-	-		6.8			23		450	77	73	28	45	12	12	11	11	7.4	4	63
silver	mg/L	-	0.0001		< 0.0001			**0.001**		**0.002**	**0.0004**	< 0.0005	**0.00014**	0.00025	< 0.005	< 0.001	< 0.003	< 0.001	< 0.003	<0.0010	<0.001
sodium	mg/L	200 d	-		41			46		85	59	52	45	45	8600	7500	6900	7200	6600	6500	8000
strontium	mg/L	-	-		1.3			4.2		9.0	3.4	3.9	1.6	2	69	52	49	61	44	42	59
sulphide	mg/L	0.05	-		< 0.02			-		-	-	< 0.02	<0.020	<0.020	-	-	-	-	< 0.02	4	0.048
sulphate	mg/L	500	-		157			-		-	-	385	280	340	-	-	-	-	1910	1900	1900
thallium	mg/L	-	0.0003		0.00012			**0.0021**		**0.0041**	**0.00057**	**0.0006**	0.00022	**0.00043**	< 0.003	< 0.0005	< 0.001	< 0.0005	< 0.001	<0.00050	**0.00058**
tin	mg/L	-	-		< 0.001			< 0.01		< 0.01	< 0.001	< 0.005	<0.0010	<0.001	< 0.05	< 0.01	< 0.03	< 0.01	< 0.03	<0.01	<0.01
titanium	mg/L	-	-		0.18			1.9		7.1	1.1	0.84	0.35	0.67	< 0.3	0.089	0.1	0.1	< 0.1	<0.05	0.68
TSS	mg/L	-	-		620			-		-	-	2900	1600	1900	-	-	-	-	560	120	1800
turbidity	NTU	1	-		250			-		-	-	77	720	210	-	-	-	-	170	130	140
uranium	mg/L	0.02	0.005		**0.011**			**0.032**		**0.043**	**0.017**	**0.017**	**0.013**	0.016	< 0.005	< 0.001	< 0.003	0.001	< 0.003	<0.0010	0.0049
vanadium	mg/L	-	0.006		**0.012**			**0.39**		**0.70**	**0.12**	**0.13**	**0.03**	0.061	< 0.05	**0.016**	< 0.03	< 0.05	**0.014**	<0.01	**0.095**
zinc	mg/L	5	0.02		**0.051**			**1**		**2**	**0.31**	**0.43**	**0.089**	**0.17**	< 0.3	**0.068**	< 0.1	**0.076**	< 0.1	<0.05	**0.41**

NOTES:
Shaded area indicates an exceedance of the MOE Ontario Drinking Water Standard (June 2006) for that specific parameter.
Bolded areas indicate an exceedance of the MOE Provincial Water Quality Objectives (July 1994) for that specific parameter.
[ ] indicate interim PWQO concentration
a = interim PWQO at pH > 6.5 to 9.0 measured in clay-free samples.
b = interim PWQO if hardness greater than 20 mg/L.
c = interim PWQO if hardness greater than 80 mg/L
d = Local Medical Office of Health should be notified when sodium concentrations exceed 20 mg/L so that this information may be communicated to local physicians for their use with patients on sodium reduced diets.
(1) Sample bottle contained visible sediment. Results may be biased high due to analyte present in sediment.

TABLE D.2
Groundwater Quality in On-Site Monitoring Wells - Total Metals Analyses
Tansley Quarry Site, Burlington, Ontario

Parameter	Units	ODWS (June 2006)	PWQO (July 1994)	MW-02 shallow								MW-02 intermediate							MW-02 deep					
				Jan-07	Oct-08	Dec-09	Oct-10	Oct-10 DUP 3	Nov-11	Nov-12	Nov-13	Jan-07	Oct-08	Dec-09	Oct-10	Nov-11	Nov-12	Nov-13	Jan-07	Oct-08	Dec-09	Nov-11	Nov-12	Nov-13
aluminum	mg/L	0.1	[0.075] a	**540**	**750**	**85**	**22**	**25**	**43**	**31**	**25**	**240**	**30**	**57**	**3**	**5.6**	**5.3**	**10**	**2.800**	**0.920**	**12**	**3.3**	**22**	**2.9**
alkalinity	mg CaCO$_3$/L	30-500	-	-	-	695	700	700	707	730	730	-	-	141	129	140	160	150	-	-	51	35	47	52
ammonia as N	mg/L	-	-	-	-	-	< 0.05	0.06	0.13	0.50	0.53	-	-	-	1.5	1.5	1.7	1.7	-	-	-	16	16	16
antimony	mg/L	-	[0.02]	< 0.01	**0.088**	< 0.005	< 0.0005	< 0.0005	< 0.0005	<0.00050	<0.0005	< 0.01	< 0.005	< 0.005	< 0.0005	< 0.0005	<0.00050	<0.0005	< 0.01	< 0.005	< 0.01	< 0.01	<0.0050	<0.01
arsenic	mg/L	0.025	[0.005]	**0.22**	**0.24**	**0.03**	**0.01**	**0.01**	**0.03**	**0.016**	**0.011**	**0.13**	**0.014**	**0.03**	0.004	**0.006**	**0.0058**	**0.0053**	< 0.05	< 0.05	< 0.02	< 0.02	**0.023**	<0.02
barium	mg/L	1	-	6	6.9	0.76	0.18	0.21	0.57	0.34	0.24	3.9	0.35	0.93	0.04	0.12	0.19	0.32	0.052	< 0.05	0.3	0.088	0.35	0.056
beryllium	mg/L	-	1.1	0.038	0.064	< 0.005	0.0013	0.0013	0.0023	0.0020	0.0016	0.017	< 0.005	< 0.005	< 0.0005	< 0.0005	<0.00050	0.00063	< 0.005	< 0.005	< 0.01	< 0.01	<0.0050	<0.01
bismuth	mg/L	-	-	< 0.01	0.15	< 0.01	0.001	< 0.001	< 0.001	<0.0010	<0.001	< 0.01	< 0.01	< 0.01	< 0.001	< 0.001	<0.0010	<0.001	< 0.01	< 0.01	< 0.02	< 0.02	<0.01	<0.02
boron	mg/L	5	0.2	**0.77**	**1.6**	**0.4**	**0.3**	**0.3**	**0.3**	**0.3**	**0.33**	**2**	**1.9**	**1.7**	**2.3**	**1.8**	**1.8**	**2.1**	**5.9**	**5.8**	**6.1**	**5.8**	**5.9**	**5.1**
bromide	mg/L	-	-	-	-	< 1	-	-	< 1	<10	<5.0	-	-	1	-	< 10	<10	<5.0	-	-	148	154	200	170
cadmium	mg/L	0.005	0.0005	**0.007**	**0.011**	< 0.001	0.0002	0.0003	**0.0009**	**0.0018**	0.0004	**0.003**	< 0.001	< 0.001	< 0.0001	0.0001	<0.00010	<0.0001	**0.002**	< 0.001	< 0.002	< 0.002	<0.0010	<0.002
calcium	mg/L	-	-	4600	5800	880	340	370	830	460	360	2200	380	610	230	240	240	250	2100	1900	1900	2200	2000	1700
chromium	mg/L	0.05	-	1.2	1.3	0.2	0.04	0.04	0.08	0.06	0.047	0.54	0.054	0.110	0.006	0.012	0.013	0.018	< 0.05	< 0.05	< 0.1	< 0.1	<0.05	<0.1
cobalt	mg/L	-	0.0009	**0.59**	**0.69**	**0.08**	**0.02**	**0.02**	**0.04**	**0.03**	**0.021**	**0.26**	**0.0280**	**0.0610**	**0.0028**	**0.0059**	**0.0056**	**0.0071**	< 0.01	< 0.01	**0.0100**	< 0.01	**0.0250**	<0.01
copper	mg/L	1	[0.005] b	**1.2**	**1.4**	**0.2**	**0.04**	**0.04**	**0.09**	**0.06**	**0.042**	**0.55**	**0.059**	**0.110**	0.004	**0.012**	**0.012**	**0.013**	**0.1**	**0.019**	**0.040**	**0.025**	**0.085**	<0.02
fluoride	mg/L	1.5 - 2.4	-	-	-	-	0.2	0.2	0.3	0.33	0.26	-	-	-	0.2	0.3	0.27	0.24	-	-	-	< 1	0.34	0.31
free cyanide	mg/L	0.2	0.005	-	-	-	< 0.002	< 0.002	< 0.002	<0.0020	<0.0020	-	-	-	< 0.002	< 0.002	<0.0020	<0.0020	-	-	-	< 0.002	<0.0020	<0.0020
hardness	mg CaCO$_3$/L	80-100	-	-	-	-	1900	2000	2100	1900	1900	-	-	-	940	980	1000	990	-	-	-	6500	6400	6500
iron	mg/L	0.3	0.3	**1300**	**1400**	**180**	**40**	**46**	**100**	**72**	**48**	**540**	**55**	**120**	**6**	**11**	**11**	**14**	**13**	**6.4**	**29.0**	**11**	**42**	**7**
lead	mg/L	0.01	[0.005] c	**0.43**	**0.55**	**0.07**	**0.02**	**0.02**	**0.04**	**0.03**	**0.018**	**0.2**	**0.024**	**0.050**	0.003	**0.0064**	**0.0054**	**0.0079**	< 0.005	< 0.005	**0.010**	< 0.01	**0.018**	<0.01
magnesium	mg/L	-	-	790	1300	440	360	360	370	350	330	360	150	180	130	120	120	120	490	490	480	550	480	420
manganese	mg/L	0.05	-	37	39	5	1	1	4.2	2.4	1.8	18	2	4	0.34	0.51	0.53	0.54	1.3	1.1	1.8	1.4	2.0	1.1
mercury	mg/L	0.001	0.0002	< 0.0001	< 0.0015 (1)	< 0.0001	< 0.0001	< 0.0001	< 0.0001	<0.00010	<0.00010	< 0.0001	< 0.0015 (1)	< 0.0001	< 0.0001	< 0.0001	<0.00010	<0.00010	< 0.0001	< 0.0001	< 0.0001	< 0.0001	<0.00010	<0.00010
molybdenum	mg/L	-	0.04	**0.049**	< 0.1	< 0.01	0.004	0.004	0.0067	0.0064	0.0055	0.038	0.013	0.01	0.01	0.0096	0.011	0.0092	0.014	< 0.01	< 0.02	< 0.01	0.012	<0.01
nickel	mg/L	-	0.025	**1.4**	**1.5**	**0.2**	**0.042**	**0.1**	**0.093**	**0.067**	**0.042**	**0.6**	**0.058**	**0.130**	0.006	0.012	0.014	0.015	< 0.01	< 0.01	**0.050**	< 0.02	**0.068**	<0.02
nitrate as N	mg/L	10	-	-	-	< 0.1	< 0.1	< 0.1	< 0.1	<0.10	<0.10	-	-	< 0.1	< 0.1	< 0.1	<0.10	<0.10	-	-	< 0.1	< 0.1	<0.10	<0.10
nitrite as N	mg/L	1	-	-	-	< 0.01	< 0.01	< 0.01	< 0.01	<0.010	0.013	-	-	0.03	< 0.01	0.03	<0.010	0.010	-	-	< 0.01	< 0.1	<0.10	0.012
pH	pH Units	6.5-8.5	6.5-8.5	-	-	-	7.57	7.56	7.52	7.61	7.40	-	-	-	7.74	7.73	7.43	7.61	-	-	-	7.16	6.66	6.93
phenol	mg/L	-	-	-	-	-	< 0.001	< 0.001	< 0.001	0.0013	0.0025	-	-	-	< 0.001	< 0.001	<0.0010	<0.0010	-	-	-	0.001	<0.0010	0.017
phosphate	mg/L	-	-	-	-	< 0.01	< 0.01	< 0.01	< 0.01	<0.010	<0.010	-	-	< 0.01	< 0.01	< 0.01	<0.010	<0.010	-	-	< 0.01	< 0.01	<0.010	<0.010
total phosphorous	mg/L	-	0.01	-	-	-	**1.1**	**1.1**	**4.4**	**2.1**	**1.2**	-	-	-	**0.17**	**0.36**	**0.35**	**0.47**	-	-	-	< 2	**1.40**	**0.44 (1)**
potassium	mg/L	-	-	160	200	26	15	15	17	15	17	97	26	28	21	19	19	22	130	120	110	130	120	100
selenium	mg/L	0.01	0.1	0.022	< 0.2	< 0.02	< 0.002	< 0.002	0.004	<0.0020	<0.002	< 0.02	< 0.02	< 0.02	< 0.002	< 0.002	<0.0020	<0.002	< 0.1	< 0.1	0.060	< 0.04	<0.04	<0.04
silicon	mg/L	-	-	39	97	100	40	43	53	48	46	28	48	79	9.7	13	13	23	8.1	4.9	18	6.9	30	6
silver	mg/L	-	0.0001	**0.003**	< 0.01	< 0.001	**0.0002**	**0.0002**	**0.0003**	**0.00024**	**0.00019**	< 0.001	< 0.001	< 0.001	< 0.0001	0.0001	<0.00010	<0.0001	< 0.001	< 0.001	< 0.002	< 0.002	<0.0010	<0.002
sodium	mg/L	200 d	-	82	130	72	68	69	65	66	66	250	190	160	210	170	200	200	6600	6900	5600	7000	6200	5400
strontium	mg/L	-	-	14	19	5.7	4.6	4.6	5.5	4.8	4.2	15	11	12	13	12	12	12	43	41	40	45	41	35
sulphide	mg/L	0.05	-	-	-	-	< 0.020	< 0.020	< 0.02	0.33	0.18	-	-	-	< 0.020	< 0.02	<0.020	<0.020	-	-	-	< 0.02	<0.020	1.6
sulphate	mg/L	500	-	-	-	-	-	-	1320	1300	1300	-	-	-	-	1140	1100	1100	-	-	-	2030	2100	2000
thallium	mg/L	-	0.0003	**0.0066**	**0.014**	**0.0009**	0.0002	0.0003	**0.00057**	**0.00032**	**0.00037**	**0.003**	**0.001**	**0.0007**	< 0.0001	0.0001	<0.000050	0.00014	< 0.0005	< 0.0005	< 0.001	< 0.001	<0.00050	<0.001
tin	mg/L	-	-	< 0.01	< 0.1	< 0.01	0.001	< 0.001	< 0.001	<0.0010	0.0012	< 0.01	< 0.01	< 0.01	< 0.001	< 0.001	<0.0010	0.0055	< 0.01	< 0.01	< 0.02	< 0.02	<0.01	<0.02
titanium	mg/L	-	-	4	11	1.5	0.56	0.61	0.97	<0.5	0.59	2.5	0.6	0.89	0.06	0.14	0.12	0.29	< 0.05	< 0.05	0.2	< 0.1	0.42	<0.1
TSS	mg/L	-	-	-	-	-	1700	1600	7600	2600	1200	-	-	-	360	920	650	730	-	-	-	540	2900	270
turbidity	NTU	1	-	-	-	-	3600	3700	460	640	550	-	-	-	320	480	290	450	-	-	-	290	630	110
uranium	mg/L	0.02	0.005	**0.068**	**0.11**	**0.027**	**0.020**	**0.021**	**0.020**	**0.023**	**0.018**	**0.031**	0.004	**0.007**	0.001	0.002	0.0013	0.0016	< 0.001	< 0.001	< 0.002	< 0.002	0.0017	<0.002
vanadium	mg/L	-	0.006	**1.3**	**1.6**	**0.18**	**0.05**	**0.05**	**0.09**	**0.07**	**0.056**	**0.52**	**0.062**	**0.1**	0.006	**0.012**	**0.012**	**0.021**	< 0.05	< 0.05	**0.050**	< 0.01	**0.054**	<0.01
zinc	mg/L	5	0.02	**3.7**	**4.1**	**0.49**	**0.12**	**0.13**	**0.27**	**0.19**	**0.12**	**1.8**	**0.17**	**0.37**	0.02	**0.04**	**0.03**	**0.038**	**0.086**	< 0.05	**0.100**	< 0.1	**0.210**	<0.1

NOTES:

Shaded area indicates an exceedance of the MOE Ontario Drinking Water Standard (June 2006) for that specific parameter.
Bolded areas indicate an exceedance of the MOE Provincial Water Quality Objectives (July 1994) for that specific parameter.
[ ] indicate interim PWQO concentration
a = interim PWQO at pH > 6.5 to 9.0 measured in clay-free samples.
b = interim PWQO if hardness greater than 20 mg/L.
c = interim PWQO if hardness greater than 80 mg/L.
d = Local Medical Office of Health should be notified when sodium concentrations exceed 20 mg/L so that this information may be communicated to local physicians for their use with patients on sodium reduced diets.
(1) Sample bottle contained visible sediment. Results may be biased high due to analyte present in sediment.

TABLE D.2
Groundwater Quality in On-Site Monitoring Wells - Total Metals Analyses
Tansley Quarry Site, Burlington, Ontario

Parameter	Units	ODWS (June 2006)	PWQO (July 1994)	MW-03 shallow							MW-03 deep							
				Jan-07	Oct-08	Dec-09	Oct-10	Nov-11	Nov-12	Nov-13	Jan-07	Oct-08	Dec-09	Oct-10	Nov-11	Nov-11 DUP 3	Nov-12	Nov-13
aluminum	mg/L	0.1	[0.075] a	**120**	**40**	**50**	**88**	**5.6**	**10**	**230**	**1.6**	**1.3**	**0.59**	**3.3**	**4.2**	**4.5**	**9.5**	**1.4**
alkalinity	mg $CaCO_3$/L	30-500	-	-	-	110	109	175	170	160	-	-	88	72	56	53	62	51
ammonia as N	mg/L	-	-	-	-	-	1.2	0.89	1.1	1.2	-	-	-	7.9	9.6	9.9	10	9.9
antimony	mg/L	-	[0.02]	< 0.01	< 0.005	0.003	< 0.005	< 0.0005	<0.00050	<0.005	< 0.01	< 0.005	< 0.005	< 0.0005	< 0.005	< 0.005	<0.0050	<0.005
arsenic	mg/L	0.025	[0.005]	**0.067**	**0.043**	**0.038**	**0.051**	0.005	**0.0092**	**0.19**	< 0.05	< 0.01	< 0.01	**0.007**	< 0.01	< 0.01	<0.01	<0.01
barium	mg/L	1	-	0.85	0.33	0.36	0.69	0.12	0.06	2.1	0.053	< 0.05	< 0.05	0.054	0.088	0.1	0.12	0.061
beryllium	mg/L	-	1.1	0.008	< 0.005	0.003	< 0.005	< 0.0005	<0.00050	0.012	< 0.005	< 0.005	< 0.005	< 0.0005	< 0.005	< 0.005	<0.0050	<0.005
bismuth	mg/L	-	-	< 0.01	< 0.01	0.005	< 0.01	< 0.001	<0.0010	<0.01	< 0.01	< 0.01	< 0.01	< 0.001	< 0.01	< 0.01	<0.01	<0.01
boron	mg/L	5	0.2	**1.2**	**1.3**	**1.2**	**1.6**	**1.8**	**1.3**	1.8	**5.4**	**3.5**	**4.8**	**4.8**	**4.6**	**4.9**	**5.3**	**5.1**
bromide	mg/L	-	-	-	-	6	-	< 1	1.2	<5.0	-	-	31	-	< 500	< 0.5	120	98
cadmium	mg/L	0.005	0.0005	**0.002**	< 0.001	**0.001**	**0.002**	< 0.0001	0.00025	**0.0079**	< 0.001	**0.002**	< 0.001	< 0.0001	< 0.001	< 0.001	**0.002**	<0.001
calcium	mg/L	-	-	1800	790	1100	1400	240	250	4700	2100	630	510	970	1200	1300	1700	1500
chromium	mg/L	0.05	-	0.3	0.096	0.110	0.180	0.011	0.018	0.48	< 0.05	< 0.05	< 0.05	0.006	< 0.05	< 0.05	<0.05	<0.05
cobalt	mg/L	-	0.0009	**0.13**	**0.045**	**0.049**	**0.083**	**0.0057**	**0.0069**	**0.24**	< 0.005	< 0.005	< 0.005	**0.0012**	< 0.005	< 0.005	<0.0050	<0.005
copper	mg/L	1	[0.005] b	**0.34**	**0.12**	**0.14**	**0.23**	**0.01**	**0.02**	**0.66**	**0.033**	< 0.01	< 0.01	0.002	**0.018**	**0.016**	**0.019**	<0.01
fluoride	mg/L	1.5 - 2.4	-	-	-	0.2	0.2	0.2	0.19	0.17	-	-	0.4	0.3	0.3	0.3	0.25	0.26
free cyanide	mg/L	0.2	0.005	-	-	-	< 0.002	< 0.002	<0.0020	<0.0020	-	-	-	< 0.002	< 0.002	< 0.002	<0.0020	<0.0020
hardness	mg $CaCO_3$/L	80-100	-	-	-	-	1000	870	880	920	-	-	-	3300	4900	5100	5500	5000
iron	mg/L	0.3	0.3	**270**	**89**	**110**	**160**	**11**	**15**	**510**	**9.8**	**3.3**	**2.0**	**5.4**	**9.2**	**9.6**	**15.0**	**4.8**
lead	mg/L	0.01	[0.005] c	**0.12**	**0.047**	**0.054**	**0.087**	**0.0064**	**0.0063**	**0.27**	< 0.005	< 0.005	< 0.005	0.0016	0.005	0.005	<0.0050	<0.005
magnesium	mg/L	-	-	290	180	210	260	120	150	710	550	230	180	270	390	400	560	450
manganese	mg/L	0.05	-	14	5.4	7.8	9.5	0.51	0.79	35	1.1	0.38	0.26	0.51	0.77	0.87	0.93	0.77
mercury	mg/L	0.001	0.0002	< 0.0001	< 0.0015 (1)	0.0001	< 0.0001	< 0.0001	<0.00010	<0.00010	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	<0.00010	<0.00010
molybdenum	mg/L	-	0.04	0.015	0.015	0.007	0.016	0.0095	0.0066	0.031	< 0.01	0.012	< 0.01	0.007	0.006	0.006	0.0074	0.0076
nickel	mg/L	-	0.025	**0.28**	**0.087**	**0.100**	**0.160**	0.011	0.015	**0.41**	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	0.012	<0.01
nitrate as N	mg/L	10	-	-	-	0.3	< 0.1	0.6	<0.10	0.37	-	-	< 0.1	< 0.1	< 0.1	< 0.1	<0.10	<0.10
nitrite as N	mg/L	1	-	-	-	0.14	0.02	0.22	0.020	0.38	-	-	0.01	< 0.01	< 0.01	< 0.01	<0.010	<0.010
pH	pH Units	6.5-8.5	6.5-8.5	-	-	-	7.76	7.78	7.58	7.80	-	-	-	7.45	7.37	7.38	6.96	7.15
phenol	mg/L	-	-	-	-	-	< 0.001	< 0.001	<0.0010	<0.0010	-	-	-	< 0.001	0.001	0.001	<0.0010	0.0020
phosphate	mg/L	-	-	-	-	0.01	< 0.01	< 0.01	<0.010	<0.010	-	-	< 0.01	< 0.01	< 0.01	< 0.01	<0.010	<0.010
total phosphorous	mg/L	-	0.01	-	-	-	**9.1**	**0.35**	**0.64**	**16**	-	-	-	< 0.1	< 1	< 1	<1	**0.13**
potassium	mg/L	-	-	49	20	20	43	19	14	73	110	48	45	65	81	83	100	88
selenium	mg/L	0.01	0.1	< 0.02	< 0.02	0.01	< 0.02	< 0.002	<0.0020	<0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	<0.04	<0.04
silicon	mg/L	-	-	20	55	62	120	13	25	310	6.4	6.9	4.9	10	10	3.6	22	5.8
silver	mg/L	-	0.0001	< 0.001	< 0.001	**0.0005**	< 0.001	< 0.0001	<0.00010	**0.0014**	< 0.001	**0.001**	< 0.001	**0.0002**	< 0.001	< 0.001	<0.0010	<0.001
sodium	mg/L	200 d	-	250	190	160	290	170	140	310	5000	1700	1500	2500	3100	3100	4100	3400
strontium	mg/L	-	-	13	12	13	15	12	12	23	46	17	13	23	28	29	41	35
sulphide	mg/L	0.05	-	-	-	-	< 0.020	< 0.02	<0.020	0.028	-	-	-	< 0.020	< 0.02	< 0.020	<0.020	<0.020
sulphate	mg/L	500	-	-	-	-	-	900	900	890	-	-	-	-	1650	1560	1500	1600
thallium	mg/L	-	0.0003	**0.0013**	< 0.0005	**0.0004**	**0.0011**	0.0001	<0.000050	**0.0029**	< 0.0005	< 0.0005	< 0.0005	< 0.00005	< 0.0005	< 0.0005	<0.00050	<0.0005
tin	mg/L	-	-	< 0.01	< 0.01	0.005	< 0.01	< 0.001	<0.0010	<0.01	< 0.01	< 0.01	< 0.01	< 0.001	< 0.01	< 0.01	<0.01	<0.01
titanium	mg/L	-	-	1.8	0.9	0.86	2.6	0.14	0.33	7.1	< 0.05	< 0.05	< 0.05	0.15	0.071	0.16	0.067	<0.05
TSS	mg/L	-	-	-	-	-	21000	5800	1100	24000	-	-	-	190	370	490	450	120
turbidity	NTU	1	-	-	-	-	19000	600	590	890	-	-	-	100	140	140	250	72
uranium	mg/L	0.02	0.005	**0.012**	**0.007**	0.0040	**0.01**	0.0015	0.00087	**0.029**	< 0.001	0.001	< 0.001	0.0002	< 0.001	< 0.001	<0.0010	<0.001
vanadium	mg/L	-	0.006	**0.27**	**0.1**	**0.1**	**0.2**	**0.012**	**0.019**	**0.5**	< 0.05	< 0.01	< 0.01	< 0.005	**0.013**	**0.015**	**0.01**	<0.01
zinc	mg/L	5	0.02	**0.96**	**0.31**	**0.35**	**0.48**	**0.041**	**0.059**	**1.5**	**0.99**	**0.23**	< 0.05	**0.083**	**0.12**	**0.15**	**0.2**	**0.09**

NOTES:

Shaded area indicates an exceedance of the MOE Ontario Drinking Water Standard (June 2006) for that specific parameter.
Bolded areas indicate an exceedance of the MOE Provincial Water Quality Objectives (July 1994) for that specific parameter.
[ ] indicate interim PWQO concentration
a = interim PWQO at pH > 6.5 to 9.0 measured in clay-free samples.
b = interim PWQO if hardness greater than 20 mg/L.
c = interim PWQO if hardness greater than 80 mg/L
d = Local Medical Office of Health should be notified when sodium concentrations exceed 20 mg/L so that this information may be communicated to local physicians for their use with patients on sodium reduced diets.
(1) Sample bottle contained visible sediment. Results may be biased high due to analyte present in sediment.

TABLE D.2
Groundwater Quality in On-Site Monitoring Wells - Total Metals Analyses
Tansley Quarry Site, Burlington, Ontario

Parameter	Units	ODWS (June 2006)	PWQO (July 1994)	MW-04 shallow							MW-04 intermediate							MW-04 deep						
				Jan-07	Oct-08	Dec-09	Oct-10	Nov-11	Nov-12	Nov-13	Jan-07	Oct-08	Dec-09	Oct-10	Nov-11	Nov-12	Nov-13	Jan-07	Oct-08	Dec-09	Oct-10	Nov-11	Nov-12	Nov-13
aluminum	mg/L	0.1	[0.075] a	**35**	**37**	**230**	**10**	**14**	**6.5**	**2.3**	**38**	**12**	**10**	**3**	**2.4**	**7.4**	**2**	**8**	**9**	**41**		**5.2**	**0.65**	**7.4**
alkalinity	mg $CaCO_3$/L	30-500	-	-	-	390	387	384	390	380	-	-	50	50	55	65	53	-	-	66		102	150	160
ammonia as N	mg/L	-	-	-	-	-	0.05	< 0.05	0.13	0.12	-	-	-	6	5.7	6.2	6.1	-	-	-		37	19	31
antimony	mg/L	-	[0.02]	< 0.001	< 0.005	< 0.005	< 0.005	< 0.0005	<0.00050	<0.0005	< 0.01	< 0.005	< 0.005	< 0.0005	< 0.0005	<0.0025	<0.0025	< 0.05	< 0.005	< 0.05		< 0.03	<0.0050	<0.025
arsenic	mg/L	0.025	[0.005]	**0.021**	**0.02**	**0.120**	< 0.010	**0.008**	0.0023	0.002	**0.014**	< 0.01	< 0.01	0.002	0.004	0.0050	<0.005	< 0.05	**0.015**	< 0.1		**0.07**	<0.02	<0.05
barium	mg/L	1	-	0.39	0.36	2.100	0.150	0.180	0.093	0.079	0.52	0.22	0.23	0.03	0.06	0.11	0.063	< 0.3	0.16	0.6		0.18	0.059	0.18
beryllium	mg/L	-	1.1	0.002	< 0.005	0.016	< 0.005	0.0009	<0.00050	<0.0005	< 0.005	< 0.005	< 0.005	< 0.0005	< 0.0005	<0.0025	<0.0025	< 0.03	< 0.005	< 0.05		< 0.03	<0.0050	<0.025
bismuth	mg/L	-	-	< 0.001	< 0.01	< 0.01	< 0.01	< 0.001	<0.0010	<0.001	< 0.01	< 0.01	< 0.01	< 0.001	< 0.001	<0.0050	<0.005	< 0.05	< 0.01	< 0.1		< 0.05	<0.01	<0.05
boron	mg/L	5	0.2	0.098	0.16	**0.5**	0.1	0.1	0.092	0.079	**7.2**	**6.7**	**6.4**	**7.1**	**6.4**	**5.9**	**6.1**	**5**	**5.9**	**6.0**		**6.6**	**6.7**	**7.7**
bromide	mg/L	-	-	-	-	< 1	-	< 1	<1.0	<1.0	-	-	21	-	21	21	25	-	-	401		572	200	400
cadmium	mg/L	0.005	0.0005	**0.0009**	< 0.001	**0.0040**	< 0.0010	0.0004	0.00010	0.00013	**0.002**	< 0.001	< 0.001	0.0001	0.0002	<0.00050	<0.0005	< 0.005	**0.007**	< 0.01		**0.017**	**0.0044**	<0.005
calcium	mg/L	-	-	260	310	1600	120	170	91	94	760	590	630	500	540	560	570	5900	3900	6800		7900	2500	4800
chromium	mg/L	0.05	-	0.077	0.065	0.400	< 0.050	0.022	0.0074	<0.005	0.09	< 0.05	< 0.05	< 0.005	0.006	<0.025	<0.025	< 0.3	0.096	< 0.5		< 0.3	<0.05	<0.25
cobalt	mg/L	-	0.0009	**0.042**	**0.037**	**0.240**	**0.011**	**0.016**	**0.005**	**0.0034**	**0.037**	**0.01**	**0.01**	< 0.0005	**0.002**	**0.0029**	<0.0025	< 0.03	< 0.03	< 0.05		**0.031**	<0.0050	<0.025
copper	mg/L	1	[0.005] b	**0.074**	**0.066**	**0.420**	**0.019**	**0.027**	**0.007**	**0.0076**	**0.1**	**0.034**	**0.030**	< 0.001	< 0.005	**0.007**	**0.0055**	**0.24**	**0.13**	**0.80**		**0.18**	**0.03**	**0.17**
fluoride	mg/L	1.5 - 2.4	-	-	-	0.3	0.2	0.2	0.23	0.20	-	-	0.5	0.5	0.6	0.55	0.54	-	-	0.1	**NOT SAMPLED**	< 0.1	0.18	<0.10
free cyanide	mg/L	0.2	0.005	-	-	-	< 0.002	< 0.002	<0.0020	<0.0020	-	-	-	0.002	< 0.002	<0.0020	<0.0020	-	-	-		< 0.002	<0.0020	<0.0020
hardness	mg $CaCO_3$/L	80-100	-	-	-	-	450	560	460	470	-	-	-	1700	1700	2000	2000	-	-	-		27000	8400	16000
iron	mg/L	0.3	0.3	**83**	**70**	**470**	**17**	**26**	**7**	**4.6**	**71**	**21**	**20**	**3**	**5**	**9**	**4.9**	**42**	**25**	**110**		**11**	**1**	**26**
lead	mg/L	0.01	[0.005] c	**0.046**	**0.061**	**0.280**	**0.014**	**0.024**	0.0050	0.0043	**0.03**	**0.012**	**0.014**	0.002	0.003	**0.006**	0.0034	< 0.03	**0.013**	**0.060**		< 0.03	<0.0050	<0.025
magnesium	mg/L	-	-	84	100	290	69	75	71	59	180	160	170	140	150	160	140	1200	920	1600		1800	620	990
manganese	mg/L	0.05	-	2.2	2.4	13.0	0.7	1.2	0.4	0.3	2.5	1.1	1.0	0.3	0.4	0.5	0.39	4.2	2.30	6.50		5.5	1.6	3.5
mercury	mg/L	0.001	0.0002	< 0.0001	< 0.0015 (1)	0.0001	< 0.0001	< 0.0001	<0.00010	<0.00010	< 0.0001	< 0.0015 (1)	< 0.0001	< 0.0001	< 0.0001	<0.00010	<0.00010	0.0001	< 0.0001	< 0.0001		< 0.0001	<0.00010	<0.00010
molybdenum	mg/L	-	0.04	0.007	< 0.01	0.02	< 0.01	0.0046	0.0044	0.0042	0.015	0.012	0.01	0.009	0.01	0.0097	0.0087	< 0.05	0.026	< 0.1		< 0.03	0.019	<0.025
nickel	mg/L	-	0.025	**0.082**	**0.077**	**0.480**	0.020	**0.027**	0.0073	0.0062	**0.081**	0.021	0.02	< 0.001	0.006	0.0062	0.0063	< 0.05	< 0.1	< 0.1		**0.22**	<0.01	**0.099**
nitrate as N	mg/L	10	-	-	-	2.5	4.2	4.3	0.98	1.0	-	-	< 0.1	0.1	< 0.1	<0.10	<0.10	-	-	< 0.1		< 0.1	<0.10	<0.10
nitrite as N	mg/L	1	-	-	-	0.25	0.11	0.02	0.040	0.021	-	-	< 0.01	0.01	0.03	<0.010	<0.010	-	-	0.02		< 0.1	0.029	<0.010
pH	pH Units	6.5-8.5	6.5-8.5	-	-	8.0	7.8	7.8	7.91	7.87	-	-	-	7.5	7.48	7.11	7.41	-	-	-		6.8	7.05	6.82
phenol	mg/L	-	-	-	-	-	< 0.001	< 0.001	<0.0010	<0.0010	-	-	-	0.001	0.001	0.011	0.0044	-	-	-		0.07	0.022	0.057
phosphate	mg/L	-	-	-	-	< 0.01	< 0.01	< 0.01	<0.010	<0.010	-	-	< 0.01	0.01	< 0.01	<0.010	<0.010	-	-	< 0.01		< 0.01	0.019	<0.010
total phosphorous	mg/L	-	0.01	-	-	-	< 1	**0.85**	**0.15**	**0.12**	-	-	-	< 0.1	**0.14**	<0.5	**0.19**	-	-	-		< 5	<1	**1.1**
potassium	mg/L	-	-	13	14	71	7.3	8.2	7	4.9	57	49	49	47	49	51	47	230	170	240		300	140	200
selenium	mg/L	0.01	0.1	0.002	< 0.02	< 0.02	< 0.02	< 0.002	<0.0020	<0.002	< 0.02	< 0.02	< 0.02	< 0.002	0.002	<0.01	<0.01	< 0.1	< 0.02	< 0.2		< 0.2	<0.04	<0.1
silicon	mg/L	-	-	53	56	350	20	24	18	9	57	23	19	9.9	7	19	6.5	16	23	58		9	5	15
silver	mg/L	-	0.0001	< 0.0003	< 0.001	**0.00100**	< 0.001	< 0.0001	<0.00010	<0.0001	< 0.001	< 0.001	< 0.001	< 0.0001	< 0.0001	<0.00050	<0.0005	< 0.005	< 0.001	< 0.01		< 0.005	<0.0010	<0.005
sodium	mg/L	200 d	-	23	34	49	28	28	26	21	930	1000	1100	1000	1000	1200	1100	13000	8900	14000		17000	7100	10000
strontium	mg/L	-	-	2	2.5	6.0	1.7	1.6	1.5	1.4	16	12	14	13	15	14	14	120	84	130		170	54	100
sulphide	mg/L	0.05	-	-	-	-	< 0.020	< 0.02	<0.020	0.069	-	-	-	0.020	< 0.02	1	0.94	-	-	-		< 0.02	<0.020	1.4
sulphate	mg/L	500	-	-	-	-	-	116.000	110	130	-	-	-		1800	1800	1800	-	-	-		1540	1700	1400
thallium	mg/L	-	0.0003	**0.00044**	< 0.0005	**0.0029**	< 0.0005	0.00017	0.00007	<0.00005	< 0.0005	< 0.0005	< 0.0005	< 0.00005	< 0.00005	<0.00025	<0.00025	< 0.003	< 0.0005	< 0.005		< 0.003	<0.00050	<0.0025
tin	mg/L	-	-	< 0.001	< 0.01	< 0.01	< 0.01	< 0.001	<0.0010	<0.001	< 0.01	< 0.01	< 0.01	< 0.001	< 0.001	<0.0050	<0.005	< 0.05	< 0.01	< 0.1	**Note:**	< 0.05	<0.01	<0.05
titanium	mg/L	-	-	0.78	0.7	5.3	0.23	0.3	0.17	0.052	0.64	0.22	0.25	0.089	0.064	0.31	0.05	< 0.3	0.36	0.6	Insufficient	< 0.3	<0.05	<0.25
TSS	mg/L	-	-	-	-	-	750	2500	1300	110	-	-	-	91	380	530	280	-	-	-	water	1600	290	1200
turbidity	NTU	1	-	-	-	-	4300	780	210	160	-	-	-	57	110	120	81	-	-	-		340	66	300
uranium	mg/L	0.02	0.005	**0.009**	**0.012**	**0.032**	**0.010**	**0.009**	**0.008**	**0.0087**	**0.006**	0.001	0.003	0.0007	0.0011	0.0016	0.00089	< 0.005	0.005	< 0.01		**0.024**	**0.032**	**0.028**
vanadium	mg/L	-	0.006	**0.091**	**0.089**	**0.480**	**0.019**	**0.026**	**0.010**	0.005	**0.086**	**0.04**	**0.02**	< 0.005 (1)	0.01	**0.01**	0.0048	< 0.05	< 0.05	< 0.1		< 0.05	<0.01	**0.029**
zinc	mg/L	5	0.02	**0.24**	**0.22**	**1.40**	**0.05**	**0.08**	0.018	0.018	**0.26**	**0.072**	**0.100**	< 0.005	< 0.03	<0.025	<0.025	< 0.3	**0.2**	**0.6**		< 0.3	<0.05	**0.71**

NOTES:
Shaded area indicates an exceedance of the MOE Ontario Drinking Water Standard (June 2006) for that specific parameter.
Bolded areas indicate an exceedance of the MOE Provincial Water Quality Objectives (July 1994) for that specific parameter.
[ ] indicate interim PWQO concentration
a = interim PWQO at pH > 6.5 to 9.0 measured in clay-free samples.
b = interim PWQO if hardness greater than 20 mg/L.
c = interim PWQO if hardness greater than 80 mg/L
d = Local Medical Office of Health should be notified when sodium concentrations exceed 20 mg/L so that this information may be communicated to local physicians for their use with patients on sodium reduced diets.
(1) Sample bottle contained visible sediment. Results may be biased high due to analyte present in sediment.

TABLE D.2
Groundwater Quality in On-Site Monitoring Wells - Total Metals Analyses
Tansley Quarry Site, Burlington, Ontario

Parameter	Units	ODWS (June 2006)	PWQO (July 1994)	MW-05 shallow							MW-05 straddle						MW-05 intermediate							MW-05 deep				
				Jan-07	Oct-08	Dec-09	Oct-10	Nov-11	Nov-12	Nov-13	Oct-08	Dec-09	Oct-10	Nov-11	Nov-12	Nov-13	Jan-07	Oct-08	Dec-09	Oct-10	Nov-11	Nov-12	Nov-13	Oct-08	Dec-09	Oct-10	Nov-11	Nov-12
aluminum	mg/L	0.1	[0.075] a	NOT SAMPLED	**82**	**53**	**26**	**130**	**43**	**11**	**60**	**300**	**19**	**57**	**100**	**98**	NOT SAMPLED	**2.7**	**2**	**0.38**	**1.10**	**5.6**	**1.5**	NOT SAMPLED	**14**	NOT SAMPLED	**190**	**8.1**
alkalinity	mg $CaCO_3$/L	30-500	-		-	275	302	300	300	280	-	296	294	285	290	290		-	264	252	285	290	270		32		36	51
ammonia as N	mg/L	-	-		-	-	< 0.05	0.12	0.096	<0.050	-	-	0.54	0.75	0.76	0.58		-	-	2.1	1.6	1.6	1.7		-		39	38
antimony	mg/L	-	[0.02]		< 0.005	< 0.003	0.0005	< 0.005	<0.00050	<0.0005	< 0.005	< 0.005	< 0.0005	< 0.003	<0.0025	<0.005		< 0.001	< 0.0005	< 0.0005	< 0.0005	<0.00050	<0.0005		**0.05**		< 0.03	<0.025
arsenic	mg/L	0.025	[0.005]		**0.049**	**0.032**	**0.021**	**0.098**	**0.027**	**0.0076**	**0.045**	**0.230**	**0.023**	**0.083**	**0.110**	**0.12**		0.005	**0.010**	0.004	**0.045**	**0.300**	**0.1**		< 0.1		**0.14**	<0.1
barium	mg/L	1	-		1.5	1.0	0.6	3.5	0.95	0.28	0.7	3.5	0.3	0.6	0.7	0.82		0.051	0.10	0.02	0.07	0.19	0.061		< 0.5		0.86	0.18
beryllium	mg/L	-	1.1		0.005	< 0.003	0.0016	0.006	0.0023	0.00069	< 0.005	0.017	0.0011	< 0.003	0.0046	0.0057		< 0.001	< 0.0005	< 0.0005	< 0.0005	0.00064	<0.0005		< 0.05		< 0.03	<0.025
bismuth	mg/L	-	-		< 0.01	< 0.005	< 0.001	< 0.01	<0.0010	<0.001	< 0.01	< 0.01	< 0.001	< 0.005	<0.0050	<0.01		< 0.001	< 0.001	< 0.001	< 0.001	<0.0010	<0.001		< 0.1		< 0.05	<0.05
boron	mg/L	5	0.2		< 0.1	< 0.05	0.038	0.13	0.064	0.026	**1.1**	**2.1**	**1.2**	**1.4**	**1.3**	**1.3**		**4**	**3**	**3**	**2.2**	**2.4**	**2.4**		**5**		**5.5**	**5.4**
bromide	mg/L	-	-		-	< 1	-	< 1	<1.0	<1.0	-	< 1	-	< 1	<1.0	<1.0		-	< 1	-	< 1	<1.0	1.2		587		747	850
cadmium	mg/L	0.005	0.0005		**0.002**	**0.002**	**0.001**	**0.009**	**0.001**	0.00039	**0.002**	**0.009**	0.0004	**0.0032**	**0.0027**	**0.0022**		< 0.0001	0.0001	< 0.0001	0.0004	**0.00066**	0.00028		**0.010**		**0.075**	**0.007**
calcium	mg/L	-	-		780	550	470	2100	600	250	920	4600	410	1400	2000	1600		80	75	100	91	110	90		8600		11000	11000
chromium	mg/L	0.05	-		0.2	0.1	0.1	0.33	0.10	0.024	0.13	0.61	0.03	0.12	0.16	0.17		0.005	< 0.005	< 0.005	< 0.005	0.013	<0.005		< 0.5		0.68	<0.25
cobalt	mg/L	-	0.0009		**0.1**	**0.1**	**0.036**	**0.23**	**0.052**	**0.015**	**0.063**	**0.300**	**0.020**	**0.065**	**0.1**	**0.096**		**0.0022**	**0.0014**	< 0.0005	**0.0012**	**0.0036**	**0.0013**		< 0.05		**0.081**	<0.025
copper	mg/L	1	[0.005] b		**0.47**	**0.35**	**0.17**	**1.10**	**0.23**	**0.069**	**0.16**	**0.87**	**0.05**	**0.19**	**1**	**0.29**		**0.01**	**0.01**	0.001	**0.009**	**0.032**	**0.008**		**0.10**		**0.80**	**0.08**
fluoride	mg/L	1.5 - 2.4	-		-	0.1	0.1	0.1	0.11	0.10	-	0.3	0.2	0.3	0.28	0.27		-	0.5	0.4	0.4	0.42	0.43		< 0.1		< 0.1	<0.10
free cyanide	mg/L	0.2	0.005		-	-	< 0.002	< 0.002	<0.0020	<0.0020	-	-	< 0.002	< 0.002	<0.0020	<0.0020		-	-	< 0.002	< 0.002	<0.0020	<0.0020		-		< 0.002	<0.0020
hardness	mg $CaCO_3$/L	80-100	-		-	-	430	440	430	440	-	-	300	270	280	270		-	-	390	320	320	320		-		35000	34000
iron	mg/L	0.3	0.3		**170**	**110**	**62**	**320**	**93**	**24**	**120**	**590**	**40**	**140**	**230**	**200**		**4.3**	**5.8**	**1.1**	**21**	**100.0**	**30**		**49.0**		**170**	**40**
lead	mg/L	0.01	[0.005] c		**0.12**	**0.08**	**0.05**	**0.23**	**0.07**	**0.019**	**0.05**	**0.25**	**0.02**	**0.063**	**0.15**	**0.085**		0.003	0.0029	< 0.0005	0.0028	**0.0097**	0.0032		< 0.05		**0.17**	<0.025
magnesium	mg/L	-	-		100	73	63	190	84	48	110	470	66	140	210	210		23	24	35	33	36	32		2000		2500	2600
manganese	mg/L	0.05	-		14	16	7	64	10	2.8	7	37	3	11	14	13		0.18	0.13	0.04	0.1	0.3	0.11		5.00		8.50	5.20
mercury	mg/L	0.001	0.0002		< 0.0015 (1)	< 0.0001	< 0.0001	< 0.0001	<0.00010	<0.00010	< 0.0015 (1)	< 0.0001	< 0.0001	< 0.0001	<0.00010	<0.00010		< 0.0001	< 0.0001	< 0.0001	< 0.0001	<0.00010	<0.00010		< 0.0001		< 0.0001	<0.00010
molybdenum	mg/L	-	0.04		0.012	0.006	0.004	0.022	0.0053	0.0019	< 0.01	0.02	0.006	0.009	0.0049	0.0091		0.009	0.005	0.004	0.0049	0.0063	0.0053		< 0.1		**0.049**	<0.025
nickel	mg/L	-	0.025		**0.19**	**0.15**	**0.063 (1)**	**0.49**	**0.09**	0.024	**0.12**	**0.63**	**0.04**	**0.12**	**0.20**	**0.18**		0.004	0.003	< 0.001	0.002	0.0093	0.0029		< 0.1		**0.3**	**0.054**
nitrate as N	mg/L	10	-		-	< 0.1	< 0.1	< 0.1	<0.10	<0.10	-	0.3	< 0.1	0.5	0.27	0.51		-	0.2	< 0.1	0.6	0.26	0.20		< 0.1		< 0.1	<0.10
nitrite as N	mg/L	1	-		-	0.02	< 0.01	< 0.01	<0.010	<0.010	-	0.16	0.03	0.04	0.022	0.038		-	0.22	< 0.01	0.55	0.13	0.27		< 0.01		< 0.1	<0.10
pH	pH Units	6.5-8.5	6.5-8.5		-	-	7.8	7.75	7.71	7.78	-	-	7.93	7.9	7.90	7.94		-	-	7.77	7.81	7.73	7.89		-		**6.43**	**6.11**
phenol	mg/L	-	-		-	-	< 0.001	< 0.001	<0.0010	<0.0010	-	-	< 0.001	< 0.001	<0.0010	<0.0010		-	-	< 0.001	< 0.001	<0.0010	<0.0010		-		0.11	0.0094
phosphate	mg/L	-	-		-	< 0.01	< 0.01	< 0.01	<0.010	<0.010	-	< 0.01	< 0.01	< 0.01	<0.010	<0.010		-	< 0.01	< 0.01	< 0.01	<0.010	<0.010		< 0.01		< 0.01	<0.010
total phosphorous	mg/L	-	0.01		-	-	**2.7**	**14**	**3.7**	**0.58**	-	-	**2.8**	**9.6**	**14**	**13**		-	-	< 0.1	< 0.1	**0.46**	**0.14**		-		< 5	<5
potassium	mg/L	-	-		23	11	6.6	15	10	3.9	18	83	10	16	23	40		17	17	20	18	18	18		280		340	330
selenium	mg/L	0.01	0.1		< 0.02	< 0.01	< 0.002	< 0.02	<0.0020	<0.002	< 0.02	< 0.02	< 0.002	< 0.01	<0.01	<0.02		< 0.002	< 0.002	< 0.002	< 0.002	<0.0020	<0.002		< 0.2		< 0.2	<0.1
silicon	mg/L	-	-		39	64	40	87	60	20	75	390	35	66	96	150		8.8	8.3	6.9	9.3	25	11		18		63	14
silver	mg/L	-	0.0001		< 0.001	< 0.0005	**0.0002**	< **0.001**	**0.00035**	0.0001	**0.001**	**0.005**	**0.0002**	**0.0006**	**0.00065**	<0.001		< 0.0001	< 0.0001	< 0.0001	< 0.0001	<0.00010	<0.0001		< 0.01		< 0.005	**0.0058**
sodium	mg/L	200 d	-		6.8	6.8	6.7	11	8.5	6.9	25	45	24	28	30	32		170	110	110	78	75	86		17000		20000	21000
strontium	mg/L	-	-		1.2	0.85	0.72	3.2	0.96	0.41	7.8	21	7.5	9.9	10	10		6.9	8.3	14	15	14	14		180		240	220
sulphide	mg/L	0.05	-		-	-	< 0.020	< 0.02	<0.020	<0.020	-	-	< 0.020	< 0.02	<0.020	0.049		-	-	< 0.020	< 0.02	<0.020	<0.020		-		0.040	<0.020
sulphate	mg/L	500	-		-	-	-	111	95	100	-	-	-	52	41	47		-	-	-	130	120	140		-		1370	1200
thallium	mg/L	-	0.0003		**0.0013**	**0.0006**	**0.0004**	**0.0018**	**0.0005**	0.00016	< 0.0005	**0.0033**	0.0002	**0.0006**	**0.0006**	**0.0013**		< 0.00005	< 0.00005	< 0.00005	< 0.00005	<0.000050	<0.00005		< 0.005		< 0.003	<0.0025
tin	mg/L	-	-		< 0.01	< 0.005	< 0.001	< 0.01	<0.0010	0.001	< 0.01	< 0.01	< 0.001	< 0.005	<0.0050	<0.01		< 0.001	< 0.001	< 0.001	< 0.001	0.0017	<0.001	**Note:**	< 0.1	**Note:**	< 0.05	<0.05
titanium	mg/L	-	-		1.3	0.77	0.52	1.5	0.83	0.24	0.76	5.6	0.38	1	1.4	2.5		0.056	0.039	0.015	0.028	0.17	0.04	Insufficient	< 0.5	Insufficient	0.96	0.91
TSS	mg/L	-	-		-	-	4000	22000	5700	2300	-	-	3600	14000	12000	25000		-	-	< 10	200	600	240	water	-	water	3800	1400
turbidity	NTU	1	-		-	-	24	2700	1600	520	-	-	3400	2700	3500	610		-	-	15	210	640	170		-		520	470
uranium	mg/L	0.02	0.005		**0.007**	0.0042	0.0038	**0.012**	0.0046	0.0029	0.005	**0.020**	0.002	0.005	**0.0062**	**0.0073**		0.0008	0.0002	0.0001	0.0006	0.0017	0.00062		< 0.01		**0.009**	<0.0050
vanadium	mg/L	-	0.006		**0.17**	**0.10**	**0.06**	**0.25**	**0.08**	**0.024**	**0.12**	**0.57**	**0.04**	**0.12**	**0.17**	**0.2**		0.006	0.004	< 0.001	0.0039	**0.01**	0.0047		< 0.1		**0.19**	<0.05
zinc	mg/L	5	0.02		**0.66**	**0.40**	**0.19**	**1.20**	**0.25**	**0.077**	**0.47**	**2.10**	**0.11**	**0.38**	**1.20**	**0.61**		**0.03**	0.013	< 0.005	**0.032**	**0.033**	0.017		< 0.5		**1.6**	<0.25

NOTES:
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Groundwater Quality in On-Site Monitoring Wells - Total Metals Analyses
Tansley Quarry Site, Burlington, Ontario

Parameter	Units	ODWS (June 2006)	PWQO (July 1994)		MW-06 shallow						MW-06 straddle						MW-06 deep					
				Nov-13	Oct-08	Dec-09	Oct-10	Nov-11	Nov-12	Nov-13	Oct-08	Dec-09	Oct-10	Nov-11	Nov-12	Nov-13	Oct-08	Dec-09	Oct-10	Nov-11	Nov-12	Nov-13
aluminum	mg/L	0.1	[0.075] a					**1800**			**230**	**330**	**210**	**12**	**19**	**1.4**						
alkalinity	mg $CaCO_3$/L	30-500	-					309			-	312	-	320	330	320						
ammonia as N	mg/L	-	-					1.1			-	0.66	-	0.17	0.32	0.21						
antimony	mg/L	-	[0.02]					< 0.03			< 0.005	< 0.005	0.01	< 0.0005	<0.0005	0.00064						
arsenic	mg/L	0.025	[0.005]					**0.78**			**0.069**	**0.110**	**0.051**	**0.02**	**0.02**	**0.0082**						
barium	mg/L	1	-					32			3.2	5.5	2.3	0.27	0.31	0.055						
beryllium	mg/L	-	1.1					0.11			0.014	0.020	0.007	0.001	0.001	<0.0005						
bismuth	mg/L	-	-					< 0.05			< 0.01	< 0.01	< 0.01	< 0.001	<0.001	0.0011						
boron	mg/L	5	0.2					**3**			**0.52**	**0.90**	**0.49**	0.1	0.2	0.058						
bromide	mg/L	-	-					< 0.001			-	< 1	-	< 1	<1.0	<1.0						
cadmium	mg/L	0.005	0.0005					**0.028**			**0.004**	**0.005**	**0.001**	0.000	**0.001**	**0.001**						
calcium	mg/L	-	-					20000			1700	2400	740	170	200	92						
chromium	mg/L	0.05	-					3.8			0.38	0.48	0.18	0.021	0.030	<0.005						
cobalt	mg/L	-	0.0009					**2**			**0.23**	**0.32**	**0.13**	**0.015**	**0.015**	**0.0013**						
copper	mg/L	1	[0.005] b					**4.7**			**0.4**	**0.5**	**0.15**	**0.026**	**0.037**	**0.0063**						
fluoride	mg/L	1.5 - 2.4	-	**NOT SAMPLED**	**NOT SAMPLED**	**NOT SAMPLED**	**NOT SAMPLED**	0.3	**NOT SAMPLED**	**NOT SAMPLED**	-	0.2	-	0.1	0.14	0.12	**NOT SAMPLED**	**NOT SAMPLED**	**NOT SAMPLED**	**NOT SAMPLED**	**NOT SAMPLED**	**NOT SAMPLED**
free cyanide	mg/L	0.2	0.005					< 0.002			-	-	-	< 0.002	<0.0020	<0.0020						
hardness	mg $CaCO_3$/L	80-100	-					320			-	-	-	400	370	400						
iron	mg/L	0.3	0.3					**3300**			**360**	**530**	**210**	**26**	**29**	**2.9**						
lead	mg/L	0.01	[0.005] c					**1.8**			**0.14**	**0.16**	**0.057**	**0.0087**	**0.01**	0.0015						
magnesium	mg/L	-	-					2400			260	350	150	45	60	39						
manganese	mg/L	0.05	-					190			16	22	7.2	0.98	1.1	0.12						
mercury	mg/L	0.001	0.0002					< 0.0001			< 0.0015 (1)	< 0.0001	< 0.0001	< 0.0001	<0.00010	<0.00010						
molybdenum	mg/L	-	0.04					**0.14**			0.016	0.02	< 0.01	0.002	0.0027	0.0016						
nickel	mg/L	-	0.025					**4.1**			**0.480**	**0.730**	**0.28**	**0.031**	**0.034**	0.0047						
nitrate as N	mg/L	10	-					< 0.1			-	0.4	-	< 0.1	<0.10	<0.10						
nitrite as N	mg/L	1	-					0.12			-	0.07	-	0.02	0.014	<0.010						
pH	pH Units	6.5-8.5	6.5-8.5					7.94			-	-	-	7.82	7.87	7.80						
phenol	mg/L	-	-					< 0.001			-	-	-	< 0.001	<0.0010	<0.0010						
phosphate	mg/L	-	-					< 0.01			-	< 0.01	-	< 0.01	<0.010	<0.010						
total phosphorous	mg/L	-	0.01					**180**			-	-	**6.6**	**0.89**	**1**	**0.30**						
potassium	mg/L	-	-					340			75	100	57	7.7	10	3.1						
selenium	mg/L	0.01	0.1					< 0.1			< 0.02	< 0.02	< 0.02	< 0.002	<0.002	<0.002						
silicon	mg/L	-	-					5.2			85	430	180	25	40	10						
silver	mg/L	-	0.0001					**0.007**			< 0.001	< 0.001	<0.001	< 0.0001	<0.0001	<0.0001						
sodium	mg/L	200 d	-					70			26	31	22	11	21	13						
strontium	mg/L	-	-					55			10	14	7	2.4	3.5	1.5						
sulphide	mg/L	0.05	-					0.31			-	-	-	< 0.02	<0.020	<0.020						
sulphate	mg/L	500	-					94			-	-	-	63	73	88						
thallium	mg/L	-	0.0003					**0.015**			**0.0023**	**0.0031**	**0.0018**	0.00022	0.00012	0.000099						
tin	mg/L	-	-	**Note:**	**Note:**	**Note:**	**Note:**	< 0.05	**Note:**	**Note:**	< 0.01	< 0.01	< 0.01	< 0.001	<0.001	0.0028	**Note:**	**Note:**	**Note:**	**Note:**	**Note:**	**Note:**
titanium	mg/L	-	-	Insufficient	Insufficient	Insufficient	Insufficient	9.1	Insufficient	Insufficient	2.3	4.7	2.1	0.22	0.42	0.027	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient
TSS	mg/L	-	-	water	water	water	water	290000	water	water	-	-	-	1500	1100	97	water	water	water	water	water	water
turbidity	NTU	1	-					32000			-	-	-	670	1100	49						
uranium	mg/L	0.02	0.005					**0.19**			**0.017**	**0.017**	**0.007**	0.002	0.0025	0.0014						
vanadium	mg/L	-	0.006					**2.7**			**0.42**	**0.57**	**0.24**	**0.026**	**0.032**	0.002						
zinc	mg/L	5	0.02					**11**			**1.8**	**1.7**	**0.68**	**0.082**	**0.083**	0.015						

NOTES:
Shaded area indicates an exceedance of the MOE Ontario Drinking Water Standard (June 2006) for that specific parameter.
Bolded areas indicate an exceedance of the MOE Provincial Water Quality Objectives (July 1994) for that specific parameter.
[ ] indicate interim PWQO concentration
a = interim PWQO at pH > 6.5 to 9.0 measured in clay-free samples.
b = interim PWQO if hardness greater than 20 mg/L.
c = interim PWQO if hardness greater than 80 mg/L
d = Local Medical Office of Health should be notified when sodium concentrations exceed 20 mg/L so that this information may be communicated to local physicians for their use with patients on sodium reduced diets.
(1) Sample bottle contained visible sediment. Results may be biased high due to analyte present in sediment.

TABLE D.2
Groundwater Quality in On-Site Monitoring Wells - Total Metals Analyses
Tansley Quarry Site, Burlington, Ontario

Parameter	Units	ODWS (June 2006)	PWQO (July 1994)	MW-07 shallow						MW-07 deep					
				Oct-08	Nov-09	Oct-10	Nov-11	Nov-12	Nov-13	Oct-08	Dec-09	Oct-10	Nov-11	Nov-12	Nov-13
aluminum	mg/L	0.1	[0.075] a	**610**	**1200**	**380**	**170**	**36**	**81**	**6.7**	**2.0**	**0.4**	**2.4**	**8.7**	**4.9**
alkalinity	mg $CaCO_3$/L	30-500	-	-	559	-	569	570	550	-	35	32	33	45	41
ammonia as N	mg/L	-	-	-	-	-	0.32	0.28	0.20	-	-	19	19	22	19
antimony	mg/L	-	[0.02]	< 0.05	< 0.03	< 0.005	< 0.005	0.00051	<0.0025	< 0.005	< 0.01	< 0.01	< 0.01	<0.025	<0.01
arsenic	mg/L	0.025	[0.005]	**0.24**	**0.480**	**0.180**	**0.081**	**0.017**	**0.044**	< 0.01	< 0.03	**0.023**	< 0.02	<0.05	<0.02
barium	mg/L	1	-	5.3	11.0	3.8	1.9	0.31	0.54	0.094	< 0.1	< 0.1	0.08	0.22	0.097
beryllium	mg/L	-	1.1	< 0.05	0.06	0.019	0.013	0.0023	0.005	< 0.005	< 0.01	< 0.01	< 0.01	<0.025	<0.01
bismuth	mg/L	-	-	< 0.1	< 0.05	< 0.01	< 0.01	<0.0010	<0.005	< 0.01	< 0.03	< 0.02	< 0.02	<0.05	<0.02
boron	mg/L	5	0.2	**3.1**	**6.9**	**5.5**	**5.6**	**6.4**	**8.6**	**6.6**	**6.4**	**7**	**6.1**	**9.4**	**7.6**
bromide	mg/L	-	-	-	< 1	-	< 1	<1.0	<1.0	-	203	-	224	320	210
cadmium	mg/L	0.005	0.0005	< 0.01	**0.026**	**0.004**	**0.002**	**0.001**	**0.00084**	< 0.001	**0.013**	< 0.002	< 0.002	**0.009**	**0.0028**
calcium	mg/L	-	-	3600	8100	2800	1300	270	580	2700	2900	3300	3400	4000	3500
chromium	mg/L	0.05	-	1	2	0.6	0.28	0.062	0.13	< 0.05	< 0.1	< 0.1	< 0.1	<0.25	<0.1
cobalt	mg/L	-	0.0009	**0.54**	**1.10**	**0.36**	**0.16**	**0.032**	**0.078**	**0.006**	< 0.01	< 0.01	< 0.01	<0.025	<0.01
copper	mg/L	1	[0.005] b	**1.1**	**2.3**	**0.74**	**0.35**	**0.062**	**0.16**	**0.028**	**0.060**	< 0.020	< 0.02	**0.072**	**0.042**
fluoride	mg/L	1.5 - 2.4	-	-	0.5	-	0.3	0.33	0.34	-	0.3	0.2	0.2	0.19	0.24
free cyanide	mg/L	0.2	0.005	-	-	-	< 0.002	<0.0020	<0.0020	-	-	< 0.002	< 0.002	<0.0020	<0.0020
hardness	mg $CaCO_3$/L	80-100	-	-	-	-	630	610	500	-	-	10000	10000	13000	11000
iron	mg/L	0.3	0.3	**1100**	**2400**	**750**	**330**	**68**	**170**	**17**	**9**	**7**	**6.5**	**18.0**	**11**
lead	mg/L	0.01	[0.005] c	**0.55**	**1.10**	**0.33**	**0.16**	**0.032**	**0.068**	**0.009**	**0.01**	< 0.01	< 0.01	<0.025	<0.01
magnesium	mg/L	-	-	740	1400	490	290	150	180	740	730	810	840	1000	900
manganese	mg/L	0.05	-	30	67.0	22	10	1.7	4	1.6	1.5	1.6	1.7	2.3	1.9
mercury	mg/L	0.001	0.0002	**0.0017**	**0.0022**	< 0.0015	< 0.0001	<0.00010	<0.00010	< 0.0001	< 0.0001	< 0.0001	< 0.0001	<0.00010	<0.00010
molybdenum	mg/L	-	0.04	< 0.1	**0.080**	0.032	0.018	0.01	0.013	< 0.01	< 0.03	< 0.02	< 0.01	<0.025	0.013
nickel	mg/L	-	0.025	**1.3**	**2.5**	**0.81**	**0.36**	**0.067**	**0.17**	< 0.01	< 0.03	< 0.02	< 0.02	<0.05	<0.02
nitrate as N	mg/L	10	-	-	< 0.1	-	< 0.1	<0.10	<0.10	-	< 0.1	< 0.1	< 0.1	<0.10	<0.10
nitrite as N	mg/L	1	-	-	0.06	-	0.01	<0.010	0.023	-	< 0.01	< 0.01	< 0.1	<0.10	0.017
pH	pH Units	6.5-8.5	6.5-8.5	-	-	-	7.7	7.92	7.74	-	-	6.97	7.02	6.58	6.90
phenol	mg/L	-	-	-	-	-	< 0.001	<0.0010	<0.0010	-	-	< 0.001	0.03	0.0025	0.035
phosphate	mg/L	-	-	-	< 0.01	-	0.01	<0.010	<0.010	-	< 0.01	< 0.01	< 0.01	<0.010	<0.010
total phosphorous	mg/L	-	0.01	-	-	**34**	**9.9**	**1.8**	**4.2**	-	-	< 2	< 2	<5	**0.32**
potassium	mg/L	-	-	160	230	100	69	17	22	140	140	160	160	180	170
selenium	mg/L	0.01	0.1	< 0.2	< 0.1	< 0.02	< 0.02	<0.0020	<0.01	0.021	< 0.05	0.045	< 0.04	<0.1	<0.04
silicon	mg/L	-	-	140	970	460	240	62	92	15	10	6.3	7.3	15	11
silver	mg/L	-	0.0001	< 0.01	< 0.005	**0.002**	< 0.001	**0.00022**	<0.0005	< 0.001	< 0.003	< 0.002	< 0.002	<0.0050	<0.002
sodium	mg/L	200 d	-	85	110	110	99	99	120	6600	6500	7200	7800	9000	8100
strontium	mg/L	-	-	14	25	11	6.6	3.2	4.5	56	60	66	68	81	75
sulphide	mg/L	0.05	-	-	-	-	0.02	0.027	0.036	-	-	< 0.020	< 0.02	<0.020	0.023
sulphate	mg/L	500	-	-	-	-	182	170	160	-	-	-	1560	1500	1500
thallium	mg/L	-	0.0003	**0.007**	**0.012**	**0.0045**	**0.0026**	**0.00047**	**0.00083**	< 0.0005	< 0.001	< 0.001	< 0.001	<0.0025	<0.001
tin	mg/L	-	-	< 0.1	< 0.05	0.012	< 0.01	<0.0010	<0.005	< 0.01	< 0.03	< 0.02	< 0.02	<0.05	<0.02
titanium	mg/L	-	-	4.9	14	7.2	4	0.92	1.3	0.12	< 0.1	< 0.1	< 0.1	<0.25	0.1
TSS	mg/L	-	-	-	-	-	10000	2200	5800	-	-	-	310	2100	210
turbidity	NTU	1	-	-	-	-	14000	770	250	-	-	-	330	210	170
uranium	mg/L	0.02	0.005	**0.086**	**0.140**	**0.047**	**0.029**	**0.011**	**0.013**	0.002	< 0.003	< 0.002	< 0.002	<0.0050	**0.0068**
vanadium	mg/L	-	0.006	**1.3**	**2.2**	**0.76**	**0.35**	**0.077**	**0.16**	< 0.01	< 0.03	**0.033**	< 0.01	**0.032**	<0.01
zinc	mg/L	5	0.02	**3.3**	**6.1**	**2**	**0.91**	**0.17**	**0.44**	**0.059**	**0.100**	< 0.100	< 0.1	<0.25	<0.1

NOTES:
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Bolded areas indicate an exceedance of the MOE Provincial Water Quality Objectives (July 1994) for that specific parameter.
[ ] indicate interim PWQO concentration
a = interim PWQO at pH > 6.5 to 9.0 measured in clay-free samples.
b = interim PWQO if hardness greater than 20 mg/L.
c = interim PWQO if hardness greater than 80 mg/L
d = Local Medical Office of Health should be notified when sodium concentrations exceed 20 mg/L so that this information may be communicated to local physicians for their use with patients on sodium reduced diets.
(1) Sample bottle contained visible sediment. Results may be biased high due to analyte present in sediment.

TABLE D.2
Groundwater Quality in On-Site Monitoring Wells - Total Metals Analyses
Tansley Quarry Site, Burlington, Ontario

Parameter	Units	ODWS (June 2006)	PWQO (July 1994)	MW-08 shallow						MW-08 intermediate								MW-08 deep					
				Oct-08	Nov-09	Oct-10	Nov-11	Nov-12	Nov-13	Oct-08	Nov-09	Oct-10	Oct-10 DUP 1	Nov-11	Nov-11 DUP 1	Nov-12	Nov-13	Oct-08	Dec-09	Oct-10	Nov-11	Nov-12	Nov-13
aluminum	mg/L	0.1	[0.075] a	**1900**	**1300**	**140**	**51**	**58**	**280**	**2**	**1**	**0.29**	**0.74**	**0.61**	**0.55**	**8.6**	**2.1**	**0.88**	**0.41**	**670**	**97**	**4**	**0.5**
alkalinity	mg $CaCO_3$/L	30-500	-	-	549	545	553	580	570	-	146	139	145	163	168	150	140	-	412	59	67	440	420
ammonia as N	mg/L	-	-	-	-	0.38	0.09	1.3	0.46	-	-	5.6	5	6.1	5.8	5.8	5.2	-	-	39	35	0.10	2.3
antimony	mg/L	-	[0.02]	< 0.05	< 0.03	< 0.005	< 0.0005	<0.00050	<0.005	< 0.005	< 0.0005	< 0.0005	< 0.0005	0.004	< 0.003	<0.0025	<0.0025	< 0.001	< 0.0005	< 0.03	< 0.03	<0.00050	0.00062
arsenic	mg/L	0.025	[0.005]	**0.64**	**0.500**	**0.054**	**0.03**	**0.03**	**0.1**	< 0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	**0.0057**	<0.005	**0.006**	< 0.005	**0.39**	**0.093**	**0.0087**	**0.0077**
barium	mg/L	1	-	17	13	1	1	0.57	2.2	< 0.05	0.018	0.015	0.016	0.02	0.021	0.26	0.036	0.018	0.016	5	1.1	0.041	0.025
beryllium	mg/L	-	1.1	**0.097**	0.08	0.008	0.0031	0.0036	0.014	< 0.005	< 0.0005	< 0.0005	< 0.0005	< 0.003	< 0.003	<0.0025	<0.0025	< 0.001	< 0.0005	0.032	< 0.03	<0.00050	<0.0005
bismuth	mg/L	-	-	< 0.1	< 0.05	< 0.01	< 0.001	<0.0010	<0.01	< 0.01	< 0.001	< 0.001	< 0.001	0.007	< 0.005	<0.0050	<0.005	< 0.001	< 0.001	< 0.05	< 0.05	<0.0010	<0.001
boron	mg/L	5	0.2	**4.2**	**3.7**	**2.0**	**1.1**	**1.8**	**2.6**	**5.9**	**6.2**	**6.1**	**5.9**	**5.7**	**5.6**	**6.2**	**5.9**	**3.7**	**4.6**	**6.8**	**4.9**	**4.4**	**4.2**
bromide	mg/L	-	-	-	< 1	-	< 1	<5.0	<1.0	-	23	-	-	23	21	60	32	-	3	-	523	<5.0	3.1
cadmium	mg/L	0.005	0.0005	**0.018**	**0.017**	**0.001**	**0.001**	**0.001**	**0.0048**	< 0.001	< 0.0001	< 0.0001	< 0.0001	< 0.0005	< 0.0005	**0.001**	<0.0005	**0.0018**	0.0002	**0.026**	< 0.005	**0.0049**	**0.011**
calcium	mg/L	-	-	11000	8000	740	520	470	1200	430	470	460	460	580	590	650	520	150	260	11000	8600	150	140
chromium	mg/L	0.05	-	3.3	2.1	0.2	0.095	0.100	0.42	< 0.05	< 0.005	< 0.005	< 0.005	< 0.03	< 0.03	<0.025	<0.025	0.018	< 0.005	1.3	< 0.3	0.093	0.069
cobalt	mg/L	-	0.0009	**1.9**	**1.3**	**0.1**	**0.056**	**0.058**	**0.23**	< 0.005	< 0.0005	< 0.0005	< 0.0005	< 0.003	< 0.003	**0.005**	<0.0025	0.0007	< 0.0005	**0.63**	**0.1**	**0.0022**	0.0008
copper	mg/L	1	[0.005] b	**3.6**	**2.3**	**0.2**	**0.093**	**0.094**	**0.43**	< 0.01	0.001	< 0.001	< 0.001	< 0.005	< 0.005	**0.019**	<0.005	**0.037**	< 0.001	**1.1**	**0.13**	**0.019**	**0.01**
fluoride	mg/L	1.5 - 2.4	-	-	0.3	0.2	0.3	0.24	0.23	-	0.4	0.4	0.4	0.4	0.5	0.42	0.45	-	0.3	< 0.1	< 0.1	0.28	0.27
free cyanide	mg/L	0.2	0.005	-	-	< 0.002	< 0.002	<0.0020	<0.0020	-	-	< 0.002	< 0.002	< 0.002	< 0.002	<0.0020	<0.0020	-	-	< 0.002	< 0.002	<0.0020	<0.0020
hardness	mg $CaCO_3$/L	80-100	-	-	-	990	880	980	910	-	-	2000	2000	1700	1700	4100	2100	-	-	18000	27000	660	600
iron	mg/L	0.3	0.3	**3500**	**2500**	**240**	**110**	**110**	**460**	**3**	**2**	**1.2**	**1.5**	**1.8**	**2.5**	**13.0**	**2.7**	**2.3**	**1.3**	**1300**	**200**	**6.5**	**2.7**
lead	mg/L	0.01	[0.005] c	**1.4**	**1.00**	**0.10**	**0.06**	**0.05**	**0.2**	< 0.005	0.0006	< 0.0005	< 0.0005	< 0.003	< 0.003	**0.02**	<0.0025	0.003	< 0.0005	**0.33**	**0.049**	0.0025	0.0012
magnesium	mg/L	-	-	2000	1400	270	200	260	400	120	140	150	150	160	170	200	150	92	120	2400	1800	130	110
manganese	mg/L	0.05	-	110	82.0	6.4	4.1	3.6	12	0.22	0.20	0.21	0.21	0.24	0.25	0.70	0.25	0.15	0.16	31	9	0.19	0.16
mercury	mg/L	0.001	0.0002	**0.0036 (1)**	**0.0020**	0.0001	< 0.0001	<0.00010	<0.00010	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	<0.00010	<0.00010	< 0.0001	< 0.0001	< 0.0015 (1)	< 0.0001	<0.00010	<0.00010
molybdenum	mg/L	-	0.04	< 0.1	**0.070**	0.014	0.009	0.0090	0.021	< 0.010	0.007	0.007	0.007	0.007	0.006	0.0064	0.0062	0.006	0.006	**0.14**	< 0.03	0.0077	0.0067
nickel	mg/L	-	0.025	**4.2**	**2.8**	**0.3**	**0.12**	**0.12**	**0.5**	< 0.010	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.013	<0.005	0.019	0.003	**1.4**	**0.19**	0.023	0.013
nitrate as N	mg/L	10	-	-	< 0.1	< 0.1	0.3	<0.10	<0.10	-	< 0.1	0.1	0.1	< 0.1	< 0.1	<0.10	<0.10	-	< 0.1	< 0.1	< 0.1	1.6	1.7
nitrite as N	mg/L	1	-	-	< 0.01	0.02	< 0.01	<0.010	0.065	-	< 0.01	0.01	< 0.01	0.03	0.04	0.038	<0.010	-	0.01	0.05	< 0.1	0.066	0.035
pH	pH Units	6.5-8.5	6.5-8.5	-	-	7.69	7.65	7.81	7.71	-	-	7.55	7.59	7.64	7.58	7.59	7.59	-	-	6.76	6.75	7.89	8.01
phenol	mg/L	-	-	-	-	< 0.001	< 0.001	<0.0010	<0.0010	-	-	0.001	< 0.001	0.005	0.004	<0.0010	0.0030	-	-	< 0.001	0.26	<0.0010	0.0025
phosphate	mg/L	-	-	-	< 0.01	< 0.01	< 0.01	<0.010	<0.010	-	< 0.01	0.01	0.01	< 0.01	0.01	<0.010	<0.010	-	< 0.01	< 0.01	< 0.01	<0.010	<0.010
total phosphorous	mg/L	-	0.01	-	-	**6.7**	**3.9**	**3.8**	**7.8**	-	-	< 0.1	< 0.1	< 0.5	< 0.5	**0.57**	**0.069**	-	-	**26**	< 5	<0.1	**0.099**
potassium	mg/L	-	-	410	250	63	22	28	91	43	46	47	47	49	50	52	44	27	28	450	300	37	31
selenium	mg/L	0.01	0.1	< 0.2	< 0.1	< 0.02	0.007	<0.0020	<0.02	< 0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	<0.01	<0.01	< 0.002	< 0.01	0.1	< 0.1	<0.0020	<0.002
silicon	mg/L	-	-	250	940	190	61	73	340	7.6	5.8	4.6	5.5	4.7	4.2	19	9.7	6.8	6.4	700	130	17	7.9
silver	mg/L	-	0.0001	< 0.01	< 0.005	< 0.001	**0.0004**	**0.00033**	**0.0018**	< 0.001	**0.0003**	< 0.0001	< 0.0001	< 0.0005	< 0.0005	<0.00050	<0.0005	< 0.0001	< 0.0001	< 0.005	< 0.005	<0.00010	<0.0001
sodium	mg/L	200 d	-	140	120	93	76	98	110	1100	1100	1100	1100	1300	1300	1500	1200	210	540	18000	15000	290	260
strontium	mg/L	-	-	53	41	14	8.3	12	16	12	12	14	14	16	16	16	14	17	13	200	170	20	19
sulphide	mg/L	0.05	-	-	-	< 0.020	< 0.02	0.48	0.28	-	-	< 0.020	< 0.020	< 0.02	< 0.020	<0.020	<0.020	-	-	0.130	< 0.02	<0.020	<0.020
sulphate	mg/L	500	-	-	-	-	423	560	550	-	-	-	-	965	976	1000	1000	-	-	-	1130	430	430
thallium	mg/L	-	0.0003	**0.014**	**0.010**	**0.002**	**0.00046**	**0.00042**	**0.0031**	< 0.0005	< 0.00005	< 0.00005	< 0.00005	< 0.0003	< 0.0003	<0.00025	<0.00025	< 0.00005	< 0.00005	**0.005**	< 0.003	<0.000050	<0.00005
tin	mg/L	-	-	< 0.1	< 0.05	< 0.01	< 0.001	<0.0010	<0.01	< 0.01	< 0.001	< 0.001	< 0.001	< 0.005	< 0.005	<0.0050	<0.005	0.001	< 0.001	0.11	< 0.05	0.0012	0.0013
titanium	mg/L	-	-	8.8	12	2.4	0.81	0.82	4.1	0.058	0.038	0.013	0.03	< 0.03	< 0.03	0.32	0.055	0.026	0.034	7.5	1.8	0.2	0.015
TSS	mg/L	-	-	-	-	9000	5700	5200	12000	-	-	27	26	32	29	4000	170	-	-	44000	9100	27	69
turbidity	NTU	1	-	-	-	14000	710	2500	1100	-	-	14	22	30	21	1000	73	-	-	96000	1900	29	12
uranium	mg/L	0.02	0.005	**0.13**	**0.08**	**0.02**	**0.015**	**0.014**	**0.028**	< 0.001	0.0002	0.0002	0.0002	0.0018	< 0.0005	**0.006**	0.0006	0.0029	0.0043	**0.037**	**0.007**	0.0013	0.0013
vanadium	mg/L	-	0.006	**3.5**	**2.2**	**0.3**	**0.1**	**0.1**	**0.5**	< 0.01	< 0.005	< 0.005	< 0.005	0.006	< 0.003	**0.01**	<0.0025	0.002	< 0.005	**1.3**	**0.23**	**0.007**	0.0014
zinc	mg/L	5	0.02	**10**	**7**	**1**	**0.3**	**0.3**	**1.3**	< 0.05	< 0.005	< 0.005	< 0.005	< 0.03	< 0.03	**0.1**	<0.025	**0.069**	< 0.005	**3.9**	**0.6**	**0.044**	**0.054**

NOTES:

Shaded area indicates an exceedance of the MOE Ontario Drinking Water Standard (June 2006) for that specific parameter.
Bolded areas indicate an exceedance of the MOE Provincial Water Quality Objectives (July 1994) for that specific parameter.
[ ] indicate interim PWQO concentration
a = interim PWQO at pH > 6.5 to 9.0 measured in clay-free samples.
b = interim PWQO if hardness greater than 20 mg/L.
c = interim PWQO if hardness greater than 80 mg/L
d = Local Medical Office of Health should be notified when sodium concentrations exceed 20 mg/L so that this information may be communicated to local physicians for their use with patients on sodium reduced diets.
(1) Sample bottle contained visible sediment. Results may be biased high due to analyte present in sediment.

TABLE D.2
Groundwater Quality in On-Site Monitoring Wells - Total Metals Analyses
Tansley Quarry Site, Burlington, Ontario

Parameter	Units	ODWS (June 2006)	PWQO (July 1994)	MW-09 shallow						MW-09 intermediate						MW-09 deep					
				Oct-08	Nov-09	Oct-10	Nov-11	Nov-12	Nov-13	Oct-08	Nov-09	Oct-10	Nov-11	Nov-12	Nov-13	Oct-08	Nov-09	Oct-10	Nov-11	Nov-12	Nov-13
aluminum	mg/L	0.1	[0.075] a	**47**	**160**	**4**	**22**	**61**	**46**	**180**	**310**	**33**	**22**	**27**	**39**	NOT SAMPLED Note: Insufficient water.	NOT SAMPLED Note: Insufficient water.	NOT SAMPLED Note: Insufficient water.	**0.75**	**1.3**	**1.4**
alkalinity	mg CaCO$_3$/L	30-500	-	-	438	412	398	390	420	-	305	261	239	220	240				52	52	41
ammonia as N	mg/L	-	-	-	-	0.17	0.36	0.39	0.20	-	2.5	2.2	1.7	2.6	3.3				40	36	39
antimony	mg/L	-	[0.02]	< 0.001	< 0.005	< 0.0005	< 0.0005	<0.00050	<0.0005	< 0.005	**<** 0.005	< 0.0005	< 0.0005	<0.00050	<0.0005				0.0053	<0.025	<0.05
arsenic	mg/L	0.025	[0.005]	**0.021**	**0.130**	0.004	**0.013**	**0.034**	**0.022**	**0.054**	**0.10**	**0.02**	**0.02**	**0.05**	**0.032**				**0.024**	<0.05	<0.1
barium	mg/L	1	-	0.44	2.0	0.1	0.3	0.75	0.54	2.1	4	0.48	0.28	0.46	0.59				0.15	0.15	<0.2
beryllium	mg/L	-	1.1	0.003	0.008	< 0.0005	0.0011	0.0035	0.0025	0.009	0.017	0.0021	0.0012	0.0020	0.002				0.0016	<0.025	<0.05
bismuth	mg/L	-	-	< 0.001	< 0.01	< 0.001	< 0.001	<0.0010	<0.001	< 0.01	< 0.01	< 0.001	< 0.001	<0.0010	<0.001				< 0.001	<0.05	<0.1
boron	mg/L	5	0.2	**0.54**	**4.0**	**0.6**	**1.8**	**1.3**	**0.57**	**3.7**	**5.2**	**3.6**	**3.7**	**4.7**	**5.6**				**5.3**	**5**	**3.9**
bromide	mg/L	-	-	-	< 1	-	< 1	<1.0	<1.0	-	1	-	3	<10	2.5				696	590	690
cadmium	mg/L	0.005	0.0005	**0.0008**	**0.0050**	< 0.0001	0.0003	**0.001**	**0.0006**	**0.002**	**0.003**	0.0003	0.0002	**0.001**	**0.00061**				**0.0012**	**0.006**	<0.01
calcium	mg/L	-	-	280	1200	66	170	440	380	1300	2200	390	220	520	700				8800	9100	9200
chromium	mg/L	0.05	-	0.12	0.41	0.01	0.057	0.170	0.11	0.36	0.52	0.06	0.043	0.06	0.064				0.035	<0.25	<0.5
cobalt	mg/L	-	0.0009	**0.049**	**0.160**	**0.004**	**0.022**	**0.067**	**0.043**	**0.16**	**0.26**	**0.03**	**0.021**	**0.030**	**0.032**				< 0.0005	<0.025	<0.05
copper	mg/L	1	[0.005] b	**0.054**	**0.170**	0.004	**0.022**	**0.064**	**0.041**	**0.15**	**0.20**	**0.02**	**0.018**	**0.027**	**0.027**				**0.033**	<0.05	<0.1
fluoride	mg/L	1.5 - 2.4	-	-	0.2	0.2	0.2	0.27	0.22	-	0.5	0.3	0.4	0.44	0.38				< 0.1	<0.10	<0.10
free cyanide	mg/L	0.2	0.005	-	-	< 0.002	< 0.002	<0.0020	<0.0020	-	< 0.002	< 0.002	< 0.002	<0.0020	<0.0020				< 0.002	<0.0020	<0.0020
hardness	mg CaCO$_3$/L	80-100	-	-	-	410	380	380	390	-	-	600	760	600	480				28000	29000	31000
iron	mg/L	0.3	0.3	**76**	**290**	**6**	**35**	**110**	**63**	**260**	**410**	**45**	**34**	**54**	**53**				**25**	**19**	**61**
lead	mg/L	0.01	[0.005] c	**0.026**	**0.090**	0.002	**0.013**	**0.038**	**0.027**	**0.1**	**0.2**	**0.02**	**0.013**	**0.026**	**0.034**				0.0041	<0.025	<0.05
magnesium	mg/L	-	-	99	700	64	79	110	98	190	300	82	58	100	120				2000	2100	2100
manganese	mg/L	0.05	-	2.4	7.1	0.2	1.2	3.9	2.9	10	18.0	2.4	1.2	3.4	3.5				4.7	4.7	5.8
mercury	mg/L	0.001	0.0002	< 0.0015 (1)	< 0.0001	< 0.0001	< 0.0001	<0.00010	<0.00010	< 0.0015 (1)	< 0.0001	< 0.0001	< 0.0001	<0.00010	<0.00010				< 0.0001	<0.00010	<0.00010
molybdenum	mg/L	-	0.04	0.015	**0.080**	0.008	0.010	0.012	0.009	0.035	**0.050**	0.011	0.012	0.013	0.013				0.0089	<0.025	<0.05
nickel	mg/L	-	0.025	**0.1**	**0.3**	0.008	**0.044**	**0.14**	**0.083**	**0.36**	**0.6**	**0.071 (1)**	**0.046**	**0.065**	**0.065**				0.006	<0.05	**0.32**
nitrate as N	mg/L	10	-	-	2.1	0.4	0.2	0.13	0.31	-	< 0.1	< <0.1	1.8	0.14	0.18				< 0.1	<0.10	<0.10
nitrite as N	mg/L	1	-	-	< 0.01	0.04	0.03	0.012	0.018	-	< 0.01	0.02	0.44	0.053	0.070				< 0.1	<0.10	<0.010
pH	pH Units	6.5-8.5	6.5-8.5	-	-	7.87	7.85	8.01	7.95	-	7.8	7.81	7.77	7.84	7.86				6.84	**6.19**	**6.31**
phenol	mg/L	-	-	-	< -	< 0.001	< 0.001	<0.0010	<0.0010	-	< 0.001	< 0.001	< 0.001	<0.0010	<0.0010				0.08	0.07	0.025
phosphate	mg/L	-	-	-	< 0.01	0.01	< 0.01	<0.010	<0.010	-	< 0.01	< 0.01	< 0.01	<0.010	<0.010				< 0.01	<0.010	<0.010
total phosphorous	mg/L	-	0.01	-	-	**0.14**	**1.1**	**3.3**	**2.9**	-	-	**1.8**	**1.1**	**2.6**	**3.8**				< 0.1	<5	**0.65 (1)**
potassium	mg/L	-	-	30	150	13	17	25	19	88	130	30	26	33	37				310	320	270
selenium	mg/L	0.01	0.1	< 0.002	< 0.02	< 0.002	< 0.002	<0.0020	<0.002	< 0.02	< 0.02	< 0.002	< 0.002	<0.0020	0.0027				0.053	<0.1	<0.2
silicon	mg/L	-	-	70	310	14	39	73	65	77	420	51	38	46	49				< 3	6	<5
silver	mg/L	-	0.0001	**0.0003**	< 0.001	< 0.0001	**0.0002**	**0.00058**	**0.00042**	**0.003**	**0.002**	**0.0002**	**0.0002**	**0.00029**	**0.00023**				**0.0003**	<0.005	<0.01
sodium	mg/L	200 d	-	36	310	34	37	37	35	170	200	190	120	250	350				18000	19000	18000
strontium	mg/L	-	-	8.9	48	6.6	7	8.9	7.7	22	34	18	19	21	20				180	190	190
sulphide	mg/L	0.05	-	-	-	< 0.02	< 0.02	<0.020	<0.020	-	-	< <0.02	< 0.02	<0.020	<0.020				< 0.02	<0.020	<0.020
sulphate	mg/L	500	-	-	-	-	59	50	67	-	-	-	468	560	400				1470	1300	1200
thallium	mg/L	-	0.0003	**0.00038**	**0.00150**	< 0.00005	0.00018	**0.00051**	**0.00034**	**0.0019**	**0.0026**	0.0003	0.0002	0.00026	0.00028				< 0.00005	<0.0025	<0.005
tin	mg/L	-	-	0.001	< 0.01	< 0.001	< 0.001	0.0011	<0.001	< 0.01	< 0.01	< 0.001	< 0.001	0.0014	0.001				< 0.001	<0.05	<0.1
titanium	mg/L	-	-	0.6	2.6	0.063	0.35	0.67	0.65	1.7	4.0	0.4	0.3	0.41	0.44				0.021	<0.25	<0.5
TSS	mg/L	-	-	-	-	180	4900	4500	4800	-	16000	3300	3100	2700	5500				390	260	1000
turbidity	NTU	1	-	-	-	330	3200	2000	430	-	-	3400	920	470	690				150	38	320
uranium	mg/L	0.02	0.005	**0.0084**	**0.0420**	0.0034	0.0035	**0.0056**	**0.0051**	**0.01**	**0.02**	0.0023	0.0023	0.0032	0.003				**0.0057**	**0.011**	<0.01
vanadium	mg/L	-	0.006	**0.092**	**0.320**	**0.008**	**0.04**	**0.11**	**0.078**	**0.32**	**0.52**	**0.06**	**0.04**	**0.06**	**0.064**				**0.0074**	<0.05	<0.05
zinc	mg/L	5	0.02	**0.37**	**1.30**	**0.03**	**0.14**	**0.39**	**0.24**	**1.1**	**1.3**	**0.1**	**0.11**	**0.15**	**0.16**				< 0.005	<0.25	<0.5

NOTES:
Shaded area indicates an exceedance of the MOE Ontario Drinking Water Standard (June 2006) for that specific parameter.
Bolded areas indicate an exceedance of the MOE Provincial Water Quality Objectives (July 1994) for that specific parameter.
[ ] indicate interim PWQO concentration
a = interim PWQO at pH > 6.5 to 9.0 measured in clay-free samples.
b = interim PWQO if hardness greater than 20 mg/L.
c = interim PWQO if hardness greater than 80 mg/L.
d = Local Medical Office of Health should be notified when sodium concentrations exceed 20 mg/L so that this information may be communicated to local physicians for their use with patients on sodium reduced diets.
(1) Sample bottle contained visible sediment. Results may be biased high due to analyte present in sediment.

TABLE D.2
Groundwater Quality in On-Site Monitoring Wells - Total Metals Analyses
Tansley Quarry Site, Burlington, Ontario

Parameter	Units	ODWS (June 2006)	PWQO (July 1994)	MW-10 shallow						MW-10 intermediate					MW-10 deep					
				Oct-08	Nov-09	Oct-10	Nov-11	Nov-12	Nov-13	Oct-08	Oct-10	Nov-11	Nov-12	Nov-13	Oct-08	Dec-09	Oct-10	Nov-11	Nov-12	Nov-13
aluminum	mg/L	0.1	[0.075] a	**1000**	**1800**	**420**	**90**	**870**	**42**	**510**	**9.3**	**28**	**5.2**	**8.3**				**4.5**	**0.37**	**1.5**
alkalinity	mg $CaCO_3$/L	30-500	-	-	475	472	485	490	490	-	400	416	410	420				40	66	39
ammonia as N	mg/L	-	-	-	-	0.43	0.13	0.42	0.13	-	0.92	0.82	0.99	0.96				34	28	34
antimony	mg/L	-	[0.02]	< 0.05	< 0.03	0.006	< 0.003	<0.05	<0.0005	< 0.005	< 0.0005	< 0.0005	<0.0005	<0.0005				< 0.0005	<0.005	<0.025
arsenic	mg/L	0.025	[0.005]	**0.27**	**0.59**	**0.12**	**0.054**	**0.300**	**0.019**	**0.11**	**0.01**	**0.16**	**0.032**	**0.2**				**0.031**	<0.05	<0.05
barium	mg/L	1	-	13	26	5	2	11	0.56	6.9	0.3	0.56	0.14	0.29				0.19	0.1	0.17
beryllium	mg/L	-	1.1	0.057	0.10	0.02	0.01	0.051	0.0029	0.025	0.0007	0.0019	<0.0005	0.00096				< 0.0005	<0.005	<0.025
bismuth	mg/L	-	-	< 0.1	< 0.05	< 0.01	< 0.005	<0.1	<0.001	< 0.01	< 0.001	< 0.001	<0.001	<0.001				< 0.001	<0.01	<0.05
boron	mg/L	5	0.2	**1.4**	**3.1**	**0.8**	**0.24**	**2.10**	0.19	**4.3**	**1.0**	**0.75**	**0.63**	**0.73**				**6**	**8.1**	**7.1**
bromide	mg/L	-	-	-	< 1	-	< 1	<1.0	<1.0	-	-	< 1	<1.0	<1.0				538	390	540
cadmium	mg/L	0.005	0.0005	< 0.01	**0.0190**	**0.003**	**0.0018**	<0.01	**0.00064**	**0.005**	0.0001	**0.0011**	**0.00054**	**0.00064**				**0.012**	**0.0087**	**0.0064**
calcium	mg/L	-	-	7800	17000	2900	1200	6400	390	2800	120	330	120	190				5600	5300	7600
chromium	mg/L	0.05	-	2	4	1	0.14	1.50	0.081	0.79	0.01	0.052	0.011	0.017				0.62	0.22	<0.25
cobalt	mg/L	-	0.0009	**1.1**	**2.0**	**0.4**	**0.092**	**0.910**	**0.047**	**0.51**	**0.01**	**0.031**	**0.0039**	**0.0098**				**0.012**	<0.01	<0.025
copper	mg/L	1	[0.005] b	**1.4**	**2.5**	**0.6**	**0.18**	**1.30**	**0.073**	**0.43**	**0.01**	**0.031**	**0.0056**	**0.011**				**0.051**	**0.018**	<0.05
fluoride	mg/L	1.5 - 2.4	-	-	0.3	0.2	0.2	0.20	0.16	-	0.2	0.2	0.2	0.19	**NOT SAMPLED**	**NOT SAMPLED**	**NOT SAMPLED**	<0.1	0.14	<0.10
free cyanide	mg/L	0.2	0.005	-	-	< 0.002	< 0.002	<0.0020	<0.0020	-	< 0.002	< 0.002	<0.0020	<0.0020				< 0.002	<0.0020	<0.0020
hardness	mg $CaCO_3$/L	80-100	-	-	-	480	500	480	480	-	370	340	380	360				25000	17000	26000
iron	mg/L	0.3	0.3	**1700**	**3200**	**660**	**170**	**1500**	**74**	**780**	**15**	**66**	**9.7**	**37**				**18**	**2.8**	**32**
lead	mg/L	0.01	[0.005] c	**0.65**	**1**	**0.21**	**0.12**	**0.51**	**0.028**	**0.21**	0.0046	**0.018**	0.0036	**0.01**				**0.011**	**0.011**	<0.025
magnesium	mg/L	-	-	1200	2300	490	220	1000	110	480	66	94	65	64				1500	1600	1700
manganese	mg/L	0.05	-	71	150	28	11	61	3.3	27	1	2.5	0.62	1.2				2.5	2.4	4.5
mercury	mg/L	0.001	0.0002	< 0.0015 (1)	< 0.0015	< 0.0001	< 0.0001	<0.00010	<0.00010	< 0.0015 (1)	< 0.0001	< 0.0001	<0.00010	<0.00010				< 0.0001	<0.00010	<0.00010
molybdenum	mg/L	-	0.04	< 0.1	< 0.05	0.02	0.005	<0.05	0.0036	0.023	0.004	0.0045	0.0032	0.003				**0.24**	**0.26**	**0.11**
nickel	mg/L	-	0.025	**2.2**	**4.1**	**0.9**	**0.18**	**1.90**	**0.099**	**1**	0.019	**0.06**	0.0087	0.021				**0.38**	**0.28**	**0.18**
nitrate as N	mg/L	10	-	-	0.4	< 0.1	< 0.1	0.11	<0.10	-	< 0.1	0.7	0.36	0.72				0.1	<0.10	<0.10
nitrite as N	mg/L	1	-	-	0.03	0.05	< 0.01	<0.010	<0.010	-	0.08	0.1	0.14	0.14				< 0.1	<0.10	<0.010
pH	pH Units	6.5-8.5	6.5-8.5	-	-	7.7	7.83	7.98	7.94	-	7.8	7.83	7.96	7.88				6.6	8.22	6.65
phenol	mg/L	-	-	-	-	< 0.001	< 0.001	<0.0010	<0.0010	-	< 0.001	< 0.001	<0.0010	<0.0010				0.05	0.0022	<0.0010
phosphate	mg/L	-	-	-	< 0.01	< 0.01	< 0.01	<0.010	<0.010	-	< 0.01	< 0.01	<0.010	<0.010				< 0.01	<0.010	<0.010
total phosphorous	mg/L	-	0.01	-	-	**26**	**11**	**57**	**3.3**	-	**0.56**	**2.4**	**0.56**	**1.6**				< 0.1	<1	**1.4**
potassium	mg/L	-	-	270	360	120	30	200	17	150	15	18	12	13				240	240	270
selenium	mg/L	0.01	0.1	< 0.2	< 0.1	< 0.02	< 0.01	<0.2	<0.002	< 0.02	< 0.002	< 0.002	<0.002	<0.002				0.08	**0.11**	<0.1
silicon	mg/L	-	-	190	1100	440	83	870	64	130	22	8.4	17	23				< 3	<5	4.2
silver	mg/L	-	0.0001	< 0.01	**0.005**	**0.002**	**0.0006**	<0.01	**0.00019**	**0.001**	< 0.0001	0.0001	<0.0001	<0.0001				**0.0002**	<0.001	<0.005
sodium	mg/L	200 d	-	74	67	29	26	59	20	85	35	31	27	26				16000	16000	16000
strontium	mg/L	-	-	24	40	8.9	4.5	18	2.5	27	12	13	11	12				120	120	170
sulphide	mg/L	0.05	-	-	-	0.230	< 0.02	0.047	0.025	-	<0.02	< 0.02	<0.020	<0.020				< 0.02	<0.020	<0.020
sulphate	mg/L	500	-	-	-	-	58	52	52	-	-	39	41	40				1360	1700	1400
thallium	mg/L	-	0.0003	**0.007**	**0.012**	**0.004**	**0.0009**	**0.0068**	**0.00038**	**0.004**	0.00009	0.00027	0.000066	0.0001				< 0.00005	<0.0005	<0.0025
tin	mg/L	-	-	< 0.1	< 0.05	< 0.01	< 0.005	<0.1	<0.001	< 0.01	< 0.001	< 0.001	<0.001	<0.001	**Note:**	**Note:**	**Note:**	< 0.001	<0.01	<0.05
titanium	mg/L	-	-	5.3	12	6.1	1.3	8	0.67	3.5	0.14	0.42	0.12	0.14	Insufficient	Insufficient	Insufficient	0.099	<0.05	<0.25
TSS	mg/L	-	-	-	-	91000	10000	27000	5800	-	440	2700	1900	2400	water.	water.	water.	770	150	4300
turbidity	NTU	1	-	-	-	94000	1500	1200	1900	-	340	540	500	440				280	41	260
uranium	mg/L	0.02	0.005	**0.09**	**0.13**	**0.03**	**0.027**	**0.059**	**0.0054**	**0.03**	0.0011	0.002	0.00073	0.00095				**0.022**	**0.0097**	**0.026**
vanadium	mg/L	-	0.006	**1.80**	**2.70**	**0.77**	**0.15**	**1.50**	**0.084**	**0.83**	**0.02**	**0.049**	**0.0094**	**0.017**				**0.034**	<0.05	<0.025
zinc	mg/L	5	0.02	**5.5**	**9.6**	**2.0**	**0.5**	**4.4**	**0.23**	**2.5**	**0.045**	**0.15**	**0.022**	**0.05**				**0.068**	<0.05	**0.35**

NOTES:
Shaded area indicates an exceedance of the MOE Ontario Drinking Water Standard (June 2006) for that specific parameter.
Bolded areas indicate an exceedance of the MOE Provincial Water Quality Objectives (July 1994) for that specific parameter.
[ ] indicate interim PWQO concentration
a = interim PWQO at pH > 6.5 to 9.0 measured in clay-free samples.
b = interim PWQO if hardness greater than 20 mg/L.
c = interim PWQO if hardness greater than 80 mg/L
d = Local Medical Office of Health should be notified when sodium concentrations exceed 20 mg/L so that this information may be communicated to local physicians for their use with patients on sodium reduced diets.
(1) Sample bottle contained visible sediment. Results may be biased high due to analyte present in sediment.

TABLE D.2
Groundwater Quality in On-Site Monitoring Wells - Total Metals Analyses
Tansley Quarry Site, Burlington, Ontario

Parameter	Units	ODWS (June 2006)	PWQO (July 1994)	MW-11 shallow						MW-11 intermediate						MW-11 deep					
				Oct-08	Dec-09	Oct-10	Nov-11	Nov-12	Nov-13	Oct-08	Dec-09	Oct-10	Nov-11	Nov-12	Nov-13	Oct-08	Dec-09	Oct-10	Nov-11	Nov-12	Nov-13
aluminum	mg/L	0.1	[0.075] a	**840**	**880**	**470**	**49**	**49**	**180**	**12**	**5**	**2**	**13**	**91**	**18**	**NOT SAMPLED** **Note:** Insufficient water.	**NOT SAMPLED** **Note:** Insufficient water.	**17**	**17**	**1.4**	**0.77**
alkalinity	mg $CaCO_3$/L	30-500	-	-	321	322	341	340	350	-	431	453	450	400	410			-	50	55	63
ammonia as N	mg/L	-	-	-	-	0.21	0.18	0.26	0.082	-	-	1.3	1.5	1.8	1.7			-	34	35	31
antimony	mg/L	-	[0.02]	< 0.05	< 0.03	< 0.005	< 0.0005	<0.00050	<0.005	< 0.001	0.0006	< 0.0005	< 0.0005	<0.0025	<0.0005			< 0.03	< 0.03	<0.025	<0.025
arsenic	mg/L	0.025	[0.005]	**0.4**	**0.4**	**0.2**	**0.022**	**0.029**	**0.079**	**0.019**	**0.015**	**0.013**	**0.02**	**0.078**	**0.015**			**0.061**	< 0.05	<0.05	<0.05
barium	mg/L	1	-	18	18	9	1	1	3.3	0.14	0.085	0.057	0.18	1	0.13			< 0.3	0.31	0.15	0.11
beryllium	mg/L	-	1.1	< 0.05	0.04	0.024	0.0027	0.0030	0.0098	0.001	< 0.0005	< 0.0005	0.0006	0.0060	0.00093			< 0.03	< 0.03	<0.025	<0.025
bismuth	mg/L	-	-	< 0.1	< 0.05	< 0.01	< 0.001	<0.0010	<0.01	< 0.001	< 0.001	0.003	< 0.001	<0.0050	<0.001			< 0.05	< 0.05	<0.05	<0.05
boron	mg/L	5	0.2	**1.5**	**1.3**	**0.8**	0.1	0.14	**0.69**	**1.4**	**1.6**	**1.3**	**1.4**	**1.7**	**2.4**			**4.8**	**5.1**	**5**	**4.6**
bromide	mg/L	-	-	-	< 1	-	< 1	<1.0	<1.0	-	< 1	-	< 1	<1.0	<1.0			-	< 500	580	460
cadmium	mg/L	0.005	0.0005	< 0.0100	**0.0100**	**0.006**	**0.0007**	**0.0011**	**0.0016**	0.0002	< 0.0001	< 0.0001	0.0003	**0.0015**	0.00021			**0.013**	**0.014**	**0.0073**	**0.011**
calcium	mg/L	-	-	7600	7800	3900	400	450	1400	210	140	99	250	1500	260			6700	7700	7400	6100
chromium	mg/L	0.05	-	3.4	2.9	1.4	0.14	0.15	0.55	0.025	0.012	0.006	0.026	0.19	0.031			< 0.3	0.6	<0.25	0.26
cobalt	mg/L	-	0.0009	**0.88**	**0.85**	**0.42**	**0.045**	**0.049**	**0.17**	**0.012**	**0.007**	**0.002**	**0.014**	**0.120**	**0.018**			< 0.030	< 0.03	<0.025	<0.025
copper	mg/L	1	[0.005] b	**2.3**	**2.3**	**1.1**	**0.11**	**0.14**	**0.48**	**0.022**	**0.011**	0.005	**0.028**	**0.240**	**0.037**			**0.096**	**0.068**	<0.05	<0.05
fluoride	mg/L	1.5 - 2.4	-	-	0.3	0.2	0.1	0.14	0.14	-	0.3	0.3	0.3	0.29	0.27			0.1	0.1	0.12	0.15
free cyanide	mg/L	0.2	0.005	-	-	< 0.002	< 0.002	<0.0020	<0.0020	-	-	< 0.002	< 0.002	<0.0020	<0.0020			< 0.002	< 0.002	<0.0020	<0.0020
hardness	mg $CaCO_3$/L	80-100	-	-	-	550	390	410	390	-	-	450	490	430	600			-	26000	27000	24000
iron	mg/L	0.3	0.3	**1700**	**1600**	**840**	**89**	**100**	**320**	**20**	**11**	**5**	**25**	**210**	**33**			**67**	**84**	**16**	<5
lead	mg/L	0.01	[0.005] c	**0.68**	**0.66**	**0.35**	**0.031**	**0.042**	**0.13**	**0.008**	0.0046	0.0017	**0.0096**	**0.081**	**0.0091**			< 0.03	< 0.03	<0.025	<0.025
magnesium	mg/L	-	-	960	960	480	100	93	230	87	70	72	86	180	100			1500	1800	1700	1600
manganese	mg/L	0.05	-	79	82	42	3.6	4.2	14	1.3	0.6	0.2	1.6	13.0	1.5			4.2	5.1	4	2.8
mercury	mg/L	0.001	0.0002	< 0.0015 (1)	**0.0003**	< 0.0001	< 0.0001	<0.00010	<0.00010	< 0.0015 (1)	< 0.0001	< 0.0001	< 0.0001	<0.00010	<0.00010			< 0.0001	< 0.0001	<0.00010	<0.00010
molybdenum	mg/L	-	0.04	< 0.1	< 0.05	0.029	0.0054	0.0052	0.012	0.004	0.004	0.004	0.0039	0.0068	0.004			< 0.05	< 0.03	<0.025	**0.12**
nickel	mg/L	-	0.025	**1.8**	**1.8**	**0.9**	**0.1**	**0.1**	**0.34**	0.023	0.012	0.005	**0.028**	**0.24**	**0.037**			< 0.05	**0.095**	**0.21**	**0.19**
nitrate as N	mg/L	10	-	-	< 0.1	< 0.1	< 0.1	<0.10	<0.10	-	< 0.1	< 0.1	< 0.1	<0.10	<0.10			-	< 0.1	<0.10	<0.10
nitrite as N	mg/L	1	-	-	0.03	0.02	0.02	<0.010	<0.010	-	< 0.01	< 0.01	< 0.01	<0.010	0.20			-	< 0.01	<0.10	<0.010
pH	pH Units	6.5-8.5	6.5-8.5	-	-	7.88	7.95	8.01	7.96	-	-	7.88	7.95	8.00	7.82			-	6.69	**6.14**	7.21
phenol	mg/L	-	-	-	-	< 0.001	< 0.001	<0.0010	<0.0010	-	-	< 0.001	< 0.001	<0.0010	<0.0010			< 0.001	0.017	0.0091	0.0070
phosphate	mg/L	-	-	-	< 0.01	< 0.01	< 0.01	<0.010	<0.010	-	< 0.01	< 0.01	< 0.01	<0.010	<0.010			< 0.01	< 0.01	<0.010	<0.010
total phosphorous	mg/L	-	0.01	-	-	**28**	**2.4**	**2.6**	**7.7**	-	-	**0.19**	**1.6**	**10**	**1.6**			< 5	< 5	<5	**0.17**
potassium	mg/L	-	-	220	190	110	16	15	62	21	18	18	22	33	25			260	280	270	250
selenium	mg/L	0.01	0.1	< 0.2	< 0.1	< 0.02	< 0.002	<0.0020	<0.02	< 0.002	< 0.002	< 0.002	< 0.002	<0.01	<0.002			< 0.1	< 0.1	<0.1	<0.1
silicon	mg/L	-	-	86	790	550	67	69	260	27	17	12	27	91	32			25	3.1	5.5	3.5
silver	mg/L	-	0.0001	< 0.01	< 0.005	**0.003**	**0.0003**	**0.00031**	**0.0013**	< 0.0001	< 0.0001	< 0.0001	< 0.0001	<0.00050	<0.0001			< 0.005	< 0.005	<0.005	<0.005
sodium	mg/L	200 d	-	60	54	22	15	11	24	64	64	60	70	63	91			14000	16000	16000	15000
strontium	mg/L	-	-	16	16	8.5	1.8	1.9	4	12	11	12	11	14	15			130	160	160	130
sulphide	mg/L	0.05	-	-	-	0.170	0.06	0.042	0.057	-	-	< 0.020	< 0.02	0.021	<0.020			0.040	< 0.02	<0.020	<0.020
sulphate	mg/L	500	-	-	-	-	79	71	73	-	-	-	147	160	360			-	1410	1300	1600
thallium	mg/L	-	0.0003	**0.009**	**0.007**	**0.004**	**0.00044**	**0.00049**	**0.002**	0.00009	0.00007	< 0.00005	0.00012	**0.00051**	0.00013			< 0.003	< 0.003	<0.0025	<0.0025
tin	mg/L	-	-	< 0.100	< 0.05	< 0.01	< 0.001	<0.0010	<0.01	< 0.001	< 0.001	0.001	< 0.001	<0.0050	<0.001			< 0.05	< 0.05	<0.05	<0.05
titanium	mg/L	-	-	4.8	7.9	5.9	0.57	0.52	2.9	0.2	0.097	0.038	0.24	1.1	0.33			< 0.3	< 0.3	<0.25	<0.25
TSS	mg/L	-	-	-	-	88000	2300	7100	11000	-	-	240	1900	14000	5900			-	1200	3000	170
turbidity	NTU	1	-	-	-	62000	840	1900	4700	-	-	210	410	900	800			-	140	320	15
uranium	mg/L	0.02	0.005	**0.093**	**0.066**	**0.04**	**0.0057**	**0.0069**	**0.014**	0.0017	0.0009	0.0008	0.0014	**0.0094**	0.0012			**0.011**	**0.01**	**0.015**	**0.029**
vanadium	mg/L	-	0.006	**1.6**	**1.6**	**0.9**	**0.091**	**0.096**	**0.34**	**0.025**	**0.011**	0.005	**0.025**	**0.190**	**0.035**			**0.140**	< 0.03	<0.025	<0.025
zinc	mg/L	5	0.02	**4.5**	**4.4**	**2.1**	**0.24**	**0.36**	**0.87**	**0.06**	**0.03**	0.02	**0.069**	**0.55**	**0.086**			**0.79**	**0.37**	<0.25	**0.44**

NOTES:

Shaded area indicates an exceedance of the MOE Ontario Drinking Water Standard (June 2006) for that specific parameter.

Bolded areas indicate an exceedance of the MOE Provincial Water Quality Objectives (July 1994) for that specific parameter.

[ ] indicate interim PWQO concentration

a = interim PWQO at pH > 6.5 to 9.0 measured in clay-free samples.

b = interim PWQO if hardness greater than 20 mg/L.

c = interim PWQO if hardness greater than 80 mg/L.

d = Local Medical Office of Health should be notified when sodium concentrations exceed 20 mg/L so that this information may be communicated to local physicians for their use with patients on sodium reduced diets.

(1) Sample bottle contained visible sediment. Results may be biased high due to analyte present in sediment.

Table D.3
Groundwater Quality - Bekkers Well
Tansley Quarry - Hanson Brick Ltd.

Parameter	**Units**	**Criteria**				**BEKKERS**						
		ODWS	**ODWS**	**ODWS**	**ODWS**	**Jul-07**	**Oct-08**	**Dec-09**	**Oct-10**	**Nov-11**	**Nov-12**	**Nov-13**
		MAC	**IMAC**	**AO**	**OG**							
aluminum	mg/L				0.1	0.038	0.01	0.012	0.015	<0.005	0.0078	**NOT SAMPLED**
alkalinity	mg $CaCO_3$/L				30-500	362	435	77	295	172	100	
ammonia-N	mg/L					0.31	<0.05	1.0	0.84	0.43	0.94	
antimony	mg/L		0.006			<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
arsenic	mg/L		0.025			<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	
barium	mg/L	1				0.037	0.022	0.010	0.015	0.022	0.016	
beryllium	mg/L					<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
bismuth	mg/L					<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	
boron	mg/L		5			0.69	0.46	1.8	1.5	1.5	1.6	
bromide	mg/L					<1	<1	3	1	<10	<10	
cadmium	mg/L	0.005				<0.0001	<0.0001	<0.0001	<0.0001	0.0003	0.00057	
calcium	mg/L					140	130	190	190	190	170	
chloride	mg/L			250		104	49	**264**	118	195	**270**	
chromium	mg/L	0.05				<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
cobalt	mg/L					<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
copper	mg/L			1		0.069	0.014	0.006	0.005	0.021	0.031	
fluoride	mg/L	1.5 [a]				0.2	0.2	0.2	0.2	0.3	0.26	
free cyanide	mg/L					<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	
hardness	mg $CaCO_3$/L				80-100	**760**	**890**	**740**	**810**	**780**	**720**	
iron	mg/L			0.3		<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	
lead	mg/L	0.01 [c]				0.0063	<0.0005	0.0010	0.0014	0.0023	0.0034	
magnesium	mg/L					130	140	79	96	100	71	
manganese	mg/L			0.05		0.043	0.011	**0.15**	**0.1**	**0.071**	**0.084**	
mercury	mg/L					<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
molybdenum	mg/L					0.007	0.007	0.018	0.016	0.015	0.015	
nickel	mg/L					<0.001	<0.001	<0.001	<0.001	0.005	0.032	
nitrate as N	mg/L	10.0 [b]				3	2.9	<0.1	2.4	1.3	0.27	
nitrite as N	mg/L	1.0 [b]				0.11	<0.01	<0.01	0.06	0.05	<0.01	
pH	pH Units				6.5-8.5	8.1	8.2	7.8	7.91	7.96	6.9	
phenol	mg/L					<0.001	<0.001	0.001	<0.001	<0.001	<0.001	
phosphate	mg/L					<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	
total phosphorous	mg/L					0.005	0.01	<0.002	<0.002	0.007	<0.1	
potassium	mg/L					13	9.6	17	17	16	15	
selenium	mg/L	0.01				<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	
silicon	mg/L					6	6.4	4.3	4.5	5.3	3.7	
silver	mg/L					<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
sodium	mg/L			20/200 [f]		120	83	**260**	**260**	**210**	**230**	
strontium	mg/L					6.1	5	12	12	11	12	
sulphate	mg/L			500 [d]		**563**	**543**	**838**	**617**	**762**	**850**	
sulphide	mg/L					<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	
thallium	mg/L					<0.05	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	
tin	mg/L					0.001	<0.001	<0.001	<0.001	<0.001	<0.001	**Note:** Well not in use.
titanium	mg/L					<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
TSS	mg/L					<10	<10	<10	<10	<10	<10	
turbidity	NTU			5 [e]		1.4	0.3	0.6	0.3	<0.2	0.4	
uranium	mg/L					0.0057	0.0074	0.0004	0.0017	0.003	0.00087	
vanadium	mg/L					<0.001	<0.001	<0.001	<0.001	0.0009	0.00064	
zinc	mg/L			5		0.04	0.032	<0.03	0.017	0.38	2.2	

NOTES:

ODWS = Ontario Drinking Water Objectives, Standards and Guidelines, dated June 2006. MAC = maximum acceptable concentrations, IMAC = interim maximum acceptable concentrations, AO = aesthetic objective, OG = operational guideline.

Bold values exceed the ODWS June 2006 standard for that parameter

[a] Where fluoride is added to drinking water, it is recommended that the concentration be adjusted to 0.5-0.8 mg/L the optimum level for control of tooth decay. Where supplies contain naturally occurring fluoride at levels higher than 1.5 mg/L but less than 2.4 mg/L the Ministry of Health and Long Term Care recommends an approach through local boards of health to raise public and professional awareness to control excessive exposure to fluoride from other sources.

[b] Where both nitrate and nitrite are present, the total of the two should not exceed 10 mg/L (as nitrogen).

[c] This standard applies to water at the point of consumption. Since lead is a component in some plumbing systems, first flush water may contain higher concentrations of lead than water that has been flushed for five minutes.

[d] When sulphate levels exceed 500 mg/L, water may have a laxative effect on some people.

[e] Applicable for all waters at the point of consumption.

[f] The aesthetic objective for sodium in drinking water is 200 mg/L. The local Medical Officer of Health should be notified when the concentration exceeds 20 mg/L so that this information may be communicated to local physicians for their use with patients on Sodium restricted diets.

"-" Parameter not analysed

Table D.4
Groundwater Quality - Eno/Myers Well
Tansley Quarry - Hanson Brick Ltd.

Parameter	Units	Criteria				ENO/MEYERS							
		ODWS MAC	ODWS IMAC	ODWS AO	ODWS OG	Sep-04	Jan-07	Oct-08	Dec-09	Oct-10	Nov-11	Nov-12	Nov-13
aluminum	mg/L				0.1	**0.12**	0.036	NOT SAMPLED	NOT SAMPLED	NOT SAMPLED	NOT SAMPLED	NOT SAMPLED	NOT SAMPLED
alkalinity	mg CaCO$_3$/L				30-500	360	372						
ammonia-N	mg/L					0.47	0.14						
antimony	mg/L		0.006			<0.002	<0.001						
arsenic	mg/L		0.025			<0.002	<0.001						
barium	mg/L	1				0.040	0.039						
beryllium	mg/L					<0.001	<0.0005						
bismuth	mg/L					<0.002	<0.001						
boron	mg/L		5			0.085	0.048						
bromide	mg/L					<0.1	<1						
cadmium	mg/L	0.005				<0.00007	0.0003						
calcium	mg/L					170	110						
chloride	mg/L			250		71	30						
chromium	mg/L	0.05				<0.002	<0.005						
cobalt	mg/L					0.0009	<0.0005						
copper	mg/L			1		0.037	0.002						
fluoride	mg/L	1.5 [a]				0.31	0.4						
free cyanide	mg/L					<0.002	<0.002						
hardness	mg CaCO$_3$/L				80-100	**730**	**390**						
iron	mg/L			0.3		0.065	0.072						
lead	mg/L	0.01 [c]				0.0011	<0.0005						
magnesium	mg/L					75	34						
manganese	mg/L			0.05		0.014	0.004						
mercury	mg/L					<0.00005	<0.0001						
molybdenum	mg/L					<0.002	<0.001						
nickel	mg/L					<0.002	<0.001						
nitrate as N	mg/L	10.0 [b]				9.4	0.7						
nitrite as N	mg/L	1.0 [b]				<0.01	0.02						
pH	pH Units				6.5-8.5	7.72	8.1						
phenol	mg/L					<0.001	<0.001						
phosphate	mg/L					<0.5	<0.01						
total phosphorous	mg/L					<0.01	<0.002						
potassium	mg/L					4.1	3						
selenium	mg/L	0.01				<0.002	<0.002						
silicon	mg/L					5.6	3.9						
silver	mg/L					<0.0001	<0.0001						
sodium	mg/L			20/200 [f]		39	23						
strontium	mg/L					1.8	0.76						
sulphide	mg/L					77	<0.02						
sulphate	mg/L			500 [d]		230	80						
thallium	mg/L					<0.0002	<0.00005						
tin	mg/L					<0.002	<0.001	**Note:** Well not in use.	**Note:** Well not in use.	**Note:** Well not in use.	**Note:** Well not in use.	**Note:** Well not in use.	**Note:** Well not in use.
titanium	mg/L					<0.01	<0.005						
TSS	mg/L					2	2						
turbidity	NTU			5 [e]		<0.1	1.6						
uranium	mg/L					0.0042	0.0024						
vanadium	mg/L					<0.002	<0.001						
zinc	mg/L			5		0.4	0.014						

NOTES:

ODWS = Ontario Drinking Water Objectives, Standards and Guidelines, dated June 2006. MAC = maximum acceptable concentrations, IMAC = interim maximum acceptable concentrations, AO = aesthetic objective, OG = operational guideline.

Bold values exceed the ODWS June 2006 standard for that parameter

[a] Where fluoride is added to drinking water, it is recommended that the concentration be adjusted to 0.5-0.8 mg/L the optimum level for control of tooth decay. Where supplies contain naturally occurring fluoride at levels higher than 1.5 mg/L but less than 2.4 mg/L the Ministry of Health and Long Term Care recommends an approach through local boards of health to raise public and professional awareness to control excessive exposure to fluoride from other sources.

[b] Where both nitrate and nitrite are present, the total of the two should not exceed 10 mg/L (as nitrogen)

[c] This standard applies to water at the point of consumption. Since lead is a component in some plumbing systems, first flush water may contain higher concentrations of lead than water that has been flushed for five minutes.

[d] When sulphate levels exceed 500 mg/L, water may have a laxative effect on some people.

[e] Applicable for all waters at the point of consumption.

[f] The aesthetic objective for sodium in drinking water is 200 mg/L. The local Medical Officer of Health should be notified when the concentration exceeds 20 mg/L so that this information may be communicated to local physicians for their use with patients on Sodium restricted diets.

"-" Parameter not analysed

Table D.5
Groundwater Quality - Featherstone Well
Tansley Quarry - Hanson Brick Ltd.

Parameter	Units	Criteria				FEATHERSTONE									
		ODWS MAC	ODWS IMAC	ODWS AO	ODWS OG	Nov-02	Mar-03	Sep-04	Jan-07	Oct-08	Dec-09	Oct-10	Nov-11	Nov-12	Nov-13
aluminum	mg/L				0.1	<0.005	0.007	<0.01	0.029	0.005	**NOT SAMPLED** **Note:** Cistern installed. Well not in use.	**NOT SAMPLED** **Note:** Cistern installed. Well not in use.	**NOT SAMPLED** **Note:** Cistern installed. Well not in use.	**NOT SAMPLED** **Note:** Cistern installed. Well not in use.	**NOT SAMPLED** **Note:** Cistern installed. Well not in use.
alkalinity	mg $CaCO_3$/L				30-500	255	98	260	378	253					
ammonia-N	mg/L					1.22	0.3	1.2	0.38	1.2					
antimony	mg/L		0.006			<0.0005	<0.0005	<0.0005	<0.001	<0.0005					
arsenic	mg/L		0.025			<0.002	<0.002	<0.002	<0.001	<0.001					
barium	mg/L	1				0.017	0.008	0.02	0.019	0.015					
beryllium	mg/L					<0.001	<0.001	<0.001	<0.0005	<0.0005					
bismuth	mg/L					<0.001	<0.001	-	<0.001	<0.001					
boron	mg/L		5			1.28	0.397	1.400	0.54	1.4					
bromide	mg/L					0.5	0.5	0.6	<1	<1					
cadmium	mg/L	0.005				<0.0001	<0.0001	<0.0001	<0.0001	<0.0001					
calcium	mg/L					135	45.4	110	150	110					
chloride	mg/L			250		53.2	12.1	49	17	32					
chromium	mg/L	0.05				<0.005	<0.005	<0.005	<0.005	<0.005					
cobalt	mg/L					<0.0001	<0.0001	<0.0001	<0.0005	<0.0005					
copper	mg/L			1		0.0008	0.0138	<0.002	0.023	0.012					
fluoride	mg/L	1.5 [a]				0.2	0.1	0.2	0.2	0.2					
free cyanide	mg/L					<0.001	<0.001	<0.001	<0.002	<0.002					
hardness	mg $CaCO_3$/L				80-100	**724**	**197**	**570**	**480**	**600**					
iron	mg/L			0.3		**0.81**	0.12	**0.41**	0.24	**0.35**					
lead	mg/L	0.01 [c]				<0.0005	<0.0005	<0.0005	0.0027	0.0043					
magnesium	mg/L					93.7	20.4	73	41	79					
manganese	mg/L			0.05		**0.06**	0.02	0.046	0.026	**0.051**					
mercury	mg/L					<0.00005	<0.00005	<0.00005	<0.0001	<0.0001					
molybdenum	mg/L					0.004	0.002	-	0.002	0.003					
nickel	mg/L					<0.001	<0.001	0.001	<0.001	<0.001					
nitrate as N	mg/L	10.0 [b]				<0.2	<0.2	<0.05	0.2	1.6					
nitrite as N	mg/L	1.0 [b]				<0.2	<0.2	<0.01	0.01	0.02					
pH	pH Units				6.5-8.5	7.71	7.46	8.19	8.1	8.1					
phenol	mg/L					<0.001	<0.001	<0.001	<0.001	<0.001					
phosphate	mg/L					<1	<1	<0.5	<0.01	<0.01					
total phosphorous	mg/L					0.005	0.033	<0.01	<0.002	0.011					
potassium	mg/L					13.5	4.5	11	5.9	12					
selenium	mg/L	0.01				<0.002	<0.002	<0.002	<0.002	<0.002					
silicon	mg/L					6.04	2.18	-	4.8	5.7					
silver	mg/L					<0.0001	<0.0001	<0.0001	<0.0001	<0.0001					
sodium	mg/L			20/200 [f]		127	24.7	99.0	45	110					
strontium	mg/L					11.7	2.940	-	5.4	11					
sulphide	mg/L					0.04	<0.01	0.50	<0.02	0.74					
sulphate	mg/L			500 [d]		**601**	137	**560**	210	**559**					
thallium	mg/L					0.00006	<0.00005	<0.00005	<0.00005	<0.00005					
tin	mg/L					<0.001	<0.001	-	<0.001	0.001					
titanium	mg/L					<0.005	<0.005	-	<0.005	<0.005					
TSS	mg/L					3	5	<2	<3	<10					
turbidity	NTU			5 [e]		2.1	3.6	2.0	2	4.1					
uranium	mg/L					<0.0001	<0.0001	<0.0001	0.0005	<0.0001					
vanadium	mg/L					0.0016	0.0009	<0.002	<0.001	<0.001					
zinc	mg/L			5		0.006	0.012	0.007	0.024	0.025					

NOTES:

ODWS = Ontario Drinking Water Objectives, Standards and Guidelines, dated June 2006. MAC = maximum acceptable concentrations, IMAC = interim maximum acceptable concentrations, AO = aesthetic objective, OG = operational guideline.

Bold values exceed the ODWS June 2006 standard for that parameter

[a] Where fluoride is added to drinking water, it is recommended that the concentration be adjusted to 0.5-0.8 mg/L the optimum level for control of tooth decay. Where supplies contain naturally occurring fluoride at levels higher than 1.5 mg/L but less than 2.4 mg/L the Ministry of Health and Long Term Care recommends an approach through local boards of health to raise public and professional awareness to control excessive exposure to fluoride from other sources.

[b] Where both nitrate and nitrite are present, the total of the two should not exceed 10 mg/L (as nitrogen).

[c] This standard applies to water at the point of consumption. Since lead is a component in some plumbing systems, first flush water may contain higher concentrations of lead than water that has been flushed for five minutes.

[d] When sulphate levels exceed 500 mg/L, water may have a laxative effect on some people.

[e] Applicable for all waters at the point of consumption.

[f] The aesthetic objective for sodium in drinking water is 200 mg/L. The local Medical Officer of Health should be notified when the concentration exceeds 20 mg/L so that this information may be communicated to local physicians for their use with patients on Sodium restricted diets.

"-" Parameter not analysed

Table D.6
Groundwater Quality - Finucci Well
Tansley Quarry - Hanson Brick Ltd.

Parameter	Units	Criteria				FINUCCI										
		ODWS MAC	ODWS IMAC	ODWS AO	ODWS OG	Nov-02	Duplicate Nov-02	Mar-03	Sep-04	Jan-07	Oct-08	Dec-09	Oct-10	Nov-11	Nov-12	Nov-13
aluminum	mg/L				0.1	<0.005	<0.005	<0.005	0.012	0.005	0.006	0.010	<0.005	0.005	<0.005	**NOT SAMPLED**
alkalinity	mg $CaCO_3$/L				30-500	391	394	389	400	402	417	404	405	408	410	
ammonia-N	mg/L					0.50	0.50	0.92	1.30	0.76	0.28	1.3	1.2	0.25	0.13	
antimony	mg/L		0.006			<0.0005	<0.0005	<0.0005	<0.0005	<0.001	0.0012	<0.0005	<0.0005	<0.0005	<0.0005	
arsenic	mg/L		0.025			<0.002	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.001	0.0016	
barium	mg/L	1				0.014	0.014	0.013	0.013	0.014	0.014	0.014	0.014	0.02	0.016	
beryllium	mg/L					<0.001	<0.001	<0.001	-	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
bismuth	mg/L					<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	
boron	mg/L		5			2.84	2.82	2.96	3.10	3.7	2.9	3.0	3.0	3.9	2.9	
bromide	mg/L					<0.5	<0.5	<0.5	0.2	<1	<1	<1	<1	<1	<1	
cadmium	mg/L	0.005				<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
calcium	mg/L					111.0	97.2	107	89	100	92	89	98	130	92	
chloride	mg/L			250		33.3	34.4	37.3	22	23	18	18	20	19	22	
chromium	mg/L	0.05				<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
cobalt	mg/L					<0.0001	<0.0001	<0.0001	0.0007	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
copper	mg/L			1		0.0064	0.0066	0.0035	0.011	0.027	0.022	0.016	0.01	0.015	0.023	
fluoride	mg/L	1.5 [a]				0.3	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.4	0.35	
free cyanide	mg/L					<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	
hardness	mg $CaCO_3$/L				80-100	**627**	**553**	**597**	**510**	**490**	**510**	**520**	**520**	**520**	**500**	
iron	mg/L			0.3		<0.03	<0.03	<0.03	0.03	**0.34**	<0.1	0.2	<0.1	<0.1	**0.74**	
lead	mg/L	0.01 [c]				<0.0005	<0.0005	<0.0005	<0.0005	0.005	0.0022	0.0016	0.0013	0.0011	0.0063	
magnesium	mg/L					84.7	75.3	79.7	70	82	75	71	77	96	69	
manganese	mg/L			0.05		0.008	0.008	0.015	0.015	0.011	0.011	0.017	0.013	0.038	**0.11**	
mercury	mg/L					<0.00005	<0.00005	<0.00005	<0.00005	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
molybdenum	mg/L					0.003	0.003	0.003	-	0.003	0.003	0.003	0.003	0.0043	0.0018	
nickel	mg/L					0.002	0.002	0.001	0.001	<0.001	0.001	0.001	<0.001	0.007	0.0031	
nitrate as N	mg/L	10.0 [b]				1.3	1.3	1.2	0.7	1.2	1.2	0.7	0.7	0.7	0.81	
nitrite as N	mg/L	1.0 [b]				<0.2	<0.2	<0.2	0.2	0.02	<0.01	<0.01	<0.01	0.01	<0.01	
pH	pH Units				6.5-8.5	7.93	7.98	7.81	8.22	8.2	8.1	8.0	8.0	7.6	8.0	
phenol	mg/L					<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	
phosphate	mg/L					<1	<1	<1	<0.5	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	
total phosphorous	mg/L					<0.002	<0.002	0.007	<0.01	0.002	0.006	<0.002	<0.1	<0.002	<0.1	
potassium	mg/L					29.6	26.5	25.5	23	27	25	23	27	34	24	
selenium	mg/L	0.01				<0.002	<0.002	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	
silicon	mg/L					5.55	4.99	5.12	-	5.8	5.8	5.6	5.9	7.5	5.3	
silver	mg/L					<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0002	<0.0001	<0.0001	<0.0001	<0.0001	
sodium	mg/L			20/200 [f]		140	130	134	110	140	110	97	110	140	100	
strontium	mg/L					14.3	14.1	13	-	15	15	14	16	21	15	
sulphide	mg/L					<0.01	-	<0.01	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	
sulphate	mg/L			500 [d]		437	446	440	-	392	351	338	354	341	360	
thallium	mg/L					0.00006	0.00008	0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	
tin	mg/L					<0.001	<0.001	<0.001	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	**Note:** Well not in use.
titanium	mg/L					<0.005	<0.005	<0.005	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
TSS	mg/L					2	2	2	2	<1	<10	<10	<10	<10	<10	
turbidity	NTU			5 [e]		0.2	0.2	1.1	0.5	3.5	0.3	2.0	1.3	<0.2	1.5	
uranium	mg/L					0.0003	0.0003	0.0003	0.0002	0.0003	0.0003	0.0003	0.0002	0.0003	0.00021	
vanadium	mg/L					0.0023	0.0045	0.0026	<0.002	<0.001	<0.001	<0.001	<0.001	0.0005	0.00077	
zinc	mg/L			5		0.066	0.066	0.013	0.069	0.067	0.16	0.083	0.034	0.34	0.24	

NOTES:

ODWS = Ontario Drinking Water Objectives, Standards and Guidelines, dated June 2006. MAC = maximum acceptable concentrations, IMAC = interim maximum acceptable concentrations, AO = aesthetic objective, OG = operational guideline.

Bold values exceed the ODWS June 2006 standard for that parameter

[a] Where fluoride is added to drinking water, it is recommended that the concentration be adjusted to 0.5-0.8 mg/L the optimum level for control of tooth decay. Where supplies contain naturally occurring fluoride at levels higher than 1.5 mg/L but less than 2.4 mg/L the Ministry of Health and Long Term Care recommends an approach through local boards of health to raise public and professional awareness to control excessive exposure to fluoride from other sources.

[b] Where both nitrate and nitrite are present, the total of the two should not exceed 10 mg/L (as nitrogen)

[c] This standard applies to water at the point of consumption. Since lead is a component in some plumbing systems, first flush water may contain higher concentrations of lead than water that has been flushed for five minutes.

[d] When sulphate levels exceed 500 mg/L, water may have a laxative effect on some people.

[e] Applicable for all waters at the point of consumption.

[f] The aesthetic objective for sodium in drinking water is 200 mg/L. The local Medical Officer of Health should be notified when the concentration exceeds 20 mg/L so that this information may be communicated to local physicians for their use with patients on Sodium restricted diets.

"-" Parameter not analysed

Table D.7
Groundwater Quality - Hendervale House Well
Tansley Quarry - Hanson Brick Ltd.

Parameter	Units	Criteria				HENDERVALE HOUSE											
		ODWS MAC	ODWS IMAC	ODWS AO	ODWS OG	Nov-02	Mar-03	Duplicate Mar-03	Sep-04	Jan-07	Oct-08	Dec-09	Oct-10	Nov-11	Nov-11 DUP 2	Nov-12	Nov-13
aluminum	mg/L				0.1	<0.005	<0.005	<0.005	<0.01	<0.005	0.007	0.007	0.018	<0.005	<0.005	0.0055	**NOT SAMPLED** **Note:** Well not in use.
alkalinity	mg $CaCO_3$/L				30-500	356	357	362	360	380	353	360	356	350	355	360	
ammonia-N	mg/L					0.43	0.5	0.5	0.47	0.63	0.54	0.54	0.36	0.29	0.29	0.71	
antimony	mg/L		0.006			<0.0005	<0.0005	<0.0005	<0.002	<0.001	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
arsenic	mg/L		0.025			0.013	0.013	0.013	0.013	0.01	0.007	0.013	0.008	0.008	0.008	0.01	
barium	mg/L	1				0.028	0.024	0.023	0.024	0.021	0.019	0.025	0.025	0.038	0.035	0.029	
beryllium	mg/L					<0.001	<0.001	<0.001	<0.001	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
bismuth	mg/L					<0.001	<0.001	<0.001	-	<0.001	<0.001	<0.001	<0.001	<0.001	0.001	<0.001	
boron	mg/L		5			0.51	0.707	0.705	0.550	0.79	0.82	0.75	0.7	0.95	0.88	0.63	
bromide	mg/L					<0.5	<0.5	<0.5	<0.1	<1	<1	<1	<1	<1	<1	<1	
cadmium	mg/L	0.005				<0.0001	<0.0001	<0.0001	<0.00007	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
calcium	mg/L					91.3	82.8	81.4	72	93	80	85	94	130	120	92	
chloride	mg/L			250		97.8	63.5	64.4	88	66	69	83	113	117	117	140	
chromium	mg/L	0.05				<0.005	<0.005	<0.005	<0.002	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
cobalt	mg/L					0.0001	0.0002	0.0002	<0.005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
copper	mg/L			1		0.0045	0.0014	0.0015	0.002	0.019	0.025	0.018	0.03	0.036	0.03	0.009	
fluoride	mg/L	1.5 [a]				0.2	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.23	
free cyanide	mg/L					<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	
hardness	mg $CaCO_3$/L				80-100	**613**	**552**	**549**	**470**	**580**	**500**	**550**	**570**	**580**	**560**	**530**	
iron	mg/L			0.3		**1.81**	**1.39**	**1.35**	**0.74**	**0.6**	**0.53**	**1.3**	**0.44**	**0.37**	**0.34**	**0.83**	
lead	mg/L	0.01 [c]				<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.001	
magnesium	mg/L					93.4	84	84.1	69	90	77	84	90	120	110	83	
manganese	mg/L			0.05		**0.052**	0.046	0.045	0.029	0.032	0.036	0.042	0.034	0.033	0.03	0.039	
mercury	mg/L					<0.00005	<0.00005	<0.00005	<0.00005	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
molybdenum	mg/L					0.004	0.005	0.005	<0.005	0.005	0.005	0.005	0.004	0.0063	0.0058	0.0041	
nickel	mg/L					<0.001	<0.001	<0.001	0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.005	0.0082	
nitrate as N	mg/L	10.0 [b]				<0.2	<0.2	<0.2	0.1	<0.1	<0.1	<0.1	0.2	<0.1	0.1	<0.1	
nitrite as N	mg/L	1.0 [b]				<0.2	<0.2	<0.2	0.01	<0.01	<0.01	0.02	<0.01	0.03	0.03	<0.01	
pH	pH Units				6.5-8.5	7.74	7.61	7.57	7.67	8.1	8.2	8.0	7.97	8.03	7.98	7.97	
phenol	mg/L					<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	
phosphate	mg/L					<1	<1	<1	<0.5	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	
total phosphorous	mg/L					0.003	0.007	0.007	<0.01	<0.002	0.017	<0.002	<0.1	0.005	<0.1	<0.1	
potassium	mg/L					9.1	9.2	9.2	7.5	10	9.9	9.4	10	14	13	9.6	
selenium	mg/L	0.01				<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	
silicon	mg/L					9.92	9.12	9	-	10	8.7	9.2	9.8	13	12	9.4	
silver	mg/L					<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
sodium	mg/L			20/200 [f]		54.9	58.4	58.1	45.0	69	68	64	70	92	85	66	
strontium	mg/L					4.37	4.55	4.59	4.60	5.1	5.3	5.6	6.3	8.1	7.6	5.4	
sulphide	mg/L					0.01	0.01		<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	
sulphate	mg/L			500 [d]		187	213	215	190	210	229	197	197	190	183	170	
thallium	mg/L					0.00007	<0.00005	0.00005	-	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	
tin	mg/L					<0.001	<0.001	<0.001	<0.05	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	
titanium	mg/L					<0.005	<0.005	<0.005	<0.01	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
TSS	mg/L					4	10	9	2	<1	<10	<10	<10	<10	<10	<10	
turbidity	NTU			5 [e]		2.2	**9.7**	**9.7**	**12**	3.5	2	**8**	3.6	1.3	1.7	3.3	
uranium	mg/L					0.0015	0.0011	0.0011	0.0012	0.0011	0.0009	0.0012	0.0011	0.0018	0.0018	0.0013	
vanadium	mg/L					0.002	0.0025	0.0017	<0.002	<0.001	<0.001	<0.001	<0.001	0.0008	<0.0005	0.00091	
zinc	mg/L			5		0.007	0.01	0.01	0.007	0.026	0.009	0.006	0.016	0.019	0.011	0.0089	

NOTES:

ODWS = Ontario Drinking Water Objectives, Standards and Guidelines, dated June 2006. MAC = maximum acceptable concentrations, IMAC = interim maximum acceptable concentrations, AO = aesthetic objective, OG = operational guideline.

Bold values exceed the ODWS June 2006 standard for that parameter

[a] Where fluoride is added to drinking water, it is recommended that the concentration be adjusted to 0.5-0.8 mg/L the optimum level for control of tooth decay. Where supplies contain naturally occurring fluoride at levels higher than 1.5 mg/L but less than 2.4 mg/L the Ministry of Health and Long Term Care recommends an approach through local boards of health to raise public and professional awareness to control excessive exposure to fluoride from other sources.

[b] Where both nitrate and nitrite are present, the total of the two should not exceed 10 mg/L (as nitrogen)

[c] This standard applies to water at the point of consumption. Since lead is a component in some plumbing systems, first flush water may contain higher concentrations of lead than water that has been flushed for five minutes.

[d] When sulphate levels exceed 500 mg/L, water may have a laxative effect on some people.

[e] Applicable for all waters at the point of consumption.

[f] The aesthetic objective for sodium in drinking water is 200 mg/L. The local Medical Officer of Health should be notified when the concentration exceeds 20 mg/L so that this information may be communicated to local physicians for their use with patients on Sodium restricted diets.

"-" Parameter not analysed

Table D.8
Groundwater Quality - Hendervale Cottage Well
Tansley Quarry - Hanson Brick Ltd.

Parameter	Units	Criteria				HENDERVALE COTTAGE						
		ODWS MAC	ODWS IMAC	ODWS AO	ODWS OG	Jan-07	Oct-08	Dec-09	Oct-10	Nov-11	Nov-12	Nov-13
aluminum	mg/L				0.1	0.007	0.005	0.006	0.007	<0.005	<0.005	**NOT SAMPLED**
alkalinity	mg $CaCO_3$/L				30-500	385	361	356	360	354	370	
ammonia-N	mg/L					0.5	0.39	0.42	0.36	0.31	0.48	
antimony	mg/L		0.006			<0.001	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
arsenic	mg/L		0.025			0.016	0.014	0.014	0.01	0.014	0.011	
barium	mg/L	1				0.032	0.037	0.029	0.03	0.04	0.03	
beryllium	mg/L					<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
bismuth	mg/L					<0.001	<0.001	<0.001	<0.001	<0.001	<0.0010	
boron	mg/L		5			0.52	0.44	0.48	0.4	0.67	0.5	
bromide	mg/L					<1	<1	<1	<1	<1	<1	
cadmium	mg/L	0.005				<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
calcium	mg/L					100.0	92	90	100	130	95	
chloride	mg/L			250		97	83	131	135	128	150	
chromium	mg/L	0.05				<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
cobalt	mg/L					<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
copper	mg/L			1		0.001	0.003	0.006	<0.001	0.002	0.05	
fluoride	mg/L	1.5 [a]				0.2	0.2	0.2	0.2	0.2	0.2	
free cyanide	mg/L					<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	
hardness	mg $CaCO_3$/L				80-100	**610**	**510**	**580**	**560**	**590**	**550**	
iron	mg/L			0.3		**1.4**	**1.1**	**1.3**	**1.1**	**0.46**	**1.2**	
lead	mg/L	0.01 [c]				<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0012	
magnesium	mg/L					85	68	78	86	100	80	
manganese	mg/L			0.05		0.028	0.032	0.029	0.032	**0.051**	0.034	
mercury	mg/L					<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
molybdenum	mg/L					0.003	0.002	0.002	0.002	0.004	0.003	
nickel	mg/L					<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	
nitrate as N	mg/L	10.0 [b]				<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
nitrite as N	mg/L	1.0 [b]				<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	
pH	pH Units				6.5-8.5	8.1	8.1	7.9	7.8	7.93	8.03	
phenol	mg/L					<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	
phosphate	mg/L					<0.01	<0.01	<0.01	0.01	<0.01	<0.01	
total phosphorous	mg/L					<0.002	0.014	<0.002	<0.1	0.008	<0.1	
potassium	mg/L					8.4	7.9	7.4	8	10	8.2	
selenium	mg/L	0.01				<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	
silicon	mg/L					11	10	9.6	11	12	9.5	
silver	mg/L					<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
sodium	mg/L			20/200 [f]		54.0	45	46	52	66	58	
strontium	mg/L					4.20	4.3	4.3	4.6	5.6	4.8	
sulphide	mg/L					<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	
sulphate	mg/L			500 [d]		141	104	144	133	154	150	
thallium	mg/L					<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	
tin	mg/L					<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	**Note:** Well not in use.
titanium	mg/L					<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
TSS	mg/L					<3	<10	<10	10	<10	<10	
turbidity	NTU			5 [e]		**12.7**	**8.5**	**17**	**8.5**	**2.1**	**7.6**	
uranium	mg/L					0.0011	0.0009	0.0013	0.0012	0.0016	0.0013	
vanadium	mg/L					<0.001	<0.001	<0.001	<0.001	0.0008	0.00071	
zinc	mg/L			5		0.008	0.006	0.007	0.009	0.047	0.038	

NOTES:

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Bold values exceed the ODWS June 2006 standard for that parameter

[a] Where fluoride is added to drinking water, it is recommended that the concentration be adjusted to 0.5-0.8 mg/L the optimum level for control of tooth decay. Where supplies contain naturally occurring fluoride at levels higher than 1.5 mg/L but less than 2.4 mg/L the Ministry of Health and Long Term Care recommends an approach through local boards of health to raise public and professional awareness to control excessive exposure to fluoride from other sources.

[b] Where both nitrate and nitrite are present, the total of the two should not exceed 10 mg/L (as nitrogen).

[c] This standard applies to water at the point of consumption. Since lead is a component in some plumbing systems, first flush water may contain higher concentrations of lead than water that has been flushed for five minutes.

[d] When sulphate levels exceed 500 mg/L, water may have a laxative effect on some people.

[e] Applicable for all waters at the point of consumption.

[f] The aesthetic objective for sodium in drinking water is 200 mg/L. The local Medical Officer of Health should be notified when the concentration exceeds 20 mg/L so that this information may be communicated to local physicians for their use with patients on sodium restricted diets.

"-" Parameter not analysed

Table D.9
Groundwater Quality - Hendervale Main Barn Well
Tansley Quarry - Hanson Brick Ltd.

Parameter	Units	Criteria				HENDERVALE MAIN BARN						
		ODWS MAC	ODWS IMAC	ODWS AO	ODWS OG	Jan-07	Oct-08	Dec-09	Oct-10	Nov-11	Nov-12	Nov-13
aluminum	mg/L				0.1	**0.48**	0.035	**4.4**	0.07	NOT SAMPLED **Note:** Well inaccessible.	NOT SAMPLED **Note:** Well inaccessible.	NOT SAMPLED **Note:** Well inaccessible.
alkalinity	mg $CaCO_3$/L				30-500	170	175	220	238			
ammonia-N	mg/L					0.21	<0.05	0.31	0.18			
antimony	mg/L		0.006			<0.001	<0.0005	<0.0005	<0.0005			
arsenic	mg/L		0.025			<0.001	0.004	0.004	0.005			
barium	mg/L	1				0.21	0.02	0.047	0.027			
beryllium	mg/L					<0.0005	<0.0005	<0.0005	<0.0005			
bismuth	mg/L					<0.001	<0.001	<0.001	<0.001			
boron	mg/L		5			0.094	0.094	0.14	0.17			
bromide	mg/L					<1	<1	<1	<1			
cadmium	mg/L	0.005				<0.0001	<0.0001	<0.0001	<0.0001			
calcium	mg/L					55	46	58	67			
chloride	mg/L			250		8	6	14	12			
chromium	mg/L	0.05				<0.005	<0.005	<0.005	<0.005			
cobalt	mg/L					<0.0005	<0.0005	0.0014	<0.0005			
copper	mg/L			1		0.081	0.002	0.007	0.002			
fluoride	mg/L	1.5 [a]				<0.1	<0.1	0.1	0.1			
free cyanide	mg/L					<0.002	<0.002	<0.002	<0.002			
hardness	mg $CaCO_3$/L				80-100	**220**	**200**	**260**	**280**			
iron	mg/L			0.3		0.29	**0.34**	**3.6**	**0.47**			
lead	mg/L	0.01 [c]				<0.0005	<0.0005	0.0053	0.0022			
magnesium	mg/L					19	20	28	34			
manganese	mg/L			0.05		0.005	0.038	**0.1**	**0.074**			
mercury	mg/L					<0.0001	<0.0001	<0.0001	<0.0001			
molybdenum	mg/L					<0.001	<0.001	<0.001	<0.001			
nickel	mg/L					<0.001	<0.001	0.004	<0.001			
nitrate as N	mg/L	10.0 [b]				2.5	0.9	0.9	0.6			
nitrite as N	mg/L	1.0 [b]				0.01	<0.01	0.04	0.03			
pH	pH Units				6.5-8.5	8.1	8	7.9	7.78			
phenol	mg/L					<0.001	<0.001	<0.001	<0.001			
phosphate	mg/L					0.01	<0.01	0.16	0.03			
total phosphorous	mg/L					0.014	0.048	0.34	0.14			
potassium	mg/L					2.8	2.7	11	6			
selenium	mg/L	0.01				<0.002	<0.002	<0.002	<0.002			
silicon	mg/L					4.60	4.5	15	7.3			
silver	mg/L					<0.0001	<0.0001	<0.0001	<0.0001			
sodium	mg/L			20/200 [f]		9.4	8.5	12	13			
strontium	mg/L					0.58	0.84	1.1	1.4			
sulphide	mg/L					<0.02	<0.02	<0.02	<0.02			
sulphate	mg/L			500 [d]		34	29	45	53			
thallium	mg/L					<0.00005	<0.00005	0.00006	<0.00005			
tin	mg/L					<0.001	<0.001	<0.001	<0.001			
titanium	mg/L					0.019	<0.005	0.18	<0.005			
TSS	mg/L					1	<10	46	10			
turbidity	NTU			5 [e]		**9.2**	2.4	**94**	**130**			
uranium	mg/L					0.0006	0.0004	0.0007	0.0004			
vanadium	mg/L					<0.001	<0.001	0.009	<0.001			
zinc	mg/L			5		0.170	0.14	0.20	0.07			

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[a] Where fluoride is added to drinking water, it is recommended that the concentration be adjusted to 0.5-0.8 mg/L the optimum level for control of tooth decay. Where supplies contain naturally occurring fluoride at levels higher than 1.5 mg/L but less than 2.4 mg/L the Ministry of Health and Long Term Care recommends an approach through local boards of health to raise public and professional awareness to control excessive exposure to fluoride from other sources.

[b] Where both nitrate and nitrite are present, the total of the two should not exceed 10 mg/L (as nitrogen)

[c] This standard applies to water at the point of consumption. Since lead is a component in some plumbing systems, first flush water may contain higher concentrations of lead than water that has been flushed for five minutes.

[d] When sulphate levels exceed 500 mg/L, water may have a laxative effect on some people.

[e] Applicable for all waters at the point of consumption.

[f] The aesthetic objective for sodium in drinking water is 200 mg/L. The local Medical Officer of Health should be notified when the concentration exceeds 20 mg/L so that this information may be communicated to local physicians for their use with patients on sodium restricted diets.

"-" Parameter not analysed

Table D.10
Groundwater Quality - Hendervale ABC Barn Well
Tansley Quarry - Hanson Brick Ltd.

Parameter	Units	Criteria				HENDERVALE ABC BARN			
		ODWS MAC	ODWS IMAC	ODWS AO	ODWS OG	Oct-10	Nov-11	Nov-12	Nov-13
aluminum	mg/L				0.1	0.083	NOT SAMPLED **Note:** Well not in use.	NOT SAMPLED **Note:** Well inaccessible.	NOT SAMPLED **Note:** Well not in use.
alkalinity	mg CaCO$_3$/L				30-500	54			
ammonia-N	mg/L					<0.05			
antimony	mg/L		0.006			<0.0005			
arsenic	mg/L		0.025			<0.001			
barium	mg/L	1				0.014			
beryllium	mg/L					<0.0005			
bismuth	mg/L					<0.001			
boron	mg/L		5			0.03			
bromide	mg/L					<1			
cadmium	mg/L	0.005				0.0001			
calcium	mg/L					19			
chloride	mg/L			250		2			
chromium	mg/L	0.05				<0.005			
cobalt	mg/L					<0.0005			
copper	mg/L			1		0.003			
fluoride	mg/L	1.5 [a]				<0.1			
free cyanide	mg/L					<0.002			
hardness	mg CaCO$_3$/L				80-100	57			
iron	mg/L			0.3		<0.1			
lead	mg/L	0.01 [c]				<0.0005			
magnesium	mg/L					3.5			
manganese	mg/L			0.05		0.006			
mercury	mg/L					<0.0001			
molybdenum	mg/L					<0.001			
nickel	mg/L					<0.001			
nitrate as N	mg/L	10.0 [b]				0.8			
nitrite as N	mg/L	1.0 [b]				<0.01			
pH	pH Units				6.5-8.5	7.64			
phenol	mg/L					<0.001			
phosphate	mg/L					0.01			
total phosphorous	mg/L					0.018			
potassium	mg/L					1.7			
selenium	mg/L	0.01				<0.002			
silicon	mg/L					0.96			
silver	mg/L					<0.0001			
sodium	mg/L			20/200 [f]		3.3			
strontium	mg/L					0.17			
sulphide	mg/L					<0.02			
sulphate	mg/L			500 [d]		6			
thallium	mg/L					0.00005			
tin	mg/L					<0.001			
titanium	mg/L					<0.005			
TSS	mg/L					<10			
turbidity	NTU			5 [e]		1.6			
uranium	mg/L					0.0001			
vanadium	mg/L					0.001			
zinc	mg/L			5		0.011			

NOTES:

ODWS = Ontario Drinking Water Objectives, Standards and Guidelines, dated June 2006. MAC = maximum acceptable concentrations, IMAC = interim maximum acceptable concentrations, AO = aesthetic objective, OG = operational guideline.

Bold values exceed the ODWS June 2006 standard for that parameter

[a] Where fluoride is added to drinking water, it is recommended that the concentration be adjusted to 0.5-0.8 mg/L the optimum level for control of tooth decay. Where supplies contain naturally occurring fluoride at levels higher than 1.5 mg/L but less than 2.4 mg/L the Ministry of Health and Long Term Care recommends an approach through local boards of health to raise public and professional awareness to control excessive exposure to fluoride from other sources.

[b] Where both nitrate and nitrite are present, the total of the two should not exceed 10 mg/L (as nitrogen).

[c] This standard applies to water at the point of consumption. Since lead is a component in some plumbing systems, first flush water may contain higher concentrations of lead than water that has been flushed for five minutes.

[d] When sulphate levels exceed 500 mg/L, water may have a laxative effect on some people.

[e] Applicable for all waters at the point of consumption.

[f] The aesthetic objective for sodium in drinking water is 200 mg/L. The local Medical Officer of Health should be notified when the concentration exceeds 20 mg/L so that this information may be communicated to local physicians for their use with patients on sodium restricted diets.

"-" Parameter not analysed

Table D.11
Groundwater Quality - Hendervale Barn Cistern
Tansley Quarry - Hanson Brick Ltd.

Parameter	Units	Criteria				HENDERVALE BARN CISTERN			
		ODWS MAC	ODWS IMAC	ODWS AO	ODWS OG	Nov-11	Nov-12	Nov-12	Nov-13
						(Main Barn Tap)	(Main Barn Tap)	(XYZ Barn Tap)	(Main Barn Tap)
aluminum	mg/L				0.1	**0.11**	0.022	0.044	0.0067
alkalinity	mg CaCO$_3$/L				30-500	368	75	75	380
ammonia-N	mg/L					0.27	0.067	0.14	<0.050
antimony	mg/L		0.006			<0.0005	<0.0005	<0.0005	<0.0005
arsenic	mg/L		0.025			0.013	<0.001	<0.001	0.0081
barium	mg/L	1				0.046	0.024	0.03	0.035
beryllium	mg/L					<0.0005	<0.0005	<0.0005	<0.0005
bismuth	mg/L					<0.001	<0.001	<0.001	<0.001
boron	mg/L		5			0.33	2.4	2.4	0.22
bromide	mg/L					<1	6.6	6.9	<1.0
cadmium	mg/L	0.005				<0.0001	<0.0001	<0.0001	<0.0001
calcium	mg/L					110	120	120	96
chloride	mg/L			250		19	**560**	**590**	28
chromium	mg/L	0.05				<0.005	<0.005	<0.005	<0.005
cobalt	mg/L					<0.0005	<0.0005	<0.0005	<0.0005
copper	mg/L			1		0.005	0.0032	0.014	0.025
fluoride	mg/L	1.5 [a]				0.2	0.23	0.25	0.14
free cyanide	mg/L					<0.002	<0.002	<0.002	<0.0020
hardness	mg CaCO$_3$/L				80-100	**450**	**420**	**440**	**470**
iron	mg/L			0.3		**1.6**	<0.1	**1**	**1.2**
lead	mg/L	0.01 [c]				<0.0005	0.00052	0.0022	**0.027**
magnesium	mg/L					58	36	37	55
manganese	mg/L			0.05		**0.051**	**0.057**	**0.067**	0.018
mercury	mg/L					<0.0001	<0.0001	<0.0001	<0.00010
molybdenum	mg/L					0.0012	0.0019	0.0023	0.00098
nickel	mg/L					<0.001	<0.001	<0.001	<0.001
nitrate as N	mg/L	10.0 [b]				<0.1	1.9	1.9	0.2
nitrite as N	mg/L	1.0 [b]				0.06	<0.01	<0.01	<0.010
pH	pH Units				6.5-8.5	8.1	6.78	6.71	8.13
phenol	mg/L					<0.001	<0.001	<0.001	<0.0010
phosphate	mg/L					<0.01	<0.01	<0.01	<0.010
total phosphorous	mg/L					0.015	<0.1	<0.002	<0.1
potassium	mg/L					5.2	14	14	4.4
selenium	mg/L	0.01				<0.002	<0.002	<0.002	<0.002
silicon	mg/L					12	1.8	1.8	10
silver	mg/L					<0.0001	<0.0001	<0.0001	<0.0001
sodium	mg/L			20/200 [f]		21	**320**	**330**	17
strontium	mg/L					2.6	3.9	4	2.2
sulphide	mg/L					<0.02	330	<0.02	87
sulphate	mg/L			500 [d]		94	<0.02	340	<0.020
thallium	mg/L					<0.00005	<0.00005	<0.00005	<0.00005
tin	mg/L					<0.001	<0.001	<0.001	0.003
titanium	mg/L					<0.005	<0.005	<0.005	<0.005
TSS	mg/L					12	<10	<10	3
turbidity	NTU			5 [e]		**6.5**	1.4	4.2	3.9
uranium	mg/L					0.001	0.00019	0.00016	0.00066
vanadium	mg/L					0.0016	0.00094	0.001	<0.0005
zinc	mg/L			5		0.031	0.066	0.26	0.13

NOTES:

ODWS = Ontario Drinking Water Objectives, Standards and Guidelines, dated June 2006. MAC = maximum acceptable concentrations, IMAC = interim maximum acceptable concentrations, AO = aesthetic objective, OG = operational guideline.

Bold values exceed the ODWS June 2006 standard for that parameter

[a] Where fluoride is added to drinking water, it is recommended that the concentration be adjusted to 0.5-0.8 mg/L the optimum level for control of tooth decay. Where supplies contain naturally occurring fluoride at levels higher than 1.5 mg/L but less than 2.4 mg/L the Ministry of Health and Long Term Care recommends an approach through local boards of health to raise public and professional awareness to control excessive exposure to fluoride from other sources.

[b] Where both nitrate and nitrite are present, the total of the two should not exceed 10 mg/L (as nitrogen).

[c] This standard applies to water at the point of consumption. Since lead is a component in some plumbing systems, first flush water may contain higher concentrations of lead than water that has been flushed for five minutes.

[d] When sulphate levels exceed 500 mg/L, water may have a laxative effect on some people.

[e] Applicable for all waters at the point of consumption.

[f] The aesthetic objective for sodium in drinking water is 200 mg/L. The local Medical Officer of Health should be notified when the concentration exceeds 20 mg/L so that this information may be communicated to local physicians for their use with patients on sodium restricted diets.

"-" Parameter not analysed

Table D.12
Groundwater Quality - Robinson Well
Tansley Quarry - Hanson Brick Ltd.

Parameter	Units	Criteria				ROBINSON								
		ODWS MAC	ODWS IMAC	ODWS AO	ODWS OG	Jun-03	Sep-04	Jan-07	Oct-08	Dec-09	Oct-10	Nov-11	Nov-12	Nov-13
aluminum	mg/L				0.1	<0.005	0.013	0.044	NOT SAMPLED	NOT SAMPLED	NOT SAMPLED	NOT SAMPLED	NOT SAMPLED	NOT SAMPLED
alkalinity	mg $CaCO_3$/L				30-500	461	430	272						
ammonia-N	mg/L					0.24	0.09	0.16						
antimony	mg/L		0.006			<0.0005	<0.002	<0.001						
arsenic	mg/L		0.025			<0.002	<0.002	<0.001						
barium	mg/L	1				0.158	0.053	0.052						
beryllium	mg/L					<0.001	<0.001	<0.005						
bismuth	mg/L					<0.001	-	<0.001						
boron	mg/L		5			0.254	0.39	0.039						
bromide	mg/L					<0.5	<0.2	<1						
cadmium	mg/L	0.005				0.0001	0.00007	<0.0001						
calcium	mg/L					190.0	96	97						
chloride	mg/L			250		49.2	33	25						
chromium	mg/L	0.05				<0.005	<0.002	<0.005						
cobalt	mg/L					0.0011	<0.0005	<0.005						
copper	mg/L			1		0.0102	<0.003	0.27						
fluoride	mg/L	1.5 [a]				0.2	0.29	0.3						
free cyanide	mg/L					<0.001	<0.002	<0.002						
hardness	mg $CaCO_3$/L				80-100	**1249**	**550**	**320**						
iron	mg/L			0.3		**0.50**	<0.02	0.15						
lead	mg/L	0.01 [c]				<0.0005	<0.0005	0.0007						
magnesium	mg/L					187.00	76	32						
manganese	mg/L			0.05		**0.771**	**0.58**	0.033						
mercury	mg/L					<0.00005	<0.00005	<0.0001						
molybdenum	mg/L					0.002	<0.005	<0.001						
nickel	mg/L					0.003	<0.002	0.004						
nitrate as N	mg/L	10.0 [b]				<0.2	0.31	0.5						
nitrite as N	mg/L	1.0 [b]				<0.2	0.14	<0.01						
pH	pH Units				6.5-8.5	7.48	7.76	8						
phenol	mg/L					<0.001	<0.001	<0.001						
phosphate	mg/L					<1	<0.5	0.01						
total phosphorous	mg/L					0.050	<0.01	<0.05						
potassium	mg/L					8	5.1	3						
selenium	mg/L	0.01				<0.002	<0.002	<0.002						
silicon	mg/L					7.22	-	3.6						
silver	mg/L					<0.0001	<0.0001	<0.0001						
sodium	mg/L			20/200 [f]		40.4	30	23						
strontium	mg/L					6.93	4.3	0.83						
sulphide	mg/L					<0.01	<0.02	<0.02						
sulphate	mg/L			500 [d]		**720**	240	72						
thallium	mg/L					<0.00005	-	<0.00005						
tin	mg/L					<0.001	<0.05	<0.001	**Note:** Well filled with municipal water	**Note:** Well filled with municipal water	**Note:** Well filled with municipal water	**Note:** Well not in use.	**Note:** Well not in use.	**Note:** Well not in use.
titanium	mg/L					<0.005	<0.01	<0.005						
TSS	mg/L					3	2	<1						
turbidity	NTU			5 [e]		2.5	0.62	1.3						
uranium	mg/L					0.0029	0.0035	0.0017						
vanadium	mg/L					0.0022	<0.002	<0.001						
zinc	mg/L			5		0.195	0.069	0.15						

NOTES:

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Bold values exceed the ODWS June 2006 standard for that parameter

[a] Where fluoride is added to drinking water, it is recommended that the concentration be adjusted to 0.5-0.8 mg/L the optimum level for control of tooth decay. Where supplies contain naturally occurring fluoride at levels higher than 1.5 mg/L but less than 2.4 mg/L the Ministry of Health and Long Term Care recommends an approach through local boards of health to raise public and professional awareness to control excessive exposure to fluoride from other sources.

[b] Where both nitrate and nitrite are present, the total of the two should not exceed 10 mg/L (as nitrogen).

[c] This standard applies to water at the point of consumption. Since lead is a component in some plumbing systems, first flush water may contain higher concentrations of lead than water that has been flushed for five minutes.

[d] When sulphate levels exceed 500 mg/L, water may have a laxative effect on some people.

[e] Applicable for all waters at the point of consumption.

[f] The aesthetic objective for sodium in drinking water is 200 mg/L. The local Medical Officer of Health should be notified when the concentration exceeds 20 mg/L so that this information may be communicated to local physicians for their use with patients on Sodium restricted diets.

"-" Parameter not analysed

Table D.13
Groundwater Quality - Sicard Well
Tansley Quarry - Hanson Brick Ltd.

Parameter	Units	Criteria				SICARD									
		ODWS MAC	ODWS IMAC	ODWS AO	ODWS OG	Nov-02	Mar-03	Sep-04	Jan-07	Oct-08	Dec-09	Oct-10	Nov-11	Nov-12	Nov-13
aluminum	mg/L				0.1	<0.005	<0.005	<0.01	<0.03	<0.005	<0.05	0.006	<0.005	**NOT SAMPLED**	**NOT SAMPLED**
alkalinity	mg $CaCO_3$/L				30-500	130	130	150	144	152	134	148	140		
ammonia-N	mg/L					4.05	3.88	3.30	3.55	2.9	4.2	2.5	2.7		
antimony	mg/L		0.006			<0.0005	<0.0005	<0.002	<0.005	<0.0005	<0.005	<0.0005	<0.0005		
arsenic	mg/L		0.025			<0.02	<0.02	<0.002	<0.005	<0.005	<0.01	0.002	<0.005		
barium	mg/L	1				0.011	0.011	0.009	<0.03	0.008	<0.05	0.009	0.009		
beryllium	mg/L					<0.001	<0.001	<0.001	<0.003	<0.0005	<0.005	<0.0005	<0.0005		
bismuth	mg/L					<0.001	0.001	-	<0.005	<0.001	<0.01	<0.001	<0.001		
boron	mg/L		5			**6.7**	**6.74**	4.3	**7.2**	**6.5**	**6.5**	**6.9**	**7.2**		
bromide	mg/L					20.9	21.1	16	16	17	21	12	13		
cadmium	mg/L	0.005				<0.0001	<0.0001	<0.00007	<0.0005	<0.0001	<0.001	<0.0001	<0.0001		
calcium	mg/L					372	355	270	370	280	370	240	300		
chloride	mg/L			250		**1770**	**1940**	**1400**	**1660**	**1150**	**1780**	**955**	**1070**		
chromium	mg/L	0.05				<0.05	<0.05	<0.002	<0.03	<0.005	<0.05	<0.005	<0.005		
cobalt	mg/L					<0.0001	<0.0001	0.0081	<0.003	<0.0005	<0.005	<0.0005	<0.003		
copper	mg/L			1		0.0155	0.0263	0.0120	0.029	0.018	0.02	0.025	0.021		
fluoride	mg/L	1.5 [a]				<0.6	<0.6	<0.6	0.4	0.5	0.5	0.6	0.6		
free cyanide	mg/L					<0.001	<0.001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002		
hardness	mg $CaCO_3$/L				80-100	**1350**	**1350**	**950**	**1400**	**1000**	**1300**	**860**	**950**		
iron	mg/L			0.3		0.07	0.14	0.16	**0.37**	0.16	<1	**1.6**	<0.1		
lead	mg/L	0.01 [c]				<0.0005	<0.0005	<0.0005	<0.003	<0.0005	<0.005	0.0006	<0.0005		
magnesium	mg/L					101	112	89	110	86	110	73	84		
manganese	mg/L			0.05		**0.126**	**0.125**	**0.100**	**0.12**	**0.1**	**0.13**	**0.07**	**0.10**		
mercury	mg/L					<0.00005	<0.00005	<0.00005	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001		
molybdenum	mg/L					0.008	<0.007	<0.007	0.008	0.009	<0.01	0.01	0.011		
nickel	mg/L					<0.001	<0.001	0.002	<0.005	<0.001	<0.01	<0.001	<0.005		
nitrate as N	mg/L	10.0 [b]				0.2	0.4	0.5	0.4	0.3	0.2	0.2	<0.1		
nitrite as N	mg/L	1.0 [b]				<2	0.2	<0.01	0.09	0.01	<0.01	0.02	<0.01		
pH	pH Units				6.5-8.5	7.66	7.56	7.74	7.8	8	7.9	7.76	7.82		
phenol	mg/L					<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001		
phosphate	mg/L					<1	<1	<0.5	<0.01	<0.01	<0.01	<0.01	<0.01		
total phosphorous	mg/L					<0.002	<0.002	<0.01	0.005	0.026	<0.002	<0.002	<0.002		
potassium	mg/L					35.8	37.8	33.0	40.0	35	42	33	39		
selenium	mg/L	0.01				<0.02	<0.02	0.004	<0.01	<0.01	<0.02	<0.002	<0.01		
silicon	mg/L					3.53	3.82	-	4.2	4.1	3.8	4	4.3		
silver	mg/L					<0.0001	<0.0001	<0.0001	<0.0005	<0.0001	<0.001	<0.0001	<0.0001		
sodium	mg/L			20/200 [f]		**982**	**1120**	**820**	**1100**	**850**	**1200**	**760**	**620**		
strontium	mg/L					11.5	10.5	10	12	9.9	11	9.6	11		
sulphide	mg/L					<0.01	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02		
sulphate	mg/L			500 [d]		**1020**	**1040**	**970**	**995**	**732**	**1030**	**952**	**999**		
thallium	mg/L					<0.00005	<0.00005	-	<0.0003	<0.00005	<0.0005	<0.00005	<0.00005		
tin	mg/L					<0.001	<0.001	<0.05	<0.005	<0.001	<0.01	<0.001	<0.001	**Note:** Well inaccessible	**Note:** Well inaccessible
titanium	mg/L					<0.005	<0.005	<0.01	<0.030	<0.005	<0.05	<0.005	<0.005		
TSS	mg/L					3	3	2	3	<10	<10	10	10		
turbidity	NTU			5 [e]		0.7	1.4	1.5	2.8	0.6	1.4	**11**	2.2		
uranium	mg/L					0.0003	<0.0003	0.0003	<0.0005	0.0005	<0.001	0.0007	0.0006		
vanadium	mg/L					0.0010	0.0005	<0.002	<0.005	<0.005	<0.01	<0.001	<0.003		
zinc	mg/L			5		0.014	0.012	0.016	<0.030	<0.03	<0.05	0.032	0.022		

NOTES:

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Bold values exceed the ODWS June 2006 standard for that parameter

[a] Where fluoride is added to drinking water, it is recommended that the concentration be adjusted to 0.5-0.8 mg/L the optimum level for control of tooth decay. Where supplies contain naturally occurring fluoride at levels higher than 1.5 mg/L but less than 2.4 mg/L the Ministry of Health and Long Term Care recommends an approach through local boards of health to raise public and professional awareness to control excessive exposure to fluoride from other sources.

[b] Where both nitrate and nitrite are present, the total of the two should not exceed 10 mg/L (as nitrogen).

[c] This standard applies to water at the point of consumption. Since lead is a component in some plumbing systems, first flush water may contain higher concentrations of lead than water that has been flushed for five minutes.

[d] When sulphate levels exceed 500 mg/L, water may have a laxative effect on some people.

[e] Applicable for all waters at the point of consumption.

[f] The aesthetic objective for sodium in drinking water is 200 mg/L. The local Medical Officer of Health should be notified when the concentration exceeds 20 mg/L so that this information may be communicated to local physicians for their use with patients on Sodium restricted diets.

"-" Parameter not analysed

Table D.14
Groundwater Quality - Simms Well
Tansley Quarry - Hanson Brick Ltd.

Parameter	Units	Criteria				SIMMS						
		ODWS MAC	ODWS IMAC	ODWS AO	ODWS OG	Aug-07	Oct-08	Dec-09	Oct-10	Nov-11	Nov-12	Nov-13
aluminum	mg/L				0.1	0.007	0.041	0.019	0.008	0.007	<0.005	<0.005
alkalinity	mg $CaCO_3$/L				30-500	345	316	164	244	313	300	280
ammonia-N	mg/L					0.09	<0.05	<0.05	<0.05	<0.05	<0.05	<0.050
antimony	mg/L		0.006			0.0009	0.0008	0.0007	0.0008	0.0015	0.0012	0.0012
arsenic	mg/L		0.025			<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
barium	mg/L	1				0.055	0.052	0.068	0.062	0.072	0.059	0.046
beryllium	mg/L					<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
bismuth	mg/L					<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
boron	mg/L		5			0.036	0.045	0.45	0.19	0.069	0.1	0.045
bromide	mg/L					<1	<1	<1	<1	<1	<1	<1.0
cadmium	mg/L	0.005				<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
calcium	mg/L					110	98	150	120	120	88	81
chloride	mg/L			250		7	6	7	6	4	7.3	5.3
chromium	mg/L	0.05				<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
cobalt	mg/L					<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
copper	mg/L			1		0.015	0.07	0.008	0.007	0.022	0.013	0.013
fluoride	mg/L	1.5 [a]				0.2	0.2	0.2	0.2	0.2	0.22	0.21
free cyanide	mg/L					0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.0020
hardness	mg $CaCO_3$/L				80-100	**360**	**340**	**650**	**500**	**360**	**340**	**330**
iron	mg/L			0.3		<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
lead	mg/L	0.01 [c]				0.0007	**0.021**	0.0006	0.0005	0.0008	0.00079	0.0014
magnesium	mg/L					34	28	55	55	41	30	31
manganese	mg/L			0.05		<0.002	0.004	0.003	0.003	<0.002	0.016	0.0058
mercury	mg/L					<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.00010
molybdenum	mg/L					<0.001	<0.001	0.004	0.003	0.0012	0.0012	0.0011
nickel	mg/L					<0.001	<0.001	0.002	<0.001	<0.001	<0.001	<0.001
nitrate as N	mg/L	10.0 [b]				3.8	4.3	0.4	1.7	1.6	1.3	1.3
nitrite as N	mg/L	1.0 [b]				<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.010
pH	pH Units				6.5-8.5	8.2	8.2	7.9	7.95	8.08	8.02	8.03
phenol	mg/L					<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0010
phosphate	mg/L					<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.010
total phosphorous	mg/L					<0.002	0.013	<0.002	<0.1	<0.1	<0.1	<0.1
potassium	mg/L					2.6	2.4	8.3	6.9	4	3.8	3.1
selenium	mg/L	0.01				<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
silicon	mg/L					5.3	5.1	3.3	4.1	6	4	3.9
silver	mg/L					<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
sodium	mg/L			20/200 [f]		12	11	55	37	14	15	12
strontium	mg/L					0.74	0.63	4.6	3.4	0.98	1.1	0.81
sulphate	mg/L			500 [d]		49	38	**597**	295	52	95	66
sulphide	mg/L					<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.020
thallium	mg/L					<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
tin	mg/L					<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
titanium	mg/L					<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
TSS	mg/L					<10	<10	<10	<10	<10	<10	<1
turbidity	NTU			5 [e]		0.4	0.5	0.6	0.3	<0.2	0.7	0.8
uranium	mg/L					0.0027	0.0024	0.0041	0.0033	0.0036	0.0031	0.0025
vanadium	mg/L					<0.001	<0.001	<0.001	<0.001	0.0008	0.00063	<0.0005
zinc	mg/L			5		2	2.1	1.6	1.4	2.6	1.4	1.3

NOTES:

ODWS = Ontario Drinking Water Objectives, Standards and Guidelines, dated June 2006. MAC = maximum acceptable concentrations, IMAC = interim maximum acceptable concentrations, AO = aesthetic objective, OG = operational guideline.

Bold values exceed the ODWS June 2006 standard for that parameter

[a] Where fluoride is added to drinking water, it is recommended that the concentration be adjusted to 0.5-0.8 mg/L the optimum level for control of tooth decay. Where supplies contain naturally occurring fluoride at levels higher than 1.5 mg/L but less than 2.4 mg/L the Ministry of Health and Long Term Care recommends an approach through local boards of health to raise public and professional awareness to control excessive exposure to fluoride from other sources.

[b] Where both nitrate and nitrite are present, the total of the two should not exceed 10 mg/L (as nitrogen)

[c] This standard applies to water at the point of consumption. Since lead is a component in some plumbing systems, first flush water may contain higher concentrations of lead than water that has been flushed for five minutes.

[d] When sulphate levels exceed 500 mg/L, water may have a laxative effect on some people.

[e] Applicable for all waters at the point of consumption.

[f] The aesthetic objective for sodium in drinking water is 200 mg/L. The local Medical Officer of Health should be notified when the concentration exceeds 20 mg/L so that this information may be communicated to local physicians for their use with patients on Sodium restricted diets.

"-" Parameter not analysed

Table D.15
Groundwater Quality - Stevenson Well
Tansley Quarry - Hanson Brick Ltd.

Parameter	Units	Criteria				STEVENSON								
		ODWS MAC	ODWS IMAC	ODWS AO	ODWS OG	Nov-02	Mar-03	Jan-07	Oct-08	Dec-09	Oct-10	Nov-11	Nov-12	Nov-13
aluminum	mg/L				0.1	<0.005	0.017	0.03						
alkalinity	mg CaCO$_3$/L				30-500	340	318	412						
ammonia-N	mg/L					0.95	0.48	0.12						
antimony	mg/L		0.006			<0.0005	<0.0005	<0.001						
arsenic	mg/L		0.025			<0.002	<0.002	0.005						
barium	mg/L	1				0.029	0.019	0.043						
beryllium	mg/L					<0.001	<0.001	<0.0005						
bismuth	mg/L					<0.001	<0.001	<0.001						
boron	mg/L		5			1.40	1.39	0.12						
bromide	mg/L					0.9	1.4	<1						
cadmium	mg/L	0.005				<0.0001	<0.0001	<0.0001						
calcium	mg/L					136	158	160						
chloride	mg/L			250		134	152	88						
chromium	mg/L	0.05				<0.005	<0.005	<0.005						
cobalt	mg/L					<0.0001	<0.0001	<0.0005						
copper	mg/L			1		0.0025	0.006	0.004						
fluoride	mg/L	1.5 [a]				0.3	0.3	0.2	**NOT SAMPLED**	**NOT SAMPLED**	**NOT SAMPLED**	**NOT SAMPLED**	**NOT SAMPLED**	**NOT SAMPLED**
free cyanide	mg/L					<0.001	<0.001	<0.002						
hardness	mg CaCO$_3$/L				80-100	**890**	**901**	**510**						
iron	mg/L			0.3		0.21	0.03	**2.8**						
lead	mg/L	0.01 [c]				0.0005	<0.0005	<0.0005						
magnesium	mg/L					133	122	35						
manganese	mg/L			0.05		**0.054**	0.020	0.022						
mercury	mg/L					<0.00005	<0.00005	<0.0001						
molybdenum	mg/L					0.005	0.004	0.001						
nickel	mg/L					<0.001	<0.001	<0.001						
nitrate as N	mg/L	10.0 [b]				1.0	1.0	7.3						
nitrite as N	mg/L	1.0 [b]				<0.2	<0.2	<0.01						
pH	pH Units				6.5-8.5	7.94	7.84	8.2						
phenol	mg/L					<0.001	<0.001	<0.001						
phosphate	mg/L					<1	1	0.02						
total phosphorous	mg/L					0.012	0.014	0.053						
potassium	mg/L					16.7	14.8	2.2						
selenium	mg/L	0.01				<0.002	<0.002	<0.002						
silicon	mg/L					6.23	5.44	6.8						
silver	mg/L					<0.0001	<0.0001	<0.0001						
sodium	mg/L			20/200 [f]		120	119	99						
strontium	mg/L					16.5	9.72	1.4						
sulphide	mg/L					0.02	<0.01	<0.02						
sulphate	mg/L			500 [d]		**531**	**564**	97						
thallium	mg/L					0.00008	<0.00005	<0.00005						
tin	mg/L					<0.001	<0.001	<0.001	**Note:** Well inaccessible	**Note:** Well not in use	**Note:** Well not in use	**Note:** Well not in use.	**Note:** Well not in use.	**Note:** Well not in use.
titanium	mg/L					<0.005	<0.005	<0.005						
TSS	mg/L					4	4	7						
turbidity	NTU			5 [e]		0.6	0.5	**13.8**						
uranium	mg/L					0.0008	0.0018	0.002						
vanadium	mg/L					0.0021	0.0022	<0.001						
zinc	mg/L			5		0.168	0.181	0.79						

NOTES:

ODWS = Ontario Drinking Water Objectives, Standards and Guidelines, dated June 2006. MAC = maximum acceptable concentrations, IMAC = interim maximum acceptable concentrations, AO aesthetic objective, OG operational guideline.

Bold values exceed the ODWS June 2006 standard for that parameter

[a] Where fluoride is added to drinking water, it is recommended that the concentration be adjusted to 0.5-0.8 mg/L the optimum level for control of tooth decay. Where supplies contain naturally occurring fluoride at levels higher than 1.5 mg/L but less than 2.4 mg/L the Ministry of Health and Long Term Care recommends an approach through local boards of health to raise public and professional awareness to control excessive exposure to fluoride from other sources.

[b] Where both nitrate and nitrite are present, the total of the two should not exceed 10 mg/L (as nitrogen).

[c] This standard applies to water at the point of consumption. Since lead is a component in some plumbing systems, first flush water may contain higher concentrations of lead than water that has been flushed for five minutes.

[d] When sulphate levels exceed 500 mg/L, water may have a laxative effect on some people.

[e] Applicable for all waters at the point of consumption.

[f] The aesthetic objective for sodium in drinking water is 200 mg/L. The local Medical Officer of Health should be notified when the concentration exceeds 20 mg/L so that this information may be communicated to local physicians for their use with patients on Sodium restricted diets.

"-" Parameter not analysed

Table D.16
Groundwater Quality - Sugiyama Well
Tansley Quarry - Hanson Brick Ltd.

Parameter	Units	Criteria				SUGIYAMA							
		ODWS MAC	ODWS IMAC	ODWS AO	ODWS OG	Sep-04	Jan-07	Oct-08	Dec-09	Oct-10	Nov-11	Nov-12	Nov-13
aluminum	mg/L				0.1	<0.01	<0.03	<0.05	<0.005	0.012	<0.005	<0.025	**NOT SAMPLED** **Note:** Well not in use.
alkalinity	mg $CaCO_3$/L				30-500	200	198	189	168	160	160	180	
ammonia-N	mg/L					2.2	1.64	1.8	2.0	2.1	2.5	2.2	
antimony	mg/L		0.006			<0.002	<0.005	<0.005	<0.0005	<0.0005	<0.0005	<0.0025	
arsenic	mg/L		0.025			0.004	<0.005	<0.01	<0.005	<0.005	<0.005	<0.005	
barium	mg/L	1				0.013	<0.03	<0.05	0.012	0.013	0.015	0.012	
beryllium	mg/L					<0.001	<0.003	<0.005	<0.0005	<0.0005	<0.0005	<0.0025	
bismuth	mg/L					-	<0.005	<0.01	<0.001	<0.001	<0.001	<0.005	
boron	mg/L		5			4.2	**5.3**	4.5	5.0	**5.3**	**5.7**	4.9	
bromide	mg/L					16	16	19	18	15	20	22	
cadmium	mg/L	0.005				0.00007	<0.0005	<0.001	<0.0001	<0.0001	<0.0001	<0.0005	
calcium	mg/L					320	380	340	360	420	480	350	
chloride	mg/L			250		**1600**	**1590**	**1660**	**1620**	**1780**	**1810**	**1800**	
chromium	mg/L	0.05				<0.002	<0.03	<0.05	<0.005	<0.005	<0.005	<0.025	
cobalt	mg/L					<0.0005	<0.003	<0.005	<0.0005	<0.003	<0.003	<0.0025	
copper	mg/L			1		0.027	0.026	0.035	0.034	0.018	0.059	0.036	
fluoride	mg/L	1.5 [a]				0.47	0.3	0.3	0.4	0.4	0.4	0.43	
free cyanide	mg/L					<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	
hardness	mg $CaCO_3$/L				80-100	**1300**	**1500**	**1300**	**1400**	**1400**	**1500**	**1300**	
iron	mg/L			0.3		0.29	**0.6**	<1	**0.4**	0.27	0.27	<0.5	
lead	mg/L	0.01 [c]				0.0008	<0.003	<0.005	<0.0005	<0.0005	<0.0005	<0.0025	
magnesium	mg/L					120	130	130	130	150	160	120	
manganese	mg/L			0.05		**13**	**0.14**	**0.11**	**0.061**	**0.12**	**0.17**	**0.1**	
mercury	mg/L					<0.00005	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
molybdenum	mg/L					-	0.006	<0.01	0.006	0.007	0.0082	0.0045	
nickel	mg/L					<0.002	<0.005	<0.01	<0.005	<0.005	<0.005	<0.005	
nitrate as N	mg/L	10.0 [b]				0.65	0.2	3	1.6	1.7	1.1	1.6	
nitrite as N	mg/L	1.0 [b]				0.078	0.04	0.01	0.05	0.02	0.13	0.048	
pH	pH Units				6.5-8.5	7.5	7.8	8.1	7.7	7.69	7.74	7.62	
phenol	mg/L					<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	
phosphate	mg/L					0.5	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	
total phosphorous	mg/L					<0.01	0.003	0.014	<0.002	<0.1	0.01	<0.5	
potassium	mg/L					34	40	38	38	44	50	38	
selenium	mg/L	0.01				**0.012**	<0.01	<0.02	<0.01	<0.01	<0.01	<0.01	
silicon	mg/L					-	4.6	4.5	3.9	4.3	5	3.9	
silver	mg/L					<0.0001	<0.0005	<0.001	<0.0001	<0.0001	<0.0001	<0.0005	
sodium	mg/L			20/200 [f]		**760**	**920**	**870**	**880**	**960**	**760**	**870**	
strontium	mg/L					-	21	20	21	24	27	22	
sulphide	mg/L					0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	
sulphate	mg/L			500 [d]		**820**	**865**	**802**	**907**	**1010**	**958**	**910**	
thallium	mg/L					<0.0002	<0.0003	<0.0005	<0.00005	<0.00005	<0.00005	<0.00025	
tin	mg/L					-	<0.005	<0.01	<0.001	<0.001	<0.001	<0.005	
titanium	mg/L					-	<0.030	<0.05	<0.005	<0.005	<0.005	<0.025	
TSS	mg/L					2	2	<10	<10	14	14	15	
turbidity	NTU			5 [e]		1.1	**5.6**	2.1	2.7	1.5	1.1	3.9	
uranium	mg/L					<0.0002	<0.0005	<0.001	0.0001	<0.0001	0.0002	<0.0005	
vanadium	mg/L					<0.002	<0.005	<0.01	<0.005	<0.005	<0.003	<0.0025	
zinc	mg/L			5		0.19	0.18	0.053	0.078	0.041	0.02	<0.025	

NOTES:

ODWS = Ontario Drinking Water Objectives, Standards and Guidelines, dated June 2006. MAC = maximum acceptable concentrations, IMAC = interim maximum acceptable concentrations, AO = aesthetic objective, OG = operational guideline.

Bold values exceed the ODWS June 2006 standard for that parameter

[a] Where fluoride is added to drinking water, it is recommended that the concentration be adjusted to 0.5-0.8 mg/L the optimum level for control of tooth decay. Where supplies contain naturally occurring fluoride at levels higher than 1.5 mg/L but less than 2.4 mg/L the Ministry of Health and Long Term Care recommends an approach through local boards of health to raise public and professional awareness to control excessive exposure to fluoride from other sources.

[b] Where both nitrate and nitrite are present, the total of the two should not exceed 10 mg/L (as nitrogen)

[c] This standard applies to water at the point of consumption. Since lead is a component in some plumbing systems, first flush water may contain higher concentrations of lead than water that has been flushed for five minutes.

[d] When sulphate levels exceed 500 mg/L, water may have a laxative effect on some people.

[e] Applicable for all waters at the point of consumption.

[f] The aesthetic objective for sodium in drinking water is 200 mg/L. The local Medical Officer of Health should be notified when the concentration exceeds 20 mg/L so that this information may be communicated to local physicians for their use with patients on Sodium restricted diets.

"-" Parameter not analysed

Table D.17
Groundwater Quality - Wiggins Well
Tansley Quarry - Hanson Brick Ltd.

Parameter	Units	Criteria				WIGGINS									
		ODWS MAC	ODWS IMAC	ODWS AO	ODWS OG	Nov-02	Apr-03	Sep-04	Jan-07	Oct-08	Dec-09	Oct-10	Nov-11	Nov-12	Nov-13
aluminum	mg/L				0.1	<0.005	0.034	0.014	<0.005	0.005					
alkalinity	mg $CaCO_3$/L				30-500	171	178	170	181	173					
ammonia-N	mg/L					1.25	1.21	1.1	1.24	1.1					
antimony	mg/L		0.006			<0.0005	<0.0005	<0.002	<0.001	<0.0005					
arsenic	mg/L		0.025			<0.002	<0.002	<0.002	0.001	<0.001					
barium	mg/L	1				0.011	0.013	0.011	0.01	0.01					
beryllium	mg/L					<0.001	<0.001	<0.001	<0.0005	<0.0005					
bismuth	mg/L					<0.001	<0.001	-	<0.001	<0.001					
boron	mg/L		5			1.38	1.35	1.3	1.3	1.4					
bromide	mg/L					<0.5	<0.5	0.49	1	<1					
cadmium	mg/L	0.005				<0.0001	0.0001	<0.00007	<0.0001	<0.0001					
calcium	mg/L					143	138	130	150	150					
chloride	mg/L			250		41.7	46.9	40	40	29					
chromium	mg/L	0.05				<0.005	<0.005	<0.002	<0.005	<0.005					
cobalt	mg/L					<0.0001	<0.0001	<0.005	<0.0005	<0.0005					
copper	mg/L			1		0.0007	0.0059	0.004	0.023	0.027					
fluoride	mg/L	1.5 [a]				0.2	0.2	0.23	0.2	0.2	**NOT SAMPLED**	**NOT SAMPLED**	**NOT SAMPLED**	**NOT SAMPLED**	**NOT SAMPLED**
free cyanide	mg/L					<0.001	<0.001	<0.002	<0.002	<0.002					
hardness	mg $CaCO_3$/L				80-100	**679**	**637**	**620**	**670**	**680**					
iron	mg/L			0.3		**0.55**	**0.33**	**0.59**	**0.98**	**0.42**					
lead	mg/L	0.01 [c]				<0.0005	<0.0005	0.0016	<0.0005	0.0013					
magnesium	mg/L					77.70	70.5	72	81	88					
manganese	mg/L			0.05		**0.088**	**0.086**	**0.08**	**0.086**	**0.084**					
mercury	mg/L					<0.00005	<0.00005	<0.00005	<0.0001	<0.0001					
molybdenum	mg/L					0.005	0.005	<0.005	0.005	0.006					
nickel	mg/L					<0.001	<0.001	0.004	<0.001	0.002					
nitrate as N	mg/L	10.0 [b]				<0.2	<0.2	0.05	0.2	<0.1					
nitrite as N	mg/L	1.0 [b]				<0.2	<0.2	0.018	<0.01	<0.01					
pH	pH Units				6.5-8.5	7.62	7.94	7.85	8.1	8.2					
phenol	mg/L					<0.001	<0.001	<0.001	<0.001	<0.001					
phosphate	mg/L					<1	<1	<0.5	<0.01	<0.01					
total phosphorous	mg/L					0.022	0.022	<0.01	0.016	0.02					
potassium	mg/L					10.8	10.3	10	13	12					
selenium	mg/L	0.01				<0.002	<0.002	<0.002	<0.002	<0.002					
silicon	mg/L					5.49	5.72	-	5.5	6.2					
silver	mg/L					<0.0001	<0.0001	<0.0001	<0.0001	<0.0001					
sodium	mg/L			20/200 [f]		108.0	98.8	97	110	120					
strontium	mg/L					10.20	10.2	11	11	12					
sulphide	mg/L					<0.01	<0.01	<0.02	<0.02	<0.02					
sulphate	mg/L			500 [d]		**686.0**	**710**	**750**	**684**	**693**					
thallium	mg/L					<0.00005	<0.00005	-	<0.00005	<0.00005					
tin	mg/L					<0.001	<0.001	0.05	<0.001	<0.001	**Note:** Cistern installed. Well not in use.	**Note:** Cistern installed. Well not in use.	**Note:** Cistern installed. Well not in use.	**Note:** Cistern installed. Well not in use.	**Note:** Decomissioned
titanium	mg/L					<0.005	<0.005	<0.01	<0.005	<0.005					
TSS	mg/L					2	2	2	<1	<10					
turbidity	NTU			5 [e]		4.7	1.6	4.3	**6.2**	1.5					
uranium	mg/L					<0.0001	<0.0001	0.0002	<0.0001	<0.0001					
vanadium	mg/L					0.0026	0.0008	<0.002	<0.001	<0.001					
zinc	mg/L			5		0.006	0.098	0.025	0.015	0.02					

NOTES:

ODWS = Ontario Drinking Water Objectives, Standards and Guidelines, dated June 2006. MAC = maximum acceptable concentrations, IMAC = interim maximum acceptable concentrations, AO aesthetic objective, OG operational guideline.

Bold values exceed the ODWS June 2006 standard for that parameter

[a] Where fluoride is added to drinking water, it is recommended that the concentration be adjusted to 0.5-0.8 mg/L the optimum level for control of tooth decay. Where supplies contain naturally occurring fluoride at levels higher than 1.5 mg/L but less than 2.4 mg/L the Ministry of Health and Long Term Care recommends an approach through local boards of health to raise public and professional awareness to control excessive exposure to fluoride from other sources.

[b] Where both nitrate and nitrite are present, the total of the two should not exceed 10 mg/L (as nitrogen)

[c] This standard applies to water at the point of consumption. Since lead is a component in some plumbing systems, first flush water may contain higher concentrations of lead than water that has been flushed for five minutes.

[d] When sulphate levels exceed 500 mg/L, water may have a laxative effect on some people.

[e] Applicable for all waters at the point of consumption.

[f] The aesthetic objective for sodium in drinking water is 200 mg/L. The local Medical Officer of Health should be notified when the concentration exceeds 20 mg/L so that this information may be communicated to local physicians for their use with patients on Sodium restricted diets.

"-" Parameter not analysed

APPENDIX E

Maxxam Analytical Certificates

HENDERVALE CISTERN
(Hendervale Main Barn Tap)

Your Project #: 021-1228
Site#: 021-1228
Site Location: TANSLEY QUARRY
Your C.O.C. #: 44283301, 442833-01-01

Attention: Josip Balaban
Golder Associates Ltd
6925 Century Ave
Suite 100
Mississauga, ON
L5N 7K2

Report Date: 2014/01/20
Report #: R2781588
Version: 2R

CERTIFICATE OF ANALYSIS – REVISED REPORT

MAXXAM JOB #: B3K0774
Received: 2013/11/20, 16:40

Sample Matrix: Water
Samples Received: 1

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Method Reference
Alkalinity	1	N/A	2013/11/21	CAM SOP-00448	SM 2320B
Anions	1	N/A	2013/11/25	CAM SOP-00435	SM 4110B
Conductivity	1	N/A	2013/11/21	CAM SOP-00414	SM 2510
Free (WAD) Cyanide	1	N/A	2013/11/23	CAM SOP-00457	Ontario MOE CN-E3015
Fluoride	1	2013/11/21	2013/11/21	CAM SOP-00449	APHA 4500FC
Hardness (calculated as CaCO3)	1	N/A	2013/11/27	CAM SOP 00102	SM 2340 B
Mercury in Water by CVAA	1	2013/11/25	2013/11/26	CAM SOP-00453	SW-846 7470A
Metals Analysis by ICPMS (as received) (1)	1	2013/11/26	2013/11/26	CAM SOP-00447	EPA 6020
Total Ammonia-N	1	N/A	2013/11/22	CAM SOP-00441	US GS I-2522-90
Nitrate (NO3) and Nitrite (NO2) in Water (2)	1	N/A	2013/11/26	CAM SOP-00440	SM 4500 NO3I/NO2B
pH	1	N/A	2013/11/21	CAM SOP-00413	SM 4500H+ B
Phenols (4AAP)	1	N/A	2013/11/25	CAM SOP-00444	MOE ROPHEN-E3179
Orthophosphate	1	N/A	2013/11/22	CAM SOP-00461	EPA 365.1
Sulphide	1	N/A	2013/11/21	CAM SOP-00455	SM 4500-S G
Total Dissolved Solids	1	N/A	2013/11/22	CAM SOP-00428	APHA 2540C
Total Phosphorus (Colourimetric)	1	2013/11/21	2013/11/23	CAM SOP-00407	APHA 4500 P,B,F
Low Level Total Suspended Solids	1	N/A	2013/11/22	CAM SOP-00428	SM 2540D
Turbidity	1	N/A	2013/11/21	CAM SOP-00417	APHA 2130B

Remarks:

Maxxam Analytics has performed all analytical testing herein in accordance with ISO 17025 and the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act. All methodologies comply with this document and are validated for use in the laboratory. The methods and techniques employed in this analysis conform to the performance criteria (detection limits, accuracy and precision) as outlined in the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act. Reporting results to two significant figures at the RDL is to permit statistical evaluation and is not intended to be an indication of analytical precision.

The CWS PHC methods employed by Maxxam conform to all prescribed elements of the reference method and performance based elements have been validated. All modifications have been validated and proven equivalent following the 'Alberta Environment Draft Addenda to the CWS-PHC, Appendix 6, Validation of Alternate Methods'. Documentation is available upon request. Maxxam has made the following improvements to the CWS-PHC reference benchmark method: (i) Headspace for F1; and, (ii) Mechanical extraction for F2-F4. Note: F4G cannot be added to the C6 to C50 hydrocarbons. The extraction date for samples field preserved with methanol for F1 and Volatile Organic Compounds is considered to be the date sampled.

Maxxam Analytics is accredited for all specific parameters as required by Ontario Regulation 153/04. Maxxam Analytics is limited in liability to the actual cost of analysis unless otherwise agreed in writing. There is no other warranty expressed or implied. Samples will be retained at Maxxam Analytics for three weeks from receipt of data or as per contract.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
* Results relate only to the items tested.

(1) Metals analysis was performed on the sample 'as received'.
(2) Values for calculated parameters may not appear to add up due to rounding of raw data and significant figures.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Antonella Brasil, Project Manager
Email: ABrasil@maxxam.ca
Phone# (905) 817-5817

==
Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Total cover pages: 2

Maxxam Job #: B3K0774
Report Date: 2014/01/20

Golder Associates Ltd
Client Project #: 021-1228
Site Location: TANSLEY QUARRY
Sampler Initials: JB

RESULTS OF ANALYSES OF WATER

Maxxam ID		TZ0052	TZ0052		
Sampling Date		2013/11/20	2013/11/20		
	Units	**MAIN BARN**	**MAIN BARN Lab-Dup**	**RDL**	**QC Batch**
Calculated Parameters					
Hardness (CaCO3)	mg/L	470		1.0	3429143
Inorganics					
Total Ammonia-N	mg/L	<0.050		0.050	3431354
Conductivity	umho/cm	900		1.0	3431125
Total Dissolved Solids	mg/L	550	560	10	3432908
Fluoride (F-)	mg/L	0.14		0.10	3431097
Free Cyanide	mg/L	<0.0020		0.0020	3433065
Orthophosphate (P)	mg/L	<0.010		0.010	3431975
pH	pH	8.13			3431109
Phenols-4AAP	mg/L	<0.0010		0.0010	3431487
Total Phosphorus	mg/L	0.006		0.002	3431237
Total Suspended Solids	mg/L	3		1	3431611
Sulphide	mg/L	<0.020		0.020	3431550
Turbidity	NTU	3.9		0.2	3431751
Alkalinity (Total as CaCO3)	mg/L	380		1.0	3431102
Nitrite (N)	mg/L	<0.010		0.010	3431956
Dissolved Chloride (Cl)	mg/L	28		1.0	3431958
Nitrate (N)	mg/L	0.20		0.10	3431956
Nitrate + Nitrite	mg/L	0.20		0.10	3431956
Dissolved Bromide (Br-)	mg/L	<1.0		1.0	3431958
Dissolved Sulphate (SO4)	mg/L	87		1.0	3431958

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		TZ0052		
Sampling Date		2013/11/20		
	Units	**MAIN BARN**	**RDL**	**QC Batch**
Metals				
. Aluminum (Al)	ug/L	6.7	5.0	3435832
. Antimony (Sb)	ug/L	<0.50	0.50	3435832
. Arsenic (As)	ug/L	8.1	1.0	3435832
. Barium (Ba)	ug/L	35	2.0	3435832
. Beryllium (Be)	ug/L	<0.50	0.50	3435832
. Bismuth (Bi)	ug/L	<1.0	1.0	3435832
. Boron (B)	ug/L	220	10	3435832
. Cadmium (Cd)	ug/L	<0.10	0.10	3435832
. Calcium (Ca)	ug/L	96000	200	3435832
. Chromium (Cr)	ug/L	<5.0	5.0	3435832
. Cobalt (Co)	ug/L	<0.50	0.50	3435832
. Copper (Cu)	ug/L	25	1.0	3435832
. Iron (Fe)	ug/L	1200	100	3435832
. Lead (Pb)	ug/L	27	0.50	3435832
. Magnesium (Mg)	ug/L	55000	50	3435832
. Manganese (Mn)	ug/L	18	2.0	3435832
Mercury (Hg)	mg/L	<0.00010	0.00010	3434873
. Molybdenum (Mo)	ug/L	0.98	0.50	3435832
. Nickel (Ni)	ug/L	<1.0	1.0	3435832
. Phosphorus (P)	ug/L	<100	100	3435832
. Potassium (K)	ug/L	4400	200	3435832
. Selenium (Se)	ug/L	<2.0	2.0	3435832
. Silicon (Si)	ug/L	10000	50	3435832
. Silver (Ag)	ug/L	<0.10	0.10	3435832
. Sodium (Na)	ug/L	17000	100	3435832
. Strontium (Sr)	ug/L	2200	1.0	3435832
. Thallium (Tl)	ug/L	<0.050	0.050	3435832
. Tin (Sn)	ug/L	3.0	1.0	3435832
. Titanium (Ti)	ug/L	<5.0	5.0	3435832
. Uranium (U)	ug/L	0.66	0.10	3435832
. Vanadium (V)	ug/L	<0.50	0.50	3435832
. Zinc (Zn)	ug/L	130	5.0	3435832

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam Job #: B3K0774
Report Date: 2014/01/20

Golder Associates Ltd
Client Project #: 021-1228
Site Location: TANSLEY QUARRY
Sampler Initials: JB

Test Summary

Maxxam ID TZ0052
Sample ID MAIN BARN
Matrix Water

Collected 2013/11/20
Shipped
Received 2013/11/20

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3431102	N/A	2013/11/21	Surinder Rai
Anions	IC	3431958	N/A	2013/11/25	Fari Dehdezi
Conductivity	COND	3431125	N/A	2013/11/21	Surinder Rai
Free (WAD) Cyanide	TECH/CN	3433065	N/A	2013/11/23	Xuanhong Qiu
Fluoride	F	3431097	2013/11/21	2013/11/21	Surinder Rai
Hardness (calculated as CaCO3)		3429143	N/A	2013/11/27	Automated Statchk
Mercury in Water by CVAA	CVAA	3434873	2013/11/25	2013/11/26	Magdalena Carlos
Metals Analysis by ICPMS (as received)	ICP/MS	3435832	2013/11/26	2013/11/26	Viviana Canzonieri
Total Ammonia-N	LACH/NH4	3431354	N/A	2013/11/22	Charles Opoku-Ware
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	3431956	N/A	2013/11/26	Shobhana Bavisiya
pH	PH	3431109	N/A	2013/11/21	Surinder Rai
Phenols (4AAP)	TECH/PHEN	3431487	N/A	2013/11/25	Louise Harding
Orthophosphate	AC	3431975	N/A	2013/11/22	Alina Dobreanu
Sulphide	ISE/S	3431550	N/A	2013/11/21	Neil Dassanayake
Total Dissolved Solids	SLDS	3432908	N/A	2013/11/22	Niki Shah
Total Phosphorus (Colourimetric)	LACH/P	3431237	2013/11/21	2013/11/23	Viorica Rotaru
Low Level Total Suspended Solids	SLDS	3431611	N/A	2013/11/22	Subhashchandra Patel
Turbidity	TURB	3431751	N/A	2013/11/21	Lemeneh Addis

Maxxam ID TZ0052 Dup
Sample ID MAIN BARN
Matrix Water

Collected 2013/11/20
Shipped
Received 2013/11/20

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Total Dissolved Solids	SLDS	3432908	N/A	2013/11/22	Niki Shah

Package 1	4.3°C
Package 2	7.0°C

Each temperature is the average of up to three cooler temperatures taken at receipt

GENERAL COMMENTS

Revised Report (2014/01/20): Split reports, as per client request..

QUALITY ASSURANCE REPORT

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	**Parameter**	**Date**	**% Recovery**	**QC Limits**	**% Recovery**	**QC Limits**	**Value**	**Units**	**Value (%)**	**QC Limits**	**% Recovery**	**QC Limits**
3431097	Fluoride (F-)	2013/11/21	102	80 - 120	101	80 - 120	<0.10	mg/L	NC	20		
3431102	Alkalinity (Total as CaCO3)	2013/11/21			95	85 - 115	<1.0	mg/L	0.7	25		
3431125	Conductivity	2013/11/21			101	85 - 115	<1.0	umho/cm	0.2	25		
3431237	Total Phosphorus	2013/11/23	96	80 - 120	100	80 - 120	<0.002	mg/L	11.8	20	99	80 - 120
3431354	Total Ammonia-N	2013/11/22	96	80 - 120	98	85 - 115	<0.050	mg/L	NC	20		
3431487	Phenols-4AAP	2013/11/25	89(1)	80 - 120	100	85 - 115	<0.0010	mg/L				
3431550	Sulphide	2013/11/21	85	80 - 120	96	80 - 120	<0.020	mg/L	NC	20		
3431611	Total Suspended Solids	2013/11/22					<1	mg/L	NC	25	98	85 - 115
3431751	Turbidity	2013/11/21					<0.2	NTU	0.5	20	104	85 - 115
3431956	Nitrite (N)	2013/11/26	112	80 - 120	109	80 - 120	<0.010	mg/L	NC	25		
3431956	Nitrate (N)	2013/11/26	97	80 - 120	92	80 - 120	<0.10	mg/L	NC	25		
3431958	Dissolved Chloride (Cl)	2013/11/25	93(2)	80 - 120	100	80 - 120	<1.0	mg/L				
3431958	Dissolved Bromide (Br-)	2013/11/25	96(2)	80 - 120	104	80 - 120	<1.0	mg/L				
3431958	Dissolved Sulphate (SO4)	2013/11/25	94(2)	80 - 120	99	80 - 120	<1.0	mg/L				
3431975	Orthophosphate (P)	2013/11/22	103	75 - 125	101	80 - 120	<0.010	mg/L	NC	25		
3432908	Total Dissolved Solids	2013/11/22					<10	mg/L	1.8(3)	25	101	90 - 110
3433065	Free Cyanide	2013/11/23	104	80 - 120	101	80 - 120	<0.0020	mg/L	NC	20		
3434873	Mercury (Hg)	2013/11/26	103	80 - 120	101	80 - 120	<0.00010	mg/L	NC	20		
3435832	. Aluminum (Al)	2013/11/26	104	80 - 120	107	80 - 120	<5.0	ug/L				
3435832	. Antimony (Sb)	2013/11/26	106	80 - 120	107	80 - 120	<0.50	ug/L				
3435832	. Arsenic (As)	2013/11/26	97	80 - 120	96	80 - 120	<1.0	ug/L				
3435832	. Barium (Ba)	2013/11/26	96	80 - 120	98	80 - 120	<2.0	ug/L				
3435832	. Beryllium (Be)	2013/11/26	101	80 - 120	101	80 - 120	<0.50	ug/L				
3435832	. Bismuth (Bi)	2013/11/26	92	80 - 120	94	80 - 120	<1.0	ug/L				
3435832	. Boron (B)	2013/11/26	100	80 - 120	98	80 - 120	<10	ug/L				
3435832	. Cadmium (Cd)	2013/11/26	102	80 - 120	103	80 - 120	<0.10	ug/L				
3435832	. Calcium (Ca)	2013/11/26	NC	80 - 120	101	80 - 120	<200	ug/L				
3435832	. Chromium (Cr)	2013/11/26	101	80 - 120	103	80 - 120	<5.0	ug/L				
3435832	. Cobalt (Co)	2013/11/26	100	80 - 120	103	80 - 120	<0.50	ug/L				
3435832	. Copper (Cu)	2013/11/26	96	80 - 120	100	80 - 120	<1.0	ug/L				
3435832	. Iron (Fe)	2013/11/26	100	80 - 120	102	80 - 120	<100	ug/L				
3435832	. Lead (Pb)	2013/11/26	95	80 - 120	97	80 - 120	<0.50	ug/L	NC	20		
3435832	. Magnesium (Mg)	2013/11/26	NC	80 - 120	103	80 - 120	<50	ug/L				
3435832	. Manganese (Mn)	2013/11/26	102	80 - 120	103	80 - 120	<2.0	ug/L				
3435832	. Molybdenum (Mo)	2013/11/26	101	80 - 120	100	80 - 120	<0.50	ug/L				
3435832	. Nickel (Ni)	2013/11/26	96	80 - 120	100	80 - 120	<1.0	ug/L				
3435832	. Phosphorus (P)	2013/11/26	108	80 - 120	120	80 - 120	<100	ug/L				
3435832	. Potassium (K)	2013/11/26	99	80 - 120	101	80 - 120	<200	ug/L				
3435832	. Selenium (Se)	2013/11/26	102	80 - 120	102	80 - 120	<2.0	ug/L				
3435832	. Silicon (Si)	2013/11/26	99	80 - 120	102	80 - 120	<50	ug/L				

QUALITY ASSURANCE REPORT

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
3435832	. Silver (Ag)	2013/11/26	99	80 - 120	98	80 - 120	<0.10	ug/L				
3435832	. Sodium (Na)	2013/11/26	NC	80 - 120	102	80 - 120	<100	ug/L				
3435832	. Strontium (Sr)	2013/11/26	NC	80 - 120	105	80 - 120	<1.0	ug/L				
3435832	. Thallium (Tl)	2013/11/26	97	80 - 120	96	80 - 120	<0.050	ug/L				
3435832	. Tin (Sn)	2013/11/26	106	80 - 120	106	80 - 120	<1.0	ug/L				
3435832	. Titanium (Ti)	2013/11/26	100	80 - 120	100	80 - 120	<5.0	ug/L				
3435832	. Uranium (U)	2013/11/26	100	80 - 120	100	80 - 120	<0.10	ug/L				
3435832	. Vanadium (V)	2013/11/26	100	80 - 120	102	80 - 120	<0.50	ug/L				
3435832	. Zinc (Zn)	2013/11/26	79(4)	80 - 120	104	80 - 120	<5.0	ug/L				

N/A = Not Applicable

RPD = Relative Percent Difference

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spiked amount was not sufficiently significant to permit a reliable recovery calculation.

NC (RPD): The RPD was not calculated. The level of analyte detected in the parent sample and its duplicate was not sufficiently significant to permit a reliable calculation.

(1) - Matrix Spike Parent ID [TZ0056-07]

(2) - Matrix Spike Parent ID [TZ0053-01]

(3) - Duplicate Parent ID [TZ0052-02]

(4) - Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.

Validation Signature Page

Maxxam Job #: B3K0774

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

Eva Pranjic

Ewa Pranjic, M.Sc., C.Chem, Scientific Specialist

==

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SIMMS

Your Project #: 021-1228
Site#: 021-1228
Site Location: TANSLEY QUARRY
Your C.O.C. #: 44283301, 442833-01-01

Attention: Josip Balaban
Golder Associates Ltd
6925 Century Ave
Suite 100
Mississauga, ON
L5N 7K2

Report Date: 2014/01/20
Report #: R2781649
Version: 3R

CERTIFICATE OF ANALYSIS – REVISED REPORT

MAXXAM JOB #: B3K0774
Received: 2013/11/20, 16:40

Sample Matrix: Water
Samples Received: 1

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Method Reference
Alkalinity	1	N/A	2013/11/21	CAM SOP-00448	SM 2320B
Anions	1	N/A	2013/11/25	CAM SOP-00435	SM 4110B
Conductivity	1	N/A	2013/11/21	CAM SOP-00414	SM 2510
Free (WAD) Cyanide	1	N/A	2013/11/23	CAM SOP-00457	Ontario MOE CN-E3015
Fluoride	1	2013/11/21	2013/11/21	CAM SOP-00449	APHA 4500FC
Hardness (calculated as CaCO3)	1	N/A	2013/11/27	CAM SOP 00102	SM 2340 B
Mercury in Water by CVAA	1	2013/11/25	2013/11/26	CAM SOP-00453	SW-846 7470A
Metals Analysis by ICPMS (as received) (1)	1	2013/11/26	2013/11/26	CAM SOP-00447	EPA 6020
Total Ammonia-N	1	N/A	2013/11/22	CAM SOP-00441	US GS I-2522-90
Nitrate (NO3) and Nitrite (NO2) in Water (2)	1	N/A	2013/11/26	CAM SOP-00440	SM 4500 NO3I/NO2B
pH	1	N/A	2013/11/21	CAM SOP-00413	SM 4500H+ B
Phenols (4AAP)	1	N/A	2013/11/25	CAM SOP-00444	MOE ROPHEN-E3179
Orthophosphate	1	N/A	2013/11/22	CAM SOP-00461	EPA 365.1
Sulphide	1	N/A	2013/11/21	CAM SOP-00455	SM 4500-S G
Total Dissolved Solids	1	N/A	2013/11/21	CAM SOP-00428	APHA 2540C
Total Phosphorus (Colourimetric)	1	2013/11/21	2013/11/23	CAM SOP-00407	APHA 4500 P,B,F
Low Level Total Suspended Solids	1	N/A	2013/11/22	CAM SOP-00428	SM 2540D
Turbidity	1	N/A	2013/11/21	CAM SOP-00417	APHA 2130B

Remarks:

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* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
* Results relate only to the items tested.

(1) Metals analysis was performed on the sample 'as received'.
(2) Values for calculated parameters may not appear to add up due to rounding of raw data and significant figures.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Antonella Brasil, Project Manager
Email: ABrasil@maxxam.ca
Phone# (905) 817-5817

==
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Total cover pages: 2

RESULTS OF ANALYSES OF WATER

Maxxam ID		TZ0053	TZ0053		
Sampling Date		2013/11/20	2013/11/20		
	Units	**SIMMS**	**SIMMS Lab-Dup**	**RDL**	**QC Batch**
Calculated Parameters					
Hardness (CaCO3)	mg/L	330		1.0	3429143
Inorganics					
Total Ammonia-N	mg/L	<0.050		0.050	3431354
Conductivity	umho/cm	650		1.0	3431125
Total Dissolved Solids	mg/L	380		10	3431957
Fluoride (F-)	mg/L	0.21		0.10	3431097
Free Cyanide	mg/L	<0.0020		0.0020	3433065
Orthophosphate (P)	mg/L	<0.010		0.010	3431975
pH	pH	8.03			3431109
Phenols-4AAP	mg/L	<0.0010		0.0010	3431487
Total Phosphorus	mg/L	0.005		0.002	3431237
Total Suspended Solids	mg/L	<1		1	3431611
Sulphide	mg/L	<0.020		0.020	3431550
Turbidity	NTU	0.8		0.2	3431751
Alkalinity (Total as CaCO3)	mg/L	280		1.0	3431102
Nitrite (N)	mg/L	<0.010		0.010	3431956
Dissolved Chloride (Cl)	mg/L	5.3	5.4	1.0	3431958
Nitrate (N)	mg/L	1.3		0.10	3431956
Nitrate + Nitrite	mg/L	1.3		0.10	3431956
Dissolved Bromide (Br-)	mg/L	<1.0	<1.0	1.0	3431958
Dissolved Sulphate (SO4)	mg/L	66	66	1.0	3431958

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Golder Associates Ltd
Client Project #: 021-1228
Site Location: TANSLEY QUARRY
Sampler Initials: JB

Maxxam Job #: B3K0774
Report Date: 2014/01/20

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		TZ0053		
Sampling Date		2013/11/20		
	Units	**SIMMS**	**RDL**	**QC Batch**
Metals				
. Aluminum (Al)	ug/L	<5.0	5.0	3435832
. Antimony (Sb)	ug/L	1.2	0.50	3435832
. Arsenic (As)	ug/L	<1.0	1.0	3435832
. Barium (Ba)	ug/L	46	2.0	3435832
. Beryllium (Be)	ug/L	<0.50	0.50	3435832
. Bismuth (Bi)	ug/L	<1.0	1.0	3435832
. Boron (B)	ug/L	45	10	3435832
. Cadmium (Cd)	ug/L	<0.10	0.10	3435832
. Calcium (Ca)	ug/L	81000	200	3435832
. Chromium (Cr)	ug/L	<5.0	5.0	3435832
. Cobalt (Co)	ug/L	<0.50	0.50	3435832
. Copper (Cu)	ug/L	13	1.0	3435832
. Iron (Fe)	ug/L	<100	100	3435832
. Lead (Pb)	ug/L	1.4	0.50	3435832
. Magnesium (Mg)	ug/L	31000	50	3435832
. Manganese (Mn)	ug/L	5.8	2.0	3435832
Mercury (Hg)	mg/L	<0.00010	0.00010	3434873
. Molybdenum (Mo)	ug/L	1.1	0.50	3435832
. Nickel (Ni)	ug/L	<1.0	1.0	3435832
. Phosphorus (P)	ug/L	<100	100	3435832
. Potassium (K)	ug/L	3100	200	3435832
. Selenium (Se)	ug/L	<2.0	2.0	3435832
. Silicon (Si)	ug/L	3900	50	3435832
. Silver (Ag)	ug/L	<0.10	0.10	3435832
. Sodium (Na)	ug/L	12000	100	3435832
. Strontium (Sr)	ug/L	810	1.0	3435832
. Thallium (Tl)	ug/L	<0.050	0.050	3435832
. Tin (Sn)	ug/L	<1.0	1.0	3435832
. Titanium (Ti)	ug/L	<5.0	5.0	3435832
. Uranium (U)	ug/L	2.5	0.10	3435832
. Vanadium (V)	ug/L	<0.50	0.50	3435832
. Zinc (Zn)	ug/L	1300	5.0	3435832

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Test Summary

Maxxam ID TZ0053
Sample ID SIMMS
Matrix Water

Collected 2013/11/20
Shipped
Received 2013/11/20

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3431102	N/A	2013/11/21	Surinder Rai
Anions	IC	3431958	N/A	2013/11/25	Fari Dehdezi
Conductivity	COND	3431125	N/A	2013/11/21	Surinder Rai
Free (WAD) Cyanide	TECH/CN	3433065	N/A	2013/11/23	Xuanhong Qiu
Fluoride	F	3431097	2013/11/21	2013/11/21	Surinder Rai
Hardness (calculated as CaCO3)		3429143	N/A	2013/11/27	Automated Statchk
Mercury in Water by CVAA	CVAA	3434873	2013/11/25	2013/11/26	Magdalena Carlos
Metals Analysis by ICPMS (as received)	ICP/MS	3435832	2013/11/26	2013/11/26	Viviana Canzonieri
Total Ammonia-N	LACH/NH4	3431354	N/A	2013/11/22	Charles Opoku-Ware
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	3431956	N/A	2013/11/26	Shobhana Bavisiya
pH	PH	3431109	N/A	2013/11/21	Surinder Rai
Phenols (4AAP)	TECH/PHEN	3431487	N/A	2013/11/25	Louise Harding
Orthophosphate	AC	3431975	N/A	2013/11/22	Alina Dobreanu
Sulphide	ISE/S	3431550	N/A	2013/11/21	Neil Dassanayake
Total Dissolved Solids	SLDS	3431957	N/A	2013/11/21	Niki Shah
Total Phosphorus (Colourimetric)	LACH/P	3431237	2013/11/21	2013/11/23	Viorica Rotaru
Low Level Total Suspended Solids	SLDS	3431611	N/A	2013/11/22	Subhashchandra Patel
Turbidity	TURB	3431751	N/A	2013/11/21	Lemeneh Addis

Maxxam ID TZ0053 Dup
Sample ID SIMMS
Matrix Water

Collected 2013/11/20
Shipped
Received 2013/11/20

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Anions	IC	3431958	N/A	2013/11/25	Fari Dehdezi

Package 1	4.3°C
Package 2	7.0°C

Each temperature is the average of up to three cooler temperatures taken at receipt

GENERAL COMMENTS

Revised Report (2014/01/20): Split reports, as per client request..

Maxxam Job #: B3K0774
Report Date: 2014/01/20

Golder Associates Ltd
Client Project #: 021-1228
Site Location: TANSLEY QUARRY
Sampler Initials: JB

QUALITY ASSURANCE REPORT

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
3431097	Fluoride (F-)	2013/11/21	102	80 - 120	101	80 - 120	<0.10	mg/L	NC	20		
3431102	Alkalinity (Total as CaCO3)	2013/11/21			95	85 - 115	<1.0	mg/L	0.7	25		
3431125	Conductivity	2013/11/21			101	85 - 115	<1.0	umho/cm	0.2	25		
3431237	Total Phosphorus	2013/11/23	96	80 - 120	100	80 - 120	<0.002	mg/L	11.8	20	99	80 - 120
3431354	Total Ammonia-N	2013/11/22	96	80 - 120	98	85 - 115	<0.050	mg/L	NC	20		
3431487	Phenols-4AAP	2013/11/25	89(1)	80 - 120	100	85 - 115	<0.0010	mg/L				
3431550	Sulphide	2013/11/21	85	80 - 120	96	80 - 120	<0.020	mg/L	NC	20		
3431611	Total Suspended Solids	2013/11/22					<1	mg/L	NC	25	98	85 - 115
3431751	Turbidity	2013/11/21					<0.2	NTU	0.5	20	104	85 - 115
3431956	Nitrite (N)	2013/11/26	112	80 - 120	109	80 - 120	<0.010	mg/L	NC	25		
3431956	Nitrate (N)	2013/11/26	97	80 - 120	92	80 - 120	<0.10	mg/L	NC	25		
3431957	Total Dissolved Solids	2013/11/21					<10	mg/L	4.4	25	95	85 - 115
3431958	Dissolved Chloride (Cl)	2013/11/25	93(2)	80 - 120	100	80 - 120	<1.0	mg/L	1.1(3)	20		
3431958	Dissolved Bromide (Br-)	2013/11/25	96(2)	80 - 120	104	80 - 120	<1.0	mg/L	NC(3)	20		
3431958	Dissolved Sulphate (SO4)	2013/11/25	94(2)	80 - 120	99	80 - 120	<1.0	mg/L	0.2(3)	20		
3431975	Orthophosphate (P)	2013/11/22	103	75 - 125	101	80 - 120	<0.010	mg/L	NC	25		
3433065	Free Cyanide	2013/11/23	104	80 - 120	101	80 - 120	<0.0020	mg/L	NC	20		
3434873	Mercury (Hg)	2013/11/26	103	80 - 120	101	80 - 120	<0.00010	mg/L	NC	20		
3435832	. Aluminum (Al)	2013/11/26	104	80 - 120	107	80 - 120	<5.0	ug/L				
3435832	. Antimony (Sb)	2013/11/26	106	80 - 120	107	80 - 120	<0.50	ug/L				
3435832	. Arsenic (As)	2013/11/26	97	80 - 120	96	80 - 120	<1.0	ug/L				
3435832	. Barium (Ba)	2013/11/26	96	80 - 120	98	80 - 120	<2.0	ug/L				
3435832	. Beryllium (Be)	2013/11/26	101	80 - 120	101	80 - 120	<0.50	ug/L				
3435832	. Bismuth (Bi)	2013/11/26	92	80 - 120	94	80 - 120	<1.0	ug/L				
3435832	. Boron (B)	2013/11/26	100	80 - 120	98	80 - 120	<10	ug/L				
3435832	. Cadmium (Cd)	2013/11/26	102	80 - 120	103	80 - 120	<0.10	ug/L				
3435832	. Calcium (Ca)	2013/11/26	NC	80 - 120	101	80 - 120	<200	ug/L				
3435832	. Chromium (Cr)	2013/11/26	101	80 - 120	103	80 - 120	<5.0	ug/L				
3435832	. Cobalt (Co)	2013/11/26	100	80 - 120	103	80 - 120	<0.50	ug/L				
3435832	. Copper (Cu)	2013/11/26	96	80 - 120	100	80 - 120	<1.0	ug/L				
3435832	. Iron (Fe)	2013/11/26	100	80 - 120	102	80 - 120	<100	ug/L				
3435832	. Lead (Pb)	2013/11/26	95	80 - 120	97	80 - 120	<0.50	ug/L	NC	20		
3435832	. Magnesium (Mg)	2013/11/26	NC	80 - 120	103	80 - 120	<50	ug/L				
3435832	. Manganese (Mn)	2013/11/26	102	80 - 120	103	80 - 120	<2.0	ug/L				
3435832	. Molybdenum (Mo)	2013/11/26	101	80 - 120	100	80 - 120	<0.50	ug/L				
3435832	. Nickel (Ni)	2013/11/26	96	80 - 120	100	80 - 120	<1.0	ug/L				
3435832	. Phosphorus (P)	2013/11/26	108	80 - 120	120	80 - 120	<100	ug/L				
3435832	. Potassium (K)	2013/11/26	99	80 - 120	101	80 - 120	<200	ug/L				
3435832	. Selenium (Se)	2013/11/26	102	80 - 120	102	80 - 120	<2.0	ug/L				
3435832	. Silicon (Si)	2013/11/26	99	80 - 120	102	80 - 120	<50	ug/L				

Maxxam Job #: B3K0774
Report Date: 2014/01/20

Golder Associates Ltd
Client Project #: 021-1228
Site Location: TANSLEY QUARRY
Sampler Initials: JB

QUALITY ASSURANCE REPORT

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
3435832	. Silver (Ag)	2013/11/26	99	80 - 120	98	80 - 120	<0.10	ug/L				
3435832	. Sodium (Na)	2013/11/26	NC	80 - 120	102	80 - 120	<100	ug/L				
3435832	. Strontium (Sr)	2013/11/26	NC	80 - 120	105	80 - 120	<1.0	ug/L				
3435832	. Thallium (Tl)	2013/11/26	97	80 - 120	96	80 - 120	<0.050	ug/L				
3435832	. Tin (Sn)	2013/11/26	106	80 - 120	106	80 - 120	<1.0	ug/L				
3435832	. Titanium (Ti)	2013/11/26	100	80 - 120	100	80 - 120	<5.0	ug/L				
3435832	. Uranium (U)	2013/11/26	100	80 - 120	100	80 - 120	<0.10	ug/L				
3435832	. Vanadium (V)	2013/11/26	100	80 - 120	102	80 - 120	<0.50	ug/L				
3435832	. Zinc (Zn)	2013/11/26	79 (4)	80 - 120	104	80 - 120	<5.0	ug/L				

N/A = Not Applicable

RPD = Relative Percent Difference

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spiked amount was not sufficiently significant to permit a reliable recovery calculation.

NC (RPD): The RPD was not calculated. The level of analyte detected in the parent sample and its duplicate was not sufficiently significant to permit a reliable calculation.

(1) - Matrix Spike Parent ID [TZ0056-07]

(2) - Matrix Spike Parent ID [TZ0053-01]

(3) - Duplicate Parent ID [TZ0053-01]

(4) - Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.

Validation Signature Page

Maxxam Job #: B3K0774

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

Eva P

CHARTERED
Eva Pranjic
CHEMIST

Ewa Pranjic, M.Sc., C.Chem, Scientific Specialist

==

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Your Project #: 021-1228
Site#: 021-1228
Site Location: TANSLEY QUARRY
Your C.O.C. #: 44283306

Attention: Josip Balaban
Golder Associates Ltd
6925 Century Ave
Suite 100
Mississauga, ON
L5N 7K2

Report Date: 2013/11/25

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B3J9025
Received: 2013/11/18, 15:35

Sample Matrix: Water
Samples Received: 10

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Method Reference
Alkalinity	10	N/A	2013/11/20	CAM SOP-00448	SM 2320B
Anions	10	N/A	2013/11/19	CAM SOP-00435	SM 4110B
Conductivity	10	N/A	2013/11/20	CAM SOP-00414	SM 2510
Free (WAD) Cyanide	10	N/A	2013/11/23	CAM SOP-00457	Ontario MOE CN-E3015
Fluoride	10	2013/11/19	2013/11/20	CAM SOP-00449	APHA 4500FC
Hardness (calculated as CaCO3)	10	N/A	2013/11/22	CAM SOP 00102	SM 2340 B
Mercury in Water by CVAA	10	2013/11/20	2013/11/21	CAM SOP-00453	SW-846 7470A
Dissolved Metals by ICPMS	10	N/A	2013/11/22	CAM SOP-00447	EPA 6020
Total Metals Analysis by ICPMS	10	N/A	2013/11/20	CAM SOP-00447	EPA 6020
Total Ammonia-N	9	N/A	2013/11/20	CAM SOP-00441	US GS I-2522-90
Total Ammonia-N	1	N/A	2013/11/25	CAM SOP-00441	US GS I-2522-90
Nitrate (NO3) and Nitrite (NO2) in Water (1)	10	N/A	2013/11/20	CAM SOP-00440	SM 4500 NO3I/NO2B
pH	10	N/A	2013/11/20	CAM SOP-00413	SM 4500H+ B
Phenols (4AAP)	10	N/A	2013/11/20	CAM SOP-00444	MOE ROPHEN-E3179
Orthophosphate	10	N/A	2013/11/20	CAM SOP-00461	EPA 365.1
Sulphide	10	N/A	2013/11/19	CAM SOP-00455	SM 4500-S G
Total Dissolved Solids	10	N/A	2013/11/19	CAM SOP-00428	APHA 2540C
Total Phosphorus (Colourimetric)	3	2013/11/19	2013/11/20	CAM SOP-00407	APHA 4500 P,B,F
Total Phosphorus (Colourimetric)	7	2013/11/20	2013/11/20	CAM SOP-00407	SM 4500 P,B,F
Low Level Total Suspended Solids	10	N/A	2013/11/19	CAM SOP-00428	SM 2540D
Turbidity	4	N/A	2013/11/19	CAM SOP-00417	APHA 2130B
Turbidity	6	N/A	2013/11/20	CAM SOP-00417	APHA 2130B

Remarks:

Maxxam Analytics has performed all analytical testing herein in accordance with ISO 17025 and the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act. All methodologies comply with this document and are validated for use in the laboratory. The methods and techniques employed in this analysis conform to the performance criteria (detection limits, accuracy and precision) as outlined in the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act. Reporting results to two significant figures at the RDL is to permit statistical evaluation and is not intended to be an indication of analytical precision.

Your Project #: 021-1228
Site#: 021-1228
Site Location: TANSLEY QUARRY
Your C.O.C. #: 44283306

Attention: Josip Balaban
Golder Associates Ltd
6925 Century Ave
Suite 100
Mississauga, ON
L5N 7K2

Report Date: 2013/11/25

CERTIFICATE OF ANALYSIS

-2-

The CWS PHC methods employed by Maxxam conform to all prescribed elements of the reference method and performance based elements have been validated. All modifications have been validated and proven equivalent following the 'Alberta Environment Draft Addenda to the CWS-PHC, Appendix 6, Validation of Alternate Methods'. Documentation is available upon request. Maxxam has made the following improvements to the CWS-PHC reference benchmark method: (i) Headspace for F1; and, (ii) Mechanical extraction for F2-F4. Note: F4G cannot be added to the C6 to C50 hydrocarbons. The extraction date for samples field preserved with methanol for F1 and Volatile Organic Compounds is considered to be the date sampled.

Maxxam Analytics is accredited for all specific parameters as required by Ontario Regulation 153/04. Maxxam Analytics is limited in liability to the actual cost of analysis unless otherwise agreed in writing. There is no other warranty expressed or implied. Samples will be retained at Maxxam Analytics for three weeks from receipt of data or as per contract.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) Values for calculated parameters may not appear to add up due to rounding of raw data and significant figures.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Antonella Brasil, Project Manager
Email: ABrasil@maxxam.ca
Phone# (905) 817-5817

==

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Total cover pages: 2

Maxxam Job #: B3J9025
Report Date: 2013/11/25

Golder Associates Ltd
Client Project #: 021-1228
Site Location: TANSLEY QUARRY
Sampler Initials: JB

RESULTS OF ANALYSES OF WATER

Maxxam ID		TY1359			TY1360	TY1360		
Sampling Date		2013/11/18			2013/11/18	2013/11/18		
COC Number		44283306			44283306	44283306		
	Units	**MW07-O**	**RDL**	**QC Batch**	**MW07-D**	**MW07-D Lab-Dup**	**RDL**	**QC Batch**
Calculated Parameters								
Hardness (CaCO3)	mg/L	500	1.0	3426692	11000		1.0	3426692
Inorganics								
Total Ammonia-N	mg/L	0.20	0.050	3428263	19		0.50	3432217
Conductivity	umho/cm	1300	1.0	3428639	47000	47000	1.0	3428639
Total Dissolved Solids	mg/L	816	10	3428129	32200		10	3428129
Fluoride (F-)	mg/L	0.34	0.10	3428645	0.24	0.24	0.10	3428645
Free Cyanide	mg/L	<0.0020	0.0020	3428105	<0.0020		0.0020	3428105
Orthophosphate (P)	mg/L	<0.010	0.010	3428710	<0.010		0.010	3428710
pH	pH	7.74		3428646	6.90	6.94		3428646
Phenols-4AAP	mg/L	<0.0010	0.0010	3428184	0.035		0.0050	3428184
Total Phosphorus	mg/L	4.2	0.10	3428827	0.32		0.10	3428827
Total Suspended Solids	mg/L	5800	30	3428125	210		3	3428125
Sulphide	mg/L	0.036	0.020	3428378	0.023		0.020	3428378
Turbidity	NTU	250	1	3428463	170	160	0.4	3428463
Alkalinity (Total as CaCO3)	mg/L	550	1.0	3428636	41	40	1.0	3428636
Nitrite (N)	mg/L	0.023	0.010	3428419	0.017		0.010	3428419
Dissolved Chloride (Cl)	mg/L	34	1.0	3428106	18000		100	3428106
Nitrate (N)	mg/L	<0.10	0.10	3428419	<0.10		0.10	3428419
Nitrate + Nitrite	mg/L	<0.10	0.10	3428419	<0.10		0.10	3428419
Dissolved Bromide (Br-)	mg/L	<1.0	1.0	3428106	210		100	3428106
Dissolved Sulphate (SO4)	mg/L	160	1.0	3428106	1500		100	3428106

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Golder Associates Ltd
Maxxam Job #: B3J9025
Client Project #: 021-1228
Report Date: 2013/11/25
Site Location: TANSLEY QUARRY
Sampler Initials: JB

RESULTS OF ANALYSES OF WATER

Maxxam ID		TY1361	TY1361			TY1362	TY1362		
Sampling Date		2013/11/18	2013/11/18			2013/11/18	2013/11/18		
COC Number		44283306	44283306			44283306	44283306		
	Units	**MW08-O**	**MW08-O Lab-Dup**	**RDL**	**QC Batch**	**MW08-I**	**MW08-I Lab-Dup**	**RDL**	**QC Batch**
Calculated Parameters									
Hardness (CaCO3)	mg/L	910		1.0	3426692	2100		1.0	3426692
Inorganics									
Total Ammonia-N	mg/L	0.46		0.050	3428263	5.2		0.25	3428263
Conductivity	umho/cm	1800		1.0	3428639	8900		1.0	3428639
Total Dissolved Solids	mg/L	1290		10	3428129	5940		10	3428129
Fluoride (F-)	mg/L	0.23		0.10	3428645	0.45		0.10	3428645
Free Cyanide	mg/L	<0.0020		0.0020	3428105	<0.0020	<0.0020	0.0020	3428105
Orthophosphate (P)	mg/L	<0.010		0.010	3428710	<0.010		0.010	3428710
pH	pH	7.71			3428646	7.59			3428646
Phenols-4AAP	mg/L	<0.0010		0.0010	3428184	0.0030		0.0010	3428184
Total Phosphorus	mg/L	7.8		0.10	3428827	0.069		0.002	3428403
Total Suspended Solids	mg/L	12000		50	3428125	170		3	3428125
Sulphide	mg/L	0.28	0.27	0.020	3428378	<0.020		0.020	3428378
Turbidity	NTU	1100		2	3428463	73		0.2	3428463
Alkalinity (Total as CaCO3)	mg/L	570		1.0	3428636	140		1.0	3428636
Nitrite (N)	mg/L	0.065		0.010	3428419	<0.010		0.010	3428419
Dissolved Chloride (Cl)	mg/L	11		1.0	3428106	2400		20	3428106
Nitrate (N)	mg/L	<0.10		0.10	3428419	<0.10		0.10	3428419
Nitrate + Nitrite	mg/L	0.11		0.10	3428419	<0.10		0.10	3428419
Dissolved Bromide (Br-)	mg/L	<1.0		1.0	3428106	32		1.0	3428106
Dissolved Sulphate (SO4)	mg/L	550		2.0	3428106	1000		20	3428106

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

RESULTS OF ANALYSES OF WATER

Maxxam ID		TY1363			TY1364		TY1365		
Sampling Date		2013/11/18			2013/11/18		2013/11/18		
COC Number		44283306			44283306		44283306		
	Units	**MW08-D**	**RDL**	**QC Batch**	**MW09-O**	**RDL**	**MW09-S**	**RDL**	**QC Batch**
Calculated Parameters									
Hardness (CaCO3)	mg/L	600	1.0	3426692	390	1.0	480	1.0	3426692
Inorganics									
Total Ammonia-N	mg/L	2.3	0.050	3428263	0.20	0.050	3.3	0.050	3428263
Conductivity	umho/cm	2200	1.0	3428639	850	1.0	1800	1.0	3428639
Total Dissolved Solids	mg/L	1380	10	3428129	508	10	1130	10	3428129
Fluoride (F-)	mg/L	0.27	0.10	3428645	0.22	0.10	0.38	0.10	3428645
Free Cyanide	mg/L	<0.0020	0.0020	3428105	<0.0020	0.0020	<0.0020	0.0020	3428105
Orthophosphate (P)	mg/L	<0.010	0.010	3428710	<0.010	0.010	<0.010	0.010	3428710
pH	pH	8.01		3428646	7.95		7.86		3428646
Phenols-4AAP	mg/L	0.0025	0.0010	3428184	<0.0010	0.0010	<0.0010	0.0010	3428184
Total Phosphorus	mg/L	0.099	0.002	3428403	2.9	0.10	3.8	0.10	3428827
Total Suspended Solids	mg/L	69	1	3428125	4800	50	5500	50	3428125
Sulphide	mg/L	<0.020	0.020	3428378	<0.020	0.020	<0.020	0.020	3428378
Turbidity	NTU	12	0.2	3428463	430	1	690	1	3428463
Alkalinity (Total as CaCO3)	mg/L	420	1.0	3428636	420	1.0	240	1.0	3428636
Nitrite (N)	mg/L	0.035	0.010	3428419	0.018	0.010	0.070	0.010	3428419
Dissolved Chloride (Cl)	mg/L	240	2.0	3428106	6.5	1.0	210	2.0	3428106
Nitrate (N)	mg/L	1.7	0.10	3428419	0.31	0.10	0.18	0.10	3428419
Nitrate + Nitrite	mg/L	1.8	0.10	3428419	0.33	0.10	0.25	0.10	3428419
Dissolved Bromide (Br-)	mg/L	3.1	1.0	3428106	<1.0	1.0	2.5	1.0	3428106
Dissolved Sulphate (SO4)	mg/L	430	1.0	3428106	67	1.0	400	1.0	3428106

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Golder Associates Ltd
Maxxam Job #: B3J9025
Report Date: 2013/11/25
Client Project #: 021-1228
Site Location: TANSLEY QUARRY
Sampler Initials: JB

RESULTS OF ANALYSES OF WATER

Maxxam ID		TY1366	TY1366		TY1367			TY1368		
Sampling Date		2013/11/18	2013/11/18		2013/11/18			2013/11/18		
COC Number		44283306	44283306		44283306			44283306		
	Units	**MW01-I**	**MW01-I Lab-Dup**	**RDL**	**MW01-D**	**RDL**	**QC Batch**	**DUP 1**	**RDL**	**QC Batch**
Calculated Parameters										
Hardness (CaCO3)	mg/L	770		1.0	6700	1.0	3426692	2100	1.0	3426692
Inorganics										
Total Ammonia-N	mg/L	<0.050		0.050	18	0.50	3428263	5.4	0.10	3428263
Conductivity	umho/cm	1500		1.0	36000	1.0	3428639	9500	1.0	3428639
Total Dissolved Solids	mg/L	984		10	24100	10	3428129	6190	10	3428129
Fluoride (F-)	mg/L	0.38		0.10	0.32	0.10	3428645	0.43	0.10	3428645
Free Cyanide	mg/L	<0.0020		0.0020	<0.0020	0.0020	3428105	<0.0020	0.0020	3428105
Orthophosphate (P)	mg/L	<0.010		0.010	<0.010	0.010	3428710	<0.010	0.010	3428710
pH	pH	7.87			6.97		3428646	7.55		3428646
Phenols-4AAP	mg/L	<0.0010		0.0010	0.019	0.0050	3428184	0.0035	0.0010	3428184
Total Phosphorus	mg/L	1.7		0.040	2.4	0.10	3428827	0.067	0.002	3428403
Total Suspended Solids	mg/L	1900		30	1800	10	3428125	180	3	3428125
Sulphide	mg/L	<0.020		0.020	0.048	0.020	3428378	<0.020	0.020	3428378
Turbidity	NTU	210		1	140	1	3428463	69	0.2	3428463
Alkalinity (Total as CaCO3)	mg/L	440		1.0	40	1.0	3428636	120	1.0	3428636
Nitrite (N)	mg/L	0.020		0.010	<0.010	0.010	3428419	0.023	0.010	3428419
Dissolved Chloride (Cl)	mg/L	95	95	1.0	13000	100	3428106	2600	20	3428106
Nitrate (N)	mg/L	0.52		0.10	<0.10	0.10	3428419	<0.10	0.10	3428419
Nitrate + Nitrite	mg/L	0.54		0.10	<0.10	0.10	3428419	<0.10	0.10	3428419
Dissolved Bromide (Br-)	mg/L	<1.0	<1.0	1.0	150	100	3428106	31	20	3428106
Dissolved Sulphate (SO4)	mg/L	340	350	1.0	1900	100	3428106	1000	20	3428106

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Golder Associates Ltd
Maxxam Job #: B3J9025
Client Project #: 021-1228
Report Date: 2013/11/25
Site Location: TANSLEY QUARRY
Sampler Initials: JB

RESULTS OF ANALYSES OF WATER

Maxxam ID		TY1368		
Sampling Date		2013/11/18		
COC Number		44283306		
	Units	**DUP** **1 Lab-Dup**	**RDL**	**QC Batch**

Inorganics				
Total Ammonia-N	mg/L	5.2	0.10	3428263
Phenols-4AAP	mg/L	0.0029	0.0010	3428184

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		TY1359		TY1360	TY1360		TY1361		
Sampling Date		2013/11/18		2013/11/18	2013/11/18		2013/11/18		
COC Number		44283306		44283306	44283306		44283306		
	Units	**MW07-O**	**RDL**	**MW07-D**	**MW07-D Lab-Dup**	**RDL**	**MW08-O**	**RDL**	**QC Batch**
Metals									
Mercury (Hg)	mg/L	<0.00010	0.00010	<0.00010	<0.00010	0.00010	<0.00010	0.00010	3429682
Dissolved Aluminum (Al)	ug/L	<5.0	5.0	<100		100	<5.0	5.0	3432196
Total Aluminum (Al)	ug/L	81000	25	4900		100	280000	250	3429360
Dissolved Antimony (Sb)	ug/L	<0.50	0.50	<10		10	<0.50	0.50	3432196
Total Antimony (Sb)	ug/L	<2.5	2.5	<10		10	<5.0	5.0	3429360
Dissolved Arsenic (As)	ug/L	3.4	1.0	25		20	1.3	1.0	3432196
Total Arsenic (As)	ug/L	44	5.0	<20		20	100	10	3429360
Dissolved Barium (Ba)	ug/L	34	2.0	40		40	28	2.0	3432196
Total Barium (Ba)	ug/L	540	10	97		40	2200	20	3429360
Dissolved Beryllium (Be)	ug/L	<0.50	0.50	<10		10	<0.50	0.50	3432196
Total Beryllium (Be)	ug/L	5.0	2.5	<10		10	14	5.0	3429360
Dissolved Bismuth (Bi)	ug/L	<1.0	1.0	<20		20	<1.0	1.0	3432196
Total Bismuth (Bi)	ug/L	<5.0	5.0	<20		20	<10	10	3429360
Dissolved Boron (B)	ug/L	7900	10	8500		200	1500	10	3432196
Total Boron (B)	ug/L	8600	50	7600		200	2600	100	3429360
Dissolved Cadmium (Cd)	ug/L	<0.10	0.10	<2.0		2.0	<0.10	0.10	3432196
Total Cadmium (Cd)	ug/L	0.84	0.50	2.8		2.0	4.8	1.0	3429360
Dissolved Calcium (Ca)	ug/L	54000	200	3000000		4000	100000	400	3432196
Total Calcium (Ca)	ug/L	580000	1000	3500000		4000	1200000	2000	3429360
Dissolved Chromium (Cr)	ug/L	<5.0	5.0	<100		100	5.2	5.0	3432196
Total Chromium (Cr)	ug/L	130	25	<100		100	420	50	3429360
Dissolved Cobalt (Co)	ug/L	0.78	0.50	<10		10	1.5	0.50	3432196
Total Cobalt (Co)	ug/L	78	2.5	<10		10	230	5.0	3429360
Dissolved Copper (Cu)	ug/L	<1.0	1.0	<20		20	<1.0	1.0	3432196
Total Copper (Cu)	ug/L	160	5.0	42		20	430	10	3429360
Dissolved Iron (Fe)	ug/L	300	100	<2000		2000	340	100	3432196
Total Iron (Fe)	ug/L	170000	500	11000		2000	460000	1000	3429360
Dissolved Lead (Pb)	ug/L	<0.50	0.50	19		10	<0.50	0.50	3432196
Total Lead (Pb)	ug/L	68	2.5	<10		10	200	5.0	3429360
Dissolved Magnesium (Mg)	ug/L	88000	50	770000		1000	160000	50	3432196
Total Magnesium (Mg)	ug/L	180000	250	900000		1000	400000	500	3429360
Dissolved Manganese (Mn)	ug/L	100	2.0	1500		40	210	2.0	3432196

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		TY1359		TY1360	TY1360		TY1361		
Sampling Date		2013/11/18		2013/11/18	2013/11/18		2013/11/18		
COC Number		44283306		44283306	44283306		44283306		
	Units	**MW07-O**	**RDL**	**MW07-D**	**MW07-D Lab-Dup**	**RDL**	**MW08-O**	**RDL**	**QC Batch**
Total Manganese (Mn)	ug/L	4000	10	1900		40	12000	20	3429360
Dissolved Molybdenum (Mo)	ug/L	9.2	0.50	15		10	3.6	0.50	3432196
Total Molybdenum (Mo)	ug/L	13	2.5	13		10	21	5.0	3429360
Dissolved Nickel (Ni)	ug/L	<1.0	1.0	<20		20	<1.0	1.0	3432196
Total Nickel (Ni)	ug/L	170	5.0	<20		20	500	10	3429360
Dissolved Phosphorus (P)	ug/L	<100	100	<2000		2000	<100	100	3432196
Total Phosphorus (P)	ug/L	4600	500	<2000		2000	12000	1000	3429360
Dissolved Potassium (K)	ug/L	6200	200	150000		4000	14000	200	3432196
Total Potassium (K)	ug/L	22000	1000	170000		4000	91000	2000	3429360
Dissolved Selenium (Se)	ug/L	<2.0	2.0	<80		80	<2.0	2.0	3432196
Dissolved Silicon (Si)	ug/L	8500	250	4300		1000	7500	250	3432196
Total Silicon (Si)	ug/L	92000	250	11000		1000	340000	500	3429360
Total Selenium (Se)	ug/L	<10	10	<40		40	<20	20	3429360
Dissolved Silver (Ag)	ug/L	<0.10	0.10	<2.0		2.0	<0.10	0.10	3432196
Total Silver (Ag)	ug/L	<0.50	0.50	<2.0		2.0	1.8	1.0	3429360
Dissolved Sodium (Na)	ug/L	110000	100	6900000		2000	78000	100	3432196
Total Sodium (Na)	ug/L	120000	500	8100000		2000	110000	1000	3429360
Dissolved Strontium (Sr)	ug/L	2700	1.0	64000		20	9400	1.0	3432196
Total Strontium (Sr)	ug/L	4500	5.0	75000		20	16000	10	3429360
Dissolved Thallium (Tl)	ug/L	<0.050	0.050	<1.0		1.0	<0.050	0.050	3432196
Total Thallium (Tl)	ug/L	0.83	0.25	<1.0		1.0	3.1	0.50	3429360
Dissolved Tin (Sn)	ug/L	<1.0	1.0	<20		20	<1.0	1.0	3432196
Total Tin (Sn)	ug/L	<5.0	5.0	<20		20	<10	10	3429360
Dissolved Titanium (Ti)	ug/L	<5.0	5.0	<100		100	<5.0	5.0	3432196
Total Titanium (Ti)	ug/L	1300	25	100		100	4100	50	3429360
Dissolved Uranium (U)	ug/L	7.0	0.10	6.8		2.0	9.3	0.10	3432196
Total Uranium (U)	ug/L	13	0.50	6.8		2.0	28	1.0	3429360
Dissolved Vanadium (V)	ug/L	1.0	0.50	27		20	1.3	0.50	3432196
Total Vanadium (V)	ug/L	160	2.5	<10		10	500	5.0	3429360
Dissolved Zinc (Zn)	ug/L	<5.0	5.0	<100		100	9.4	5.0	3432196
Total Zinc (Zn)	ug/L	440	25	<100		100	1300	50	3429360

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		TY1362		TY1363		TY1364		TY1365		
Sampling Date		2013/11/18		2013/11/18		2013/11/18		2013/11/18		
COC Number		44283306		44283306		44283306		44283306		
	Units	**MW08-I**	**RDL**	**MW08-D**	**RDL**	**MW09-O**	**RDL**	**MW09-S**	**RDL**	**QC Batch**
Metals										
Mercury (Hg)	mg/L	<0.00010	0.00010	<0.00010	0.00010	<0.00010	0.00010	<0.00010	0.00010	3429682
Dissolved Aluminum (Al)	ug/L	<25	25	<5.0	5.0	<5.0	5.0	<5.0	5.0	3432196
Total Aluminum (Al)	ug/L	2100	25	500	5.0	46000	25	39000	25	3429360
Dissolved Antimony (Sb)	ug/L	<2.5	2.5	<0.50	0.50	<0.50	0.50	<0.50	0.50	3432196
Total Antimony (Sb)	ug/L	<2.5	2.5	0.62	0.50	<0.50	0.50	<0.50	0.50	3429360
Dissolved Arsenic (As)	ug/L	6.4	5.0	1.2	1.0	1.7	1.0	2.6	1.0	3432196
Total Arsenic (As)	ug/L	<5.0	5.0	7.7	1.0	22	1.0	32	1.0	3429360
Dissolved Barium (Ba)	ug/L	14	10	14	2.0	64	2.0	50	2.0	3432196
Total Barium (Ba)	ug/L	36	10	25	2.0	540	2.0	590	2.0	3429360
Dissolved Beryllium (Be)	ug/L	<2.5	2.5	<0.50	0.50	<0.50	0.50	<0.50	0.50	3432196
Total Beryllium (Be)	ug/L	<2.5	2.5	<0.50	0.50	2.5	0.50	2.0	0.50	3429360
Dissolved Bismuth (Bi)	ug/L	<5.0	5.0	<1.0	1.0	<1.0	1.0	<1.0	1.0	3432196
Total Bismuth (Bi)	ug/L	<5.0	5.0	<1.0	1.0	<1.0	1.0	<1.0	1.0	3429360
Dissolved Boron (B)	ug/L	6300	50	3500	10	530	10	4400	10	3432196
Total Boron (B)	ug/L	5900	50	4200	10	570	10	5600	10	3429360
Dissolved Cadmium (Cd)	ug/L	<0.50	0.50	0.67	0.10	<0.10	0.10	<0.10	0.10	3432196
Total Cadmium (Cd)	ug/L	<0.50	0.50	11	0.10	0.60	0.10	0.61	0.10	3429360
Dissolved Calcium (Ca)	ug/L	560000	1000	100000	1000	55000	400	120000	1000	3432196
Total Calcium (Ca)	ug/L	520000	1000	140000	1000	380000	400	700000	1000	3429360
Dissolved Chromium (Cr)	ug/L	<25	25	<5.0	5.0	<5.0	5.0	<5.0	5.0	3432196
Total Chromium (Cr)	ug/L	<25	25	69	5.0	110	5.0	64	5.0	3429360
Dissolved Cobalt (Co)	ug/L	<2.5	2.5	<0.50	0.50	<0.50	0.50	<0.50	0.50	3432196
Total Cobalt (Co)	ug/L	<2.5	2.5	0.80	0.50	43	1.0	32	1.0	3429360
Dissolved Copper (Cu)	ug/L	<5.0	5.0	<1.0	1.0	<1.0	1.0	<1.0	1.0	3432196
Total Copper (Cu)	ug/L	<5.0	5.0	10	1.0	41	1.0	27	2.0	3429360
Dissolved Iron (Fe)	ug/L	1300	500	<100	100	<100	100	200	100	3432196
Total Iron (Fe)	ug/L	2700	500	2700	100	63000	100	53000	100	3429360
Dissolved Lead (Pb)	ug/L	<2.5	2.5	<0.50	0.50	<0.50	0.50	<0.50	0.50	3432196
Total Lead (Pb)	ug/L	<2.5	2.5	1.2	0.50	27	0.50	34	0.50	3429360
Dissolved Magnesium (Mg)	ug/L	160000	250	85000	50	62000	50	47000	50	3432196
Total Magnesium (Mg)	ug/L	150000	250	110000	50	98000	50	120000	50	3429360
Dissolved Manganese (Mn)	ug/L	240	10	10	2.0	39	2.0	47	2.0	3432196

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		TY1362		TY1363		TY1364		TY1365		
Sampling Date		2013/11/18		2013/11/18		2013/11/18		2013/11/18		
COC Number		44283306		44283306		44283306		44283306		
	Units	**MW08-I**	**RDL**	**MW08-D**	**RDL**	**MW09-O**	**RDL**	**MW09-S**	**RDL**	**QC Batch**
Total Manganese (Mn)	ug/L	250	10	160	2.0	2900	2.0	3500	2.0	3429360
Dissolved Molybdenum (Mo)	ug/L	6.4	2.5	4.6	0.50	5.4	0.50	9.0	0.50	3432196
Total Molybdenum (Mo)	ug/L	6.2	2.5	6.7	0.50	9.0	0.50	13	0.50	3429360
Dissolved Nickel (Ni)	ug/L	<5.0	5.0	3.2	1.0	<1.0	1.0	<1.0	1.0	3432196
Total Nickel (Ni)	ug/L	<5.0	5.0	13	1.0	83	2.0	65	2.0	3429360
Dissolved Phosphorus (P)	ug/L	<500	500	<100	100	<100	100	<100	100	3432196
Total Phosphorus (P)	ug/L	<500	500	<100	100	2500	100	2700	100	3429360
Dissolved Potassium (K)	ug/L	47000	1000	25000	200	9800	200	21000	200	3432196
Total Potassium (K)	ug/L	44000	1000	31000	200	19000	200	37000	200	3429360
Dissolved Selenium (Se)	ug/L	16	10	<2.0	2.0	<2.0	2.0	<2.0	2.0	3432196
Dissolved Silicon (Si)	ug/L	4200	250	5700	100	7800	100	5100	100	3432196
Total Silicon (Si)	ug/L	9700	250	7900	50	65000	250	49000	50	3429360
Total Selenium (Se)	ug/L	<10	10	<2.0	2.0	<2.0	2.0	2.7	2.0	3429360
Dissolved Silver (Ag)	ug/L	<0.50	0.50	<0.10	0.10	<0.10	0.10	<0.10	0.10	3432196
Total Silver (Ag)	ug/L	<0.50	0.50	<0.10	0.10	0.42	0.10	0.23	0.10	3429360
Dissolved Sodium (Na)	ug/L	1300000	500	200000	100	33000	100	180000	100	3432196
Total Sodium (Na)	ug/L	1200000	500	260000	100	35000	100	350000	100	3429360
Dissolved Strontium (Sr)	ug/L	15000	5.0	16000	1.0	6500	1.0	17000	1.0	3432196
Total Strontium (Sr)	ug/L	14000	5.0	19000	1.0	7700	1.0	20000	1.0	3429360
Dissolved Thallium (Tl)	ug/L	<0.25	0.25	<0.050	0.050	<0.050	0.050	<0.050	0.050	3432196
Total Thallium (Tl)	ug/L	<0.25	0.25	<0.050	0.050	0.34	0.050	0.28	0.050	3429360
Dissolved Tin (Sn)	ug/L	<5.0	5.0	<1.0	1.0	<1.0	1.0	<1.0	1.0	3432196
Total Tin (Sn)	ug/L	<5.0	5.0	1.3	1.0	<1.0	1.0	1.0	1.0	3429360
Dissolved Titanium (Ti)	ug/L	<25	25	<5.0	5.0	<5.0	5.0	<5.0	5.0	3432196
Total Titanium (Ti)	ug/L	55	25	15	5.0	650	25	440	5.0	3429360
Dissolved Uranium (U)	ug/L	<0.50	0.50	0.96	0.10	2.6	0.10	1.0	0.10	3432196
Total Uranium (U)	ug/L	0.60	0.50	1.3	0.10	5.1	0.10	3.0	0.10	3429360
Dissolved Vanadium (V)	ug/L	9.6	2.5	<0.50	0.50	0.96	0.50	0.54	0.50	3432196
Total Vanadium (V)	ug/L	<2.5	2.5	1.4	0.50	78	0.50	64	0.50	3429360
Dissolved Zinc (Zn)	ug/L	<25	25	17	5.0	<5.0	5.0	<5.0	5.0	3432196
Total Zinc (Zn)	ug/L	<25	25	54	5.0	240	5.0	160	5.0	3429360

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		TY1366		TY1367		TY1368		
Sampling Date		2013/11/18		2013/11/18		2013/11/18		
COC Number		44283306		44283306		44283306		
	Units	**MW01-I**	**RDL**	**MW01-D**	**RDL**	**DUP 1**	**RDL**	**QC Batch**
Metals								
Mercury (Hg)	mg/L	<0.00010	0.00010	<0.00010	0.00010	<0.00010	0.00010	3429682
Dissolved Aluminum (Al)	ug/L	<5.0	5.0	<50	50	<25	25	3432196
Total Aluminum (Al)	ug/L	31000	25	57000	50	2300	25	3429360
Dissolved Antimony (Sb)	ug/L	<0.50	0.50	<5.0	5.0	<2.5	2.5	3432196
Total Antimony (Sb)	ug/L	<0.50	0.50	<5.0	5.0	<2.5	2.5	3429360
Dissolved Arsenic (As)	ug/L	<1.0	1.0	<20	20	6.6	5.0	3432196
Total Arsenic (As)	ug/L	17	1.0	45 (1)	20	<5.0	5.0	3429360
Dissolved Barium (Ba)	ug/L	16	2.0	24	20	14	10	3432196
Total Barium (Ba)	ug/L	230	2.0	1000	20	46	10	3429360
Dissolved Beryllium (Be)	ug/L	<0.50	0.50	<5.0	5.0	<2.5	2.5	3432196
Total Beryllium (Be)	ug/L	2.1	0.50	<5.0	5.0	<2.5	2.5	3429360
Dissolved Bismuth (Bi)	ug/L	<1.0	1.0	<10	10	<5.0	5.0	3432196
Total Bismuth (Bi)	ug/L	<1.0	1.0	<10	10	<5.0	5.0	3429360
Dissolved Boron (B)	ug/L	140	10	6300	100	6200	50	3432196
Total Boron (B)	ug/L	200	10	6300	100	6800	50	3429360
Dissolved Cadmium (Cd)	ug/L	<0.10	0.10	<1.0	1.0	<0.50	0.50	3432196
Total Cadmium (Cd)	ug/L	0.49	0.10	8.0	1.0	<0.50	0.50	3429360
Dissolved Calcium (Ca)	ug/L	74000	200	1900000	2000	550000	1000	3432196
Total Calcium (Ca)	ug/L	290000	200	2700000	4000	570000	1000	3429360
Dissolved Chromium (Cr)	ug/L	<5.0	5.0	<50	50	<25	25	3432196
Total Chromium (Cr)	ug/L	55	5.0	830	50	<25	25	3429360
Dissolved Cobalt (Co)	ug/L	<0.50	0.50	<5.0	5.0	<2.5	2.5	3432196
Total Cobalt (Co)	ug/L	31	0.50	69	5.0	<2.5	2.5	3429360
Dissolved Copper (Cu)	ug/L	1.4	1.0	<10	10	<5.0	5.0	3432196
Total Copper (Cu)	ug/L	64	1.0	240	10	<5.0	5.0	3429360
Dissolved Iron (Fe)	ug/L	<100	100	5000	1000	1300	500	3432196
Total Iron (Fe)	ug/L	58000	100	110000	1000	3100	500	3429360
Dissolved Lead (Pb)	ug/L	<0.50	0.50	<5.0	5.0	<2.5	2.5	3432196
Total Lead (Pb)	ug/L	34	0.50	130	5.0	<2.5	2.5	3429360
Dissolved Magnesium (Mg)	ug/L	140000	50	460000	500	160000	250	3432196
Total Magnesium (Mg)	ug/L	180000	50	650000	500	170000	250	3429360
Dissolved Manganese (Mn)	ug/L	8.0	2.0	1100	20	240	10	3432196

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
(1) Detection Limit was raised due to matrix interferences.

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		TY1366		TY1367		TY1368		
Sampling Date		2013/11/18		2013/11/18		2013/11/18		
COC Number		44283306		44283306		44283306		
	Units	**MW01-I**	**RDL**	**MW01-D**	**RDL**	**DUP 1**	**RDL**	**QC Batch**
Total Manganese (Mn)	ug/L	1500	2.0	4400	20	280	10	3429360
Dissolved Molybdenum (Mo)	ug/L	2.0	0.50	12	5.0	6.3	2.5	3432196
Total Molybdenum (Mo)	ug/L	3.9	0.50	27	5.0	7.5	2.5	3429360
Dissolved Nickel (Ni)	ug/L	1.8	1.0	79	10	<5.0	5.0	3432196
Total Nickel (Ni)	ug/L	52	1.0	470	10	<5.0	5.0	3429360
Dissolved Phosphorus (P)	ug/L	<100	100	<1000	1000	<500	500	3432196
Total Phosphorus (P)	ug/L	1700	100	3500	1000	<500	500	3429360
Dissolved Potassium (K)	ug/L	3300	200	130000	2000	47000	1000	3432196
Total Potassium (K)	ug/L	11000	200	150000	2000	50000	1000	3429360
Dissolved Selenium (Se)	ug/L	6.2	2.0	<40	40	16	10	3432196
Dissolved Silicon (Si)	ug/L	6900	250	3200	500	4200	250	3432196
Total Silicon (Si)	ug/L	45000	50	63000	500	10000	250	3429360
Total Selenium (Se)	ug/L	6.7	2.0	<40 (1)	40	<10	10	3429360
Dissolved Silver (Ag)	ug/L	<0.10	0.10	<1.0	1.0	<0.50	0.50	3432196
Total Silver (Ag)	ug/L	0.25	0.10	<1.0	1.0	<0.50	0.50	3429360
Dissolved Sodium (Na)	ug/L	42000	100	5800000	5000	1300000	500	3432196
Total Sodium (Na)	ug/L	45000	100	8000000	5000	1300000	500	3429360
Dissolved Strontium (Sr)	ug/L	1400	1.0	40000	10	15000	5.0	3432196
Total Strontium (Sr)	ug/L	2000	1.0	59000	10	16000	5.0	3429360
Dissolved Thallium (Tl)	ug/L	<0.050	0.050	<0.50	0.50	<0.25	0.25	3432196
Total Thallium (Tl)	ug/L	0.43	0.050	0.58	0.50	<0.25	0.25	3429360
Dissolved Tin (Sn)	ug/L	<1.0	1.0	<10	10	<5.0	5.0	3432196
Total Tin (Sn)	ug/L	<1.0	1.0	<10	10	<5.0	5.0	3429360
Dissolved Titanium (Ti)	ug/L	<5.0	5.0	<50	50	<25	25	3432196
Total Titanium (Ti)	ug/L	670	25	680	50	67	25	3429360
Dissolved Uranium (U)	ug/L	11	0.10	<1.0	1.0	<0.50	0.50	3432196
Total Uranium (U)	ug/L	16	0.10	4.9	1.0	0.62	0.50	3429360
Dissolved Vanadium (V)	ug/L	0.85	0.50	<10	10	12	2.5	3432196
Total Vanadium (V)	ug/L	61	0.50	95	10	<2.5	2.5	3429360
Dissolved Zinc (Zn)	ug/L	<5.0	5.0	<50	50	<25	25	3432196
Total Zinc (Zn)	ug/L	170	5.0	410	50	<25	25	3429360

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
(1) Detection Limit was raised due to matrix interferences.

Test Summary

Maxxam ID TY1359
Sample ID MW07-O
Matrix Water

Collected 2013/11/18
Shipped
Received 2013/11/18

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3428636	N/A	2013/11/20	Surinder Rai
Anions	IC	3428106	N/A	2013/11/19	Fari Dehdezi
Conductivity	COND	3428639	N/A	2013/11/20	Surinder Rai
Free (WAD) Cyanide	TECH/CN	3428105	N/A	2013/11/23	Xuanhong Qiu
Fluoride	F	3428645	2013/11/19	2013/11/20	Surinder Rai
Hardness (calculated as CaCO3)		3426692	N/A	2013/11/22	Automated Statchk
Mercury in Water by CVAA	CVAA	3429682	2013/11/20	2013/11/21	Magdalena Carlos
Dissolved Metals by ICPMS	ICP/MS	3432196	N/A	2013/11/22	Hua Ren
Total Metals Analysis by ICPMS	ICP/MS	3429360	N/A	2013/11/20	Hua Ren
Total Ammonia-N	LACH/NH4	3428263	N/A	2013/11/20	Charles Opoku-Ware
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	3428419	N/A	2013/11/20	Sandeep Singh
pH	PH	3428646	N/A	2013/11/20	Surinder Rai
Phenols (4AAP)	TECH/PHEN	3428184	N/A	2013/11/20	Bramdeo Motiram
Orthophosphate	AC	3428710	N/A	2013/11/20	Alina Dobreanu
Sulphide	ISE/S	3428378	N/A	2013/11/19	Neil Dassanayake
Total Dissolved Solids	SLDS	3428129	N/A	2013/11/19	Niki Shah
Total Phosphorus (Colourimetric)	LACH/P	3428827	2013/11/20	2013/11/20	Viorica Rotaru
Low Level Total Suspended Solids	SLDS	3428125	N/A	2013/11/19	Malik Kai Morgan John
Turbidity	TURB	3428463	N/A	2013/11/20	Lemeneh Addis

Maxxam ID TY1360
Sample ID MW07-D
Matrix Water

Collected 2013/11/18
Shipped
Received 2013/11/18

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3428636	N/A	2013/11/20	Surinder Rai
Anions	IC	3428106	N/A	2013/11/19	Fari Dehdezi
Conductivity	COND	3428639	N/A	2013/11/20	Surinder Rai
Free (WAD) Cyanide	TECH/CN	3428105	N/A	2013/11/23	Xuanhong Qiu
Fluoride	F	3428645	2013/11/19	2013/11/20	Surinder Rai
Hardness (calculated as CaCO3)		3426692	N/A	2013/11/22	Automated Statchk
Mercury in Water by CVAA	CVAA	3429682	2013/11/20	2013/11/21	Magdalena Carlos
Dissolved Metals by ICPMS	ICP/MS	3432196	N/A	2013/11/22	Hua Ren
Total Metals Analysis by ICPMS	ICP/MS	3429360	N/A	2013/11/20	Hua Ren
Total Ammonia-N	LACH/NH4	3432217	N/A	2013/11/25	Charles Opoku-Ware
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	3428419	N/A	2013/11/20	Sandeep Singh
pH	PH	3428646	N/A	2013/11/20	Surinder Rai
Phenols (4AAP)	TECH/PHEN	3428184	N/A	2013/11/20	Bramdeo Motiram
Orthophosphate	AC	3428710	N/A	2013/11/20	Alina Dobreanu
Sulphide	ISE/S	3428378	N/A	2013/11/19	Neil Dassanayake
Total Dissolved Solids	SLDS	3428129	N/A	2013/11/19	Niki Shah
Total Phosphorus (Colourimetric)	LACH/P	3428827	2013/11/20	2013/11/20	Viorica Rotaru
Low Level Total Suspended Solids	SLDS	3428125	N/A	2013/11/19	Malik Kai Morgan John
Turbidity	TURB	3428463	N/A	2013/11/19	Lemeneh Addis

Test Summary

Maxxam ID TY1360 Dup
Sample ID MW07-D
Matrix Water

Collected 2013/11/18
Shipped
Received 2013/11/18

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3428636	N/A	2013/11/20	Surinder Rai
Conductivity	COND	3428639	N/A	2013/11/20	Surinder Rai
Fluoride	F	3428645	2013/11/19	2013/11/20	Surinder Rai
Mercury in Water by CVAA	CVAA	3429682	2013/11/20	2013/11/21	Magdalena Carlos
pH	PH	3428646	N/A	2013/11/20	Surinder Rai
Turbidity	TURB	3428463	N/A	2013/11/19	Lemeneh Addis

Maxxam ID TY1361
Sample ID MW08-O
Matrix Water

Collected 2013/11/18
Shipped
Received 2013/11/18

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3428636	N/A	2013/11/20	Surinder Rai
Anions	IC	3428106	N/A	2013/11/19	Fari Dehdezi
Conductivity	COND	3428639	N/A	2013/11/20	Surinder Rai
Free (WAD) Cyanide	TECH/CN	3428105	N/A	2013/11/23	Xuanhong Qiu
Fluoride	F	3428645	2013/11/19	2013/11/20	Surinder Rai
Hardness (calculated as CaCO3)		3426692	N/A	2013/11/22	Automated Statchk
Mercury in Water by CVAA	CVAA	3429682	2013/11/20	2013/11/21	Magdalena Carlos
Dissolved Metals by ICPMS	ICP/MS	3432196	N/A	2013/11/22	Hua Ren
Total Metals Analysis by ICPMS	ICP/MS	3429360	N/A	2013/11/20	Hua Ren
Total Ammonia-N	LACH/NH4	3428263	N/A	2013/11/20	Charles Opoku-Ware
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	3428419	N/A	2013/11/20	Sandeep Singh
pH	PH	3428646	N/A	2013/11/20	Surinder Rai
Phenols (4AAP)	TECH/PHEN	3428184	N/A	2013/11/20	Bramdeo Motiram
Orthophosphate	AC	3428710	N/A	2013/11/20	Alina Dobreanu
Sulphide	ISE/S	3428378	N/A	2013/11/19	Neil Dassanayake
Total Dissolved Solids	SLDS	3428129	N/A	2013/11/19	Niki Shah
Total Phosphorus (Colourimetric)	LACH/P	3428827	2013/11/20	2013/11/20	Viorica Rotaru
Low Level Total Suspended Solids	SLDS	3428125	N/A	2013/11/19	Malik Kai Morgan John
Turbidity	TURB	3428463	N/A	2013/11/20	Lemeneh Addis

Maxxam ID TY1361 Dup
Sample ID MW08-O
Matrix Water

Collected 2013/11/18
Shipped
Received 2013/11/18

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Sulphide	ISE/S	3428378	N/A	2013/11/19	Neil Dassanayake

Maxxam ID TY1362
Sample ID MW08-I
Matrix Water

Collected 2013/11/18
Shipped
Received 2013/11/18

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3428636	N/A	2013/11/20	Surinder Rai
Anions	IC	3428106	N/A	2013/11/19	Fari Dehdezi
Conductivity	COND	3428639	N/A	2013/11/20	Surinder Rai
Free (WAD) Cyanide	TECH/CN	3428105	N/A	2013/11/23	Xuanhong Qiu
Fluoride	F	3428645	2013/11/19	2013/11/20	Surinder Rai
Hardness (calculated as CaCO3)		3426692	N/A	2013/11/22	Automated Statchk
Mercury in Water by CVAA	CVAA	3429682	2013/11/20	2013/11/21	Magdalena Carlos

Test Summary

Dissolved Metals by ICPMS	ICP/MS	3432196	N/A	2013/11/22	Hua Ren
Total Metals Analysis by ICPMS	ICP/MS	3429360	N/A	2013/11/20	Hua Ren
Total Ammonia-N	LACH/NH4	3428263	N/A	2013/11/20	Charles Opoku-Ware
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	3428419	N/A	2013/11/20	Sandeep Singh
pH	PH	3428646	N/A	2013/11/20	Surinder Rai
Phenols (4AAP)	TECH/PHEN	3428184	N/A	2013/11/20	Bramdeo Motiram
Orthophosphate	AC	3428710	N/A	2013/11/20	Alina Dobreanu
Sulphide	ISE/S	3428378	N/A	2013/11/19	Neil Dassanayake
Total Dissolved Solids	SLDS	3428129	N/A	2013/11/19	Niki Shah
Total Phosphorus (Colourimetric)	LACH/P	3428403	2013/11/19	2013/11/20	Viorica Rotaru
Low Level Total Suspended Solids	SLDS	3428125	N/A	2013/11/19	Malik Kai Morgan John
Turbidity	TURB	3428463	N/A	2013/11/19	Lemeneh Addis

Maxxam ID TY1362 Dup
Sample ID MW08-I
Matrix Water

Collected 2013/11/18
Shipped
Received 2013/11/18

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Free (WAD) Cyanide	TECH/CN	3428105	N/A	2013/11/23	Xuanhong Qiu

Maxxam ID TY1363
Sample ID MW08-D
Matrix Water

Collected 2013/11/18
Shipped
Received 2013/11/18

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3428636	N/A	2013/11/20	Surinder Rai
Anions	IC	3428106	N/A	2013/11/19	Fari Dehdezi
Conductivity	COND	3428639	N/A	2013/11/20	Surinder Rai
Free (WAD) Cyanide	TECH/CN	3428105	N/A	2013/11/23	Xuanhong Qiu
Fluoride	F	3428645	2013/11/19	2013/11/20	Surinder Rai
Hardness (calculated as CaCO3)		3426692	N/A	2013/11/22	Automated Statchk
Mercury in Water by CVAA	CVAA	3429682	2013/11/20	2013/11/21	Magdalena Carlos
Dissolved Metals by ICPMS	ICP/MS	3432196	N/A	2013/11/22	Hua Ren
Total Metals Analysis by ICPMS	ICP/MS	3429360	N/A	2013/11/20	Hua Ren
Total Ammonia-N	LACH/NH4	3428263	N/A	2013/11/20	Charles Opoku-Ware
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	3428419	N/A	2013/11/20	Sandeep Singh
pH	PH	3428646	N/A	2013/11/20	Surinder Rai
Phenols (4AAP)	TECH/PHEN	3428184	N/A	2013/11/20	Bramdeo Motiram
Orthophosphate	AC	3428710	N/A	2013/11/20	Alina Dobreanu
Sulphide	ISE/S	3428378	N/A	2013/11/19	Neil Dassanayake
Total Dissolved Solids	SLDS	3428129	N/A	2013/11/19	Niki Shah
Total Phosphorus (Colourimetric)	LACH/P	3428403	2013/11/19	2013/11/20	Viorica Rotaru
Low Level Total Suspended Solids	SLDS	3428125	N/A	2013/11/19	Malik Kai Morgan John
Turbidity	TURB	3428463	N/A	2013/11/19	Lemeneh Addis

Maxxam ID TY1364
Sample ID MW09-O
Matrix Water

Collected 2013/11/18
Shipped
Received 2013/11/18

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3428636	N/A	2013/11/20	Surinder Rai
Anions	IC	3428106	N/A	2013/11/19	Fari Dehdezi
Conductivity	COND	3428639	N/A	2013/11/20	Surinder Rai
Free (WAD) Cyanide	TECH/CN	3428105	N/A	2013/11/23	Xuanhong Qiu
Fluoride	F	3428645	2013/11/19	2013/11/20	Surinder Rai
Hardness (calculated as CaCO3)		3426692	N/A	2013/11/22	Automated Statchk

Test Summary

Mercury in Water by CVAA	CVAA	3429682	2013/11/20	2013/11/21	Magdalena Carlos
Dissolved Metals by ICPMS	ICP/MS	3432196	N/A	2013/11/22	Hua Ren
Total Metals Analysis by ICPMS	ICP/MS	3429360	N/A	2013/11/20	Hua Ren
Total Ammonia-N	LACH/NH4	3428263	N/A	2013/11/20	Charles Opoku-Ware
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	3428419	N/A	2013/11/20	Sandeep Singh
pH	PH	3428646	N/A	2013/11/20	Surinder Rai
Phenols (4AAP)	TECH/PHEN	3428184	N/A	2013/11/20	Bramdeo Motiram
Orthophosphate	AC	3428710	N/A	2013/11/20	Alina Dobreanu
Sulphide	ISE/S	3428378	N/A	2013/11/19	Neil Dassanayake
Total Dissolved Solids	SLDS	3428129	N/A	2013/11/19	Niki Shah
Total Phosphorus (Colourimetric)	LACH/P	3428827	2013/11/20	2013/11/20	Viorica Rotaru
Low Level Total Suspended Solids	SLDS	3428125	N/A	2013/11/19	Malik Kai Morgan John
Turbidity	TURB	3428463	N/A	2013/11/20	Lemeneh Addis

Maxxam ID TY1365
Sample ID MW09-S
Matrix Water

Collected 2013/11/18
Shipped
Received 2013/11/18

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3428636	N/A	2013/11/20	Surinder Rai
Anions	IC	3428106	N/A	2013/11/19	Fari Dehdezi
Conductivity	COND	3428639	N/A	2013/11/20	Surinder Rai
Free (WAD) Cyanide	TECH/CN	3428105	N/A	2013/11/23	Xuanhong Qiu
Fluoride	F	3428645	2013/11/19	2013/11/20	Surinder Rai
Hardness (calculated as CaCO3)		3426692	N/A	2013/11/22	Automated Statchk
Mercury in Water by CVAA	CVAA	3429682	2013/11/20	2013/11/21	Magdalena Carlos
Dissolved Metals by ICPMS	ICP/MS	3432196	N/A	2013/11/22	Hua Ren
Total Metals Analysis by ICPMS	ICP/MS	3429360	N/A	2013/11/20	Hua Ren
Total Ammonia-N	LACH/NH4	3428263	N/A	2013/11/20	Charles Opoku-Ware
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	3428419	N/A	2013/11/20	Sandeep Singh
pH	PH	3428646	N/A	2013/11/20	Surinder Rai
Phenols (4AAP)	TECH/PHEN	3428184	N/A	2013/11/20	Bramdeo Motiram
Orthophosphate	AC	3428710	N/A	2013/11/20	Alina Dobreanu
Sulphide	ISE/S	3428378	N/A	2013/11/19	Neil Dassanayake
Total Dissolved Solids	SLDS	3428129	N/A	2013/11/19	Niki Shah
Total Phosphorus (Colourimetric)	LACH/P	3428827	2013/11/20	2013/11/20	Viorica Rotaru
Low Level Total Suspended Solids	SLDS	3428125	N/A	2013/11/19	Malik Kai Morgan John
Turbidity	TURB	3428463	N/A	2013/11/20	Lemeneh Addis

Maxxam ID TY1366
Sample ID MW01-I
Matrix Water

Collected 2013/11/18
Shipped
Received 2013/11/18

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3428636	N/A	2013/11/20	Surinder Rai
Anions	IC	3428106	N/A	2013/11/19	Fari Dehdezi
Conductivity	COND	3428639	N/A	2013/11/20	Surinder Rai
Free (WAD) Cyanide	TECH/CN	3428105	N/A	2013/11/23	Xuanhong Qiu
Fluoride	F	3428645	2013/11/19	2013/11/20	Surinder Rai
Hardness (calculated as CaCO3)		3426692	N/A	2013/11/22	Automated Statchk
Mercury in Water by CVAA	CVAA	3429682	2013/11/20	2013/11/21	Magdalena Carlos
Dissolved Metals by ICPMS	ICP/MS	3432196	N/A	2013/11/22	Hua Ren
Total Metals Analysis by ICPMS	ICP/MS	3429360	N/A	2013/11/20	Hua Ren
Total Ammonia-N	LACH/NH4	3428263	N/A	2013/11/20	Charles Opoku-Ware
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	3428419	N/A	2013/11/20	Sandeep Singh
pH	PH	3428646	N/A	2013/11/20	Surinder Rai
Phenols (4AAP)	TECH/PHEN	3428184	N/A	2013/11/20	Bramdeo Motiram

Test Summary

Orthophosphate	AC	3428710	N/A	2013/11/20	Alina Dobreanu
Sulphide	ISE/S	3428378	N/A	2013/11/19	Neil Dassanayake
Total Dissolved Solids	SLDS	3428129	N/A	2013/11/19	Niki Shah
Total Phosphorus (Colourimetric)	LACH/P	3428827	2013/11/20	2013/11/20	Viorica Rotaru
Low Level Total Suspended Solids	SLDS	3428125	N/A	2013/11/19	Malik Kai Morgan John
Turbidity	TURB	3428463	N/A	2013/11/20	Lemeneh Addis

Maxxam ID TY1366 Dup
Sample ID MW01-I
Matrix Water

Collected 2013/11/18
Shipped
Received 2013/11/18

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Anions	IC	3428106	N/A	2013/11/19	Fari Dehdezi

Maxxam ID TY1367
Sample ID MW01-D
Matrix Water

Collected 2013/11/18
Shipped
Received 2013/11/18

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3428636	N/A	2013/11/20	Surinder Rai
Anions	IC	3428106	N/A	2013/11/19	Fari Dehdezi
Conductivity	COND	3428639	N/A	2013/11/20	Surinder Rai
Free (WAD) Cyanide	TECH/CN	3428105	N/A	2013/11/23	Xuanhong Qiu
Fluoride	F	3428645	2013/11/19	2013/11/20	Surinder Rai
Hardness (calculated as CaCO3)		3426692	N/A	2013/11/22	Automated Statchk
Mercury in Water by CVAA	CVAA	3429682	2013/11/20	2013/11/21	Magdalena Carlos
Dissolved Metals by ICPMS	ICP/MS	3432196	N/A	2013/11/22	Hua Ren
Total Metals Analysis by ICPMS	ICP/MS	3429360	N/A	2013/11/20	Hua Ren
Total Ammonia-N	LACH/NH4	3428263	N/A	2013/11/20	Charles Opoku-Ware
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	3428419	N/A	2013/11/20	Sandeep Singh
pH	PH	3428646	N/A	2013/11/20	Surinder Rai
Phenols (4AAP)	TECH/PHEN	3428184	N/A	2013/11/20	Bramdeo Motiram
Orthophosphate	AC	3428710	N/A	2013/11/20	Alina Dobreanu
Sulphide	ISE/S	3428378	N/A	2013/11/19	Neil Dassanayake
Total Dissolved Solids	SLDS	3428129	N/A	2013/11/19	Niki Shah
Total Phosphorus (Colourimetric)	LACH/P	3428827	2013/11/20	2013/11/20	Viorica Rotaru
Low Level Total Suspended Solids	SLDS	3428125	N/A	2013/11/19	Malik Kai Morgan John
Turbidity	TURB	3428463	N/A	2013/11/20	Lemeneh Addis

Maxxam ID TY1368
Sample ID DUP 1
Matrix Water

Collected 2013/11/18
Shipped
Received 2013/11/18

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3428636	N/A	2013/11/20	Surinder Rai
Anions	IC	3428106	N/A	2013/11/19	Fari Dehdezi
Conductivity	COND	3428639	N/A	2013/11/20	Surinder Rai
Free (WAD) Cyanide	TECH/CN	3428105	N/A	2013/11/23	Xuanhong Qiu
Fluoride	F	3428645	2013/11/19	2013/11/20	Surinder Rai
Hardness (calculated as CaCO3)		3426692	N/A	2013/11/22	Automated Statchk
Mercury in Water by CVAA	CVAA	3429682	2013/11/20	2013/11/21	Magdalena Carlos
Dissolved Metals by ICPMS	ICP/MS	3432196	N/A	2013/11/22	Hua Ren
Total Metals Analysis by ICPMS	ICP/MS	3429360	N/A	2013/11/20	Hua Ren
Total Ammonia-N	LACH/NH4	3428263	N/A	2013/11/20	Charles Opoku-Ware
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	3428419	N/A	2013/11/20	Sandeep Singh
pH	PH	3428646	N/A	2013/11/20	Surinder Rai

Test Summary

Phenols (4AAP)	TECH/PHEN	3428184	N/A	2013/11/20	Bramdeo Motiram
Orthophosphate	AC	3428710	N/A	2013/11/20	Alina Dobreanu
Sulphide	ISE/S	3428378	N/A	2013/11/19	Neil Dassanayake
Total Dissolved Solids	SLDS	3428129	N/A	2013/11/19	Niki Shah
Total Phosphorus (Colourimetric)	LACH/P	3428403	2013/11/19	2013/11/20	Viorica Rotaru
Low Level Total Suspended Solids	SLDS	3428125	N/A	2013/11/19	Malik Kai Morgan John
Turbidity	TURB	3428463	N/A	2013/11/19	Lemeneh Addis

Maxxam ID TY1368 Dup
Sample ID DUP 1
Matrix Water

Collected 2013/11/18
Shipped
Received 2013/11/18

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Total Ammonia-N	LACH/NH4	3428263	N/A	2013/11/20	Charles Opoku-Ware
Phenols (4AAP)	TECH/PHEN	3428184	N/A	2013/11/20	Bramdeo Motiram

Package 1	6.7°C
Package 2	3.7°C

Each temperature is the average of up to three cooler temperatures taken at receipt

GENERAL COMMENTS

Sample TY1359-01: Metals Analysis: Due to the sample matrix, sample required dilution. Detection limits were adjusted accordingly.

Sample TY1360-01: Metals Analysis: Due to the sample matrix, sample required dilution. Detection limits were adjusted accordingly.

Sample TY1361-01: Metals Analysis: Due to the sample matrix, sample required dilution. Detection limits were adjusted accordingly.

Sample TY1362-01: Metals Analysis: Due to the sample matrix, sample required dilution. Detection limits were adjusted accordingly.

Sample TY1367-01: Metals Analysis: Due to the sample matrix, sample required dilution. Detection limits were adjusted accordingly.

Sample TY1368-01: Metals Analysis: Due to the sample matrix, sample required dilution. Detection limits were adjusted accordingly.

Results relate only to the items tested.

Golder Associates Ltd
Attention: Josip Balaban
Client Project #: 021-1228
P.O. #:
Site Location: TANSLEY QUARRY

Quality Assurance Report

Maxxam Job Number: MB3J9025

QA/QC Batch Num Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
3428105 XQI	Matrix Spike						
	[TY1362-04]	Free Cyanide	2013/11/23		104	%	80 - 120
	Spiked Blank	Free Cyanide	2013/11/23		102	%	80 - 120
	Method Blank	Free Cyanide	2013/11/23	<0.0020		mg/L	
	RPD [TY1362-04]	Free Cyanide	2013/11/23	NC		%	20
3428106 FD	Matrix Spike						
	[TY1366-01]	Dissolved Chloride (Cl)	2013/11/19		NC	%	80 - 120
		Dissolved Bromide (Br-)	2013/11/19		103	%	80 - 120
		Dissolved Sulphate (SO4)	2013/11/19		NC	%	80 - 120
	Spiked Blank	Dissolved Chloride (Cl)	2013/11/19		99	%	80 - 120
		Dissolved Bromide (Br-)	2013/11/19		103	%	80 - 120
		Dissolved Sulphate (SO4)	2013/11/19		99	%	80 - 120
	Method Blank	Dissolved Chloride (Cl)	2013/11/19	<1.0		mg/L	
		Dissolved Bromide (Br-)	2013/11/19	<1.0		mg/L	
		Dissolved Sulphate (SO4)	2013/11/19	<1.0		mg/L	
	RPD [TY1366-01]	Dissolved Chloride (Cl)	2013/11/19	0.9		%	20
		Dissolved Bromide (Br-)	2013/11/19	NC		%	20
		Dissolved Sulphate (SO4)	2013/11/19	0.7		%	20
3428125 MMJ	QC Standard	Total Suspended Solids	2013/11/19		98	%	85 - 115
	Method Blank	Total Suspended Solids	2013/11/19	<1		mg/L	
	RPD	Total Suspended Solids	2013/11/19	15.0		%	25
3428129 NS1	QC Standard	Total Dissolved Solids	2013/11/19		97	%	85 - 115
	Method Blank	Total Dissolved Solids	2013/11/19	<10		mg/L	
	RPD	Total Dissolved Solids	2013/11/19	4.2		%	25
3428184 BMO	Matrix Spike						
	[TY1368-09]	Phenols-4AAP	2013/11/20		113	%	80 - 120
	Spiked Blank	Phenols-4AAP	2013/11/20		106	%	85 - 115
	Method Blank	Phenols-4AAP	2013/11/20	<0.0010		mg/L	
	RPD [TY1368-09]	Phenols-4AAP	2013/11/20	NC		%	25
3428263 COP	Matrix Spike						
	[TY1368-03]	Total Ammonia-N	2013/11/20		NC	%	80 - 120
	Spiked Blank	Total Ammonia-N	2013/11/20		100	%	85 - 115
	Method Blank	Total Ammonia-N	2013/11/20	<0.050		mg/L	
	RPD [TY1368-03]	Total Ammonia-N	2013/11/20	3.3		%	20
3428378 NYS	Matrix Spike						
	[TY1361-05]	Sulphide	2013/11/19		87	%	80 - 120
	Spiked Blank	Sulphide	2013/11/19		92	%	80 - 120
	Method Blank	Sulphide	2013/11/19	<0.020		mg/L	
	RPD [TY1361-05]	Sulphide	2013/11/19	NC		%	20
3428403 VRO	Matrix Spike	Total Phosphorus	2013/11/20		99	%	80 - 120
	QC Standard	Total Phosphorus	2013/11/20		101	%	80 - 120
	Spiked Blank	Total Phosphorus	2013/11/20		98	%	80 - 120
	Method Blank	Total Phosphorus	2013/11/20	<0.002		mg/L	
	RPD	Total Phosphorus	2013/11/20	NC		%	20
3428419 SS4	Matrix Spike	Nitrite (N)	2013/11/20		104	%	80 - 120
		Nitrate (N)	2013/11/20		100	%	80 - 120
	Spiked Blank	Nitrite (N)	2013/11/20		103	%	80 - 120
		Nitrate (N)	2013/11/20		98	%	80 - 120
	Method Blank	Nitrite (N)	2013/11/20	<0.010		mg/L	
		Nitrate (N)	2013/11/20	<0.10		mg/L	
	RPD	Nitrite (N)	2013/11/20	NC		%	25
		Nitrate (N)	2013/11/20	NC		%	25
3428463 L_A	QC Standard	Turbidity	2013/11/19		103	%	85 - 115
	Method Blank	Turbidity	2013/11/19	<0.2		NTU	
	RPD [TY1360-01]	Turbidity	2013/11/19	6.6		%	20

Golder Associates Ltd
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P.O. #:
Site Location: TANSLEY QUARRY

Quality Assurance Report (Continued)

Maxxam Job Number: MB3J9025

QA/QC Batch Num	Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
3428636	SAU	Spiked Blank	Alkalinity (Total as CaCO3)	2013/11/20		94	%	85 - 115
		Method Blank	Alkalinity (Total as CaCO3)	2013/11/20	<1.0		mg/L	
		RPD [TY1360-01]	Alkalinity (Total as CaCO3)	2013/11/20	2.1		%	25
3428639	SAU	Spiked Blank	Conductivity	2013/11/20		100	%	85 - 115
		Method Blank	Conductivity	2013/11/20	<1.0		umho/cm	
		RPD [TY1360-01]	Conductivity	2013/11/20	0.2		%	25
3428645	SAU	Matrix Spike [TY1360-01]	Fluoride (F-)	2013/11/20		50 (1)	%	80 - 120
		Spiked Blank	Fluoride (F-)	2013/11/20		99	%	80 - 120
		Method Blank	Fluoride (F-)	2013/11/20	<0.10		mg/L	
		RPD [TY1360-01]	Fluoride (F-)	2013/11/20	NC		%	20
3428710	ADB	Matrix Spike	Orthophosphate (P)	2013/11/20		93	%	75 - 125
		Spiked Blank	Orthophosphate (P)	2013/11/20		99	%	80 - 120
		Method Blank	Orthophosphate (P)	2013/11/20	<0.010		mg/L	
		RPD	Orthophosphate (P)	2013/11/20	NC		%	25
3428827	VRO	Matrix Spike	Total Phosphorus	2013/11/20		101	%	80 - 120
		QC Standard	Total Phosphorus	2013/11/20		105	%	80 - 120
		Spiked Blank	Total Phosphorus	2013/11/20		102	%	80 - 120
		Method Blank	Total Phosphorus	2013/11/20	<0.020		mg/L	
		RPD	Total Phosphorus	2013/11/20	9.0		%	20
3429360	HRE	Matrix Spike	Total Aluminum (Al)	2013/11/20		NC	%	80 - 120
			Total Antimony (Sb)	2013/11/20		101	%	80 - 120
			Total Arsenic (As)	2013/11/20		98	%	80 - 120
			Total Barium (Ba)	2013/11/20		95	%	80 - 120
			Total Beryllium (Be)	2013/11/20		99	%	80 - 120
			Total Bismuth (Bi)	2013/11/20		97	%	80 - 120
			Total Boron (B)	2013/11/20		97	%	80 - 120
			Total Cadmium (Cd)	2013/11/20		100	%	80 - 120
			Total Calcium (Ca)	2013/11/20		NC	%	80 - 120
			Total Chromium (Cr)	2013/11/20		98	%	80 - 120
			Total Cobalt (Co)	2013/11/20		97	%	80 - 120
			Total Copper (Cu)	2013/11/20		95	%	80 - 120
			Total Iron (Fe)	2013/11/20		98	%	80 - 120
			Total Lead (Pb)	2013/11/20		99	%	80 - 120
			Total Magnesium (Mg)	2013/11/20		97	%	80 - 120
			Total Manganese (Mn)	2013/11/20		99	%	80 - 120
			Total Molybdenum (Mo)	2013/11/20		101	%	80 - 120
			Total Nickel (Ni)	2013/11/20		NC	%	80 - 120
			Total Phosphorus (P)	2013/11/20		98	%	80 - 120
			Total Potassium (K)	2013/11/20		91	%	80 - 120
			Total Silicon (Si)	2013/11/20		92	%	80 - 120
			Total Selenium (Se)	2013/11/20		99	%	80 - 120
			Total Silver (Ag)	2013/11/20		97	%	80 - 120
			Total Sodium (Na)	2013/11/20		NC	%	80 - 120
			Total Strontium (Sr)	2013/11/20		100	%	80 - 120
			Total Thallium (Tl)	2013/11/20		101	%	80 - 120
			Total Tin (Sn)	2013/11/20		99	%	80 - 120
			Total Titanium (Ti)	2013/11/20		99	%	80 - 120
			Total Uranium (U)	2013/11/20		99	%	80 - 120
			Total Vanadium (V)	2013/11/20		99	%	80 - 120
			Total Zinc (Zn)	2013/11/20		98	%	80 - 120
		Spiked Blank	Total Aluminum (Al)	2013/11/20		101	%	80 - 120
			Total Antimony (Sb)	2013/11/20		100	%	80 - 120
			Total Arsenic (As)	2013/11/20		98	%	80 - 120
			Total Barium (Ba)	2013/11/20		94	%	80 - 120

Quality Assurance Report (Continued)

Maxxam Job Number: MB3J9025

QA/QC Batch Num Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
3429360 HRE	Spiked Blank	Total Beryllium (Be)	2013/11/20		100	%	80 - 120
		Total Bismuth (Bi)	2013/11/20		96	%	80 - 120
		Total Boron (B)	2013/11/20		98	%	80 - 120
		Total Cadmium (Cd)	2013/11/20		99	%	80 - 120
		Total Calcium (Ca)	2013/11/20		97	%	80 - 120
		Total Chromium (Cr)	2013/11/20		97	%	80 - 120
		Total Cobalt (Co)	2013/11/20		97	%	80 - 120
		Total Copper (Cu)	2013/11/20		96	%	80 - 120
		Total Iron (Fe)	2013/11/20		97	%	80 - 120
		Total Lead (Pb)	2013/11/20		97	%	80 - 120
		Total Magnesium (Mg)	2013/11/20		98	%	80 - 120
		Total Manganese (Mn)	2013/11/20		99	%	80 - 120
		Total Molybdenum (Mo)	2013/11/20		99	%	80 - 120
		Total Nickel (Ni)	2013/11/20		96	%	80 - 120
		Total Phosphorus (P)	2013/11/20		99	%	80 - 120
		Total Potassium (K)	2013/11/20		89	%	80 - 120
		Total Silicon (Si)	2013/11/20		91	%	80 - 120
		Total Selenium (Se)	2013/11/20		99	%	80 - 120
		Total Silver (Ag)	2013/11/20		96	%	80 - 120
		Total Sodium (Na)	2013/11/20		97	%	80 - 120
		Total Strontium (Sr)	2013/11/20		99	%	80 - 120
		Total Thallium (Tl)	2013/11/20		102	%	80 - 120
		Total Tin (Sn)	2013/11/20		99	%	80 - 120
		Total Titanium (Ti)	2013/11/20		99	%	80 - 120
		Total Uranium (U)	2013/11/20		98	%	80 - 120
		Total Vanadium (V)	2013/11/20		99	%	80 - 120
		Total Zinc (Zn)	2013/11/20		99	%	80 - 120
	Method Blank	Total Aluminum (Al)	2013/11/20	<5.0		ug/L	
		Total Antimony (Sb)	2013/11/20	<0.50		ug/L	
		Total Arsenic (As)	2013/11/20	<1.0		ug/L	
		Total Barium (Ba)	2013/11/20	<2.0		ug/L	
		Total Beryllium (Be)	2013/11/20	<0.50		ug/L	
		Total Bismuth (Bi)	2013/11/20	<1.0		ug/L	
		Total Boron (B)	2013/11/20	<10		ug/L	
		Total Cadmium (Cd)	2013/11/20	<0.10		ug/L	
		Total Calcium (Ca)	2013/11/20	<200		ug/L	
		Total Chromium (Cr)	2013/11/20	<5.0		ug/L	
		Total Cobalt (Co)	2013/11/20	<0.50		ug/L	
		Total Copper (Cu)	2013/11/20	1.0, RDL=1.0		ug/L	
		Total Iron (Fe)	2013/11/20	<100		ug/L	
		Total Lead (Pb)	2013/11/20	<0.50		ug/L	
		Total Magnesium (Mg)	2013/11/20	<50		ug/L	
		Total Manganese (Mn)	2013/11/20	<2.0		ug/L	
		Total Molybdenum (Mo)	2013/11/20	<0.50		ug/L	
		Total Nickel (Ni)	2013/11/20	<1.0		ug/L	
		Total Phosphorus (P)	2013/11/20	<100		ug/L	
		Total Potassium (K)	2013/11/20	<200		ug/L	
		Total Silicon (Si)	2013/11/20	<50		ug/L	
		Total Selenium (Se)	2013/11/20	<2.0		ug/L	
		Total Silver (Ag)	2013/11/20	<0.10		ug/L	
		Total Sodium (Na)	2013/11/20	<100		ug/L	
		Total Strontium (Sr)	2013/11/20	<1.0		ug/L	
		Total Thallium (Tl)	2013/11/20	<0.050		ug/L	
		Total Tin (Sn)	2013/11/20	<1.0		ug/L	
		Total Titanium (Ti)	2013/11/20	<5.0		ug/L	

Quality Assurance Report (Continued)

Maxxam Job Number: MB3J9025

QA/QC Batch Num	Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
3429360	HRE	Method Blank	Total Uranium (U)	2013/11/20	<0.10		ug/L	
			Total Vanadium (V)	2013/11/20	<0.50		ug/L	
			Total Zinc (Zn)	2013/11/20	8.8, RDL=5.0		ug/L	
		RPD	Total Aluminum (Al)	2013/11/20	6.0		%	20
			Total Antimony (Sb)	2013/11/20	NC		%	20
			Total Arsenic (As)	2013/11/20	NC		%	20
			Total Barium (Ba)	2013/11/20	4.4		%	20
			Total Beryllium (Be)	2013/11/20	NC		%	20
			Total Bismuth (Bi)	2013/11/20	NC		%	20
			Total Boron (B)	2013/11/20	NC		%	20
			Total Cadmium (Cd)	2013/11/20	NC		%	20
			Total Calcium (Ca)	2013/11/20	5.7		%	20
			Total Chromium (Cr)	2013/11/20	NC		%	20
			Total Cobalt (Co)	2013/11/20	NC		%	20
			Total Copper (Cu)	2013/11/20	4.5		%	20
			Total Iron (Fe)	2013/11/20	NC		%	20
			Total Lead (Pb)	2013/11/20	5.9		%	20
			Total Magnesium (Mg)	2013/11/20	5.0		%	20
			Total Manganese (Mn)	2013/11/20	5.0		%	20
			Total Molybdenum (Mo)	2013/11/20	NC		%	20
			Total Nickel (Ni)	2013/11/20	7.3		%	20
			Total Phosphorus (P)	2013/11/20	NC		%	20
			Total Potassium (K)	2013/11/20	7.0		%	20
			Total Silicon (Si)	2013/11/20	3.1		%	20
			Total Selenium (Se)	2013/11/20	NC		%	20
			Total Silver (Ag)	2013/11/20	NC		%	20
			Total Sodium (Na)	2013/11/20	5.5		%	20
			Total Strontium (Sr)	2013/11/20	4.0		%	20
			Total Thallium (Tl)	2013/11/20	4.7		%	20
			Total Tin (Sn)	2013/11/20	NC		%	20
			Total Titanium (Ti)	2013/11/20	NC		%	20
			Total Uranium (U)	2013/11/20	NC		%	20
			Total Vanadium (V)	2013/11/20	NC		%	20
			Total Zinc (Zn)	2013/11/20	NC		%	20
3429682	MC	Matrix Spike [TY1360-08]	Mercury (Hg)	2013/11/21		100	%	80 - 120
		Spiked Blank	Mercury (Hg)	2013/11/21		105	%	80 - 120
		Method Blank	Mercury (Hg)	2013/11/21	<0.00010		mg/L	
		RPD [TY1360-08]	Mercury (Hg)	2013/11/21	NC		%	20
3432196	HRE	Matrix Spike	Dissolved Aluminum (Al)	2013/11/22		99	%	80 - 120
			Dissolved Antimony (Sb)	2013/11/22		104	%	80 - 120
			Dissolved Arsenic (As)	2013/11/22		103	%	80 - 120
			Dissolved Barium (Ba)	2013/11/22		100	%	80 - 120
			Dissolved Beryllium (Be)	2013/11/22		104	%	80 - 120
			Dissolved Bismuth (Bi)	2013/11/22		99	%	80 - 120
			Dissolved Boron (B)	2013/11/22		106	%	80 - 120
			Dissolved Cadmium (Cd)	2013/11/22		103	%	80 - 120
			Dissolved Calcium (Ca)	2013/11/22		NC	%	80 - 120
			Dissolved Chromium (Cr)	2013/11/22		99	%	80 - 120
			Dissolved Cobalt (Co)	2013/11/22		101	%	80 - 120
			Dissolved Copper (Cu)	2013/11/22		98	%	80 - 120
			Dissolved Iron (Fe)	2013/11/22		99	%	80 - 120
			Dissolved Lead (Pb)	2013/11/22		99	%	80 - 120
			Dissolved Magnesium (Mg)	2013/11/22		NC	%	80 - 120
			Dissolved Manganese (Mn)	2013/11/22		101	%	80 - 120

Golder Associates Ltd
Attention: Josip Balaban
Client Project #: 021-1228
P.O. #:
Site Location: TANSLEY QUARRY

Quality Assurance Report (Continued)

Maxxam Job Number: MB3J9025

QA/QC Batch Num	Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
3432196	HRE	Matrix Spike	Dissolved Molybdenum (Mo)	2013/11/22		104	%	80 - 120
			Dissolved Nickel (Ni)	2013/11/22		99	%	80 - 120
			Dissolved Phosphorus (P)	2013/11/22		101	%	80 - 120
			Dissolved Potassium (K)	2013/11/22		99	%	80 - 120
			Dissolved Selenium (Se)	2013/11/22		107	%	80 - 120
			Dissolved Silicon (Si)	2013/11/22		99	%	80 - 120
			Dissolved Silver (Ag)	2013/11/22		102	%	80 - 120
			Dissolved Sodium (Na)	2013/11/22		NC	%	80 - 120
			Dissolved Strontium (Sr)	2013/11/22		102	%	80 - 120
			Dissolved Thallium (Tl)	2013/11/22		98	%	80 - 120
			Dissolved Tin (Sn)	2013/11/22		104	%	80 - 120
			Dissolved Titanium (Ti)	2013/11/22		100	%	80 - 120
			Dissolved Uranium (U)	2013/11/22		102	%	80 - 120
			Dissolved Vanadium (V)	2013/11/22		101	%	80 - 120
			Dissolved Zinc (Zn)	2013/11/22		100	%	80 - 120
		Spiked Blank	Dissolved Aluminum (Al)	2013/11/22		100	%	80 - 120
			Dissolved Antimony (Sb)	2013/11/22		101	%	80 - 120
			Dissolved Arsenic (As)	2013/11/22		99	%	80 - 120
			Dissolved Barium (Ba)	2013/11/22		100	%	80 - 120
			Dissolved Beryllium (Be)	2013/11/22		103	%	80 - 120
			Dissolved Bismuth (Bi)	2013/11/22		100	%	80 - 120
			Dissolved Boron (B)	2013/11/22		105	%	80 - 120
			Dissolved Cadmium (Cd)	2013/11/22		100	%	80 - 120
			Dissolved Calcium (Ca)	2013/11/22		97	%	80 - 120
			Dissolved Chromium (Cr)	2013/11/22		99	%	80 - 120
			Dissolved Cobalt (Co)	2013/11/22		102	%	80 - 120
			Dissolved Copper (Cu)	2013/11/22		99	%	80 - 120
			Dissolved Iron (Fe)	2013/11/22		99	%	80 - 120
			Dissolved Lead (Pb)	2013/11/22		99	%	80 - 120
			Dissolved Magnesium (Mg)	2013/11/22		97	%	80 - 120
			Dissolved Manganese (Mn)	2013/11/22		101	%	80 - 120
			Dissolved Molybdenum (Mo)	2013/11/22		101	%	80 - 120
			Dissolved Nickel (Ni)	2013/11/22		101	%	80 - 120
			Dissolved Phosphorus (P)	2013/11/22		99	%	80 - 120
			Dissolved Potassium (K)	2013/11/22		98	%	80 - 120
			Dissolved Selenium (Se)	2013/11/22		102	%	80 - 120
			Dissolved Silicon (Si)	2013/11/22		98	%	80 - 120
			Dissolved Silver (Ag)	2013/11/22		99	%	80 - 120
			Dissolved Sodium (Na)	2013/11/22		99	%	80 - 120
			Dissolved Strontium (Sr)	2013/11/22		102	%	80 - 120
			Dissolved Thallium (Tl)	2013/11/22		99	%	80 - 120
			Dissolved Tin (Sn)	2013/11/22		101	%	80 - 120
			Dissolved Titanium (Ti)	2013/11/22		99	%	80 - 120
			Dissolved Uranium (U)	2013/11/22		101	%	80 - 120
			Dissolved Vanadium (V)	2013/11/22		99	%	80 - 120
			Dissolved Zinc (Zn)	2013/11/22		100	%	80 - 120
		Method Blank	Dissolved Aluminum (Al)	2013/11/22	<5.0		ug/L	
			Dissolved Antimony (Sb)	2013/11/22	<0.50		ug/L	
			Dissolved Arsenic (As)	2013/11/22	<1.0		ug/L	
			Dissolved Barium (Ba)	2013/11/22	<2.0		ug/L	
			Dissolved Beryllium (Be)	2013/11/22	<0.50		ug/L	
			Dissolved Bismuth (Bi)	2013/11/22	<1.0		ug/L	
			Dissolved Boron (B)	2013/11/22	<10		ug/L	
			Dissolved Cadmium (Cd)	2013/11/22	<0.10		ug/L	
			Dissolved Calcium (Ca)	2013/11/22	<200		ug/L	

Quality Assurance Report (Continued)

Maxxam Job Number: MB3J9025

QA/QC Batch Num Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
3432196 HRE	Method Blank	Dissolved Chromium (Cr)	2013/11/22	<5.0		ug/L	
		Dissolved Cobalt (Co)	2013/11/22	<0.50		ug/L	
		Dissolved Copper (Cu)	2013/11/22	<1.0		ug/L	
		Dissolved Iron (Fe)	2013/11/22	<100		ug/L	
		Dissolved Lead (Pb)	2013/11/22	<0.50		ug/L	
		Dissolved Magnesium (Mg)	2013/11/22	<50		ug/L	
		Dissolved Manganese (Mn)	2013/11/22	<2.0		ug/L	
		Dissolved Molybdenum (Mo)	2013/11/22	<0.50		ug/L	
		Dissolved Nickel (Ni)	2013/11/22	<1.0		ug/L	
		Dissolved Phosphorus (P)	2013/11/22	<100		ug/L	
		Dissolved Potassium (K)	2013/11/22	<200		ug/L	
		Dissolved Selenium (Se)	2013/11/22	<2.0		ug/L	
		Dissolved Silicon (Si)	2013/11/22	<50		ug/L	
		Dissolved Silver (Ag)	2013/11/22	<0.10		ug/L	
		Dissolved Sodium (Na)	2013/11/22	<100		ug/L	
		Dissolved Strontium (Sr)	2013/11/22	<1.0		ug/L	
		Dissolved Thallium (Tl)	2013/11/22	<0.050		ug/L	
		Dissolved Tin (Sn)	2013/11/22	<1.0		ug/L	
		Dissolved Titanium (Ti)	2013/11/22	<5.0		ug/L	
		Dissolved Uranium (U)	2013/11/22	<0.10		ug/L	
		Dissolved Vanadium (V)	2013/11/22	<0.50		ug/L	
		Dissolved Zinc (Zn)	2013/11/22	<5.0		ug/L	
	RPD	Dissolved Boron (B)	2013/11/22	NC		%	20
		Dissolved Calcium (Ca)	2013/11/22	2.9		%	20
		Dissolved Chromium (Cr)	2013/11/22	NC		%	20
		Dissolved Iron (Fe)	2013/11/22	NC		%	20
		Dissolved Magnesium (Mg)	2013/11/22	0.7		%	20
		Dissolved Manganese (Mn)	2013/11/22	NC		%	20
		Dissolved Nickel (Ni)	2013/11/22	NC		%	20
		Dissolved Potassium (K)	2013/11/22	1.6		%	20
		Dissolved Sodium (Na)	2013/11/22	0.2		%	20
		Dissolved Zinc (Zn)	2013/11/22	NC		%	20
3432217 COP	Matrix Spike	Total Ammonia-N	2013/11/25		104	%	80 - 120
	Spiked Blank	Total Ammonia-N	2013/11/25		106	%	85 - 115
	Method Blank	Total Ammonia-N	2013/11/25	<0.050		mg/L	
	RPD	Total Ammonia-N	2013/11/25	NC		%	20

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.
Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.
QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.
Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.
Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.
NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spiked amount was not sufficiently significant to permit a reliable recovery calculation.
NC (RPD): The RPD was not calculated. The level of analyte detected in the parent sample and its duplicate was not sufficiently significant to permit a reliable calculation.
(1) Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.

Validation Signature Page

Maxxam Job #: B3J9025

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

Cristina Carriere

Cristina Carriere, Scientific Services

Your Project #: 021-1228
Site#: 021-1228
Site Location: TANSLEY QUARRY
Your C.O.C. #: 44283305, 442833-05-01

Attention: Josip Balaban
Golder Associates Ltd
6925 Century Ave
Suite 100
Mississauga, ON
L5N 7K2

Report Date: 2013/11/27

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B3J9927
Received: 2013/11/19, 17:20

Sample Matrix: Water
Samples Received: 6

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Method Reference
Alkalinity	6	N/A	2013/11/20	CAM SOP-00448	SM 2320B
Anions	6	N/A	2013/11/21	CAM SOP-00435	SM 4110B
Conductivity	6	N/A	2013/11/20	CAM SOP-00414	SM 2510
Free (WAD) Cyanide	3	N/A	2013/11/23	CAM SOP-00457	Ontario MOE CN-E3015
Free (WAD) Cyanide	3	N/A	2013/11/25	CAM SOP-00457	Ontario MOE CN-E3015
Fluoride	6	2013/11/20	2013/11/20	CAM SOP-00449	APHA 4500FC
Hardness (calculated as CaCO3)	6	N/A	2013/11/26	CAM SOP 00102	SM 2340 B
Mercury in Water by CVAA	6	2013/11/25	2013/11/26	CAM SOP-00453	SW-846 7470A
Dissolved Metals by ICPMS	6	N/A	2013/11/26	CAM SOP-00447	EPA 6020
Total Metals Analysis by ICPMS	2	N/A	2013/11/25	CAM SOP-00447	EPA 6020
Total Metals Analysis by ICPMS	4	N/A	2013/11/26	CAM SOP-00447	EPA 6020
Total Ammonia-N	6	N/A	2013/11/25	CAM SOP-00441	US GS I-2522-90
Nitrate (NO3) and Nitrite (NO2) in Water (1)	6	N/A	2013/11/21	CAM SOP-00440	SM 4500 NO3I/NO2B
pH	6	N/A	2013/11/20	CAM SOP-00413	SM 4500H+ B
Phenols (4AAP)	6	N/A	2013/11/22	CAM SOP-00444	MOE ROPHEN-E3179
Orthophosphate	6	N/A	2013/11/21	CAM SOP-00461	EPA 365.1
Sulphide	6	N/A	2013/11/20	CAM SOP-00455	SM 4500-S G
Total Dissolved Solids	6	N/A	2013/11/21	CAM SOP-00428	APHA 2540C
Total Phosphorus (Colourimetric)	6	2013/11/22	2013/11/23	CAM SOP-00407	SM 4500 P,B,F
Low Level Total Suspended Solids	6	N/A	2013/11/20	CAM SOP-00428	SM 2540D
Turbidity	6	N/A	2013/11/20	CAM SOP-00417	APHA 2130B

Remarks:

Maxxam Analytics has performed all analytical testing herein in accordance with ISO 17025 and the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act. All methodologies comply with this document and are validated for use in the laboratory. The methods and techniques employed in this analysis conform to the performance criteria (detection limits, accuracy and precision) as outlined in the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act. Reporting results to two significant figures at the RDL is to permit statistical evaluation and is not intended to be an indication of analytical precision.

The CWS PHC methods employed by Maxxam conform to all prescribed elements of the reference method and

Your Project #: 021-1228
Site#: 021-1228
Site Location: TANSLEY QUARRY
Your C.O.C. #: 44283305, 442833-05-01

Attention: Josip Balaban
Golder Associates Ltd
6925 Century Ave
Suite 100
Mississauga, ON
L5N 7K2

Report Date: 2013/11/27

CERTIFICATE OF ANALYSIS

-2-

performance based elements have been validated. All modifications have been validated and proven equivalent following the 'Alberta Environment Draft Addenda to the CWS-PHC, Appendix 6, Validation of Alternate Methods'. Documentation is available upon request. Maxxam has made the following improvements to the CWS-PHC reference benchmark method: (i) Headspace for F1; and, (ii) Mechanical extraction for F2-F4. Note: F4G cannot be added to the C6 to C50 hydrocarbons. The extraction date for samples field preserved with methanol for F1 and Volatile Organic Compounds is considered to be the date sampled.

Maxxam Analytics is accredited for all specific parameters as required by Ontario Regulation 153/04. Maxxam Analytics is limited in liability to the actual cost of analysis unless otherwise agreed in writing. There is no other warranty expressed or implied. Samples will be retained at Maxxam Analytics for three weeks from receipt of data or as per contract.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) Values for calculated parameters may not appear to add up due to rounding of raw data and significant figures.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Antonella Brasil, Project Manager
Email: ABrasil@maxxam.ca
Phone# (905) 817-5817

==

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Total cover pages: 2

Maxxam Job #: B3J9927
Report Date: 2013/11/27

Golder Associates Ltd
Client Project #: 021-1228
Site Location: TANSLEY QUARRY
Sampler Initials: JB

RESULTS OF ANALYSES OF WATER

Maxxam ID		TY6375		TY6376	TY6376			TY6377		
Sampling Date		2013/11/19		2013/11/19	2013/11/19			2013/11/19		
COC Number		442833-05-01		442833-05-01	442833-05-01			442833-05-01		
	Units	**MW09-D**	**RDL**	**MW06-S**	**MW06-S Lab-Dup**	**RDL**	**QC Batch**	**MW02-O**	**RDL**	**QC Batch**
Calculated Parameters										
Hardness (CaCO3)	mg/L	31000	1.0	400		1.0	3427988	1900	1.0	3427988
Inorganics										
Total Ammonia-N	mg/L	39	0.50	0.21		0.050	3432309	0.53	0.050	3432309
Conductivity	umho/cm	>100,000	1.0	770	750	1.0	3429443	2900	1.0	3429443
Total Dissolved Solids	mg/L	95600	10	648		10	3430653	2550	10	3430653
Fluoride (F-)	mg/L	<0.10	0.10	0.12	0.11	0.10	3429448	0.26	0.10	3429448
Free Cyanide	mg/L	<0.0020	0.0020	<0.0020		0.0020	3431427	<0.0020	0.0020	3433065
Orthophosphate (P)	mg/L	<0.010	0.010	<0.010		0.010	3430335	<0.010	0.010	3430335
pH	pH	6.31		7.80	7.83		3429440	7.40		3429440
Phenols-4AAP	mg/L	0.025	0.0050	<0.0010		0.0010	3430192	0.0025	0.0010	3430192
Total Phosphorus	mg/L	0.65 (1)	0.20	0.30		0.10	3433188	1.2	0.10	3433188
Total Suspended Solids	mg/L	1000	10	97		2	3429375	1200	10	3429375
Sulphide	mg/L	<0.020	0.020	<0.020		0.020	3429297	0.18	0.020	3429297
Turbidity	NTU	320	2	49		0.2	3429969	550	2	3429969
Alkalinity (Total as CaCO3)	mg/L	41	1.0	320	320	1.0	3429442	730	1.0	3429442
Nitrite (N)	mg/L	<0.010	0.010	<0.010		0.010	3429504	0.013	0.010	3429504
Dissolved Chloride (Cl)	mg/L	53000	500	11	11	1.0	3430674	14	5.0	3430674
Nitrate (N)	mg/L	<0.10	0.10	<0.10		0.10	3429504	<0.10	0.10	3429504
Nitrate + Nitrite	mg/L	<0.10	0.10	<0.10		0.10	3429504	<0.10	0.10	3429504
Dissolved Bromide (Br-)	mg/L	690	100	<1.0	<1.0	1.0	3430674	<5.0	5.0	3430674
Dissolved Sulphate (SO4)	mg/L	1200	100	88	87	1.0	3430674	1300	5.0	3430674

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
(1) Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.

Maxxam Job #: B3J9927
Report Date: 2013/11/27

Golder Associates Ltd
Client Project #: 021-1228
Site Location: TANSLEY QUARRY
Sampler Initials: JB

RESULTS OF ANALYSES OF WATER

Maxxam ID		TY6378	TY6378		TY6379			TY6380		
Sampling Date		2013/11/19	2013/11/19		2013/11/19			2013/11/19		
COC Number		442833-05-01	442833-05-01		442833-05-01			442833-05-01		
	Units	**MW02-I**	**MW02-I Lab-Dup**	**RDL**	**MW02-D**	**RDL**	**QC Batch**	**DUP2**	**RDL**	**QC Batch**
Calculated Parameters										
Hardness (CaCO3)	mg/L	990		1.0	6500	1.0	3427988	1000	1.0	3427988
Inorganics										
Total Ammonia-N	mg/L	1.7		0.050	16	0.50	3432309	1.7	0.050	3432309
Conductivity	umho/cm	2400		1.0	35000	1.0	3429443	2400	1.0	3429443
Total Dissolved Solids	mg/L	1970		10	25600	10	3430653	1940	10	3430653
Fluoride (F-)	mg/L	0.24		0.10	0.31	0.10	3429448	0.25	0.10	3429448
Free Cyanide	mg/L	<0.0020		0.0020	<0.0020	0.0020	3433065	<0.0020	0.0020	3431427
Orthophosphate (P)	mg/L	<0.010		0.010	<0.010	0.010	3430335	<0.010	0.010	3430335
pH	pH	7.61			6.93		3429440	7.64		3429440
Phenols-4AAP	mg/L	<0.0010		0.0010	0.017	0.0050	3430192	<0.0010	0.0010	3430192
Total Phosphorus	mg/L	0.47		0.10	0.44 (1)	0.20	3433188	0.088	0.040	3433188
Total Suspended Solids	mg/L	730		10	270	5	3429375	680	10	3429375
Sulphide	mg/L	<0.020		0.020	1.6	0.020	3429297	0.023	0.020	3429297
Turbidity	NTU	450	430	1	110	0.2	3429969	390	2	3429969
Alkalinity (Total as CaCO3)	mg/L	150		1.0	52	1.0	3429442	120	1.0	3429442
Nitrite (N)	mg/L	0.010		0.010	0.012	0.010	3429504	<0.010	0.010	3429504
Dissolved Chloride (Cl)	mg/L	140		5.0	13000	100	3430674	140	5.0	3430674
Nitrate (N)	mg/L	<0.10		0.10	<0.10	0.10	3429504	<0.10	0.10	3429504
Nitrate + Nitrite	mg/L	<0.10		0.10	<0.10	0.10	3429504	<0.10	0.10	3429504
Dissolved Bromide (Br-)	mg/L	<5.0		5.0	170	100	3430674	<5.0	5.0	3430674
Dissolved Sulphate (SO4)	mg/L	1100		5.0	2000	10	3430674	1100	5.0	3430674

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
(1) Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.

RESULTS OF ANALYSES OF WATER

Maxxam ID		TY6380		
Sampling Date		2013/11/19		
COC Number		442833-05-01		
	Units	**DUP2 Lab-Dup**	**RDL**	**QC Batch**
Inorganics				
Phenols-4AAP	mg/L	<0.0010	0.0010	3430192

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam Job #: B3J9927
Report Date: 2013/11/27

Golder Associates Ltd
Client Project #: 021-1228
Site Location: TANSLEY QUARRY
Sampler Initials: JB

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		TY6375		TY6376	TY6376		TY6377		
Sampling Date		2013/11/19		2013/11/19	2013/11/19		2013/11/19		
COC Number		442833-05-01		442833-05-01	442833-05-01		442833-05-01		
	Units	**MW09-D**	**RDL**	**MW06-S**	**MW06-S Lab-Dup**	**RDL**	**MW02-O**	**RDL**	**QC Batch**
Metals									
Mercury (Hg)	mg/L	<0.00010	0.00010	<0.00010	<0.00010	0.00010	<0.00010	0.00010	3434873
Dissolved Aluminum (Al)	ug/L	<250	250	5.7	<5.0	5.0	<5.0	5.0	3435787
Total Aluminum (Al)	ug/L	1400	500	1400		5.0	25000	25	3434531
Dissolved Antimony (Sb)	ug/L	<25	25	<0.50	<0.50	0.50	<0.50	0.50	3435787
Total Antimony (Sb)	ug/L	<50	50	0.64		0.50	<0.50	0.50	3434531
Dissolved Arsenic (As)	ug/L	<100	100	7.9	8.0	1.0	2.3	1.0	3435787
Total Arsenic (As)	ug/L	<100	100	8.2		1.0	11	1.0	3434531
Dissolved Barium (Ba)	ug/L	120	100	44	43	2.0	19	2.0	3435787
Total Barium (Ba)	ug/L	<200	200	55		2.0	240	2.0	3434531
Dissolved Beryllium (Be)	ug/L	<25	25	<0.50	<0.50	0.50	<0.50	0.50	3435787
Total Beryllium (Be)	ug/L	<50	50	<0.50		0.50	1.6	0.50	3434531
Dissolved Bismuth (Bi)	ug/L	<50	50	<1.0	<1.0	1.0	<1.0	1.0	3435787
Total Bismuth (Bi)	ug/L	<100	100	1.1		1.0	<1.0	1.0	3434531
Dissolved Boron (B)	ug/L	4900	500	68	70	10	340	10	3435787
Total Boron (B)	ug/L	3900	1000	58		10	330	10	3434531
Dissolved Cadmium (Cd)	ug/L	<5.0	5.0	0.10	<0.10	0.10	<0.10	0.10	3435787
Total Cadmium (Cd)	ug/L	<10	10	1.0		0.10	0.40	0.10	3434531
Dissolved Calcium (Ca)	ug/L	8700000	10000	92000	93000	200	200000	200	3435787
Total Calcium (Ca)	ug/L	9200000	20000	92000		200	360000	200	3434531
Dissolved Chromium (Cr)	ug/L	<250	250	<5.0	<5.0	5.0	<5.0	5.0	3435787
Total Chromium (Cr)	ug/L	<500	500	<5.0		5.0	47	5.0	3434531
Dissolved Cobalt (Co)	ug/L	<25	25	<0.50	<0.50	0.50	<0.50	0.50	3435787
Total Cobalt (Co)	ug/L	<50	50	1.3		0.50	21	1.0	3434531
Dissolved Copper (Cu)	ug/L	<50	50	1.6	1.4	1.0	<2.0 (1)	2.0	3435787
Total Copper (Cu)	ug/L	<100	100	6.3		1.0	42	1.0	3434531
Dissolved Iron (Fe)	ug/L	15000	5000	690	690	100	2300	100	3435787
Total Iron (Fe)	ug/L	61000	10000	2900		100	48000	100	3434531
Dissolved Lead (Pb)	ug/L	<25	25	<0.50	<0.50	0.50	<0.50	0.50	3435787
Total Lead (Pb)	ug/L	<50	50	1.5		0.50	18	0.50	3434531
Dissolved Magnesium (Mg)	ug/L	2100000	2500	42000	42000	50	340000	50	3435787
Total Magnesium (Mg)	ug/L	2100000	5000	39000		50	330000	50	3434531

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
(1) Metal analysis:Detection Limit was raised due to matrix interferences.

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		TY6375		TY6376	TY6376		TY6377		
Sampling Date		2013/11/19		2013/11/19	2013/11/19		2013/11/19		
COC Number		442833-05-01		442833-05-01	442833-05-01		442833-05-01		
	Units	**MW09-D**	**RDL**	**MW06-S**	**MW06-S Lab-Dup**	**RDL**	**MW02-O**	**RDL**	**QC Batch**
Dissolved Manganese (Mn)	ug/L	4700	100	37	38	2.0	570	2.0	3435787
Total Manganese (Mn)	ug/L	5800	200	120		2.0	1800	2.0	3434531
Dissolved Molybdenum (Mo)	ug/L	29	25	1.2	1.2	0.50	3.4	0.50	3435787
Total Molybdenum (Mo)	ug/L	<50	50	1.6		0.50	5.5	0.50	3434531
Dissolved Nickel (Ni)	ug/L	67	50	<1.0	<1.0	1.0	1.0	1.0	3435787
Total Nickel (Ni)	ug/L	320	100	4.7		1.0	42	2.0	3434531
Dissolved Phosphorus (P)	ug/L	<5000	5000	<100	<100	100	<100	100	3435787
Total Phosphorus (P)	ug/L	<10000	10000	<100		100	1400	100	3434531
Dissolved Potassium (K)	ug/L	300000	10000	2900	2900	200	9000	200	3435787
Total Potassium (K)	ug/L	270000	20000	3100		200	17000	200	3434531
Dissolved Selenium (Se)	ug/L	<200	200	<2.0	<2.0	2.0	<2.0	2.0	3435787
Dissolved Silicon (Si)	ug/L	<2500	2500	9500	9500	50	10000	100	3435787
Total Silicon (Si)	ug/L	<5000	5000	10000		50	46000	50	3434531
Total Selenium (Se)	ug/L	<200	200	<2.0		2.0	<2.0	2.0	3434531
Dissolved Silver (Ag)	ug/L	<5.0	5.0	<0.10	<0.10	0.10	<0.10	0.10	3435787
Total Silver (Ag)	ug/L	<10	10	<0.10		0.10	0.19	0.10	3434531
Dissolved Sodium (Na)	ug/L	19000000	5000	14000	14000	100	71000	100	3435787
Total Sodium (Na)	ug/L	18000000	10000	13000		100	66000	100	3434531
Dissolved Strontium (Sr)	ug/L	180000	50	1600	1600	1.0	4100	1.0	3435787
Total Strontium (Sr)	ug/L	190000	100	1500		1.0	4200	1.0	3434531
Dissolved Thallium (Tl)	ug/L	<2.5	2.5	<0.050	<0.050	0.050	<0.050	0.050	3435787
Total Thallium (Tl)	ug/L	<5.0	5.0	0.099		0.050	0.37	0.050	3434531
Dissolved Tin (Sn)	ug/L	<50	50	<1.0	<1.0	1.0	<1.0	1.0	3435787
Total Tin (Sn)	ug/L	<100	100	2.8		1.0	1.2	1.0	3434531
Dissolved Titanium (Ti)	ug/L	<250	250	<5.0	<5.0	5.0	<5.0	5.0	3435787
Total Titanium (Ti)	ug/L	<500	500	27		5.0	590	25	3434531
Dissolved Uranium (U)	ug/L	19	5.0	1.0	1.0	0.10	17	0.10	3435787
Total Uranium (U)	ug/L	<10	10	1.4		0.10	18	0.10	3434531
Dissolved Vanadium (V)	ug/L	<50	50	<0.50	<0.50	0.50	0.88	0.50	3435787
Total Vanadium (V)	ug/L	<50	50	2.0		0.50	56	0.50	3434531
Dissolved Zinc (Zn)	ug/L	430	250	14	9.8	5.0	<10 (1)	10	3435787
Total Zinc (Zn)	ug/L	<500	500	15		5.0	120	10	3434531

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
(1) Metal analysis:Detection Limit was raised due to matrix interferences.

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		TY6378		TY6379		TY6380		
Sampling Date		2013/11/19		2013/11/19		2013/11/19		
COC Number		442833-05-01		442833-05-01		442833-05-01		
	Units	**MW02-I**	**RDL**	**MW02-D**	**RDL**	**DUP2**	**RDL**	**QC Batch**
Metals								
Mercury (Hg)	mg/L	<0.00010	0.00010	<0.00010	0.00010	<0.00010	0.00010	3434873
Dissolved Aluminum (Al)	ug/L	21	5.0	<100	100	<5.0	5.0	3435787
Total Aluminum (Al)	ug/L	10000	5.0	2900	100	7600	5.0	3434531
Dissolved Antimony (Sb)	ug/L	<0.50	0.50	<10	10	<0.50	0.50	3435787
Total Antimony (Sb)	ug/L	<0.50	0.50	<10	10	<0.50	0.50	3434531
Dissolved Arsenic (As)	ug/L	3.0	1.0	<20	20	3.0	1.0	3435787
Total Arsenic (As)	ug/L	5.3	1.0	<20	20	4.7	1.0	3434531
Dissolved Barium (Ba)	ug/L	7.1	2.0	<40	40	7.3	2.0	3435787
Total Barium (Ba)	ug/L	320	2.0	56	40	150	2.0	3434531
Dissolved Beryllium (Be)	ug/L	<0.50	0.50	<10	10	<0.50	0.50	3435787
Total Beryllium (Be)	ug/L	0.63	0.50	<10	10	<0.50	0.50	3434531
Dissolved Bismuth (Bi)	ug/L	<1.0	1.0	<20	20	<1.0	1.0	3435787
Total Bismuth (Bi)	ug/L	<1.0	1.0	<20	20	<1.0	1.0	3434531
Dissolved Boron (B)	ug/L	2100	10	6700	200	2300	10	3435787
Total Boron (B)	ug/L	2100	10	5100	200	1900	10	3434531
Dissolved Cadmium (Cd)	ug/L	<0.10	0.10	<2.0	2.0	<0.10	0.10	3435787
Total Cadmium (Cd)	ug/L	<0.10	0.10	<2.0	2.0	<0.10	0.10	3434531
Dissolved Calcium (Ca)	ug/L	200000	1000	1900000	4000	200000	1000	3435787
Total Calcium (Ca)	ug/L	250000	1000	1700000	4000	240000	1000	3434531
Dissolved Chromium (Cr)	ug/L	<5.0	5.0	<100	100	<5.0	5.0	3435787
Total Chromium (Cr)	ug/L	18	5.0	<100	100	14	5.0	3434531
Dissolved Cobalt (Co)	ug/L	<0.50	0.50	<10	10	<0.50	0.50	3435787
Total Cobalt (Co)	ug/L	7.1	0.50	<10	10	6.9	0.50	3434531
Dissolved Copper (Cu)	ug/L	<2.0 (1)	2.0	<20	20	<2.0 (1)	2.0	3435787
Total Copper (Cu)	ug/L	13	1.0	<20	20	14	1.0	3434531
Dissolved Iron (Fe)	ug/L	780	100	3700	2000	800	100	3435787
Total Iron (Fe)	ug/L	14000	100	7000	2000	13000	100	3434531
Dissolved Lead (Pb)	ug/L	<0.50	0.50	<10	10	<0.50	0.50	3435787
Total Lead (Pb)	ug/L	7.9	0.50	<10	10	7.1	0.50	3434531
Dissolved Magnesium (Mg)	ug/L	120000	50	460000	1000	120000	50	3435787
Total Magnesium (Mg)	ug/L	120000	50	420000	1000	120000	50	3434531
Dissolved Manganese (Mn)	ug/L	130	2.0	1000	40	130	2.0	3435787

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
(1) Metal analysis:Detection Limit was raised due to matrix interferences.

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		TY6378		TY6379		TY6380		
Sampling Date		2013/11/19		2013/11/19		2013/11/19		
COC Number		442833-05-01		442833-05-01		442833-05-01		
	Units	**MW02-I**	**RDL**	**MW02-D**	**RDL**	**DUP2**	**RDL**	**QC Batch**
Total Manganese (Mn)	ug/L	540	2.0	1100	40	530	2.0	3434531
Dissolved Molybdenum (Mo)	ug/L	8.9	0.50	<10	10	8.6	0.50	3435787
Total Molybdenum (Mo)	ug/L	9.2	0.50	<10	10	9.1	0.50	3434531
Dissolved Nickel (Ni)	ug/L	<1.0	1.0	<20	20	<1.0	1.0	3435787
Total Nickel (Ni)	ug/L	15	1.0	<20	20	15	1.0	3434531
Dissolved Phosphorus (P)	ug/L	<100	100	<2000	2000	<100	100	3435787
Total Phosphorus (P)	ug/L	390	100	<2000	2000	340	100	3434531
Dissolved Potassium (K)	ug/L	19000	200	120000	4000	19000	200	3435787
Total Potassium (K)	ug/L	22000	200	100000	4000	20000	200	3434531
Dissolved Selenium (Se)	ug/L	<2.0	2.0	<40	40	<2.0	2.0	3435787
Dissolved Silicon (Si)	ug/L	5100	50	2700	1000	5200	50	3435787
Total Silicon (Si)	ug/L	23000	50	6000	1000	15000	50	3434531
Total Selenium (Se)	ug/L	<2.0	2.0	<40	40	<2.0	2.0	3434531
Dissolved Silver (Ag)	ug/L	<0.10	0.10	<2.0	2.0	<0.10	0.10	3435787
Total Silver (Ag)	ug/L	<0.10	0.10	<2.0	2.0	<0.10	0.10	3434531
Dissolved Sodium (Na)	ug/L	200000	100	6100000	2000	200000	100	3435787
Total Sodium (Na)	ug/L	200000	100	5400000	2000	190000	100	3434531
Dissolved Strontium (Sr)	ug/L	12000	1.0	39000	20	12000	1.0	3435787
Total Strontium (Sr)	ug/L	12000	1.0	35000	20	12000	1.0	3434531
Dissolved Thallium (Tl)	ug/L	<0.050	0.050	<1.0	1.0	<0.050	0.050	3435787
Total Thallium (Tl)	ug/L	0.14	0.050	<1.0	1.0	0.10	0.050	3434531
Dissolved Tin (Sn)	ug/L	<1.0	1.0	<20	20	<1.0	1.0	3435787
Total Tin (Sn)	ug/L	5.5	1.0	<20	20	<1.0	1.0	3434531
Dissolved Titanium (Ti)	ug/L	<5.0	5.0	<100	100	<5.0	5.0	3435787
Total Titanium (Ti)	ug/L	290	5.0	<100	100	170	5.0	3434531
Dissolved Uranium (U)	ug/L	0.30	0.10	<2.0	2.0	0.28	0.10	3435787
Total Uranium (U)	ug/L	1.6	0.10	<2.0	2.0	1.4	0.10	3434531
Dissolved Vanadium (V)	ug/L	0.52	0.50	28	10	0.75	0.50	3435787
Total Vanadium (V)	ug/L	21	0.50	<10	10	15	0.50	3434531
Dissolved Zinc (Zn)	ug/L	<10 (1)	10	<100	100	<10 (1)	10	3435787
Total Zinc (Zn)	ug/L	38	10	<100	100	43	10	3434531

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
(1) Metal analysis:Detection Limit was raised due to matrix interferences.

Test Summary

Maxxam ID TY6375
Sample ID MW09-D
Matrix Water

Collected 2013/11/19
Shipped
Received 2013/11/19

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3429442	N/A	2013/11/20	Surinder Rai
Anions	IC	3430674	N/A	2013/11/21	Fari Dehdezi
Conductivity	COND	3429443	N/A	2013/11/20	Surinder Rai
Free (WAD) Cyanide	TECH/CN	3431427	N/A	2013/11/25	Xuanhong Qiu
Fluoride	F	3429448	2013/11/20	2013/11/20	Surinder Rai
Hardness (calculated as CaCO3)		3427988	N/A	2013/11/26	Automated Statchk
Mercury in Water by CVAA	CVAA	3434873	2013/11/25	2013/11/26	Magdalena Carlos
Dissolved Metals by ICPMS	ICP/MS	3435787	N/A	2013/11/26	Hua Ren
Total Metals Analysis by ICPMS	ICP/MS	3434531	N/A	2013/11/26	Prempal Bhatti
Total Ammonia-N	LACH/NH4	3432309	N/A	2013/11/25	Charles Opoku-Ware
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	3429504	N/A	2013/11/21	Sandeep Singh
pH	PH	3429440	N/A	2013/11/20	Surinder Rai
Phenols (4AAP)	TECH/PHEN	3430192	N/A	2013/11/22	Louise Harding
Orthophosphate	AC	3430335	N/A	2013/11/21	Alina Dobreanu
Sulphide	ISE/S	3429297	N/A	2013/11/20	Neil Dassanayake
Total Dissolved Solids	SLDS	3430653	N/A	2013/11/21	Malik Kai Morgan John
Total Phosphorus (Colourimetric)	LACH/P	3433188	2013/11/22	2013/11/23	Viorica Rotaru
Low Level Total Suspended Solids	SLDS	3429375	N/A	2013/11/20	Niki Shah
Turbidity	TURB	3429969	N/A	2013/11/20	Lemeneh Addis

Maxxam ID TY6376
Sample ID MW06-S
Matrix Water

Collected 2013/11/19
Shipped
Received 2013/11/19

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3429442	N/A	2013/11/20	Surinder Rai
Anions	IC	3430674	N/A	2013/11/21	Fari Dehdezi
Conductivity	COND	3429443	N/A	2013/11/20	Surinder Rai
Free (WAD) Cyanide	TECH/CN	3431427	N/A	2013/11/25	Xuanhong Qiu
Fluoride	F	3429448	2013/11/20	2013/11/20	Surinder Rai
Hardness (calculated as CaCO3)		3427988	N/A	2013/11/26	Automated Statchk
Mercury in Water by CVAA	CVAA	3434873	2013/11/25	2013/11/26	Magdalena Carlos
Dissolved Metals by ICPMS	ICP/MS	3435787	N/A	2013/11/26	Hua Ren
Total Metals Analysis by ICPMS	ICP/MS	3434531	N/A	2013/11/26	Prempal Bhatti
Total Ammonia-N	LACH/NH4	3432309	N/A	2013/11/25	Charles Opoku-Ware
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	3429504	N/A	2013/11/21	Sandeep Singh
pH	PH	3429440	N/A	2013/11/20	Surinder Rai
Phenols (4AAP)	TECH/PHEN	3430192	N/A	2013/11/22	Louise Harding
Orthophosphate	AC	3430335	N/A	2013/11/21	Alina Dobreanu
Sulphide	ISE/S	3429297	N/A	2013/11/20	Neil Dassanayake
Total Dissolved Solids	SLDS	3430653	N/A	2013/11/21	Malik Kai Morgan John
Total Phosphorus (Colourimetric)	LACH/P	3433188	2013/11/22	2013/11/23	Viorica Rotaru
Low Level Total Suspended Solids	SLDS	3429375	N/A	2013/11/20	Niki Shah
Turbidity	TURB	3429969	N/A	2013/11/20	Lemeneh Addis

Test Summary

Maxxam ID TY6376 Dup
Sample ID MW06-S
Matrix Water

Collected 2013/11/19
Shipped
Received 2013/11/19

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3429442	N/A	2013/11/20	Surinder Rai
Anions	IC	3430674	N/A	2013/11/21	Fari Dehdezi
Conductivity	COND	3429443	N/A	2013/11/20	Surinder Rai
Fluoride	F	3429448	2013/11/20	2013/11/20	Surinder Rai
Mercury in Water by CVAA	CVAA	3434873	2013/11/25	2013/11/26	Magdalena Carlos
Dissolved Metals by ICPMS	ICP/MS	3435787	N/A	2013/11/26	Hua Ren
pH	PH	3429440	N/A	2013/11/20	Surinder Rai

Maxxam ID TY6377
Sample ID MW02-O
Matrix Water

Collected 2013/11/19
Shipped
Received 2013/11/19

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3429442	N/A	2013/11/20	Surinder Rai
Anions	IC	3430674	N/A	2013/11/21	Fari Dehdezi
Conductivity	COND	3429443	N/A	2013/11/20	Surinder Rai
Free (WAD) Cyanide	TECH/CN	3433065	N/A	2013/11/23	Xuanhong Qiu
Fluoride	F	3429448	2013/11/20	2013/11/20	Surinder Rai
Hardness (calculated as CaCO3)		3427988	N/A	2013/11/26	Automated Statchk
Mercury in Water by CVAA	CVAA	3434873	2013/11/25	2013/11/26	Magdalena Carlos
Dissolved Metals by ICPMS	ICP/MS	3435787	N/A	2013/11/26	Hua Ren
Total Metals Analysis by ICPMS	ICP/MS	3434531	N/A	2013/11/25	Prempal Bhatti
Total Ammonia-N	LACH/NH4	3432309	N/A	2013/11/25	Charles Opoku-Ware
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	3429504	N/A	2013/11/21	Sandeep Singh
pH	PH	3429440	N/A	2013/11/20	Surinder Rai
Phenols (4AAP)	TECH/PHEN	3430192	N/A	2013/11/22	Louise Harding
Orthophosphate	AC	3430335	N/A	2013/11/21	Alina Dobreanu
Sulphide	ISE/S	3429297	N/A	2013/11/20	Neil Dassanayake
Total Dissolved Solids	SLDS	3430653	N/A	2013/11/21	Malik Kai Morgan John
Total Phosphorus (Colourimetric)	LACH/P	3433188	2013/11/22	2013/11/23	Viorica Rotaru
Low Level Total Suspended Solids	SLDS	3429375	N/A	2013/11/20	Niki Shah
Turbidity	TURB	3429969	N/A	2013/11/20	Lemeneh Addis

Maxxam ID TY6378
Sample ID MW02-I
Matrix Water

Collected 2013/11/19
Shipped
Received 2013/11/19

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3429442	N/A	2013/11/20	Surinder Rai
Anions	IC	3430674	N/A	2013/11/21	Fari Dehdezi
Conductivity	COND	3429443	N/A	2013/11/20	Surinder Rai
Free (WAD) Cyanide	TECH/CN	3433065	N/A	2013/11/23	Xuanhong Qiu
Fluoride	F	3429448	2013/11/20	2013/11/20	Surinder Rai
Hardness (calculated as CaCO3)		3427988	N/A	2013/11/26	Automated Statchk
Mercury in Water by CVAA	CVAA	3434873	2013/11/25	2013/11/26	Magdalena Carlos
Dissolved Metals by ICPMS	ICP/MS	3435787	N/A	2013/11/26	Hua Ren
Total Metals Analysis by ICPMS	ICP/MS	3434531	N/A	2013/11/25	Prempal Bhatti
Total Ammonia-N	LACH/NH4	3432309	N/A	2013/11/25	Charles Opoku-Ware
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	3429504	N/A	2013/11/21	Sandeep Singh
pH	PH	3429440	N/A	2013/11/20	Surinder Rai
Phenols (4AAP)	TECH/PHEN	3430192	N/A	2013/11/22	Louise Harding
Orthophosphate	AC	3430335	N/A	2013/11/21	Alina Dobreanu

Test Summary

Sulphide	ISE/S	3429297	N/A	2013/11/20	Neil Dassanayake
Total Dissolved Solids	SLDS	3430653	N/A	2013/11/21	Malik Kai Morgan John
Total Phosphorus (Colourimetric)	LACH/P	3433188	2013/11/22	2013/11/23	Viorica Rotaru
Low Level Total Suspended Solids	SLDS	3429375	N/A	2013/11/20	Niki Shah
Turbidity	TURB	3429969	N/A	2013/11/20	Lemeneh Addis

Maxxam ID TY6378 Dup
Sample ID MW02-I
Matrix Water

Collected 2013/11/19
Shipped
Received 2013/11/19

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Turbidity	TURB	3429969	N/A	2013/11/20	Lemeneh Addis

Maxxam ID TY6379
Sample ID MW02-D
Matrix Water

Collected 2013/11/19
Shipped
Received 2013/11/19

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3429442	N/A	2013/11/20	Surinder Rai
Anions	IC	3430674	N/A	2013/11/21	Fari Dehdezi
Conductivity	COND	3429443	N/A	2013/11/20	Surinder Rai
Free (WAD) Cyanide	TECH/CN	3433065	N/A	2013/11/23	Xuanhong Qiu
Fluoride	F	3429448	2013/11/20	2013/11/20	Surinder Rai
Hardness (calculated as CaCO3)		3427988	N/A	2013/11/26	Automated Statchk
Mercury in Water by CVAA	CVAA	3434873	2013/11/25	2013/11/26	Magdalena Carlos
Dissolved Metals by ICPMS	ICP/MS	3435787	N/A	2013/11/26	Hua Ren
Total Metals Analysis by ICPMS	ICP/MS	3434531	N/A	2013/11/26	Prempal Bhatti
Total Ammonia-N	LACH/NH4	3432309	N/A	2013/11/25	Charles Opoku-Ware
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	3429504	N/A	2013/11/21	Sandeep Singh
pH	PH	3429440	N/A	2013/11/20	Surinder Rai
Phenols (4AAP)	TECH/PHEN	3430192	N/A	2013/11/22	Louise Harding
Orthophosphate	AC	3430335	N/A	2013/11/21	Alina Dobreanu
Sulphide	ISE/S	3429297	N/A	2013/11/20	Neil Dassanayake
Total Dissolved Solids	SLDS	3430653	N/A	2013/11/21	Malik Kai Morgan John
Total Phosphorus (Colourimetric)	LACH/P	3433188	2013/11/22	2013/11/23	Viorica Rotaru
Low Level Total Suspended Solids	SLDS	3429375	N/A	2013/11/20	Niki Shah
Turbidity	TURB	3429969	N/A	2013/11/20	Lemeneh Addis

Maxxam ID TY6380
Sample ID DUP2
Matrix Water

Collected 2013/11/19
Shipped
Received 2013/11/19

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3429442	N/A	2013/11/20	Surinder Rai
Anions	IC	3430674	N/A	2013/11/21	Fari Dehdezi
Conductivity	COND	3429443	N/A	2013/11/20	Surinder Rai
Free (WAD) Cyanide	TECH/CN	3431427	N/A	2013/11/25	Xuanhong Qiu
Fluoride	F	3429448	2013/11/20	2013/11/20	Surinder Rai
Hardness (calculated as CaCO3)		3427988	N/A	2013/11/26	Automated Statchk
Mercury in Water by CVAA	CVAA	3434873	2013/11/25	2013/11/26	Magdalena Carlos
Dissolved Metals by ICPMS	ICP/MS	3435787	N/A	2013/11/26	Hua Ren
Total Metals Analysis by ICPMS	ICP/MS	3434531	N/A	2013/11/26	Prempal Bhatti
Total Ammonia-N	LACH/NH4	3432309	N/A	2013/11/25	Charles Opoku-Ware
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	3429504	N/A	2013/11/21	Sandeep Singh
pH	PH	3429440	N/A	2013/11/20	Surinder Rai
Phenols (4AAP)	TECH/PHEN	3430192	N/A	2013/11/22	Louise Harding

Test Summary

Orthophosphate	AC	3430335	N/A	2013/11/21	Alina Dobreanu
Sulphide	ISE/S	3429297	N/A	2013/11/20	Neil Dassanayake
Total Dissolved Solids	SLDS	3430653	N/A	2013/11/21	Malik Kai Morgan John
Total Phosphorus (Colourimetric)	LACH/P	3433188	2013/11/22	2013/11/23	Viorica Rotaru
Low Level Total Suspended Solids	SLDS	3429375	N/A	2013/11/20	Niki Shah
Turbidity	TURB	3429969	N/A	2013/11/20	Lemeneh Addis

Maxxam ID	TY6380 Dup	**Collected**	2013/11/19
Sample ID	DUP2	**Shipped**	
Matrix	Water	**Received**	2013/11/19

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Phenols (4AAP)	TECH/PHEN	3430192	N/A	2013/11/22	Louise Harding

Package 1	5.0°C
Package 2	7.0°C

Each temperature is the average of up to three cooler temperatures taken at receipt

GENERAL COMMENTS

Anions Analysis: Due to the sample matrix, some of the samples required dilution. Detection limits were adjusted accordingly.

Sample TY6375-01: Metal analysis:Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.

Sample TY6379-01: Metal analysis:Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.

Results relate only to the items tested.

Golder Associates Ltd
Attention: Josip Balaban
Client Project #: 021-1228
P.O. #:
Site Location: TANSLEY QUARRY

Quality Assurance Report

Maxxam Job Number: MB3J9927

QA/QC Batch Num	Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
3429297	NYS	Matrix Spike	Sulphide	2013/11/20		89	%	80 - 120
		Spiked Blank	Sulphide	2013/11/20		89	%	80 - 120
		Method Blank	Sulphide	2013/11/20	<0.020		mg/L	
		RPD	Sulphide	2013/11/20	NC		%	20
3429375	NS1	QC Standard	Total Suspended Solids	2013/11/20		98	%	85 - 115
		Method Blank	Total Suspended Solids	2013/11/20	<1		mg/L	
		RPD	Total Suspended Solids	2013/11/20	5.6		%	25
3429442	SAU	Spiked Blank	Alkalinity (Total as CaCO3)	2013/11/20		96	%	85 - 115
		Method Blank	Alkalinity (Total as CaCO3)	2013/11/20	1.6, RDL=1.0		mg/L	
		RPD [TY6376-01]	Alkalinity (Total as CaCO3)	2013/11/20	0.4		%	25
3429443	SAU	Spiked Blank	Conductivity	2013/11/20		99	%	85 - 115
		Method Blank	Conductivity	2013/11/20	<1.0		umho/cm	
		RPD [TY6376-01]	Conductivity	2013/11/20	2.5		%	25
3429448	SAU	Matrix Spike [TY6376-01]	Fluoride (F-)	2013/11/20		98	%	80 - 120
		Spiked Blank	Fluoride (F-)	2013/11/20		97	%	80 - 120
		Method Blank	Fluoride (F-)	2013/11/20	<0.10		mg/L	
		RPD [TY6376-01]	Fluoride (F-)	2013/11/20	NC		%	20
3429504	SS4	Matrix Spike	Nitrite (N)	2013/11/21		103	%	80 - 120
			Nitrate (N)	2013/11/21		NC	%	80 - 120
		Spiked Blank	Nitrite (N)	2013/11/21		104	%	80 - 120
			Nitrate (N)	2013/11/21		98	%	80 - 120
		Method Blank	Nitrite (N)	2013/11/21	<0.010		mg/L	
			Nitrate (N)	2013/11/21	<0.10		mg/L	
		RPD	Nitrite (N)	2013/11/21	NC		%	25
			Nitrate (N)	2013/11/21	0.2		%	25
3429969	L_A	QC Standard	Turbidity	2013/11/20		103	%	85 - 115
		Method Blank	Turbidity	2013/11/20	<0.2		NTU	
		RPD [TY6378-01]	Turbidity	2013/11/20	3.4		%	20
3430192	LHA	Matrix Spike [TY6380-08]	Phenols-4AAP	2013/11/22		107	%	80 - 120
		Spiked Blank	Phenols-4AAP	2013/11/22		105	%	85 - 115
		Method Blank	Phenols-4AAP	2013/11/22	<0.0010		mg/L	
		RPD [TY6380-08]	Phenols-4AAP	2013/11/22	NC		%	25
3430335	ADB	Matrix Spike	Orthophosphate (P)	2013/11/21		100	%	75 - 125
		Spiked Blank	Orthophosphate (P)	2013/11/21		98	%	80 - 120
		Method Blank	Orthophosphate (P)	2013/11/21	<0.010		mg/L	
		RPD	Orthophosphate (P)	2013/11/21	NC		%	25
3430653	MMJ	QC Standard	Total Dissolved Solids	2013/11/21		97	%	90 - 110
		Method Blank	Total Dissolved Solids	2013/11/21	<10		mg/L	
		RPD	Total Dissolved Solids	2013/11/21	3.7		%	25
3430674	FD	Matrix Spike [TY6376-01]	Dissolved Chloride (Cl)	2013/11/21		98	%	80 - 120
			Dissolved Bromide (Br-)	2013/11/21		96	%	80 - 120
			Dissolved Sulphate (SO4)	2013/11/21		99	%	80 - 120
		Spiked Blank	Dissolved Chloride (Cl)	2013/11/21		99	%	80 - 120
			Dissolved Bromide (Br-)	2013/11/21		95	%	80 - 120
			Dissolved Sulphate (SO4)	2013/11/21		99	%	80 - 120
		Method Blank	Dissolved Chloride (Cl)	2013/11/21	<1.0		mg/L	
			Dissolved Bromide (Br-)	2013/11/21	<1.0		mg/L	
			Dissolved Sulphate (SO4)	2013/11/21	<1.0		mg/L	
		RPD [TY6376-01]	Dissolved Chloride (Cl)	2013/11/21	1.8		%	20
			Dissolved Bromide (Br-)	2013/11/21	NC		%	20
			Dissolved Sulphate (SO4)	2013/11/21	0.6		%	20
3431427	XQI	Matrix Spike	Free Cyanide	2013/11/25		102	%	80 - 120

Quality Assurance Report (Continued)

Maxxam Job Number: MB3J9927

QA/QC Batch Num	Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
3431427	XQI	Spiked Blank	Free Cyanide	2013/11/25		101	%	80 - 120
		Method Blank	Free Cyanide	2013/11/25	<0.0020		mg/L	
		RPD	Free Cyanide	2013/11/25	NC		%	20
3432309	COP	Matrix Spike	Total Ammonia-N	2013/11/25		100	%	80 - 120
		Spiked Blank	Total Ammonia-N	2013/11/25		96	%	85 - 115
		Method Blank	Total Ammonia-N	2013/11/25	<0.050		mg/L	
		RPD	Total Ammonia-N	2013/11/25	0.2		%	20
3433065	XQI	Matrix Spike	Free Cyanide	2013/11/23		104	%	80 - 120
		Spiked Blank	Free Cyanide	2013/11/23		101	%	80 - 120
		Method Blank	Free Cyanide	2013/11/23	<0.0020		mg/L	
		RPD	Free Cyanide	2013/11/23	NC		%	20
3433188	VRO	Matrix Spike	Total Phosphorus	2013/11/23		91	%	80 - 120
		QC Standard	Total Phosphorus	2013/11/23		102	%	80 - 120
		Spiked Blank	Total Phosphorus	2013/11/23		101	%	80 - 120
		Method Blank	Total Phosphorus	2013/11/23	0.023, RDL=0.020		mg/L	
		RPD	Total Phosphorus	2013/11/23	2.3		%	20
3434531	PBA	Matrix Spike	Total Aluminum (Al)	2013/11/25		NC	%	80 - 120
			Total Antimony (Sb)	2013/11/25		113	%	80 - 120
			Total Arsenic (As)	2013/11/25		106	%	80 - 120
			Total Barium (Ba)	2013/11/25		104	%	80 - 120
			Total Beryllium (Be)	2013/11/25		107	%	80 - 120
			Total Bismuth (Bi)	2013/11/25		103	%	80 - 120
			Total Boron (B)	2013/11/25		109	%	80 - 120
			Total Cadmium (Cd)	2013/11/25		109	%	80 - 120
			Total Calcium (Ca)	2013/11/25		NC	%	80 - 120
			Total Chromium (Cr)	2013/11/25		108	%	80 - 120
			Total Cobalt (Co)	2013/11/25		106	%	80 - 120
			Total Copper (Cu)	2013/11/25		102	%	80 - 120
			Total Iron (Fe)	2013/11/25		106	%	80 - 120
			Total Lead (Pb)	2013/11/25		105	%	80 - 120
			Total Magnesium (Mg)	2013/11/25		106	%	80 - 120
			Total Manganese (Mn)	2013/11/25		107	%	80 - 120
			Total Molybdenum (Mo)	2013/11/25		111	%	80 - 120
			Total Nickel (Ni)	2013/11/25		104	%	80 - 120
			Total Phosphorus (P)	2013/11/25		105	%	80 - 120
			Total Potassium (K)	2013/11/25		98	%	80 - 120
			Total Silicon (Si)	2013/11/25		104	%	80 - 120
			Total Selenium (Se)	2013/11/25		106	%	80 - 120
			Total Silver (Ag)	2013/11/25		109	%	80 - 120
			Total Sodium (Na)	2013/11/25		107	%	80 - 120
			Total Strontium (Sr)	2013/11/25		107	%	80 - 120
			Total Thallium (Tl)	2013/11/25		106	%	80 - 120
			Total Tin (Sn)	2013/11/25		110	%	80 - 120
			Total Titanium (Ti)	2013/11/25		104	%	80 - 120
			Total Uranium (U)	2013/11/25		108	%	80 - 120
			Total Vanadium (V)	2013/11/25		107	%	80 - 120
			Total Zinc (Zn)	2013/11/25		105	%	80 - 120
		Spiked Blank	Total Aluminum (Al)	2013/11/25		110	%	80 - 120
			Total Antimony (Sb)	2013/11/25		109	%	80 - 120
			Total Arsenic (As)	2013/11/25		106	%	80 - 120
			Total Barium (Ba)	2013/11/25		104	%	80 - 120
			Total Beryllium (Be)	2013/11/25		106	%	80 - 120
			Total Bismuth (Bi)	2013/11/25		101	%	80 - 120
			Total Boron (B)	2013/11/25		109	%	80 - 120
			Total Cadmium (Cd)	2013/11/25		107	%	80 - 120

Quality Assurance Report (Continued)

Maxxam Job Number: MB3J9927

QA/QC Batch Num	Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
3434531	PBA	Spiked Blank	Total Calcium (Ca)	2013/11/25		108	%	80 - 120
			Total Chromium (Cr)	2013/11/25		109	%	80 - 120
			Total Cobalt (Co)	2013/11/25		108	%	80 - 120
			Total Copper (Cu)	2013/11/25		105	%	80 - 120
			Total Iron (Fe)	2013/11/25		107	%	80 - 120
			Total Lead (Pb)	2013/11/25		104	%	80 - 120
			Total Magnesium (Mg)	2013/11/25		109	%	80 - 120
			Total Manganese (Mn)	2013/11/25		109	%	80 - 120
			Total Molybdenum (Mo)	2013/11/25		108	%	80 - 120
			Total Nickel (Ni)	2013/11/25		106	%	80 - 120
			Total Phosphorus (P)	2013/11/25		110	%	80 - 120
			Total Potassium (K)	2013/11/25		99	%	80 - 120
			Total Silicon (Si)	2013/11/25		103	%	80 - 120
			Total Selenium (Se)	2013/11/25		108	%	80 - 120
			Total Silver (Ag)	2013/11/25		107	%	80 - 120
			Total Sodium (Na)	2013/11/25		108	%	80 - 120
			Total Strontium (Sr)	2013/11/25		109	%	80 - 120
			Total Thallium (Tl)	2013/11/25		104	%	80 - 120
			Total Tin (Sn)	2013/11/25		106	%	80 - 120
			Total Titanium (Ti)	2013/11/25		105	%	80 - 120
			Total Uranium (U)	2013/11/25		106	%	80 - 120
			Total Vanadium (V)	2013/11/25		107	%	80 - 120
			Total Zinc (Zn)	2013/11/25		109	%	80 - 120
		Method Blank	Total Aluminum (Al)	2013/11/25	<5.0		ug/L	
			Total Antimony (Sb)	2013/11/25	<0.50		ug/L	
			Total Arsenic (As)	2013/11/25	<1.0		ug/L	
			Total Barium (Ba)	2013/11/25	<2.0		ug/L	
			Total Beryllium (Be)	2013/11/25	<0.50		ug/L	
			Total Bismuth (Bi)	2013/11/25	<1.0		ug/L	
			Total Boron (B)	2013/11/25	<10		ug/L	
			Total Cadmium (Cd)	2013/11/25	0.12, RDL=0.10		ug/L	
			Total Calcium (Ca)	2013/11/25	<200		ug/L	
			Total Chromium (Cr)	2013/11/25	<5.0		ug/L	
			Total Cobalt (Co)	2013/11/25	<0.50		ug/L	
			Total Copper (Cu)	2013/11/25	<1.0		ug/L	
			Total Iron (Fe)	2013/11/25	<100		ug/L	
			Total Lead (Pb)	2013/11/25	<0.50		ug/L	
			Total Magnesium (Mg)	2013/11/25	<50		ug/L	
			Total Manganese (Mn)	2013/11/25	<2.0		ug/L	
			Total Molybdenum (Mo)	2013/11/25	<0.50		ug/L	
			Total Nickel (Ni)	2013/11/25	<1.0		ug/L	
			Total Phosphorus (P)	2013/11/25	<100		ug/L	
			Total Potassium (K)	2013/11/25	<200		ug/L	
			Total Silicon (Si)	2013/11/25	<50		ug/L	
			Total Selenium (Se)	2013/11/25	<2.0		ug/L	
			Total Silver (Ag)	2013/11/25	<0.10		ug/L	
			Total Sodium (Na)	2013/11/25	<100		ug/L	
			Total Strontium (Sr)	2013/11/25	<1.0		ug/L	
			Total Thallium (Tl)	2013/11/25	<0.050		ug/L	
			Total Tin (Sn)	2013/11/25	<1.0		ug/L	
			Total Titanium (Ti)	2013/11/25	<5.0		ug/L	
			Total Uranium (U)	2013/11/25	<0.10		ug/L	
			Total Vanadium (V)	2013/11/25	<0.50		ug/L	
			Total Zinc (Zn)	2013/11/25	<5.0		ug/L	
		RPD	Total Aluminum (Al)	2013/11/25	4.1		%	20

Quality Assurance Report (Continued)

Maxxam Job Number: MB3J9927

QA/QC Batch Num	Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
3434531	PBA	RPD	Total Arsenic (As)	2013/11/25	NC		%	20
			Total Calcium (Ca)	2013/11/25	2.7		%	20
			Total Copper (Cu)	2013/11/25	NC		%	20
			Total Iron (Fe)	2013/11/25	7.9		%	20
			Total Lead (Pb)	2013/11/25	NC		%	20
			Total Magnesium (Mg)	2013/11/25	3.4		%	20
			Total Nickel (Ni)	2013/11/25	NC		%	20
			Total Potassium (K)	2013/11/25	7.9		%	20
			Total Selenium (Se)	2013/11/25	NC		%	20
			Total Sodium (Na)	2013/11/25	2.6		%	20
			Total Zinc (Zn)	2013/11/25	2.4		%	20
3434873	MC	Matrix Spike [TY6376-09]	Mercury (Hg)	2013/11/26		103	%	80 - 120
		Spiked Blank	Mercury (Hg)	2013/11/26		101	%	80 - 120
		Method Blank	Mercury (Hg)	2013/11/26	<0.00010		mg/L	
		RPD [TY6376-09]	Mercury (Hg)	2013/11/26	NC		%	20
3435787	HRE	Matrix Spike [TY6376-05]	Dissolved Aluminum (Al)	2013/11/26		103	%	80 - 120
			Dissolved Antimony (Sb)	2013/11/26		108	%	80 - 120
			Dissolved Arsenic (As)	2013/11/26		103	%	80 - 120
			Dissolved Barium (Ba)	2013/11/26		101	%	80 - 120
			Dissolved Beryllium (Be)	2013/11/26		111	%	80 - 120
			Dissolved Bismuth (Bi)	2013/11/26		101	%	80 - 120
			Dissolved Boron (B)	2013/11/26		110	%	80 - 120
			Dissolved Cadmium (Cd)	2013/11/26		106	%	80 - 120
			Dissolved Calcium (Ca)	2013/11/26		NC	%	80 - 120
			Dissolved Chromium (Cr)	2013/11/26		101	%	80 - 120
			Dissolved Cobalt (Co)	2013/11/26		100	%	80 - 120
			Dissolved Copper (Cu)	2013/11/26		98	%	80 - 120
			Dissolved Iron (Fe)	2013/11/26		100	%	80 - 120
			Dissolved Lead (Pb)	2013/11/26		101	%	80 - 120
			Dissolved Magnesium (Mg)	2013/11/26		NC	%	80 - 120
			Dissolved Manganese (Mn)	2013/11/26		101	%	80 - 120
			Dissolved Molybdenum (Mo)	2013/11/26		107	%	80 - 120
			Dissolved Nickel (Ni)	2013/11/26		100	%	80 - 120
			Dissolved Phosphorus (P)	2013/11/26		106	%	80 - 120
			Dissolved Potassium (K)	2013/11/26		100	%	80 - 120
			Dissolved Selenium (Se)	2013/11/26		103	%	80 - 120
			Dissolved Silicon (Si)	2013/11/26		102	%	80 - 120
			Dissolved Silver (Ag)	2013/11/26		103	%	80 - 120
			Dissolved Sodium (Na)	2013/11/26		NC	%	80 - 120
			Dissolved Strontium (Sr)	2013/11/26		NC	%	80 - 120
			Dissolved Thallium (Tl)	2013/11/26		101	%	80 - 120
			Dissolved Tin (Sn)	2013/11/26		106	%	80 - 120
			Dissolved Titanium (Ti)	2013/11/26		101	%	80 - 120
			Dissolved Uranium (U)	2013/11/26		105	%	80 - 120
			Dissolved Vanadium (V)	2013/11/26		103	%	80 - 120
			Dissolved Zinc (Zn)	2013/11/26		100	%	80 - 120
		Spiked Blank	Dissolved Aluminum (Al)	2013/11/26		97	%	80 - 120
			Dissolved Antimony (Sb)	2013/11/26		99	%	80 - 120
			Dissolved Arsenic (As)	2013/11/26		93	%	80 - 120
			Dissolved Barium (Ba)	2013/11/26		96	%	80 - 120
			Dissolved Beryllium (Be)	2013/11/26		105	%	80 - 120
			Dissolved Bismuth (Bi)	2013/11/26		95	%	80 - 120
			Dissolved Boron (B)	2013/11/26		104	%	80 - 120

Quality Assurance Report (Continued)

Maxxam Job Number: MB3J9927

QA/QC Batch Num	Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
3435787	HRE	Spiked Blank	Dissolved Cadmium (Cd)	2013/11/26		98	%	80 - 120
			Dissolved Calcium (Ca)	2013/11/26		93	%	80 - 120
			Dissolved Chromium (Cr)	2013/11/26		94	%	80 - 120
			Dissolved Cobalt (Co)	2013/11/26		95	%	80 - 120
			Dissolved Copper (Cu)	2013/11/26		93	%	80 - 120
			Dissolved Iron (Fe)	2013/11/26		95	%	80 - 120
			Dissolved Lead (Pb)	2013/11/26		95	%	80 - 120
			Dissolved Magnesium (Mg)	2013/11/26		97	%	80 - 120
			Dissolved Manganese (Mn)	2013/11/26		96	%	80 - 120
			Dissolved Molybdenum (Mo)	2013/11/26		96	%	80 - 120
			Dissolved Nickel (Ni)	2013/11/26		96	%	80 - 120
			Dissolved Phosphorus (P)	2013/11/26		97	%	80 - 120
			Dissolved Potassium (K)	2013/11/26		94	%	80 - 120
			Dissolved Selenium (Se)	2013/11/26		94	%	80 - 120
			Dissolved Silicon (Si)	2013/11/26		97	%	80 - 120
			Dissolved Silver (Ag)	2013/11/26		95	%	80 - 120
			Dissolved Sodium (Na)	2013/11/26		96	%	80 - 120
			Dissolved Strontium (Sr)	2013/11/26		96	%	80 - 120
			Dissolved Thallium (Tl)	2013/11/26		94	%	80 - 120
			Dissolved Tin (Sn)	2013/11/26		99	%	80 - 120
			Dissolved Titanium (Ti)	2013/11/26		96	%	80 - 120
			Dissolved Uranium (U)	2013/11/26		97	%	80 - 120
			Dissolved Vanadium (V)	2013/11/26		95	%	80 - 120
			Dissolved Zinc (Zn)	2013/11/26		95	%	80 - 120
		Method Blank	Dissolved Aluminum (Al)	2013/11/26	<5.0		ug/L	
			Dissolved Antimony (Sb)	2013/11/26	<0.50		ug/L	
			Dissolved Arsenic (As)	2013/11/26	<1.0		ug/L	
			Dissolved Barium (Ba)	2013/11/26	<2.0		ug/L	
			Dissolved Beryllium (Be)	2013/11/26	<0.50		ug/L	
			Dissolved Bismuth (Bi)	2013/11/26	<1.0		ug/L	
			Dissolved Boron (B)	2013/11/26	<10		ug/L	
			Dissolved Cadmium (Cd)	2013/11/26	<0.10		ug/L	
			Dissolved Calcium (Ca)	2013/11/26	<200		ug/L	
			Dissolved Chromium (Cr)	2013/11/26	<5.0		ug/L	
			Dissolved Cobalt (Co)	2013/11/26	<0.50		ug/L	
			Dissolved Copper (Cu)	2013/11/26	<1.0		ug/L	
			Dissolved Iron (Fe)	2013/11/26	<100		ug/L	
			Dissolved Lead (Pb)	2013/11/26	<0.50		ug/L	
			Dissolved Magnesium (Mg)	2013/11/26	<50		ug/L	
			Dissolved Manganese (Mn)	2013/11/26	<2.0		ug/L	
			Dissolved Molybdenum (Mo)	2013/11/26	<0.50		ug/L	
			Dissolved Nickel (Ni)	2013/11/26	<1.0		ug/L	
			Dissolved Phosphorus (P)	2013/11/26	<100		ug/L	
			Dissolved Potassium (K)	2013/11/26	<200		ug/L	
			Dissolved Selenium (Se)	2013/11/26	<2.0		ug/L	
			Dissolved Silicon (Si)	2013/11/26	<50		ug/L	
			Dissolved Silver (Ag)	2013/11/26	<0.10		ug/L	
			Dissolved Sodium (Na)	2013/11/26	<100		ug/L	
			Dissolved Strontium (Sr)	2013/11/26	<1.0		ug/L	
			Dissolved Thallium (Tl)	2013/11/26	<0.050		ug/L	
			Dissolved Tin (Sn)	2013/11/26	<1.0		ug/L	
			Dissolved Titanium (Ti)	2013/11/26	<5.0		ug/L	
			Dissolved Uranium (U)	2013/11/26	<0.10		ug/L	
			Dissolved Vanadium (V)	2013/11/26	<0.50		ug/L	
			Dissolved Zinc (Zn)	2013/11/26	<5.0		ug/L	

Golder Associates Ltd
Attention: Josip Balaban
Client Project #: 021-1228
P.O. #:
Site Location: TANSLEY QUARRY

Quality Assurance Report (Continued)

Maxxam Job Number: MB3J9927

QA/QC Batch Num	Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
3435787	HRE	RPD [TY6376-05]	Dissolved Aluminum (Al)	2013/11/26	NC		%	20
			Dissolved Antimony (Sb)	2013/11/26	NC		%	20
			Dissolved Arsenic (As)	2013/11/26	1.2		%	20
			Dissolved Barium (Ba)	2013/11/26	1.1		%	20
			Dissolved Beryllium (Be)	2013/11/26	NC		%	20
			Dissolved Bismuth (Bi)	2013/11/26	NC		%	20
			Dissolved Boron (B)	2013/11/26	2.6		%	20
			Dissolved Cadmium (Cd)	2013/11/26	NC		%	20
			Dissolved Calcium (Ca)	2013/11/26	1.2		%	20
			Dissolved Chromium (Cr)	2013/11/26	NC		%	20
			Dissolved Cobalt (Co)	2013/11/26	NC		%	20
			Dissolved Copper (Cu)	2013/11/26	NC		%	20
			Dissolved Iron (Fe)	2013/11/26	0.2		%	20
			Dissolved Lead (Pb)	2013/11/26	NC		%	20
			Dissolved Magnesium (Mg)	2013/11/26	0.6		%	20
			Dissolved Manganese (Mn)	2013/11/26	2.7		%	20
			Dissolved Molybdenum (Mo)	2013/11/26	NC		%	20
			Dissolved Nickel (Ni)	2013/11/26	NC		%	20
			Dissolved Phosphorus (P)	2013/11/26	NC		%	20
			Dissolved Potassium (K)	2013/11/26	0.3		%	20
			Dissolved Selenium (Se)	2013/11/26	NC		%	20
			Dissolved Silicon (Si)	2013/11/26	0.9		%	20
			Dissolved Silver (Ag)	2013/11/26	NC		%	20
			Dissolved Sodium (Na)	2013/11/26	1.5		%	20
			Dissolved Strontium (Sr)	2013/11/26	0.6		%	20
			Dissolved Thallium (Tl)	2013/11/26	NC		%	20
			Dissolved Tin (Sn)	2013/11/26	NC		%	20
			Dissolved Titanium (Ti)	2013/11/26	NC		%	20
			Dissolved Uranium (U)	2013/11/26	0.1		%	20
			Dissolved Vanadium (V)	2013/11/26	NC		%	20
			Dissolved Zinc (Zn)	2013/11/26	NC		%	20

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.
Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.
QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.
Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.
Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.
NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spiked amount was not sufficiently significant to permit a reliable recovery calculation.
NC (RPD): The RPD was not calculated. The level of analyte detected in the parent sample and its duplicate was not sufficiently significant to permit a reliable calculation.

Validation Signature Page

Maxxam Job #: B3J9927

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

Eva

ASSOCIATION OF THE CHEMICAL PROFESSION OF ONTARIO
CHARTERED
Eva Pranjic
CHEMIST

Ewa Pranjic, M.Sc., C.Chem, Scientific Specialist

==
Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Your Project #: 021-1228
Site#: 021-1228
Site Location: TANSLEY QUARRY
Your C.O.C. #: 44283301, 442833-01-01

Attention: Josip Balaban
Golder Associates Ltd
6925 Century Ave
Suite 100
Mississauga, ON
L5N 7K2

Report Date: 2014/01/20
Report #: R2781821
Version: 4R

CERTIFICATE OF ANALYSIS – REVISED REPORT

MAXXAM JOB #: B3K0774
Received: 2013/11/20, 16:40

Sample Matrix: Water
Samples Received: 5

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Method Reference
Alkalinity	5	N/A	2013/11/21	CAM SOP-00448	SM 2320B
Anions	5	N/A	2013/11/25	CAM SOP-00435	SM 4110B
Conductivity	5	N/A	2013/11/21	CAM SOP-00414	SM 2510
Free (WAD) Cyanide	5	N/A	2013/11/23	CAM SOP-00457	Ontario MOE CN-E3015
Fluoride	5	2013/11/21	2013/11/21	CAM SOP-00449	APHA 4500FC
Hardness (calculated as CaCO3)	5	N/A	2013/11/26	CAM SOP 00102	SM 2340 B
Mercury in Water by CVAA	5	2013/11/25	2013/11/26	CAM SOP-00453	SW-846 7470A
Dissolved Metals by ICPMS	5	N/A	2013/11/26	CAM SOP-00447	EPA 6020
Total Metals Analysis by ICPMS	2	N/A	2013/11/25	CAM SOP-00447	EPA 6020
Total Metals Analysis by ICPMS	3	N/A	2013/11/26	CAM SOP-00447	EPA 6020
Total Ammonia-N	5	N/A	2013/11/22	CAM SOP-00441	US GS I-2522-90
Nitrate (NO3) and Nitrite (NO2) in Water (1)	1	N/A	2013/11/22	CAM SOP-00440	SM 4500 NO3I/NO2B
Nitrate (NO3) and Nitrite (NO2) in Water (1)	4	N/A	2013/11/26	CAM SOP-00440	SM 4500 NO3I/NO2B
pH	5	N/A	2013/11/21	CAM SOP-00413	SM 4500H+ B
Phenols (4AAP)	5	N/A	2013/11/25	CAM SOP-00444	MOE ROPHEN-E3179
Orthophosphate	5	N/A	2013/11/22	CAM SOP-00461	EPA 365.1
Sulphide	5	N/A	2013/11/21	CAM SOP-00455	SM 4500-S G
Total Dissolved Solids	5	N/A	2013/11/21	CAM SOP-00428	APHA 2540C
Total Phosphorus (Colourimetric)	2	2013/11/21	2013/11/23	CAM SOP-00407	APHA 4500 P,B,F
Total Phosphorus (Colourimetric)	3	2013/11/22	2013/11/23	CAM SOP-00407	SM 4500 P,B,F
Low Level Total Suspended Solids	5	N/A	2013/11/22	CAM SOP-00428	SM 2540D
Turbidity	5	N/A	2013/11/21	CAM SOP-00417	APHA 2130B

Remarks:

Maxxam Analytics has performed all analytical testing herein in accordance with ISO 17025 and the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act. All methodologies comply with this document and are validated for use in the laboratory. The methods and techniques employed in this analysis conform to the performance criteria (detection limits, accuracy and precision) as outlined in the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act. Reporting results to two significant figures at the RDL is to permit statistical evaluation and is not intended to be an indication of analytical precision.

The CWS PHC methods employed by Maxxam conform to all prescribed elements of the reference method and performance based elements have been validated. All modifications have been validated and proven equivalent following the 'Alberta Environment Draft Addenda to the CWS-PHC, Appendix 6, Validation of Alternate Methods'. Documentation is available upon request. Maxxam has made the following improvements to the CWS-PHC reference benchmark method: (i) Headspace for F1; and, (ii) Mechanical extraction for F2-F4. Note: F4G cannot be added to the C6 to C50 hydrocarbons. The extraction date for samples field preserved with methanol for F1 and Volatile Organic Compounds is considered to be the date sampled.

Maxxam Analytics is accredited for all specific parameters as required by Ontario Regulation 153/04. Maxxam Analytics is limited in liability to the actual cost of analysis unless otherwise agreed in writing. There is no other warranty expressed or implied. Samples will be retained at Maxxam Analytics for three weeks from receipt of data or as per contract.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
* Results relate only to the items tested.

(1) Values for calculated parameters may not appear to add up due to rounding of raw data and significant figures.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Antonella Brasil, Project Manager
Email: ABrasil@maxxam.ca
Phone# (905) 817-5817

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Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Total cover pages: 2

Maxxam Job #: B3K0774
Report Date: 2014/01/20

Golder Associates Ltd
Client Project #: 021-1228
Site Location: TANSLEY QUARRY
Sampler Initials: JB

RESULTS OF ANALYSES OF WATER

Maxxam ID		TZ0054			TZ0055			TZ0056		
Sampling Date		2013/11/20			2013/11/20			2013/11/20		
	Units	**MW03-O**	**RDL**	**QC Batch**	**MW03-D**	**RDL**	**QC Batch**	**MW11-I**	**RDL**	**QC Batch**
Calculated Parameters										
Hardness (CaCO3)	mg/L	920	1.0	3429143	5000	1.0	3429143	600	1.0	3429143
Inorganics										
Total Ammonia-N	mg/L	1.2	0.050	3431354	9.9	0.25	3431354	1.7	0.050	3431354
Conductivity	umho/cm	2000	1.0	3431125	23000	1.0	3431125	1400	1.0	3431125
Total Dissolved Solids	mg/L	1610	10	3431957	15300	10	3431957	912	10	3431957
Fluoride (F-)	mg/L	0.17	0.10	3431097	0.26	0.10	3431097	0.27	0.10	3431097
Free Cyanide	mg/L	<0.0020	0.0020	3433065	<0.0020	0.0020	3433065	<0.0020	0.0020	3433065
Orthophosphate (P)	mg/L	<0.010	0.010	3431975	<0.010	0.010	3431975	<0.010	0.010	3431975
pH	pH	7.80		3431109	7.15		3431109	7.82		3431109
Phenols-4AAP	mg/L	<0.0010	0.0010	3431487	0.0020	0.0010	3431487	<0.0010	0.0010	3431487
Total Phosphorus	mg/L	16	0.10	3433188	0.13	0.002	3431237	1.6	0.10	3433188
Total Suspended Solids	mg/L	24000	50	3431611	120	3	3431611	5900	20	3431611
Sulphide	mg/L	0.028	0.020	3431550	<0.020	0.020	3431550	<0.020	0.020	3431550
Turbidity	NTU	890	2	3431751	72	0.2	3431751	800	2	3431751
Alkalinity (Total as CaCO3)	mg/L	160	1.0	3431102	51	1.0	3431102	410	1.0	3431102
Nitrite (N)	mg/L	0.38	0.010	3431956	<0.010	0.010	3431956	0.20	0.010	3431956
Dissolved Chloride (Cl)	mg/L	82	5.0	3431958	7600	50	3431958	26	1.0	3431958
Nitrate (N)	mg/L	0.37	0.10	3431956	<0.10	0.10	3431956	<0.10	0.10	3431956
Nitrate + Nitrite	mg/L	0.76	0.10	3431956	<0.10	0.10	3431956	0.17	0.10	3431956
Dissolved Bromide (Br-)	mg/L	<5.0	5.0	3431958	98	10	3431958	<1.0	1.0	3431958
Dissolved Sulphate (SO4)	mg/L	890	5.0	3431958	1600	10	3431958	360	1.0	3431958

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

RESULTS OF ANALYSES OF WATER

Maxxam ID		TZ0056			TZ0057			TZ0058		
Sampling Date		2013/11/20			2013/11/20			2013/11/20		
	Units	**MW11-I Lab-Dup**	**RDL**	**QC Batch**	**MW11-S**	**RDL**	**QC Batch**	**MW11-DEEP**	**RDL**	**QC Batch**
Calculated Parameters										
Hardness (CaCO3)	mg/L		1.0	3429143	390	1.0	3429143	24000	1.0	3429143
Inorganics										
Total Ammonia-N	mg/L		0.050	3431354	0.082	0.050	3431354	31	0.50	3431354
Conductivity	umho/cm		1.0	3431125	740	1.0	3431125	86000	1.0	3431125
Total Dissolved Solids	mg/L		10	3431957	570	10	3431957	72300	10	3431957
Fluoride (F-)	mg/L		0.10	3431097	0.14	0.10	3431097	0.15	0.10	3431097
Free Cyanide	mg/L		0.0020	3433065	<0.0020	0.0020	3433065	<0.0020	0.0020	3433065
Orthophosphate (P)	mg/L		0.010	3431975	<0.010	0.010	3431975	<0.010	0.010	3431975
pH	pH			3431109	7.96		3431109	7.21		3431109
Phenols-4AAP	mg/L	<0.0010	0.0010	3431487	<0.0010	0.0010	3431487	0.0070	0.0010	3431487
Total Phosphorus	mg/L		0.10	3433188	7.7	0.10	3433188	0.17	0.005	3431237
Total Suspended Solids	mg/L		20	3431611	11000	30	3431611	170	5	3431611
Sulphide	mg/L		0.020	3431550	0.057	0.020	3431550	<0.020	0.020	3431550
Turbidity	NTU		2	3431751	4700	10	3431751	15	0.2	3431751
Alkalinity (Total as CaCO3)	mg/L		1.0	3431102	350	1.0	3431102	63	1.0	3431102
Nitrite (N)	mg/L		0.010	3431956	<0.010	0.010	3431199	<0.010	0.010	3431956
Dissolved Chloride (Cl)	mg/L		1.0	3431958	2.5	1.0	3431958	38000	500	3431958
Nitrate (N)	mg/L		0.10	3431956	<0.10	0.10	3431199	<0.10	0.10	3431956
Nitrate + Nitrite	mg/L		0.10	3431956	<0.10	0.10	3431199	<0.10	0.10	3431956
Dissolved Bromide (Br-)	mg/L		1.0	3431958	<1.0	1.0	3431958	460	100	3431958
Dissolved Sulphate (SO4)	mg/L		1.0	3431958	73	1.0	3431958	1600	100	3431958

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam Job #: B3K0774
Report Date: 2014/01/20

Golder Associates Ltd
Client Project #: 021-1228
Site Location: TANSLEY QUARRY
Sampler Initials: JB

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		TZ0054		
Sampling Date		2013/11/20		
	Units	**MW03-O**	**RDL**	**QC Batch**
Metals				
Mercury (Hg)	mg/L	<0.00010	0.00010	3434873
Dissolved Aluminum (Al)	ug/L	<5.0	5.0	3435787
Total Aluminum (Al)	ug/L	230000	250	3432622
Dissolved Antimony (Sb)	ug/L	<0.50	0.50	3435787
Total Antimony (Sb)	ug/L	<5.0	5.0	3432622
Dissolved Arsenic (As)	ug/L	4.2	1.0	3435787
Total Arsenic (As)	ug/L	190	10	3432622
Dissolved Barium (Ba)	ug/L	9.5	2.0	3435787
Total Barium (Ba)	ug/L	2100	20	3432622
Dissolved Beryllium (Be)	ug/L	<0.50	0.50	3435787
Total Beryllium (Be)	ug/L	12	5.0	3432622
Dissolved Bismuth (Bi)	ug/L	<1.0	1.0	3435787
Total Bismuth (Bi)	ug/L	<10	10	3432622
Dissolved Boron (B)	ug/L	1200	10	3435787
Total Boron (B)	ug/L	1800	100	3432622
Dissolved Cadmium (Cd)	ug/L	<0.10	0.10	3435787
Total Cadmium (Cd)	ug/L	7.9	1.0	3432622
Dissolved Calcium (Ca)	ug/L	160000	1000	3435787
Total Calcium (Ca)	ug/L	4700000	2000	3432622
Dissolved Chromium (Cr)	ug/L	<5.0	5.0	3435787
Total Chromium (Cr)	ug/L	480	50	3432622
Dissolved Cobalt (Co)	ug/L	<0.50	0.50	3435787
Total Cobalt (Co)	ug/L	240	10	3432622
Dissolved Copper (Cu)	ug/L	<2.0(1)	2.0	3435787
Total Copper (Cu)	ug/L	660	10	3432622
Dissolved Iron (Fe)	ug/L	620	100	3435787
Total Iron (Fe)	ug/L	510000	1000	3432622
Dissolved Lead (Pb)	ug/L	<0.50	0.50	3435787
Total Lead (Pb)	ug/L	270	5.0	3432622
Dissolved Magnesium (Mg)	ug/L	130000	50	3435787
Total Magnesium (Mg)	ug/L	710000	500	3432622
Dissolved Manganese (Mn)	ug/L	110	2.0	3435787
Total Manganese (Mn)	ug/L	35000	20	3432622
Dissolved Molybdenum (Mo)	ug/L	6.9	0.50	3435787

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
(1) - Metal analysis:Detection Limit was raised due to matrix interferences.

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		TZ0054		
Sampling Date		2013/11/20		
	Units	**MW03-O**	**RDL**	**QC Batch**
Total Molybdenum (Mo)	ug/L	31	5.0	3432622
Dissolved Nickel (Ni)	ug/L	<1.0	1.0	3435787
Total Nickel (Ni)	ug/L	410	20	3432622
Dissolved Phosphorus (P)	ug/L	<100	100	3435787
Total Phosphorus (P)	ug/L	36000	1000	3432622
Dissolved Potassium (K)	ug/L	9900	200	3435787
Total Potassium (K)	ug/L	73000	2000	3432622
Dissolved Selenium (Se)	ug/L	<2.0	2.0	3435787
Dissolved Silicon (Si)	ug/L	6400	50	3435787
Total Silicon (Si)	ug/L	310000	500	3432622
Total Selenium (Se)	ug/L	<20	20	3432622
Dissolved Silver (Ag)	ug/L	<0.10	0.10	3435787
Total Silver (Ag)	ug/L	1.4	1.0	3432622
Dissolved Sodium (Na)	ug/L	130000	100	3435787
Total Sodium (Na)	ug/L	310000	1000	3432622
Dissolved Strontium (Sr)	ug/L	11000	1.0	3435787
Total Strontium (Sr)	ug/L	23000	10	3432622
Dissolved Thallium (Tl)	ug/L	<0.050	0.050	3435787
Total Thallium (Tl)	ug/L	2.9	0.50	3432622
Dissolved Tin (Sn)	ug/L	<1.0	1.0	3435787
Total Tin (Sn)	ug/L	<10	10	3432622
Dissolved Titanium (Ti)	ug/L	<5.0	5.0	3435787
Total Titanium (Ti)	ug/L	7100	250	3432622
Dissolved Uranium (U)	ug/L	0.41	0.10	3435787
Total Uranium (U)	ug/L	29	1.0	3432622
Dissolved Vanadium (V)	ug/L	<0.50	0.50	3435787
Total Vanadium (V)	ug/L	500	5.0	3432622
Dissolved Zinc (Zn)	ug/L	<10(1)	10	3435787
Total Zinc (Zn)	ug/L	1500	50	3432622

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
(1) - Metal analysis:Detection Limit was raised due to matrix interferences.

Maxxam Job #: B3K0774
Report Date: 2014/01/20

Golder Associates Ltd
Client Project #: 021-1228
Site Location: TANSLEY QUARRY
Sampler Initials: JB

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		TZ0055			TZ0056		
Sampling Date		2013/11/20			2013/11/20		
	Units	**MW03-D**	**RDL**	**QC Batch**	**MW11-I**	**RDL**	**QC Batch**
Metals							
Mercury (Hg)	mg/L	<0.00010	0.00010	3434929	<0.00010	0.00010	3434873
Dissolved Aluminum (Al)	ug/L	<50	50	3435787	<5.0	5.0	3435787
Total Aluminum (Al)	ug/L	1400	50	3432622	18000	5.0	3432622
Dissolved Antimony (Sb)	ug/L	<5.0	5.0	3435787	<0.50	0.50	3435787
Total Antimony (Sb)	ug/L	<5.0	5.0	3432622	<0.50	0.50	3432622
Dissolved Arsenic (As)	ug/L	<10	10	3435787	7.2	1.0	3435787
Total Arsenic (As)	ug/L	<10	10	3432622	15	1.0	3432622
Dissolved Barium (Ba)	ug/L	21	20	3435787	24	2.0	3435787
Total Barium (Ba)	ug/L	61	20	3432622	130	2.0	3432622
Dissolved Beryllium (Be)	ug/L	<5.0	5.0	3435787	<0.50	0.50	3435787
Total Beryllium (Be)	ug/L	<5.0	5.0	3432622	0.93	0.50	3432622
Dissolved Bismuth (Bi)	ug/L	<10	10	3435787	<1.0	1.0	3435787
Total Bismuth (Bi)	ug/L	<10	10	3432622	<1.0	1.0	3432622
Dissolved Boron (B)	ug/L	5500	100	3435787	2600	10	3435787
Total Boron (B)	ug/L	5100	100	3432622	2400	10	3432622
Dissolved Cadmium (Cd)	ug/L	<1.0	1.0	3435787	<0.10	0.10	3435787
Total Cadmium (Cd)	ug/L	<1.0	1.0	3432622	0.21	0.10	3432622
Dissolved Calcium (Ca)	ug/L	1300000	2000	3435787	100000	1000	3435787
Total Calcium (Ca)	ug/L	1500000	2000	3432622	260000	1000	3432622
Dissolved Chromium (Cr)	ug/L	<50	50	3435787	<5.0	5.0	3435787
Total Chromium (Cr)	ug/L	<50	50	3432622	31	5.0	3432622
Dissolved Cobalt (Co)	ug/L	<5.0	5.0	3435787	<0.50	0.50	3435787
Total Cobalt (Co)	ug/L	<5.0	5.0	3432622	18	0.50	3432622
Dissolved Copper (Cu)	ug/L	<10	10	3435787	<1.0	1.0	3435787
Total Copper (Cu)	ug/L	<10	10	3432622	37	1.0	3432622
Dissolved Iron (Fe)	ug/L	3400	1000	3435787	1100	100	3435787
Total Iron (Fe)	ug/L	4800	1000	3432622	33000	100	3432622
Dissolved Lead (Pb)	ug/L	<5.0	5.0	3435787	<0.50	0.50	3435787
Total Lead (Pb)	ug/L	<5.0	5.0	3432622	9.1	0.50	3432622
Dissolved Magnesium (Mg)	ug/L	420000	500	3435787	84000	50	3435787
Total Magnesium (Mg)	ug/L	450000	500	3432622	100000	50	3432622
Dissolved Manganese (Mn)	ug/L	580	20	3435787	40	2.0	3435787
Total Manganese (Mn)	ug/L	770	20	3432622	1500	2.0	3432622
Dissolved Molybdenum (Mo)	ug/L	7.0	5.0	3435787	3.2	0.50	3435787
Total Molybdenum (Mo)	ug/L	7.6	5.0	3432622	4.0	0.50	3432622

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam Job #: B3K0774
Report Date: 2014/01/20

Golder Associates Ltd
Client Project #: 021-1228
Site Location: TANSLEY QUARRY
Sampler Initials: JB

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		TZ0055			TZ0056		
Sampling Date		2013/11/20			2013/11/20		
	Units	**MW03-D**	**RDL**	**QC Batch**	**MW11-I**	**RDL**	**QC Batch**
Dissolved Nickel (Ni)	ug/L	<10	10	3435787	<1.0	1.0	3435787
Total Nickel (Ni)	ug/L	<10	10	3432622	37	1.0	3432622
Dissolved Phosphorus (P)	ug/L	<1000	1000	3435787	<100	100	3435787
Total Phosphorus (P)	ug/L	<1000	1000	3432622	1300	100	3432622
Dissolved Potassium (K)	ug/L	82000	2000	3435787	21000	200	3435787
Total Potassium (K)	ug/L	88000	2000	3432622	25000	200	3432622
Dissolved Selenium (Se)	ug/L	<20	20	3435787	<2.0	2.0	3435787
Dissolved Silicon (Si)	ug/L	3300	500	3435787	7500	100	3435787
Total Silicon (Si)	ug/L	5800	500	3432622	32000	50	3432622
Total Selenium (Se)	ug/L	<40(1)	40	3432622	<2.0	2.0	3432622
Dissolved Silver (Ag)	ug/L	<1.0	1.0	3435787	<0.10	0.10	3435787
Total Silver (Ag)	ug/L	<1.0	1.0	3432622	<0.10	0.10	3432622
Dissolved Sodium (Na)	ug/L	3300000	1000	3435787	92000	100	3435787
Total Sodium (Na)	ug/L	3400000	1000	3432622	91000	100	3432622
Dissolved Strontium (Sr)	ug/L	31000	10	3435787	14000	1.0	3435787
Total Strontium (Sr)	ug/L	35000	10	3432622	15000	1.0	3432622
Dissolved Thallium (Tl)	ug/L	<0.50	0.50	3435787	<0.050	0.050	3435787
Total Thallium (Tl)	ug/L	<0.50	0.50	3432622	0.13	0.050	3432622
Dissolved Tin (Sn)	ug/L	<10	10	3435787	<1.0	1.0	3435787
Total Tin (Sn)	ug/L	<10	10	3432622	<1.0	1.0	3432622
Dissolved Titanium (Ti)	ug/L	<50	50	3435787	<5.0	5.0	3435787
Total Titanium (Ti)	ug/L	<50	50	3432622	330	5.0	3432622
Dissolved Uranium (U)	ug/L	<1.0	1.0	3435787	0.34	0.10	3435787
Total Uranium (U)	ug/L	<1.0	1.0	3432622	1.2	0.10	3432622
Dissolved Vanadium (V)	ug/L	<10	10	3435787	0.52	0.50	3435787
Total Vanadium (V)	ug/L	<10(1)	10	3432622	35	0.50	3432622
Dissolved Zinc (Zn)	ug/L	<50	50	3435787	<5.0	5.0	3435787
Total Zinc (Zn)	ug/L	90	50	3432622	86	5.0	3432622

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
(1) - Detection Limit was raised due to matrix interferences.

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		TZ0057		TZ0058		
Sampling Date		2013/11/20		2013/11/20		
	Units	**MW11-S**	**RDL**	**MW11-DEEP**	**RDL**	**QC Batch**
Metals						
Mercury (Hg)	mg/L	<0.00010	0.00010	<0.00010	0.00010	3434873
Dissolved Aluminum (Al)	ug/L	<5.0	5.0	<250	250	3435787
Total Aluminum (Al)	ug/L	180000	50	770	250	3432622
Dissolved Antimony (Sb)	ug/L	<0.50	0.50	<25	25	3435787
Total Antimony (Sb)	ug/L	<5.0	5.0	<25	25	3432622
Dissolved Arsenic (As)	ug/L	4.5	1.0	<50	50	3435787
Total Arsenic (As)	ug/L	79	10	<50	50	3432622
Dissolved Barium (Ba)	ug/L	52	2.0	130	100	3435787
Total Barium (Ba)	ug/L	3300	20	110	100	3432622
Dissolved Beryllium (Be)	ug/L	<0.50	0.50	<25	25	3435787
Total Beryllium (Be)	ug/L	9.8	5.0	<25	25	3432622
Dissolved Bismuth (Bi)	ug/L	<1.0	1.0	<50	50	3435787
Total Bismuth (Bi)	ug/L	<10	10	<50	50	3432622
Dissolved Boron (B)	ug/L	130	10	5500	500	3435787
Total Boron (B)	ug/L	690	100	4600	500	3432622
Dissolved Cadmium (Cd)	ug/L	<0.10	0.10	6.7	5.0	3435787
Total Cadmium (Cd)	ug/L	1.6	1.0	11	5.0	3432622
Dissolved Calcium (Ca)	ug/L	61000	200	6800000	10000	3435787
Total Calcium (Ca)	ug/L	1400000	2000	6100000	10000	3432622
Dissolved Chromium (Cr)	ug/L	<5.0	5.0	<250	250	3435787
Total Chromium (Cr)	ug/L	550	50	260	250	3432622
Dissolved Cobalt (Co)	ug/L	<0.50	0.50	<25	25	3435787
Total Cobalt (Co)	ug/L	170	5.0	<25	25	3432622
Dissolved Copper (Cu)	ug/L	<1.0	1.0	<50	50	3435787
Total Copper (Cu)	ug/L	480	10	<50	50	3432622
Dissolved Iron (Fe)	ug/L	510	100	7100	5000	3435787
Total Iron (Fe)	ug/L	320000	1000	<5000	5000	3432622
Dissolved Lead (Pb)	ug/L	<0.50	0.50	<25	25	3435787
Total Lead (Pb)	ug/L	130	5.0	<25	25	3432622
Dissolved Magnesium (Mg)	ug/L	57000	50	1800000	2500	3435787
Total Magnesium (Mg)	ug/L	230000	500	1600000	2500	3432622
Dissolved Manganese (Mn)	ug/L	62	2.0	3400	100	3435787
Total Manganese (Mn)	ug/L	14000	20	2800	100	3432622
Dissolved Molybdenum (Mo)	ug/L	3.1	0.50	63	25	3435787
Total Molybdenum (Mo)	ug/L	12	5.0	120	25	3432622

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		TZ0057		TZ0058		
Sampling Date		2013/11/20		2013/11/20		
	Units	**MW11-S**	**RDL**	**MW11-DEEP**	**RDL**	**QC Batch**
Dissolved Nickel (Ni)	ug/L	<1.0	1.0	250	50	3435787
Total Nickel (Ni)	ug/L	340	10	190	50	3432622
Dissolved Phosphorus (P)	ug/L	<100	100	<5000	5000	3435787
Total Phosphorus (P)	ug/L	9200	1000	<5000	5000	3432622
Dissolved Potassium (K)	ug/L	4000	200	260000	10000	3435787
Total Potassium (K)	ug/L	62000	2000	250000	10000	3432622
Dissolved Selenium (Se)	ug/L	<2.0	2.0	<100	100	3435787
Dissolved Silicon (Si)	ug/L	8600	100	<2500	2500	3435787
Total Silicon (Si)	ug/L	260000	500	3500	2500	3432622
Total Selenium (Se)	ug/L	<20	20	<100	100	3432622
Dissolved Silver (Ag)	ug/L	<0.10	0.10	<5.0	5.0	3435787
Total Silver (Ag)	ug/L	1.3	1.0	<5.0	5.0	3432622
Dissolved Sodium (Na)	ug/L	15000	100	16000000	5000	3435787
Total Sodium (Na)	ug/L	24000	1000	15000000	5000	3432622
Dissolved Strontium (Sr)	ug/L	1200	1.0	140000	50	3435787
Total Strontium (Sr)	ug/L	4000	10	130000	50	3432622
Dissolved Thallium (Tl)	ug/L	<0.050	0.050	<2.5	2.5	3435787
Total Thallium (Tl)	ug/L	2.0	0.50	<2.5	2.5	3432622
Dissolved Tin (Sn)	ug/L	<1.0	1.0	<50	50	3435787
Total Tin (Sn)	ug/L	<10	10	<50	50	3432622
Dissolved Titanium (Ti)	ug/L	<5.0	5.0	<250	250	3435787
Total Titanium (Ti)	ug/L	2900	50	<250	250	3432622
Dissolved Uranium (U)	ug/L	2.4	0.10	17	5.0	3435787
Total Uranium (U)	ug/L	14	1.0	29	5.0	3432622
Dissolved Vanadium (V)	ug/L	0.51	0.50	<50	50	3435787
Total Vanadium (V)	ug/L	340	5.0	<25	25	3432622
Dissolved Zinc (Zn)	ug/L	<5.0	5.0	360	250	3435787
Total Zinc (Zn)	ug/L	870	50	440	250	3432622

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam Job #: B3K0774
Report Date: 2014/01/20

Golder Associates Ltd
Client Project #: 021-1228
Site Location: TANSLEY QUARRY
Sampler Initials: JB

Test Summary

Maxxam ID TZ0054
Sample ID MW03-O
Matrix Water

Collected 2013/11/20
Shipped
Received 2013/11/20

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3431102	N/A	2013/11/21	Surinder Rai
Anions	IC	3431958	N/A	2013/11/25	Fari Dehdezi
Conductivity	COND	3431125	N/A	2013/11/21	Surinder Rai
Free (WAD) Cyanide	TECH/CN	3433065	N/A	2013/11/23	Xuanhong Qiu
Fluoride	F	3431097	2013/11/21	2013/11/21	Surinder Rai
Hardness (calculated as CaCO3)		3429143	N/A	2013/11/26	Automated Statchk
Mercury in Water by CVAA	CVAA	3434873	2013/11/25	2013/11/26	Magdalena Carlos
Dissolved Metals by ICPMS	ICP/MS	3435787	N/A	2013/11/26	Hua Ren
Total Metals Analysis by ICPMS	ICP/MS	3432622	N/A	2013/11/25	Hua Ren
Total Ammonia-N	LACH/NH4	3431354	N/A	2013/11/22	Charles Opoku-Ware
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	3431956	N/A	2013/11/26	Shobhana Bavisiya
pH	PH	3431109	N/A	2013/11/21	Surinder Rai
Phenols (4AAP)	TECH/PHEN	3431487	N/A	2013/11/25	Louise Harding
Orthophosphate	AC	3431975	N/A	2013/11/22	Alina Dobreanu
Sulphide	ISE/S	3431550	N/A	2013/11/21	Neil Dassanayake
Total Dissolved Solids	SLDS	3431957	N/A	2013/11/21	Niki Shah
Total Phosphorus (Colourimetric)	LACH/P	3433188	2013/11/22	2013/11/23	Viorica Rotaru
Low Level Total Suspended Solids	SLDS	3431611	N/A	2013/11/22	Subhashchandra Patel
Turbidity	TURB	3431751	N/A	2013/11/21	Lemeneh Addis

Maxxam ID TZ0055
Sample ID MW03-D
Matrix Water

Collected 2013/11/20
Shipped
Received 2013/11/20

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3431102	N/A	2013/11/21	Surinder Rai
Anions	IC	3431958	N/A	2013/11/25	Fari Dehdezi
Conductivity	COND	3431125	N/A	2013/11/21	Surinder Rai
Free (WAD) Cyanide	TECH/CN	3433065	N/A	2013/11/23	Xuanhong Qiu
Fluoride	F	3431097	2013/11/21	2013/11/21	Surinder Rai
Hardness (calculated as CaCO3)		3429143	N/A	2013/11/26	Automated Statchk
Mercury in Water by CVAA	CVAA	3434929	2013/11/25	2013/11/26	Magdalena Carlos
Dissolved Metals by ICPMS	ICP/MS	3435787	N/A	2013/11/26	Hua Ren

Test Summary

Total Metals Analysis by ICPMS	ICP/MS	3432622	N/A	2013/11/25	Hua Ren
Total Ammonia-N	LACH/NH4	3431354	N/A	2013/11/22	Charles Opoku-Ware
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	3431956	N/A	2013/11/26	Shobhana Bavisiya
pH	PH	3431109	N/A	2013/11/21	Surinder Rai
Phenols (4AAP)	TECH/PHEN	3431487	N/A	2013/11/25	Louise Harding
Orthophosphate	AC	3431975	N/A	2013/11/22	Alina Dobreanu
Sulphide	ISE/S	3431550	N/A	2013/11/21	Neil Dassanayake
Total Dissolved Solids	SLDS	3431957	N/A	2013/11/21	Niki Shah
Total Phosphorus (Colourimetric)	LACH/P	3431237	2013/11/21	2013/11/23	Viorica Rotaru
Low Level Total Suspended Solids	SLDS	3431611	N/A	2013/11/22	Subhashchandra Patel
Turbidity	TURB	3431751	N/A	2013/11/21	Lemeneh Addis

Maxxam ID TZ0056
Sample ID MW11-I
Matrix Water

Collected 2013/11/20
Shipped
Received 2013/11/20

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3431102	N/A	2013/11/21	Surinder Rai
Anions	IC	3431958	N/A	2013/11/25	Fari Dehdezi
Conductivity	COND	3431125	N/A	2013/11/21	Surinder Rai
Free (WAD) Cyanide	TECH/CN	3433065	N/A	2013/11/23	Xuanhong Qiu
Fluoride	F	3431097	2013/11/21	2013/11/21	Surinder Rai
Hardness (calculated as CaCO3)		3429143	N/A	2013/11/26	Automated Statchk
Mercury in Water by CVAA	CVAA	3434873	2013/11/25	2013/11/26	Magdalena Carlos
Dissolved Metals by ICPMS	ICP/MS	3435787	N/A	2013/11/26	Hua Ren
Total Metals Analysis by ICPMS	ICP/MS	3432622	N/A	2013/11/26	Hua Ren
Total Ammonia-N	LACH/NH4	3431354	N/A	2013/11/22	Charles Opoku-Ware
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	3431956	N/A	2013/11/26	Shobhana Bavisiya
pH	PH	3431109	N/A	2013/11/21	Surinder Rai
Phenols (4AAP)	TECH/PHEN	3431487	N/A	2013/11/25	Louise Harding
Orthophosphate	AC	3431975	N/A	2013/11/22	Alina Dobreanu
Sulphide	ISE/S	3431550	N/A	2013/11/21	Neil Dassanayake
Total Dissolved Solids	SLDS	3431957	N/A	2013/11/21	Niki Shah
Total Phosphorus (Colourimetric)	LACH/P	3433188	2013/11/22	2013/11/23	Viorica Rotaru
Low Level Total Suspended Solids	SLDS	3431611	N/A	2013/11/22	Subhashchandra Patel
Turbidity	TURB	3431751	N/A	2013/11/21	Lemeneh Addis

Test Summary

Maxxam ID TZ0056 Dup
Sample ID MW11-I
Matrix Water

Collected 2013/11/20
Shipped
Received 2013/11/20

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Phenols (4AAP)	TECH/PHEN	3431487	N/A	2013/11/25	Louise Harding

Maxxam ID TZ0057
Sample ID MW11-S
Matrix Water

Collected 2013/11/20
Shipped
Received 2013/11/20

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3431102	N/A	2013/11/21	Surinder Rai
Anions	IC	3431958	N/A	2013/11/25	Fari Dehdezi
Conductivity	COND	3431125	N/A	2013/11/21	Surinder Rai
Free (WAD) Cyanide	TECH/CN	3433065	N/A	2013/11/23	Xuanhong Qiu
Fluoride	F	3431097	2013/11/21	2013/11/21	Surinder Rai
Hardness (calculated as CaCO3)		3429143	N/A	2013/11/26	Automated Statchk
Mercury in Water by CVAA	CVAA	3434873	2013/11/25	2013/11/26	Magdalena Carlos
Dissolved Metals by ICPMS	ICP/MS	3435787	N/A	2013/11/26	Hua Ren
Total Metals Analysis by ICPMS	ICP/MS	3432622	N/A	2013/11/26	Hua Ren
Total Ammonia-N	LACH/NH4	3431354	N/A	2013/11/22	Charles Opoku-Ware
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	3431199	N/A	2013/11/22	Shobhana Bavisiya
pH	PH	3431109	N/A	2013/11/21	Surinder Rai
Phenols (4AAP)	TECH/PHEN	3431487	N/A	2013/11/25	Louise Harding
Orthophosphate	AC	3431975	N/A	2013/11/22	Alina Dobreanu
Sulphide	ISE/S	3431550	N/A	2013/11/21	Neil Dassanayake
Total Dissolved Solids	SLDS	3431957	N/A	2013/11/21	Niki Shah
Total Phosphorus (Colourimetric)	LACH/P	3433188	2013/11/22	2013/11/23	Viorica Rotaru
Low Level Total Suspended Solids	SLDS	3431611	N/A	2013/11/22	Subhashchandra Patel
Turbidity	TURB	3431751	N/A	2013/11/21	Lemeneh Addis

Maxxam Job #: B3K0774
Report Date: 2014/01/20

Golder Associates Ltd
Client Project #: 021-1228
Site Location: TANSLEY QUARRY
Sampler Initials: JB

Test Summary

Maxxam ID TZ0058
Sample ID MW11-DEEP
Matrix Water

Collected 2013/11/20
Shipped
Received 2013/11/20

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3431102	N/A	2013/11/21	Surinder Rai
Anions	IC	3431958	N/A	2013/11/25	Fari Dehdezi
Conductivity	COND	3431125	N/A	2013/11/21	Surinder Rai
Free (WAD) Cyanide	TECH/CN	3433065	N/A	2013/11/23	Xuanhong Qiu
Fluoride	F	3431097	2013/11/21	2013/11/21	Surinder Rai
Hardness (calculated as CaCO3)		3429143	N/A	2013/11/26	Automated Statchk
Mercury in Water by CVAA	CVAA	3434873	2013/11/25	2013/11/26	Magdalena Carlos
Dissolved Metals by ICPMS	ICP/MS	3435787	N/A	2013/11/26	Hua Ren
Total Metals Analysis by ICPMS	ICP/MS	3432622	N/A	2013/11/26	Hua Ren
Total Ammonia-N	LACH/NH4	3431354	N/A	2013/11/22	Charles Opoku-Ware
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	3431956	N/A	2013/11/26	Shobhana Bavisiya
pH	PH	3431109	N/A	2013/11/21	Surinder Rai
Phenols (4AAP)	TECH/PHEN	3431487	N/A	2013/11/25	Louise Harding
Orthophosphate	AC	3431975	N/A	2013/11/22	Alina Dobreanu
Sulphide	ISE/S	3431550	N/A	2013/11/21	Neil Dassanayake
Total Dissolved Solids	SLDS	3431957	N/A	2013/11/21	Niki Shah
Total Phosphorus (Colourimetric)	LACH/P	3431237	2013/11/21	2013/11/23	Viorica Rotaru
Low Level Total Suspended Solids	SLDS	3431611	N/A	2013/11/22	Subhashchandra Patel
Turbidity	TURB	3431751	N/A	2013/11/21	Lemeneh Addis

Package 1	4.3°C
Package 2	7.0°C

Each temperature is the average of up to three cooler temperatures taken at receipt

GENERAL COMMENTS

Revised Report (2014/01/20): Split reports, as per client request..

Sample TZ0054-01: Anions Analysis: Due to the sample matrix, sample required dilution. Detection limits were adjusted accordingly.

Sample TZ0055-01: Metal analysis:Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.

Sample TZ0057-01: Metals Analysis: Due to the sample matrix, sample required dilution. Detection limits were adjusted accordingly.

Sample TZ0058-01: Metal analysis:Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.

Maxxam Job #: B3K0774
Report Date: 2014/01/20

Golder Associates Ltd
Client Project #: 021-1228
Site Location: TANSLEY QUARRY
Sampler Initials: JB

QUALITY ASSURANCE REPORT

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	**Parameter**	**Date**	**% Recovery**	**QC Limits**	**% Recovery**	**QC Limits**	**Value**	**Units**	**Value (%)**	**QC Limits**	**% Recovery**	**QC Limits**
3431097	Fluoride (F-)	2013/11/21	102	80 - 120	101	80 - 120	<0.10	mg/L	NC	20		
3431102	Alkalinity (Total as CaCO3)	2013/11/21			95	85 - 115	<1.0	mg/L	0.7	25		
3431125	Conductivity	2013/11/21			101	85 - 115	<1.0	umho/cm	0.2	25		
3431199	Nitrite (N)	2013/11/22	105	80 - 120	108	80 - 120	<0.010	mg/L	NC	25		
3431199	Nitrate (N)	2013/11/22	96	80 - 120	100	80 - 120	<0.10	mg/L	NC	25		
3431237	Total Phosphorus	2013/11/23	96	80 - 120	100	80 - 120	<0.002	mg/L	11.8	20	99	80 - 120
3431354	Total Ammonia-N	2013/11/22	96	80 - 120	98	85 - 115	<0.050	mg/L	NC	20		
3431487	Phenols-4AAP	2013/11/25	89(1)	80 - 120	100	85 - 115	<0.0010	mg/L	NC(2)	25		
3431550	Sulphide	2013/11/21	85	80 - 120	96	80 - 120	<0.020	mg/L	NC	20		
3431611	Total Suspended Solids	2013/11/22					<1	mg/L	NC	25	98	85 - 115
3431751	Turbidity	2013/11/21					<0.2	NTU	0.5	20	104	85 - 115
3431956	Nitrite (N)	2013/11/26	112	80 - 120	109	80 - 120	<0.010	mg/L	NC	25		
3431956	Nitrate (N)	2013/11/26	97	80 - 120	92	80 - 120	<0.10	mg/L	NC	25		
3431957	Total Dissolved Solids	2013/11/21					<10	mg/L	4.4	25	95	85 - 115
3431958	Dissolved Chloride (Cl)	2013/11/25	93(3)	80 - 120	100	80 - 120	<1.0	mg/L				
3431958	Dissolved Bromide (Br-)	2013/11/25	96(3)	80 - 120	104	80 - 120	<1.0	mg/L				
3431958	Dissolved Sulphate (SO4)	2013/11/25	94(3)	80 - 120	99	80 - 120	<1.0	mg/L				
3431975	Orthophosphate (P)	2013/11/22	103	75 - 125	101	80 - 120	<0.010	mg/L	NC	25		
3432622	Total Aluminum (Al)	2013/11/25	104	80 - 120	106	80 - 120	6.9, RDL=5.0	ug/L	NC	20		
3432622	Total Antimony (Sb)	2013/11/25	105	80 - 120	103	80 - 120	<0.50	ug/L				
3432622	Total Arsenic (As)	2013/11/25	101	80 - 120	102	80 - 120	<1.0	ug/L	NC	20		
3432622	Total Barium (Ba)	2013/11/25	100	80 - 120	101	80 - 120	<2.0	ug/L				
3432622	Total Beryllium (Be)	2013/11/25	103	80 - 120	106	80 - 120	<0.50	ug/L				
3432622	Total Bismuth (Bi)	2013/11/25	99	80 - 120	100	80 - 120	<1.0	ug/L				
3432622	Total Boron (B)	2013/11/25	100	80 - 120	107	80 - 120	<10	ug/L				
3432622	Total Cadmium (Cd)	2013/11/25	103	80 - 120	103	80 - 120	<0.10	ug/L				
3432622	Total Calcium (Ca)	2013/11/25	NC	80 - 120	105	80 - 120	<200	ug/L	0.2	20		
3432622	Total Chromium (Cr)	2013/11/25	100	80 - 120	104	80 - 120	<5.0	ug/L				
3432622	Total Cobalt (Co)	2013/11/25	99	80 - 120	102	80 - 120	<0.50	ug/L				
3432622	Total Copper (Cu)	2013/11/25	98	80 - 120	101	80 - 120	<1.0	ug/L	NC	20		
3432622	Total Iron (Fe)	2013/11/25	100	80 - 120	102	80 - 120	<100	ug/L	0.6	20		
3432622	Total Lead (Pb)	2013/11/25	100	80 - 120	100	80 - 120	<0.50	ug/L	NC	20		
3432622	Total Magnesium (Mg)	2013/11/25	100	80 - 120	103	80 - 120	<50	ug/L	0.9	20		
3432622	Total Manganese (Mn)	2013/11/25	NC	80 - 120	104	80 - 120	<2.0	ug/L				
3432622	Total Molybdenum (Mo)	2013/11/25	105	80 - 120	103	80 - 120	<0.50	ug/L				
3432622	Total Nickel (Ni)	2013/11/25	99	80 - 120	103	80 - 120	<1.0	ug/L	NC	20		
3432622	Total Phosphorus (P)	2013/11/25	105	80 - 120	108	80 - 120	<100	ug/L				
3432622	Total Potassium (K)	2013/11/25	93	80 - 120	97	80 - 120	<200	ug/L	0.9	20		
3432622	Total Silicon (Si)	2013/11/25	96	80 - 120	100	80 - 120	<50	ug/L				
3432622	Total Selenium (Se)	2013/11/25	101	80 - 120	102	80 - 120	<2.0	ug/L	NC	20		

QUALITY ASSURANCE REPORT

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	**Parameter**	**Date**	**% Recovery**	**QC Limits**	**% Recovery**	**QC Limits**	**Value**	**Units**	**Value (%)**	**QC Limits**	**% Recovery**	**QC Limits**
3432622	Total Silver (Ag)	2013/11/25	100	80 - 120	101	80 - 120	<0.10	ug/L				
3432622	Total Sodium (Na)	2013/11/25	NC	80 - 120	102	80 - 120	<100	ug/L	0.08	20		
3432622	Total Strontium (Sr)	2013/11/25	103	80 - 120	104	80 - 120	<1.0	ug/L				
3432622	Total Thallium (Tl)	2013/11/25	98	80 - 120	99	80 - 120	<0.050	ug/L				
3432622	Total Tin (Sn)	2013/11/25	102	80 - 120	100	80 - 120	<1.0	ug/L				
3432622	Total Titanium (Ti)	2013/11/25	102	80 - 120	104	80 - 120	<5.0	ug/L				
3432622	Total Uranium (U)	2013/11/25	103	80 - 120	103	80 - 120	<0.10	ug/L				
3432622	Total Vanadium (V)	2013/11/25	103	80 - 120	105	80 - 120	<0.50	ug/L				
3432622	Total Zinc (Zn)	2013/11/25	100	80 - 120	103	80 - 120	<5.0	ug/L	NC	20		
3433065	Free Cyanide	2013/11/23	104	80 - 120	101	80 - 120	<0.0020	mg/L	NC	20		
3433188	Total Phosphorus	2013/11/23	91	80 - 120	101	80 - 120	0.023, RDL=0.020	mg/L	2.3	20	102	80 - 120
3434873	Mercury (Hg)	2013/11/26	103	80 - 120	101	80 - 120	<0.00010	mg/L	NC	20		
3434929	Mercury (Hg)	2013/11/26	96	80 - 120	100	80 - 120	<0.00010	mg/L	NC	20		
3435787	Dissolved Aluminum (Al)	2013/11/26	103	80 - 120	97	80 - 120	<5.0	ug/L	NC	20		
3435787	Dissolved Antimony (Sb)	2013/11/26	108	80 - 120	99	80 - 120	<0.50	ug/L	NC	20		
3435787	Dissolved Arsenic (As)	2013/11/26	103	80 - 120	93	80 - 120	<1.0	ug/L	1.2	20		
3435787	Dissolved Barium (Ba)	2013/11/26	101	80 - 120	96	80 - 120	<2.0	ug/L	1.1	20		
3435787	Dissolved Beryllium (Be)	2013/11/26	111	80 - 120	105	80 - 120	<0.50	ug/L	NC	20		
3435787	Dissolved Bismuth (Bi)	2013/11/26	101	80 - 120	95	80 - 120	<1.0	ug/L	NC	20		
3435787	Dissolved Boron (B)	2013/11/26	110	80 - 120	104	80 - 120	<10	ug/L	2.6	20		
3435787	Dissolved Cadmium (Cd)	2013/11/26	106	80 - 120	98	80 - 120	<0.10	ug/L	NC	20		
3435787	Dissolved Calcium (Ca)	2013/11/26	NC	80 - 120	93	80 - 120	<200	ug/L	1.2	20		
3435787	Dissolved Chromium (Cr)	2013/11/26	101	80 - 120	94	80 - 120	<5.0	ug/L	NC	20		
3435787	Dissolved Cobalt (Co)	2013/11/26	100	80 - 120	95	80 - 120	<0.50	ug/L	NC	20		
3435787	Dissolved Copper (Cu)	2013/11/26	98	80 - 120	93	80 - 120	<1.0	ug/L	NC	20		
3435787	Dissolved Iron (Fe)	2013/11/26	100	80 - 120	95	80 - 120	<100	ug/L	0.2	20		
3435787	Dissolved Lead (Pb)	2013/11/26	101	80 - 120	95	80 - 120	<0.50	ug/L	NC	20		
3435787	Dissolved Magnesium (Mg)	2013/11/26	NC	80 - 120	97	80 - 120	<50	ug/L	0.6	20		
3435787	Dissolved Manganese (Mn)	2013/11/26	101	80 - 120	96	80 - 120	<2.0	ug/L	2.7	20		
3435787	Dissolved Molybdenum (Mo)	2013/11/26	107	80 - 120	96	80 - 120	<0.50	ug/L	NC	20		
3435787	Dissolved Nickel (Ni)	2013/11/26	100	80 - 120	96	80 - 120	<1.0	ug/L	NC	20		
3435787	Dissolved Phosphorus (P)	2013/11/26	106	80 - 120	97	80 - 120	<100	ug/L	NC	20		
3435787	Dissolved Potassium (K)	2013/11/26	100	80 - 120	94	80 - 120	<200	ug/L	0.3	20		
3435787	Dissolved Selenium (Se)	2013/11/26	103	80 - 120	94	80 - 120	<2.0	ug/L	NC	20		
3435787	Dissolved Silicon (Si)	2013/11/26	102	80 - 120	97	80 - 120	<50	ug/L	0.9	20		
3435787	Dissolved Silver (Ag)	2013/11/26	103	80 - 120	95	80 - 120	<0.10	ug/L	NC	20		
3435787	Dissolved Sodium (Na)	2013/11/26	NC	80 - 120	96	80 - 120	<100	ug/L	1.5	20		
3435787	Dissolved Strontium (Sr)	2013/11/26	NC	80 - 120	96	80 - 120	<1.0	ug/L	0.6	20		
3435787	Dissolved Thallium (Tl)	2013/11/26	101	80 - 120	94	80 - 120	<0.050	ug/L	NC	20		
3435787	Dissolved Tin (Sn)	2013/11/26	106	80 - 120	99	80 - 120	<1.0	ug/L	NC	20		

QUALITY ASSURANCE REPORT

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
3435787	Dissolved Titanium (Ti)	2013/11/26	101	80 - 120	96	80 - 120	<5.0	ug/L	NC	20		
3435787	Dissolved Uranium (U)	2013/11/26	105	80 - 120	97	80 - 120	<0.10	ug/L	0.1	20		
3435787	Dissolved Vanadium (V)	2013/11/26	103	80 - 120	95	80 - 120	<0.50	ug/L	NC	20		
3435787	Dissolved Zinc (Zn)	2013/11/26	100	80 - 120	95	80 - 120	<5.0	ug/L	NC	20		

N/A = Not Applicable

RDL = Reportable Detection Limit

RPD = Relative Percent Difference

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spiked amount was not sufficiently significant to permit a reliable recovery calculation.

NC (RPD): The RPD was not calculated. The level of analyte detected in the parent sample and its duplicate was not sufficiently significant to permit a reliable calculation.

(1) - Matrix Spike Parent ID [TZ0056-07]

(2) - Duplicate Parent ID [TZ0056-07]

(3) - Matrix Spike Parent ID [TZ0053-01]

Validation Signature Page

Maxxam Job #: B3K0774

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

Eva Pranjic

Ewa Pranjic, M.Sc., C.Chem, Scientific Specialist

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Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Your Project #: 021-1228
Site#: 021-1228
Site Location: TANSLEY QUARRY
Your C.O.C. #: 44283302, 442833-02-01

Attention: Josip Balaban
Golder Associates Ltd
6925 Century Ave
Suite 100
Mississauga, ON
L5N 7K2

Report Date: 2013/11/28

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B3K1890
Received: 2013/11/21, 16:35

Sample Matrix: Water
Samples Received: 9

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Method Reference
Alkalinity	9	N/A	2013/11/25	CAM SOP-00448	SM 2320B
Anions	9	N/A	2013/11/25	CAM SOP-00435	SM 4110B
Conductivity	9	N/A	2013/11/25	CAM SOP-00414	SM 2510
Free (WAD) Cyanide	9	N/A	2013/11/23	CAM SOP-00457	Ontario MOE CN-E3015
Fluoride	9	2013/11/22	2013/11/25	CAM SOP-00449	APHA 4500FC
Hardness (calculated as CaCO3)	9	N/A	2013/11/28	CAM SOP 00102	SM 2340 B
Mercury in Water by CVAA	1	2013/11/25	2013/11/26	CAM SOP-00453	SW-846 7470A
Mercury in Water by CVAA	8	2013/11/26	2013/11/27	CAM SOP-00453	SW-846 7470A
Dissolved Metals by ICPMS	9	N/A	2013/11/28	CAM SOP-00447	EPA 6020
Total Metals Analysis by ICPMS	8	N/A	2013/11/27	CAM SOP-00447	EPA 6020
Total Metals Analysis by ICPMS	1	N/A	2013/11/28	CAM SOP-00447	EPA 6020
Total Ammonia-N	9	N/A	2013/11/25	CAM SOP-00441	US GS I-2522-90
Nitrate (NO3) and Nitrite (NO2) in Water (1)	3	N/A	2013/11/27	CAM SOP-00440	SM 4500 NO3I/NO2B
Nitrate (NO3) and Nitrite (NO2) in Water (1)	6	N/A	2013/11/28	CAM SOP-00440	SM 4500 NO3I/NO2B
pH	9	N/A	2013/11/25	CAM SOP-00413	SM 4500H+ B
Phenols (4AAP)	3	N/A	2013/11/26	CAM SOP-00444	MOE ROPHEN-E3179
Phenols (4AAP)	6	N/A	2013/11/27	CAM SOP-00444	MOE ROPHEN-E3179
Orthophosphate	9	N/A	2013/11/25	CAM SOP-00461	EPA 365.1
Sulphide	9	N/A	2013/11/22	CAM SOP-00455	SM 4500-S G
Total Dissolved Solids	8	N/A	2013/11/22	CAM SOP-00428	APHA 2540C
Total Dissolved Solids	1	N/A	2013/11/26	CAM SOP-00428	APHA 2540C
Total Phosphorus (Colourimetric)	9	2013/11/25	2013/11/26	CAM SOP-00407	SM 4500 P,B,F
Low Level Total Suspended Solids	9	N/A	2013/11/22	CAM SOP-00428	SM 2540D
Turbidity	9	N/A	2013/11/22	CAM SOP-00417	APHA 2130B

Remarks:

Maxxam Analytics has performed all analytical testing herein in accordance with ISO 17025 and the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act. All methodologies comply with this document and are validated for use in the laboratory. The methods and techniques employed in this analysis conform to the performance criteria (detection limits, accuracy and precision) as outlined in the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act. Reporting results to two significant figures at the RDL is to permit statistical evaluation and is not intended to be an indication of

Your Project #: 021-1228
Site#: 021-1228
Site Location: TANSLEY QUARRY
Your C.O.C. #: 44283302, 442833-02-01

Attention: Josip Balaban
Golder Associates Ltd
6925 Century Ave
Suite 100
Mississauga, ON
L5N 7K2

Report Date: 2013/11/28

CERTIFICATE OF ANALYSIS

-2-

analytical precision.

The CWS PHC methods employed by Maxxam conform to all prescribed elements of the reference method and performance based elements have been validated. All modifications have been validated and proven equivalent following the 'Alberta Environment Draft Addenda to the CWS-PHC, Appendix 6, Validation of Alternate Methods'. Documentation is available upon request. Maxxam has made the following improvements to the CWS-PHC reference benchmark method: (i) Headspace for F1; and, (ii) Mechanical extraction for F2-F4. Note: F4G cannot be added to the C6 to C50 hydrocarbons. The extraction date for samples field preserved with methanol for F1 and Volatile Organic Compounds is considered to be the date sampled.

Maxxam Analytics is accredited for all specific parameters as required by Ontario Regulation 153/04. Maxxam Analytics is limited in liability to the actual cost of analysis unless otherwise agreed in writing. There is no other warranty expressed or implied. Samples will be retained at Maxxam Analytics for three weeks from receipt of data or as per contract.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) Values for calculated parameters may not appear to add up due to rounding of raw data and significant figures.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Antonella Brasil, Project Manager
Email: ABrasil@maxxam.ca
Phone# (905) 817-5817

==
Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Total cover pages: 2

Golder Associates Ltd
Maxxam Job #: B3K1890
Report Date: 2013/11/28
Client Project #: 021-1228
Site Location: TANSLEY QUARRY
Sampler Initials: JB

RESULTS OF ANALYSES OF WATER

Maxxam ID		TZ8249		TZ8250	TZ8250		TZ8251		
Sampling Date		2013/11/21		2013/11/21	2013/11/21		2013/11/21		
COC Number		442833-02-01		442833-02-01	442833-02-01		442833-02-01		
	Units	**MW04-S**	**RDL**	**MW04-I**	**MW04-I Lab-Dup**	**RDL**	**MW04-D**	**RDL**	**QC Batch**
Calculated Parameters									
Hardness (CaCO3)	mg/L	470	1.0	2000		1.0	16000	1.0	3431640
Inorganics									
Total Ammonia-N	mg/L	0.12	0.050	6.1		0.10	31	0.50	3433892
Conductivity	umho/cm	890	1.0	8400		1.0	76000	1.0	3433702
Total Dissolved Solids	mg/L	578	10	6030		10	46800	10	3432908
Fluoride (F-)	mg/L	0.20	0.10	0.54		0.10	<0.10	0.10	3433703
Free Cyanide	mg/L	<0.0020	0.0020	<0.0020		0.0020	<0.0020	0.0020	3433065
Orthophosphate (P)	mg/L	<0.010	0.010	<0.010		0.010	<0.010	0.010	3434052
pH	pH	7.87		7.41			6.82		3433704
Phenols-4AAP	mg/L	<0.0010	0.0010	0.0044	0.0053	0.0010	0.057	0.0010	3433778
Total Phosphorus	mg/L	0.12	0.020	0.19		0.020	1.1	0.040	3434803
Total Suspended Solids	mg/L	110	5	280		5	1200	30	3432899
Sulphide	mg/L	0.069	0.020	0.94		0.020	1.4	0.020	3432913
Turbidity	NTU	160	0.4	81		0.2	300	1	3433317
Alkalinity (Total as CaCO3)	mg/L	380	1.0	53		1.0	160	1.0	3433701
Nitrite (N)	mg/L	0.021	0.010	<0.010		0.010	<0.010	0.010	3433380
Dissolved Chloride (Cl)	mg/L	3.6	1.0	2000		20	33000	200	3433654
Nitrate (N)	mg/L	1.0	0.10	<0.10		0.10	<0.10	0.10	3433380
Nitrate + Nitrite	mg/L	1.0	0.10	<0.10		0.10	<0.10	0.10	3433380
Dissolved Bromide (Br-)	mg/L	<1.0	1.0	25		1.0	400	100	3433654
Dissolved Sulphate (SO4)	mg/L	130	1.0	1800		20	1400	100	3433654

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam Job #: B3K1890
Report Date: 2013/11/28

Golder Associates Ltd
Client Project #: 021-1228
Site Location: TANSLEY QUARRY
Sampler Initials: JB

RESULTS OF ANALYSES OF WATER

Maxxam ID		TZ8252	TZ8252			TZ8253		
Sampling Date		2013/11/21	2013/11/21			2013/11/21		
COC Number		442833-02-01	442833-02-01			442833-02-01		
	Units	**MW10-I**	**MW10-I Lab-Dup**	**RDL**	**QC Batch**	**MW10-O**	**RDL**	**QC Batch**
Calculated Parameters								
Hardness (CaCO3)	mg/L	360		1.0	3431640	480	1.0	3431640
Inorganics								
Total Ammonia-N	mg/L	0.96		0.050	3433892	0.13	0.050	3433892
Conductivity	umho/cm	800	800	1.0	3433702	900	1.0	3433702
Total Dissolved Solids	mg/L	482		10	3432908	510	10	3432908
Fluoride (F-)	mg/L	0.19	0.18	0.10	3433703	0.16	0.10	3433703
Free Cyanide	mg/L	<0.0020		0.0020	3433065	<0.0020	0.0020	3433065
Orthophosphate (P)	mg/L	<0.010		0.010	3434052	<0.010	0.010	3434052
pH	pH	7.88	7.89		3433704	7.94		3433704
Phenols-4AAP	mg/L	<0.0010		0.0010	3433985	<0.0010	0.0010	3433985
Total Phosphorus	mg/L	1.6		0.040	3434803	3.3	0.040	3434803
Total Suspended Solids	mg/L	2400		30	3432899	5800	50	3433362
Sulphide	mg/L	<0.020		0.020	3432913	0.025	0.020	3432913
Turbidity	NTU	440		2	3433317	1900	4	3433317
Alkalinity (Total as CaCO3)	mg/L	420	420	1.0	3433701	490	1.0	3433701
Nitrite (N)	mg/L	0.14		0.010	3433380	<0.010	0.010	3433380
Dissolved Chloride (Cl)	mg/L	2.6		1.0	3433654	2.1	1.0	3433654
Nitrate (N)	mg/L	0.72		0.10	3433380	<0.10	0.10	3433380
Nitrate + Nitrite	mg/L	0.86		0.10	3433380	<0.10	0.10	3433380
Dissolved Bromide (Br-)	mg/L	<1.0		1.0	3433654	<1.0	1.0	3433654
Dissolved Sulphate (SO4)	mg/L	40		1.0	3433654	52	1.0	3433654

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

RESULTS OF ANALYSES OF WATER

Maxxam ID		TZ8254			TZ8255		TZ8256		
Sampling Date		2013/11/21			2013/11/21		2013/11/21		
COC Number		442833-02-01			442833-02-01		442833-02-01		
	Units	**MW10-D**	**RDL**	**QC Batch**	**DUP 3**	**RDL**	**MW05-O**	**RDL**	**QC Batch**
Calculated Parameters									
Hardness (CaCO3)	mg/L	26000	1.0	3431640	480	1.0	440	1.0	3431640
Inorganics									
Total Ammonia-N	mg/L	34	0.50	3433892	0.11	0.050	<0.050	0.050	3433917
Conductivity	umho/cm	92000	1.0	3433702	910	1.0	780	1.0	3433702
Total Dissolved Solids	mg/L	80700	10	3436783	580	10	1220	10	3432908
Fluoride (F-)	mg/L	<0.10	0.10	3433703	0.21	0.10	0.10	0.10	3433703
Free Cyanide	mg/L	<0.0020	0.0020	3433065	<0.0020	0.0020	<0.0020	0.0020	3433065
Orthophosphate (P)	mg/L	<0.010	0.010	3434052	0.025	0.010	<0.010	0.010	3434052
pH	pH	6.65		3433704	7.87		7.78		3433704
Phenols-4AAP	mg/L	<0.0010	0.0010	3433985	<0.0010	0.0010	<0.0010	0.0010	3433778
Total Phosphorus	mg/L	1.4	0.10	3434803	0.12	0.020	0.58	0.040	3434803
Total Suspended Solids	mg/L	4300	30	3432899	130	5	2300	20	3432899
Sulphide	mg/L	<0.020	0.020	3432913	0.069	0.020	<0.020	0.020	3432839
Turbidity	NTU	260	1	3433317	240	1	520	2	3433317
Alkalinity (Total as CaCO3)	mg/L	39	1.0	3433701	390	1.0	280	1.0	3433701
Nitrite (N)	mg/L	<0.010	0.010	3433380	0.032	0.010	<0.010	0.010	3433688
Dissolved Chloride (Cl)	mg/L	44000	1000	3433654	3.7	1.0	33	1.0	3433654
Nitrate (N)	mg/L	<0.10	0.10	3433380	1.6	0.10	<0.10	0.10	3433688
Nitrate + Nitrite	mg/L	<0.10	0.10	3433380	1.6	0.10	<0.10	0.10	3433688
Dissolved Bromide (Br-)	mg/L	540	100	3433654	<1.0	1.0	<1.0	1.0	3433654
Dissolved Sulphate (SO4)	mg/L	1400	5.0	3433654	130	1.0	100	1.0	3433654

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam Job #: B3K1890
Report Date: 2013/11/28

Golder Associates Ltd
Client Project #: 021-1228
Site Location: TANSLEY QUARRY
Sampler Initials: JB

RESULTS OF ANALYSES OF WATER

Maxxam ID		TZ8257		
Sampling Date		2013/11/21		
COC Number		442833-02-01		
	Units	**MW05-I**	**RDL**	**QC Batch**

Calculated Parameters				
Hardness (CaCO3)	mg/L	270	1.0	3431640
Inorganics				
Total Ammonia-N	mg/L	0.58	0.050	3433917
Conductivity	umho/cm	630	1.0	3433702
Total Dissolved Solids	mg/L	396	10	3432908
Fluoride (F-)	mg/L	0.27	0.10	3433703
Free Cyanide	mg/L	<0.0020	0.0020	3433065
Orthophosphate (P)	mg/L	<0.010	0.010	3434052
pH	pH	7.94		3433704
Phenols-4AAP	mg/L	<0.0010	0.0010	3433778
Total Phosphorus	mg/L	13	0.10	3434803
Total Suspended Solids	mg/L	25000	20	3432899
Sulphide	mg/L	0.049	0.020	3432839
Turbidity	NTU	610	2	3433317
Alkalinity (Total as CaCO3)	mg/L	290	1.0	3433701
Nitrite (N)	mg/L	0.038	0.010	3433688
Dissolved Chloride (Cl)	mg/L	7.7	1.0	3433654
Nitrate (N)	mg/L	0.51	0.10	3433688
Nitrate + Nitrite	mg/L	0.55	0.10	3433688
Dissolved Bromide (Br-)	mg/L	<1.0	1.0	3433654
Dissolved Sulphate (SO4)	mg/L	47	1.0	3433654

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		TZ8249			TZ8250		TZ8251		
Sampling Date		2013/11/21			2013/11/21		2013/11/21		
COC Number		442833-02-01			442833-02-01		442833-02-01		
	Units	**MW04-S**	**RDL**	**QC Batch**	**MW04-I**	**RDL**	**MW04-D**	**RDL**	**QC Batch**
Metals									
Mercury (Hg)	mg/L	<0.00010	0.00010	3435264	<0.00010	0.00010	<0.00010	0.00010	3436003
Dissolved Aluminum (Al)	ug/L	<5.0	5.0	3437543	<25	25	<250	250	3437543
Total Aluminum (Al)	ug/L	2300	5.0	3435936	2000	25	7400	250	3435936
Dissolved Antimony (Sb)	ug/L	<0.50	0.50	3437543	<2.5	2.5	<25	25	3437543
Total Antimony (Sb)	ug/L	<0.50	0.50	3435936	<2.5	2.5	<25	25	3435936
Dissolved Arsenic (As)	ug/L	<1.0	1.0	3437543	<5.0	5.0	<50	50	3437543
Total Arsenic (As)	ug/L	2.0	1.0	3435936	<5.0	5.0	<50	50	3435936
Dissolved Barium (Ba)	ug/L	51	2.0	3437543	<10	10	<100	100	3437543
Total Barium (Ba)	ug/L	79	2.0	3435936	63	10	180	100	3435936
Dissolved Beryllium (Be)	ug/L	<0.50	0.50	3437543	<2.5	2.5	<25	25	3437543
Total Beryllium (Be)	ug/L	<0.50	0.50	3435936	<2.5	2.5	<25	25	3435936
Dissolved Bismuth (Bi)	ug/L	<1.0	1.0	3437543	<5.0	5.0	<50	50	3437543
Total Bismuth (Bi)	ug/L	<1.0	1.0	3435936	<5.0	5.0	<50	50	3435936
Dissolved Boron (B)	ug/L	54	10	3437543	5600	50	7900	500	3437543
Total Boron (B)	ug/L	79	10	3435936	6100	50	7700	500	3435936
Dissolved Cadmium (Cd)	ug/L	<0.10	0.10	3437543	<0.50	0.50	<5.0	5.0	3437543
Total Cadmium (Cd)	ug/L	0.13	0.10	3435936	<0.50	0.50	<5.0	5.0	3435936
Dissolved Calcium (Ca)	ug/L	86000	200	3437543	540000	1000	4800000	10000	3437543
Total Calcium (Ca)	ug/L	94000	200	3435936	570000	1000	4800000	10000	3435936
Dissolved Chromium (Cr)	ug/L	<5.0	5.0	3437543	<25	25	<250	250	3437543
Total Chromium (Cr)	ug/L	<5.0	5.0	3435936	<25	25	<250	250	3435936
Dissolved Cobalt (Co)	ug/L	0.62	0.50	3437543	<2.5	2.5	<25	25	3437543
Total Cobalt (Co)	ug/L	3.4	0.50	3435936	<2.5	2.5	<25	25	3435936
Dissolved Copper (Cu)	ug/L	<1.0	1.0	3437543	<5.0	5.0	<50	50	3437543
Total Copper (Cu)	ug/L	7.6	1.0	3435936	5.5	5.0	170	50	3435936
Dissolved Iron (Fe)	ug/L	<100	100	3437543	910	500	7700	5000	3437543
Total Iron (Fe)	ug/L	4600	100	3435936	4900	500	26000	5000	3435936
Dissolved Lead (Pb)	ug/L	<0.50	0.50	3437543	<2.5	2.5	<25	25	3437543
Total Lead (Pb)	ug/L	4.3	0.50	3435936	3.4	2.5	<25	25	3435936
Dissolved Magnesium (Mg)	ug/L	63000	50	3437543	150000	250	1100000	2500	3437543
Total Magnesium (Mg)	ug/L	59000	50	3435936	140000	250	990000	2500	3435936
Dissolved Manganese (Mn)	ug/L	180	2.0	3437543	230	10	3000	100	3437543

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		TZ8249			TZ8250		TZ8251		
Sampling Date		2013/11/21			2013/11/21		2013/11/21		
COC Number		442833-02-01			442833-02-01		442833-02-01		
	Units	**MW04-S**	**RDL**	**QC Batch**	**MW04-I**	**RDL**	**MW04-D**	**RDL**	**QC Batch**
Total Manganese (Mn)	ug/L	300	2.0	3435936	390	10	3500	100	3435936
Dissolved Molybdenum (Mo)	ug/L	2.4	0.50	3437543	7.7	2.5	<25	25	3437543
Total Molybdenum (Mo)	ug/L	4.2	0.50	3435936	8.7	2.5	<25	25	3435936
Dissolved Nickel (Ni)	ug/L	<1.0	1.0	3437543	<5.0	5.0	<50	50	3437543
Total Nickel (Ni)	ug/L	6.2	1.0	3435936	6.3	5.0	99	50	3435936
Dissolved Phosphorus (P)	ug/L	150	100	3437543	<500	500	<5000	5000	3437543
Total Phosphorus (P)	ug/L	170	100	3435936	<500	500	<5000	5000	3435936
Dissolved Potassium (K)	ug/L	4300	200	3437543	48000	1000	210000	10000	3437543
Total Potassium (K)	ug/L	4900	200	3435936	47000	1000	200000	10000	3435936
Dissolved Selenium (Se)	ug/L	<2.0	2.0	3437543	<10	10	<100	100	3437543
Dissolved Silicon (Si)	ug/L	6700	50	3437543	3500	250	7100	2500	3437543
Total Silicon (Si)	ug/L	9000	50	3435936	6500	250	15000	2500	3435936
Total Selenium (Se)	ug/L	<2.0	2.0	3435936	<10	10	<100	100	3435936
Dissolved Silver (Ag)	ug/L	<0.10	0.10	3437543	<0.50	0.50	<5.0	5.0	3437543
Total Silver (Ag)	ug/L	<0.10	0.10	3435936	<0.50	0.50	<5.0	5.0	3435936
Dissolved Sodium (Na)	ug/L	23000	100	3437543	1200000	500	11000000	5000	3437543
Total Sodium (Na)	ug/L	21000	100	3435936	1100000	500	10000000	5000	3435936
Dissolved Strontium (Sr)	ug/L	1300	1.0	3437543	13000	5.0	98000	50	3437543
Total Strontium (Sr)	ug/L	1400	1.0	3435936	14000	5.0	100000	50	3435936
Dissolved Thallium (Tl)	ug/L	<0.050	0.050	3437543	<0.25	0.25	<2.5	2.5	3437543
Total Thallium (Tl)	ug/L	<0.050	0.050	3435936	<0.25	0.25	<2.5	2.5	3435936
Dissolved Tin (Sn)	ug/L	<1.0	1.0	3437543	<5.0	5.0	<50	50	3437543
Total Tin (Sn)	ug/L	<1.0	1.0	3435936	<5.0	5.0	<50	50	3435936
Dissolved Titanium (Ti)	ug/L	<5.0	5.0	3437543	<25	25	<250	250	3437543
Total Titanium (Ti)	ug/L	52	5.0	3435936	50	25	<250	250	3435936
Dissolved Uranium (U)	ug/L	7.0	0.10	3437543	<0.50	0.50	25	5.0	3437543
Total Uranium (U)	ug/L	8.7	0.10	3435936	0.89	0.50	28	5.0	3435936
Dissolved Vanadium (V)	ug/L	<0.50	0.50	3437543	<2.5	2.5	26	25	3437543
Total Vanadium (V)	ug/L	5.0	0.50	3435936	4.8	2.5	29	25	3435936
Dissolved Zinc (Zn)	ug/L	<5.0	5.0	3437543	<25	25	<250	250	3437543
Total Zinc (Zn)	ug/L	18	5.0	3435936	<25	25	710	250	3435936

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam Job #: B3K1890
Report Date: 2013/11/28

Golder Associates Ltd
Client Project #: 021-1228
Site Location: TANSLEY QUARRY
Sampler Initials: JB

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		TZ8252	TZ8252		TZ8253		TZ8254		
Sampling Date		2013/11/21	2013/11/21		2013/11/21		2013/11/21		
COC Number		442833-02-01	442833-02-01		442833-02-01		442833-02-01		
	Units	**MW10-I**	**MW10-I Lab-Dup**	**RDL**	**MW10-O**	**RDL**	**MW10-D**	**RDL**	**QC Batch**
Metals									
Mercury (Hg)	mg/L	<0.00010		0.00010	<0.00010	0.00010	<0.00010	0.00010	3436003
Dissolved Aluminum (Al)	ug/L	<5.0	<5.0	5.0	<5.0	5.0	460	250	3437543
Total Aluminum (Al)	ug/L	8300		5.0	42000	25	1500	250	3435936
Dissolved Antimony (Sb)	ug/L	<0.50	<0.50	0.50	<0.50	0.50	<25	25	3437543
Total Antimony (Sb)	ug/L	<0.50		0.50	<0.50	0.50	<25	25	3435936
Dissolved Arsenic (As)	ug/L	4.6	4.5	1.0	2.3	1.0	<50	50	3437543
Total Arsenic (As)	ug/L	200		1.0	19	1.0	<50	50	3435936
Dissolved Barium (Ba)	ug/L	68	69	2.0	54	2.0	110	100	3437543
Total Barium (Ba)	ug/L	290		2.0	560	2.0	170	100	3435936
Dissolved Beryllium (Be)	ug/L	<0.50	<0.50	0.50	<0.50	0.50	<25	25	3437543
Total Beryllium (Be)	ug/L	0.96		0.50	2.9	0.50	<25	25	3435936
Dissolved Bismuth (Bi)	ug/L	<1.0	<1.0	1.0	<1.0	1.0	<50	50	3437543
Total Bismuth (Bi)	ug/L	<1.0		1.0	<1.0	1.0	<50	50	3435936
Dissolved Boron (B)	ug/L	630	660	10	97	10	6600	500	3437543
Total Boron (B)	ug/L	730		10	190	10	7100	500	3435936
Dissolved Cadmium (Cd)	ug/L	<0.10	<0.10	0.10	<0.10	0.10	<5.0	5.0	3437543
Total Cadmium (Cd)	ug/L	0.64		0.10	0.64	0.10	6.4	5.0	3435936
Dissolved Calcium (Ca)	ug/L	53000	55000	1000	61000	200	7500000	10000	3437543
Total Calcium (Ca)	ug/L	190000		1000	390000	200	7600000	10000	3435936
Dissolved Chromium (Cr)	ug/L	<5.0	<5.0	5.0	<5.0	5.0	<250	250	3437543
Total Chromium (Cr)	ug/L	17		5.0	81	5.0	<250	250	3435936
Dissolved Cobalt (Co)	ug/L	<0.50	<0.50	0.50	<0.50	0.50	<25	25	3437543
Total Cobalt (Co)	ug/L	9.8		0.50	47	1.0	<25	25	3435936
Dissolved Copper (Cu)	ug/L	<1.0	<1.0	1.0	<1.0	1.0	<50	50	3437543
Total Copper (Cu)	ug/L	11		1.0	73	1.0	<50	50	3435936
Dissolved Iron (Fe)	ug/L	150	150	100	360	100	22000	5000	3437543
Total Iron (Fe)	ug/L	37000		100	74000	100	32000	5000	3435936
Dissolved Lead (Pb)	ug/L	<0.50	<0.50	0.50	<0.50	0.50	<25	25	3437543
Total Lead (Pb)	ug/L	10		0.50	28	0.50	<25	25	3435936
Dissolved Magnesium (Mg)	ug/L	55000	58000	50	80000	50	1800000	2500	3437543
Total Magnesium (Mg)	ug/L	64000		50	110000	50	1700000	2500	3435936
Dissolved Manganese (Mn)	ug/L	20	20	2.0	68	2.0	4100	100	3437543

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		TZ8252	TZ8252		TZ8253		TZ8254		
Sampling Date		2013/11/21	2013/11/21		2013/11/21		2013/11/21		
COC Number		442833-02-01	442833-02-01		442833-02-01		442833-02-01		
	Units	**MW10-I**	**MW10-I Lab-Dup**	**RDL**	**MW10-O**	**RDL**	**MW10-D**	**RDL**	**QC Batch**
Total Manganese (Mn)	ug/L	1200		2.0	3300	2.0	4500	100	3435936
Dissolved Molybdenum (Mo)	ug/L	2.5	2.7	0.50	2.2	0.50	78	25	3437543
Total Molybdenum (Mo)	ug/L	3.0		0.50	3.6	0.50	110	25	3435936
Dissolved Nickel (Ni)	ug/L	<1.0	<1.0	1.0	<1.0	1.0	63	50	3437543
Total Nickel (Ni)	ug/L	21		1.0	99	2.0	180	50	3435936
Dissolved Phosphorus (P)	ug/L	<100	<100	100	<100	100	<5000	5000	3437543
Total Phosphorus (P)	ug/L	1300		100	3000	100	<5000	5000	3435936
Dissolved Potassium (K)	ug/L	11000	11000	200	6400	200	260000	10000	3437543
Total Potassium (K)	ug/L	13000		200	17000	200	270000	10000	3435936
Dissolved Selenium (Se)	ug/L	<2.0	<2.0	2.0	<2.0	2.0	<200	200	3437543
Dissolved Silicon (Si)	ug/L	8500	8800	50	8800	50	5600	2500	3437543
Total Silicon (Si)	ug/L	23000		50	64000	250	4200	2500	3435936
Total Selenium (Se)	ug/L	<2.0		2.0	<2.0	2.0	<100	100	3435936
Dissolved Silver (Ag)	ug/L	<0.10	<0.10	0.10	<0.10	0.10	<5.0	5.0	3437543
Total Silver (Ag)	ug/L	<0.10		0.10	0.19	0.10	<5.0	5.0	3435936
Dissolved Sodium (Na)	ug/L	27000	28000	100	22000	100	17000000	5000	3437543
Total Sodium (Na)	ug/L	26000		100	20000	100	16000000	5000	3435936
Dissolved Strontium (Sr)	ug/L	11000	11000	1.0	1500	1.0	160000	50	3437543
Total Strontium (Sr)	ug/L	12000		1.0	2500	1.0	170000	50	3435936
Dissolved Thallium (Tl)	ug/L	<0.050	<0.050	0.050	<0.050	0.050	<2.5	2.5	3437543
Total Thallium (Tl)	ug/L	0.10		0.050	0.38	0.050	<2.5	2.5	3435936
Dissolved Tin (Sn)	ug/L	<1.0	<1.0	1.0	<1.0	1.0	<50	50	3437543
Total Tin (Sn)	ug/L	<1.0		1.0	<1.0	1.0	<50	50	3435936
Dissolved Titanium (Ti)	ug/L	<5.0	<5.0	5.0	<5.0	5.0	<250	250	3437543
Total Titanium (Ti)	ug/L	140		5.0	670	25	<250	250	3435936
Dissolved Uranium (U)	ug/L	0.29	0.35	0.10	1.6	0.10	17	5.0	3437543
Total Uranium (U)	ug/L	0.95		0.10	5.4	0.10	26	5.0	3435936
Dissolved Vanadium (V)	ug/L	<0.50	<0.50	0.50	<0.50	0.50	<50	50	3437543
Total Vanadium (V)	ug/L	17		0.50	84	0.50	<25	25	3435936
Dissolved Zinc (Zn)	ug/L	<5.0	<5.0	5.0	<5.0	5.0	610	250	3437543
Total Zinc (Zn)	ug/L	50		5.0	230	5.0	350	250	3435936

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		TZ8254			TZ8255	TZ8256		
Sampling Date		2013/11/21			2013/11/21	2013/11/21		
COC Number		442833-02-01			442833-02-01	442833-02-01		
	Units	**MW10-D Lab-Dup**	**RDL**	**QC Batch**	**DUP 3**	**MW05-O**	**RDL**	**QC Batch**
Metals								
Mercury (Hg)	mg/L	<0.00010	0.00010	3436003	<0.00010	<0.00010	0.00010	3436003
Dissolved Aluminum (Al)	ug/L		250	3437543	8.5	<5.0	5.0	3437543
Total Aluminum (Al)	ug/L		250	3435936	3000	11000	5.0	3436229
Dissolved Antimony (Sb)	ug/L		25	3437543	<0.50	<0.50	0.50	3437543
Total Antimony (Sb)	ug/L		25	3435936	<0.50	<0.50	0.50	3436229
Dissolved Arsenic (As)	ug/L		50	3437543	<1.0	<1.0	1.0	3437543
Total Arsenic (As)	ug/L		50	3435936	1.6	7.6	1.0	3436229
Dissolved Barium (Ba)	ug/L		100	3437543	51	58	2.0	3437543
Total Barium (Ba)	ug/L		100	3435936	73	280	2.0	3436229
Dissolved Beryllium (Be)	ug/L		25	3437543	<0.50	<0.50	0.50	3437543
Total Beryllium (Be)	ug/L		25	3435936	<0.50	0.69	0.50	3436229
Dissolved Bismuth (Bi)	ug/L		50	3437543	<1.0	<1.0	1.0	3437543
Total Bismuth (Bi)	ug/L		50	3435936	<1.0	<1.0	1.0	3436229
Dissolved Boron (B)	ug/L		500	3437543	51	<10	10	3437543
Total Boron (B)	ug/L		500	3435936	69	26	10	3436229
Dissolved Cadmium (Cd)	ug/L		5.0	3437543	<0.10	<0.10	0.10	3437543
Total Cadmium (Cd)	ug/L		5.0	3435936	0.14	0.39	0.10	3436229
Dissolved Calcium (Ca)	ug/L		10000	3437543	86000	120000	200	3437543
Total Calcium (Ca)	ug/L		10000	3435936	100000	250000	200	3436229
Dissolved Chromium (Cr)	ug/L		250	3437543	<5.0	<5.0	5.0	3437543
Total Chromium (Cr)	ug/L		250	3435936	<5.0	24	5.0	3436229
Dissolved Cobalt (Co)	ug/L		25	3437543	0.65	<0.50	0.50	3437543
Total Cobalt (Co)	ug/L		25	3435936	3.4	15	0.50	3436229
Dissolved Copper (Cu)	ug/L		50	3437543	<1.0	<1.0	1.0	3437543
Total Copper (Cu)	ug/L		50	3435936	7.8	69	1.0	3436229
Dissolved Iron (Fe)	ug/L		5000	3437543	<100	<100	100	3437543
Total Iron (Fe)	ug/L		5000	3435936	4600	24000	100	3436229
Dissolved Lead (Pb)	ug/L		25	3437543	<0.50	<0.50	0.50	3437543
Total Lead (Pb)	ug/L		25	3435936	4.3	19	0.50	3436229
Dissolved Magnesium (Mg)	ug/L		2500	3437543	63000	34000	50	3437543
Total Magnesium (Mg)	ug/L		2500	3435936	68000	48000	50	3436229
Dissolved Manganese (Mn)	ug/L		100	3437543	180	4.4	2.0	3437543

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		TZ8254			TZ8255	TZ8256		
Sampling Date		2013/11/21			2013/11/21	2013/11/21		
COC Number		442833-02-01			442833-02-01	442833-02-01		
	Units	**MW10-D Lab-Dup**	**RDL**	**QC Batch**	**DUP 3**	**MW05-O**	**RDL**	**QC Batch**
Total Manganese (Mn)	ug/L		100	3435936	300	2800	2.0	3436229
Dissolved Molybdenum (Mo)	ug/L		25	3437543	2.3	<0.50	0.50	3437543
Total Molybdenum (Mo)	ug/L		25	3435936	4.0	1.9	0.50	3436229
Dissolved Nickel (Ni)	ug/L		50	3437543	<1.0	<1.0	1.0	3437543
Total Nickel (Ni)	ug/L		50	3435936	5.3	24	1.0	3436229
Dissolved Phosphorus (P)	ug/L		5000	3437543	130	<100	100	3437543
Total Phosphorus (P)	ug/L		5000	3435936	140	1000	100	3436229
Dissolved Potassium (K)	ug/L		10000	3437543	4400	720	200	3437543
Total Potassium (K)	ug/L		10000	3435936	5500	3900	200	3436229
Dissolved Selenium (Se)	ug/L		200	3437543	<2.0	<2.0	2.0	3437543
Dissolved Silicon (Si)	ug/L		2500	3437543	6700	5200	50	3437543
Total Silicon (Si)	ug/L		2500	3435936	11000	20000	50	3436229
Total Selenium (Se)	ug/L		100	3435936	<2.0	<2.0	2.0	3436229
Dissolved Silver (Ag)	ug/L		5.0	3437543	<0.10	<0.10	0.10	3437543
Total Silver (Ag)	ug/L		5.0	3435936	<0.10	0.10	0.10	3436229
Dissolved Sodium (Na)	ug/L		5000	3437543	24000	6700	100	3437543
Total Sodium (Na)	ug/L		5000	3435936	25000	6900	100	3436229
Dissolved Strontium (Sr)	ug/L		50	3437543	1300	210	1.0	3437543
Total Strontium (Sr)	ug/L		50	3435936	1400	410	1.0	3436229
Dissolved Thallium (Tl)	ug/L		2.5	3437543	<0.050	<0.050	0.050	3437543
Total Thallium (Tl)	ug/L		2.5	3435936	<0.050	0.16	0.050	3436229
Dissolved Tin (Sn)	ug/L		50	3437543	<1.0	<1.0	1.0	3437543
Total Tin (Sn)	ug/L		50	3435936	<1.0	1.0	1.0	3436229
Dissolved Titanium (Ti)	ug/L		250	3437543	<5.0	<5.0	5.0	3437543
Total Titanium (Ti)	ug/L		250	3435936	65	240	5.0	3436229
Dissolved Uranium (U)	ug/L		5.0	3437543	7.1	2.0	0.10	3437543
Total Uranium (U)	ug/L		5.0	3435936	8.5	2.9	0.10	3436229
Dissolved Vanadium (V)	ug/L		50	3437543	<0.50	<0.50	0.50	3437543
Total Vanadium (V)	ug/L		25	3435936	6.0	24	0.50	3436229
Dissolved Zinc (Zn)	ug/L		250	3437543	<5.0	<5.0	5.0	3437543
Total Zinc (Zn)	ug/L		250	3435936	18	77	5.0	3436229

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam Job #: B3K1890
Report Date: 2013/11/28

Golder Associates Ltd
Client Project #: 021-1228
Site Location: TANSLEY QUARRY
Sampler Initials: JB

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		TZ8257		
Sampling Date		2013/11/21		
COC Number		442833-02-01		
	Units	**MW05-I**	**RDL**	**QC Batch**
Metals				
Mercury (Hg)	mg/L	<0.00010	0.00010	3436003
Dissolved Aluminum (Al)	ug/L	<5.0	5.0	3437543
Total Aluminum (Al)	ug/L	98000	50	3436229
Dissolved Antimony (Sb)	ug/L	<0.50	0.50	3437543
Total Antimony (Sb)	ug/L	<5.0	5.0	3436229
Dissolved Arsenic (As)	ug/L	10	1.0	3437543
Total Arsenic (As)	ug/L	120	10	3436229
Dissolved Barium (Ba)	ug/L	59	2.0	3437543
Total Barium (Ba)	ug/L	820	20	3436229
Dissolved Beryllium (Be)	ug/L	<0.50	0.50	3437543
Total Beryllium (Be)	ug/L	5.7	5.0	3436229
Dissolved Bismuth (Bi)	ug/L	<1.0	1.0	3437543
Total Bismuth (Bi)	ug/L	<10	10	3436229
Dissolved Boron (B)	ug/L	1000	10	3437543
Total Boron (B)	ug/L	1300	100	3436229
Dissolved Cadmium (Cd)	ug/L	<0.10	0.10	3437543
Total Cadmium (Cd)	ug/L	2.2	1.0	3436229
Dissolved Calcium (Ca)	ug/L	56000	400	3437543
Total Calcium (Ca)	ug/L	1600000	2000	3436229
Dissolved Chromium (Cr)	ug/L	<5.0	5.0	3437543
Total Chromium (Cr)	ug/L	170	50	3436229
Dissolved Cobalt (Co)	ug/L	<0.50	0.50	3437543
Total Cobalt (Co)	ug/L	96	5.0	3436229
Dissolved Copper (Cu)	ug/L	<1.0	1.0	3437543
Total Copper (Cu)	ug/L	290	10	3436229
Dissolved Iron (Fe)	ug/L	130	100	3437543
Total Iron (Fe)	ug/L	200000	1000	3436229
Dissolved Lead (Pb)	ug/L	<0.50	0.50	3437543
Total Lead (Pb)	ug/L	85	5.0	3436229
Dissolved Magnesium (Mg)	ug/L	32000	50	3437543
Total Magnesium (Mg)	ug/L	210000	500	3436229
Dissolved Manganese (Mn)	ug/L	25	2.0	3437543

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		TZ8257		
Sampling Date		2013/11/21		
COC Number		442833-02-01		
	Units	**MW05-I**	**RDL**	**QC Batch**
Total Manganese (Mn)	ug/L	13000	20	3436229
Dissolved Molybdenum (Mo)	ug/L	5.0	0.50	3437543
Total Molybdenum (Mo)	ug/L	9.1	5.0	3436229
Dissolved Nickel (Ni)	ug/L	<1.0	1.0	3437543
Total Nickel (Ni)	ug/L	180	10	3436229
Dissolved Phosphorus (P)	ug/L	<100	100	3437543
Total Phosphorus (P)	ug/L	13000	1000	3436229
Dissolved Potassium (K)	ug/L	6400	200	3437543
Total Potassium (K)	ug/L	40000	2000	3436229
Dissolved Selenium (Se)	ug/L	<2.0	2.0	3437543
Dissolved Silicon (Si)	ug/L	9500	50	3437543
Total Silicon (Si)	ug/L	150000	500	3436229
Total Selenium (Se)	ug/L	<20	20	3436229
Dissolved Silver (Ag)	ug/L	<0.10	0.10	3437543
Total Silver (Ag)	ug/L	<1.0	1.0	3436229
Dissolved Sodium (Na)	ug/L	27000	100	3437543
Total Sodium (Na)	ug/L	32000	1000	3436229
Dissolved Strontium (Sr)	ug/L	6800	1.0	3437543
Total Strontium (Sr)	ug/L	10000	10	3436229
Dissolved Thallium (Tl)	ug/L	<0.050	0.050	3437543
Total Thallium (Tl)	ug/L	1.3	0.50	3436229
Dissolved Tin (Sn)	ug/L	<1.0	1.0	3437543
Total Tin (Sn)	ug/L	<10	10	3436229
Dissolved Titanium (Ti)	ug/L	<5.0	5.0	3437543
Total Titanium (Ti)	ug/L	2500	50	3436229
Dissolved Uranium (U)	ug/L	0.21	0.10	3437543
Total Uranium (U)	ug/L	7.3	1.0	3436229
Dissolved Vanadium (V)	ug/L	<0.50	0.50	3437543
Total Vanadium (V)	ug/L	200	5.0	3436229
Dissolved Zinc (Zn)	ug/L	<5.0	5.0	3437543
Total Zinc (Zn)	ug/L	610	50	3436229

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Golder Associates Ltd
Maxxam Job #: B3K1890
Client Project #: 021-1228
Report Date: 2013/11/28
Site Location: TANSLEY QUARRY
Sampler Initials: JB

Test Summary

Maxxam ID TZ8249
Sample ID MW04-S
Matrix Water

Collected 2013/11/21
Shipped
Received 2013/11/21

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3433701	N/A	2013/11/25	Surinder Rai
Anions	IC	3433654	N/A	2013/11/25	Fari Dehdezi
Conductivity	COND	3433702	N/A	2013/11/25	Surinder Rai
Free (WAD) Cyanide	TECH/CN	3433065	N/A	2013/11/23	Xuanhong Qiu
Fluoride	F	3433703	2013/11/22	2013/11/25	Surinder Rai
Hardness (calculated as CaCO3)		3431640	N/A	2013/11/28	Automated Statchk
Mercury in Water by CVAA	CVAA	3435264	2013/11/25	2013/11/26	Lawrence Cheung
Dissolved Metals by ICPMS	ICP/MS	3437543	N/A	2013/11/28	Prempal Bhatti
Total Metals Analysis by ICPMS	ICP/MS	3435936	N/A	2013/11/27	Hua Ren
Total Ammonia-N	LACH/NH4	3433892	N/A	2013/11/25	Charles Opoku-Ware
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	3433380	N/A	2013/11/28	Shobhana Bavisiya
pH	PH	3433704	N/A	2013/11/25	Surinder Rai
Phenols (4AAP)	TECH/PHEN	3433778	N/A	2013/11/27	Bramdeo Motiram
Orthophosphate	AC	3434052	N/A	2013/11/25	Alina Dobreanu
Sulphide	ISE/S	3432913	N/A	2013/11/22	Neil Dassanayake
Total Dissolved Solids	SLDS	3432908	N/A	2013/11/22	Niki Shah
Total Phosphorus (Colourimetric)	LACH/P	3434803	2013/11/25	2013/11/26	Viorica Rotaru
Low Level Total Suspended Solids	SLDS	3432899	N/A	2013/11/22	Niki Shah
Turbidity	TURB	3433317	N/A	2013/11/22	Neil Dassanayake

Maxxam ID TZ8250
Sample ID MW04-I
Matrix Water

Collected 2013/11/21
Shipped
Received 2013/11/21

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3433701	N/A	2013/11/25	Surinder Rai
Anions	IC	3433654	N/A	2013/11/25	Fari Dehdezi
Conductivity	COND	3433702	N/A	2013/11/25	Surinder Rai
Free (WAD) Cyanide	TECH/CN	3433065	N/A	2013/11/23	Xuanhong Qiu
Fluoride	F	3433703	2013/11/22	2013/11/25	Surinder Rai
Hardness (calculated as CaCO3)		3431640	N/A	2013/11/28	Automated Statchk
Mercury in Water by CVAA	CVAA	3436003	2013/11/26	2013/11/27	Magdalena Carlos
Dissolved Metals by ICPMS	ICP/MS	3437543	N/A	2013/11/28	Prempal Bhatti
Total Metals Analysis by ICPMS	ICP/MS	3435936	N/A	2013/11/27	Hua Ren
Total Ammonia-N	LACH/NH4	3433892	N/A	2013/11/25	Charles Opoku-Ware
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	3433380	N/A	2013/11/28	Shobhana Bavisiya
pH	PH	3433704	N/A	2013/11/25	Surinder Rai
Phenols (4AAP)	TECH/PHEN	3433778	N/A	2013/11/27	Bramdeo Motiram
Orthophosphate	AC	3434052	N/A	2013/11/25	Alina Dobreanu
Sulphide	ISE/S	3432913	N/A	2013/11/22	Neil Dassanayake
Total Dissolved Solids	SLDS	3432908	N/A	2013/11/22	Niki Shah
Total Phosphorus (Colourimetric)	LACH/P	3434803	2013/11/25	2013/11/26	Viorica Rotaru
Low Level Total Suspended Solids	SLDS	3432899	N/A	2013/11/22	Niki Shah
Turbidity	TURB	3433317	N/A	2013/11/22	Neil Dassanayake

Maxxam Job #: B3K1890
Report Date: 2013/11/28

Golder Associates Ltd
Client Project #: 021-1228
Site Location: TANSLEY QUARRY
Sampler Initials: JB

Test Summary

Maxxam ID TZ8250 Dup
Sample ID MW04-I
Matrix Water

Collected 2013/11/21
Shipped
Received 2013/11/21

Test Description	**Instrumentation**	**Batch**	**Extracted**	**Analyzed**	**Analyst**
Phenols (4AAP)	TECH/PHEN	3433778	N/A	2013/11/27	Bramdeo Motiram

Maxxam ID TZ8251
Sample ID MW04-D
Matrix Water

Collected 2013/11/21
Shipped
Received 2013/11/21

Test Description	**Instrumentation**	**Batch**	**Extracted**	**Analyzed**	**Analyst**
Alkalinity	PH	3433701	N/A	2013/11/25	Surinder Rai
Anions	IC	3433654	N/A	2013/11/25	Fari Dehdezi
Conductivity	COND	3433702	N/A	2013/11/25	Surinder Rai
Free (WAD) Cyanide	TECH/CN	3433065	N/A	2013/11/23	Xuanhong Qiu
Fluoride	F	3433703	2013/11/22	2013/11/25	Surinder Rai
Hardness (calculated as CaCO3)		3431640	N/A	2013/11/28	Automated Statchk
Mercury in Water by CVAA	CVAA	3436003	2013/11/26	2013/11/27	Magdalena Carlos
Dissolved Metals by ICPMS	ICP/MS	3437543	N/A	2013/11/28	Prempal Bhatti
Total Metals Analysis by ICPMS	ICP/MS	3435936	N/A	2013/11/27	Hua Ren
Total Ammonia-N	LACH/NH4	3433892	N/A	2013/11/25	Charles Opoku-Ware
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	3433380	N/A	2013/11/28	Shobhana Bavisiya
pH	PH	3433704	N/A	2013/11/25	Surinder Rai
Phenols (4AAP)	TECH/PHEN	3433778	N/A	2013/11/27	Bramdeo Motiram
Orthophosphate	AC	3434052	N/A	2013/11/25	Alina Dobreanu
Sulphide	ISE/S	3432913	N/A	2013/11/22	Neil Dassanayake
Total Dissolved Solids	SLDS	3432908	N/A	2013/11/22	Niki Shah
Total Phosphorus (Colourimetric)	LACH/P	3434803	2013/11/25	2013/11/26	Viorica Rotaru
Low Level Total Suspended Solids	SLDS	3432899	N/A	2013/11/22	Niki Shah
Turbidity	TURB	3433317	N/A	2013/11/22	Neil Dassanayake

Maxxam ID TZ8252
Sample ID MW10-I
Matrix Water

Collected 2013/11/21
Shipped
Received 2013/11/21

Test Description	**Instrumentation**	**Batch**	**Extracted**	**Analyzed**	**Analyst**
Alkalinity	PH	3433701	N/A	2013/11/25	Surinder Rai
Anions	IC	3433654	N/A	2013/11/25	Fari Dehdezi
Conductivity	COND	3433702	N/A	2013/11/25	Surinder Rai
Free (WAD) Cyanide	TECH/CN	3433065	N/A	2013/11/23	Xuanhong Qiu
Fluoride	F	3433703	2013/11/22	2013/11/25	Surinder Rai
Hardness (calculated as CaCO3)		3431640	N/A	2013/11/28	Automated Statchk
Mercury in Water by CVAA	CVAA	3436003	2013/11/26	2013/11/27	Magdalena Carlos
Dissolved Metals by ICPMS	ICP/MS	3437543	N/A	2013/11/28	Prempal Bhatti
Total Metals Analysis by ICPMS	ICP/MS	3435936	N/A	2013/11/27	Hua Ren
Total Ammonia-N	LACH/NH4	3433892	N/A	2013/11/25	Charles Opoku-Ware
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	3433380	N/A	2013/11/28	Shobhana Bavisiya
pH	PH	3433704	N/A	2013/11/25	Surinder Rai
Phenols (4AAP)	TECH/PHEN	3433985	N/A	2013/11/26	Bramdeo Motiram
Orthophosphate	AC	3434052	N/A	2013/11/25	Alina Dobreanu
Sulphide	ISE/S	3432913	N/A	2013/11/22	Neil Dassanayake
Total Dissolved Solids	SLDS	3432908	N/A	2013/11/22	Niki Shah
Total Phosphorus (Colourimetric)	LACH/P	3434803	2013/11/25	2013/11/26	Viorica Rotaru
Low Level Total Suspended Solids	SLDS	3432899	N/A	2013/11/22	Niki Shah
Turbidity	TURB	3433317	N/A	2013/11/22	Neil Dassanayake

Test Summary

Maxxam ID TZ8252 Dup
Sample ID MW10-I
Matrix Water

Collected 2013/11/21
Shipped
Received 2013/11/21

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3433701	N/A	2013/11/25	Surinder Rai
Conductivity	COND	3433702	N/A	2013/11/25	Surinder Rai
Fluoride	F	3433703	2013/11/22	2013/11/25	Surinder Rai
Dissolved Metals by ICPMS	ICP/MS	3437543	N/A	2013/11/28	Prempal Bhatti
pH	PH	3433704	N/A	2013/11/25	Surinder Rai

Maxxam ID TZ8253
Sample ID MW10-O
Matrix Water

Collected 2013/11/21
Shipped
Received 2013/11/21

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3433701	N/A	2013/11/25	Surinder Rai
Anions	IC	3433654	N/A	2013/11/25	Fari Dehdezi
Conductivity	COND	3433702	N/A	2013/11/25	Surinder Rai
Free (WAD) Cyanide	TECH/CN	3433065	N/A	2013/11/23	Xuanhong Qiu
Fluoride	F	3433703	2013/11/22	2013/11/25	Surinder Rai
Hardness (calculated as CaCO3)		3431640	N/A	2013/11/28	Automated Statchk
Mercury in Water by CVAA	CVAA	3436003	2013/11/26	2013/11/27	Magdalena Carlos
Dissolved Metals by ICPMS	ICP/MS	3437543	N/A	2013/11/28	Prempal Bhatti
Total Metals Analysis by ICPMS	ICP/MS	3435936	N/A	2013/11/27	Hua Ren
Total Ammonia-N	LACH/NH4	3433892	N/A	2013/11/25	Charles Opoku-Ware
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	3433380	N/A	2013/11/28	Shobhana Bavisiya
pH	PH	3433704	N/A	2013/11/25	Surinder Rai
Phenols (4AAP)	TECH/PHEN	3433985	N/A	2013/11/26	Bramdeo Motiram
Orthophosphate	AC	3434052	N/A	2013/11/25	Alina Dobreanu
Sulphide	ISE/S	3432913	N/A	2013/11/22	Neil Dassanayake
Total Dissolved Solids	SLDS	3432908	N/A	2013/11/22	Niki Shah
Total Phosphorus (Colourimetric)	LACH/P	3434803	2013/11/25	2013/11/26	Viorica Rotaru
Low Level Total Suspended Solids	SLDS	3433362	N/A	2013/11/22	Niki Shah
Turbidity	TURB	3433317	N/A	2013/11/22	Neil Dassanayake

Maxxam ID TZ8254
Sample ID MW10-D
Matrix Water

Collected 2013/11/21
Shipped
Received 2013/11/21

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3433701	N/A	2013/11/25	Surinder Rai
Anions	IC	3433654	N/A	2013/11/25	Fari Dehdezi
Conductivity	COND	3433702	N/A	2013/11/25	Surinder Rai
Free (WAD) Cyanide	TECH/CN	3433065	N/A	2013/11/23	Xuanhong Qiu
Fluoride	F	3433703	2013/11/22	2013/11/25	Surinder Rai
Hardness (calculated as CaCO3)		3431640	N/A	2013/11/28	Automated Statchk
Mercury in Water by CVAA	CVAA	3436003	2013/11/26	2013/11/27	Magdalena Carlos
Dissolved Metals by ICPMS	ICP/MS	3437543	N/A	2013/11/28	Prempal Bhatti
Total Metals Analysis by ICPMS	ICP/MS	3435936	N/A	2013/11/27	Hua Ren
Total Ammonia-N	LACH/NH4	3433892	N/A	2013/11/25	Charles Opoku-Ware
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	3433380	N/A	2013/11/28	Shobhana Bavisiya
pH	PH	3433704	N/A	2013/11/25	Surinder Rai
Phenols (4AAP)	TECH/PHEN	3433985	N/A	2013/11/26	Bramdeo Motiram
Orthophosphate	AC	3434052	N/A	2013/11/25	Alina Dobreanu
Sulphide	ISE/S	3432913	N/A	2013/11/22	Neil Dassanayake
Total Dissolved Solids	SLDS	3436783	N/A	2013/11/26	Niki Shah

Test Summary

Total Phosphorus (Colourimetric)	LACH/P	3434803	2013/11/25	2013/11/26	Viorica Rotaru
Low Level Total Suspended Solids	SLDS	3432899	N/A	2013/11/22	Niki Shah
Turbidity	TURB	3433317	N/A	2013/11/22	Neil Dassanayake

Maxxam ID TZ8254 Dup
Sample ID MW10-D
Matrix Water

Collected 2013/11/21
Shipped
Received 2013/11/21

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Mercury in Water by CVAA	CVAA	3436003	2013/11/26	2013/11/27	Magdalena Carlos

Maxxam ID TZ8255
Sample ID DUP 3
Matrix Water

Collected 2013/11/21
Shipped
Received 2013/11/21

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3433701	N/A	2013/11/25	Surinder Rai
Anions	IC	3433654	N/A	2013/11/25	Fari Dehdezi
Conductivity	COND	3433702	N/A	2013/11/25	Surinder Rai
Free (WAD) Cyanide	TECH/CN	3433065	N/A	2013/11/23	Xuanhong Qiu
Fluoride	F	3433703	2013/11/22	2013/11/25	Surinder Rai
Hardness (calculated as CaCO3)		3431640	N/A	2013/11/28	Automated Statchk
Mercury in Water by CVAA	CVAA	3436003	2013/11/26	2013/11/27	Magdalena Carlos
Dissolved Metals by ICPMS	ICP/MS	3437543	N/A	2013/11/28	Prempal Bhatti
Total Metals Analysis by ICPMS	ICP/MS	3436229	N/A	2013/11/27	Viviana Canzonieri
Total Ammonia-N	LACH/NH4	3433917	N/A	2013/11/25	Charles Opoku-Ware
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	3433688	N/A	2013/11/27	Shobhana Bavisiya
pH	PH	3433704	N/A	2013/11/25	Surinder Rai
Phenols (4AAP)	TECH/PHEN	3433778	N/A	2013/11/27	Bramdeo Motiram
Orthophosphate	AC	3434052	N/A	2013/11/25	Alina Dobreanu
Sulphide	ISE/S	3432839	N/A	2013/11/22	Neil Dassanayake
Total Dissolved Solids	SLDS	3432908	N/A	2013/11/22	Niki Shah
Total Phosphorus (Colourimetric)	LACH/P	3434803	2013/11/25	2013/11/26	Viorica Rotaru
Low Level Total Suspended Solids	SLDS	3432899	N/A	2013/11/22	Niki Shah
Turbidity	TURB	3433317	N/A	2013/11/22	Neil Dassanayake

Maxxam ID TZ8256
Sample ID MW05-O
Matrix Water

Collected 2013/11/21
Shipped
Received 2013/11/21

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3433701	N/A	2013/11/25	Surinder Rai
Anions	IC	3433654	N/A	2013/11/25	Fari Dehdezi
Conductivity	COND	3433702	N/A	2013/11/25	Surinder Rai
Free (WAD) Cyanide	TECH/CN	3433065	N/A	2013/11/23	Xuanhong Qiu
Fluoride	F	3433703	2013/11/22	2013/11/25	Surinder Rai
Hardness (calculated as CaCO3)		3431640	N/A	2013/11/28	Automated Statchk
Mercury in Water by CVAA	CVAA	3436003	2013/11/26	2013/11/27	Magdalena Carlos
Dissolved Metals by ICPMS	ICP/MS	3437543	N/A	2013/11/28	Prempal Bhatti
Total Metals Analysis by ICPMS	ICP/MS	3436229	N/A	2013/11/27	Viviana Canzonieri
Total Ammonia-N	LACH/NH4	3433917	N/A	2013/11/25	Charles Opoku-Ware
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	3433688	N/A	2013/11/27	Shobhana Bavisiya
pH	PH	3433704	N/A	2013/11/25	Surinder Rai
Phenols (4AAP)	TECH/PHEN	3433778	N/A	2013/11/27	Bramdeo Motiram
Orthophosphate	AC	3434052	N/A	2013/11/25	Alina Dobreanu
Sulphide	ISE/S	3432839	N/A	2013/11/22	Neil Dassanayake

Test Summary

Total Dissolved Solids	SLDS	3432908	N/A	2013/11/22	Niki Shah
Total Phosphorus (Colourimetric)	LACH/P	3434803	2013/11/25	2013/11/26	Viorica Rotaru
Low Level Total Suspended Solids	SLDS	3432899	N/A	2013/11/22	Niki Shah
Turbidity	TURB	3433317	N/A	2013/11/22	Neil Dassanayake

Maxxam ID TZ8257
Sample ID MW05-I
Matrix Water

Collected 2013/11/21
Shipped
Received 2013/11/21

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3433701	N/A	2013/11/25	Surinder Rai
Anions	IC	3433654	N/A	2013/11/25	Fari Dehdezi
Conductivity	COND	3433702	N/A	2013/11/25	Surinder Rai
Free (WAD) Cyanide	TECH/CN	3433065	N/A	2013/11/23	Xuanhong Qiu
Fluoride	F	3433703	2013/11/22	2013/11/25	Surinder Rai
Hardness (calculated as CaCO3)		3431640	N/A	2013/11/28	Automated Statchk
Mercury in Water by CVAA	CVAA	3436003	2013/11/26	2013/11/27	Magdalena Carlos
Dissolved Metals by ICPMS	ICP/MS	3437543	N/A	2013/11/28	Prempal Bhatti
Total Metals Analysis by ICPMS	ICP/MS	3436229	N/A	2013/11/28	Viviana Canzonieri
Total Ammonia-N	LACH/NH4	3433917	N/A	2013/11/25	Charles Opoku-Ware
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	3433688	N/A	2013/11/27	Shobhana Bavisiya
pH	PH	3433704	N/A	2013/11/25	Surinder Rai
Phenols (4AAP)	TECH/PHEN	3433778	N/A	2013/11/27	Bramdeo Motiram
Orthophosphate	AC	3434052	N/A	2013/11/25	Alina Dobreanu
Sulphide	ISE/S	3432839	N/A	2013/11/22	Neil Dassanayake
Total Dissolved Solids	SLDS	3432908	N/A	2013/11/22	Niki Shah
Total Phosphorus (Colourimetric)	LACH/P	3434803	2013/11/25	2013/11/26	Viorica Rotaru
Low Level Total Suspended Solids	SLDS	3432899	N/A	2013/11/22	Niki Shah
Turbidity	TURB	3433317	N/A	2013/11/22	Neil Dassanayake

Package 1	4.7°C
Package 2	6.0°C

Each temperature is the average of up to three cooler temperatures taken at receipt

GENERAL COMMENTS

Sample TZ8250-01: Metal analysis:Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.

Sample TZ8251-01: Metal analysis:Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.

Sample TZ8254-01: Metal analysis:Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.

Sample TZ8257-01: Metals Analysis: Due to the sample matrix, sample required dilution. Detection limits were adjusted accordingly.

Results relate only to the items tested.

Golder Associates Ltd
Attention: Josip Balaban
Client Project #: 021-1228
P.O. #:
Site Location: TANSLEY QUARRY

Quality Assurance Report

Maxxam Job Number: MB3K1890

QA/QC Batch Num Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
3432839 NYS	Matrix Spike	Sulphide	2013/11/22		91	%	80 - 120
	Spiked Blank	Sulphide	2013/11/22		97	%	80 - 120
	Method Blank	Sulphide	2013/11/22	<0.020		mg/L	
	RPD	Sulphide	2013/11/22	NC		%	20
3432899 NS1	QC Standard	Total Suspended Solids	2013/11/22		100	%	85 - 115
	Method Blank	Total Suspended Solids	2013/11/22	<1		mg/L	
	RPD	Total Suspended Solids	2013/11/22	5.7		%	25
3432908 NS1	QC Standard	Total Dissolved Solids	2013/11/22		101	%	90 - 110
	Method Blank	Total Dissolved Solids	2013/11/22	<10		mg/L	
	RPD	Total Dissolved Solids	2013/11/22	1.8		%	25
3432913 NYS	Matrix Spike	Sulphide	2013/11/22		83	%	80 - 120
	Spiked Blank	Sulphide	2013/11/22		93	%	80 - 120
	Method Blank	Sulphide	2013/11/22	<0.020		mg/L	
	RPD	Sulphide	2013/11/22	NC		%	20
3433065 XQI	Matrix Spike	Free Cyanide	2013/11/23		104	%	80 - 120
	Spiked Blank	Free Cyanide	2013/11/23		101	%	80 - 120
	Method Blank	Free Cyanide	2013/11/23	<0.0020		mg/L	
	RPD	Free Cyanide	2013/11/23	NC		%	20
3433317 NYS	QC Standard	Turbidity	2013/11/22		101	%	85 - 115
	Method Blank	Turbidity	2013/11/22	<0.2		NTU	
	RPD	Turbidity	2013/11/22	NC		%	20
3433362 NS1	QC Standard	Total Suspended Solids	2013/11/22		100	%	85 - 115
	Method Blank	Total Suspended Solids	2013/11/22	<1		mg/L	
	RPD	Total Suspended Solids	2013/11/22	0		%	25
3433380 S_B	Matrix Spike	Nitrite (N)	2013/11/28		107	%	80 - 120
		Nitrate (N)	2013/11/28		NC	%	80 - 120
	Spiked Blank	Nitrite (N)	2013/11/28		96	%	80 - 120
		Nitrate (N)	2013/11/28		101	%	80 - 120
	Method Blank	Nitrite (N)	2013/11/28	<0.010		mg/L	
		Nitrate (N)	2013/11/28	<0.10		mg/L	
	RPD	Nitrite (N)	2013/11/28	NC		%	25
		Nitrate (N)	2013/11/28	0.7		%	25
3433654 FD	Matrix Spike	Dissolved Chloride (Cl)	2013/11/25		94	%	80 - 120
		Dissolved Bromide (Br-)	2013/11/25		97	%	80 - 120
		Dissolved Sulphate (SO4)	2013/11/25		NC	%	80 - 120
	Spiked Blank	Dissolved Chloride (Cl)	2013/11/25		98	%	80 - 120
		Dissolved Bromide (Br-)	2013/11/25		101	%	80 - 120
		Dissolved Sulphate (SO4)	2013/11/25		96	%	80 - 120
	Method Blank	Dissolved Chloride (Cl)	2013/11/25	<1.0		mg/L	
		Dissolved Bromide (Br-)	2013/11/25	<1.0		mg/L	
		Dissolved Sulphate (SO4)	2013/11/25	<1.0		mg/L	
	RPD	Dissolved Chloride (Cl)	2013/11/25	NC		%	20
3433688 S_B	Matrix Spike	Nitrite (N)	2013/11/27		105	%	80 - 120
		Nitrate (N)	2013/11/27		93	%	80 - 120
	Spiked Blank	Nitrite (N)	2013/11/27		105	%	80 - 120
		Nitrate (N)	2013/11/27		96	%	80 - 120
	Method Blank	Nitrite (N)	2013/11/27	<0.010		mg/L	
		Nitrate (N)	2013/11/27	<0.10		mg/L	
	RPD	Nitrite (N)	2013/11/27	NC		%	25
		Nitrate (N)	2013/11/27	NC		%	25
3433701 SAU	Spiked Blank	Alkalinity (Total as CaCO3)	2013/11/25		98	%	85 - 115
	Method Blank	Alkalinity (Total as CaCO3)	2013/11/25	<1.0		mg/L	
	RPD [TZ8252-01]	Alkalinity (Total as CaCO3)	2013/11/25	0.4		%	25
3433702 SAU	Spiked Blank	Conductivity	2013/11/25		103	%	85 - 115
	Method Blank	Conductivity	2013/11/25	<1.0		umho/cm	

Quality Assurance Report (Continued)

Maxxam Job Number: MB3K1890

QA/QC Batch Num	Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
3433702	SAU	RPD [TZ8252-01]	Conductivity	2013/11/25	0		%	25
3433703	SAU	Matrix Spike [TZ8252-01]	Fluoride (F-)	2013/11/25		102	%	80 - 120
		Spiked Blank	Fluoride (F-)	2013/11/25		101	%	80 - 120
		Method Blank	Fluoride (F-)	2013/11/25	<0.10		mg/L	
		RPD [TZ8252-01]	Fluoride (F-)	2013/11/25	NC		%	20
3433778	BMO	Matrix Spike [TZ8250-09]	Phenols-4AAP	2013/11/27		102	%	80 - 120
		Spiked Blank	Phenols-4AAP	2013/11/27		104	%	85 - 115
		Method Blank	Phenols-4AAP	2013/11/27	<0.0010		mg/L	
		RPD [TZ8250-09]	Phenols-4AAP	2013/11/27	NC		%	25
3433892	COP	Matrix Spike	Total Ammonia-N	2013/11/25		102	%	80 - 120
		Spiked Blank	Total Ammonia-N	2013/11/25		98	%	85 - 115
		Method Blank	Total Ammonia-N	2013/11/25	<0.050		mg/L	
		RPD	Total Ammonia-N	2013/11/25	NC		%	20
3433917	COP	Matrix Spike	Total Ammonia-N	2013/11/25		104	%	80 - 120
		Spiked Blank	Total Ammonia-N	2013/11/25		98	%	85 - 115
		Method Blank	Total Ammonia-N	2013/11/25	<0.050		mg/L	
		RPD	Total Ammonia-N	2013/11/25	NC		%	20
3433985	BMO	Matrix Spike	Phenols-4AAP	2013/11/26		95	%	80 - 120
		Spiked Blank	Phenols-4AAP	2013/11/26		100	%	85 - 115
		Method Blank	Phenols-4AAP	2013/11/26	<0.0010		mg/L	
		RPD	Phenols-4AAP	2013/11/26	NC		%	25
3434052	ADB	Matrix Spike	Orthophosphate (P)	2013/11/25		NC	%	75 - 125
		Spiked Blank	Orthophosphate (P)	2013/11/25		99	%	80 - 120
		Method Blank	Orthophosphate (P)	2013/11/25	<0.010		mg/L	
		RPD	Orthophosphate (P)	2013/11/25	0.5		%	25
3434803	VRO	Matrix Spike	Total Phosphorus	2013/11/26		98	%	80 - 120
		QC Standard	Total Phosphorus	2013/11/26		104	%	80 - 120
		Spiked Blank	Total Phosphorus	2013/11/26		101	%	80 - 120
		Method Blank	Total Phosphorus	2013/11/26	<0.020		mg/L	
		RPD	Total Phosphorus	2013/11/26	5.1		%	20
3435264	LCH	Matrix Spike	Mercury (Hg)	2013/11/26		99	%	80 - 120
		Spiked Blank	Mercury (Hg)	2013/11/26		97	%	80 - 120
		Method Blank	Mercury (Hg)	2013/11/26	<0.00010		mg/L	
		RPD	Mercury (Hg)	2013/11/26	NC		%	20
3435936	HRE	Matrix Spike	Total Aluminum (Al)	2013/11/27		102	%	80 - 120
			Total Antimony (Sb)	2013/11/27		102	%	80 - 120
			Total Arsenic (As)	2013/11/27		112	%	80 - 120
			Total Barium (Ba)	2013/11/27		104	%	80 - 120
			Total Beryllium (Be)	2013/11/27		103	%	80 - 120
			Total Bismuth (Bi)	2013/11/27		96	%	80 - 120
			Total Boron (B)	2013/11/27		NC	%	80 - 120
			Total Cadmium (Cd)	2013/11/27		103	%	80 - 120
			Total Calcium (Ca)	2013/11/27		NC	%	80 - 120
			Total Chromium (Cr)	2013/11/27		99	%	80 - 120
			Total Cobalt (Co)	2013/11/27		105	%	80 - 120
			Total Copper (Cu)	2013/11/27		106	%	80 - 120
			Total Iron (Fe)	2013/11/27		102	%	80 - 120
			Total Lead (Pb)	2013/11/27		101	%	80 - 120
			Total Magnesium (Mg)	2013/11/27		NC	%	80 - 120
			Total Manganese (Mn)	2013/11/27		101	%	80 - 120
			Total Molybdenum (Mo)	2013/11/27		107	%	80 - 120
			Total Nickel (Ni)	2013/11/27		103	%	80 - 120
			Total Phosphorus (P)	2013/11/27		NC	%	80 - 120

Golder Associates Ltd
Attention: Josip Balaban
Client Project #: 021-1228
P.O. #:
Site Location: TANSLEY QUARRY

Quality Assurance Report (Continued)

Maxxam Job Number: MB3K1890

QA/QC Batch Num	Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
3435936	HRE	Matrix Spike	Total Potassium (K)	2013/11/27		NC	%	80 - 120
			Total Silicon (Si)	2013/11/27		95	%	80 - 120
			Total Selenium (Se)	2013/11/27		105	%	80 - 120
			Total Silver (Ag)	2013/11/27		97	%	80 - 120
			Total Sodium (Na)	2013/11/27		NC	%	80 - 120
			Total Strontium (Sr)	2013/11/27		NC	%	80 - 120
			Total Thallium (Tl)	2013/11/27		101	%	80 - 120
			Total Tin (Sn)	2013/11/27		101	%	80 - 120
			Total Titanium (Ti)	2013/11/27		103	%	80 - 120
			Total Uranium (U)	2013/11/27		103	%	80 - 120
			Total Vanadium (V)	2013/11/27		103	%	80 - 120
			Total Zinc (Zn)	2013/11/27		109	%	80 - 120
		Spiked Blank	Total Aluminum (Al)	2013/11/27		94	%	80 - 120
			Total Antimony (Sb)	2013/11/27		107	%	80 - 120
			Total Arsenic (As)	2013/11/27		106	%	80 - 120
			Total Barium (Ba)	2013/11/27		106	%	80 - 120
			Total Beryllium (Be)	2013/11/27		105	%	80 - 120
			Total Bismuth (Bi)	2013/11/27		104	%	80 - 120
			Total Boron (B)	2013/11/27		104	%	80 - 120
			Total Cadmium (Cd)	2013/11/27		105	%	80 - 120
			Total Calcium (Ca)	2013/11/27		99	%	80 - 120
			Total Chromium (Cr)	2013/11/27		104	%	80 - 120
			Total Cobalt (Co)	2013/11/27		105	%	80 - 120
			Total Copper (Cu)	2013/11/27		106	%	80 - 120
			Total Iron (Fe)	2013/11/27		103	%	80 - 120
			Total Lead (Pb)	2013/11/27		106	%	80 - 120
			Total Magnesium (Mg)	2013/11/27		92	%	80 - 120
			Total Manganese (Mn)	2013/11/27		105	%	80 - 120
			Total Molybdenum (Mo)	2013/11/27		110	%	80 - 120
			Total Nickel (Ni)	2013/11/27		106	%	80 - 120
			Total Phosphorus (P)	2013/11/27		105	%	80 - 120
			Total Potassium (K)	2013/11/27		88	%	80 - 120
			Total Silicon (Si)	2013/11/27		91	%	80 - 120
			Total Selenium (Se)	2013/11/27		108	%	80 - 120
			Total Silver (Ag)	2013/11/27		105	%	80 - 120
			Total Sodium (Na)	2013/11/27		93	%	80 - 120
			Total Strontium (Sr)	2013/11/27		106	%	80 - 120
			Total Thallium (Tl)	2013/11/27		106	%	80 - 120
			Total Tin (Sn)	2013/11/27		105	%	80 - 120
			Total Titanium (Ti)	2013/11/27		103	%	80 - 120
			Total Uranium (U)	2013/11/27		107	%	80 - 120
			Total Vanadium (V)	2013/11/27		104	%	80 - 120
			Total Zinc (Zn)	2013/11/27		107	%	80 - 120
		Method Blank	Total Aluminum (Al)	2013/11/27	<5.0		ug/L	
			Total Antimony (Sb)	2013/11/27	<0.50		ug/L	
			Total Arsenic (As)	2013/11/27	<1.0		ug/L	
			Total Barium (Ba)	2013/11/27	<2.0		ug/L	
			Total Beryllium (Be)	2013/11/27	<0.50		ug/L	
			Total Bismuth (Bi)	2013/11/27	<1.0		ug/L	
			Total Boron (B)	2013/11/27	<10		ug/L	
			Total Cadmium (Cd)	2013/11/27	<0.10		ug/L	
			Total Calcium (Ca)	2013/11/27	<200		ug/L	
			Total Chromium (Cr)	2013/11/27	<5.0		ug/L	
			Total Cobalt (Co)	2013/11/27	<0.50		ug/L	
			Total Copper (Cu)	2013/11/27	1.2, RDL=1.0		ug/L	

Quality Assurance Report (Continued)

Maxxam Job Number: MB3K1890

QA/QC Batch Num	Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
3435936	HRE	Method Blank	Total Iron (Fe)	2013/11/27	<100		ug/L	
			Total Lead (Pb)	2013/11/27	<0.50		ug/L	
			Total Magnesium (Mg)	2013/11/27	<50		ug/L	
			Total Manganese (Mn)	2013/11/27	<2.0		ug/L	
			Total Molybdenum (Mo)	2013/11/27	<0.50		ug/L	
			Total Nickel (Ni)	2013/11/27	<1.0		ug/L	
			Total Phosphorus (P)	2013/11/27	<100		ug/L	
			Total Potassium (K)	2013/11/27	<200		ug/L	
			Total Silicon (Si)	2013/11/27	<50		ug/L	
			Total Selenium (Se)	2013/11/27	<2.0		ug/L	
			Total Silver (Ag)	2013/11/27	<0.10		ug/L	
			Total Sodium (Na)	2013/11/27	<100		ug/L	
			Total Strontium (Sr)	2013/11/27	<1.0		ug/L	
			Total Thallium (Tl)	2013/11/27	<0.050		ug/L	
			Total Tin (Sn)	2013/11/27	<1.0		ug/L	
			Total Titanium (Ti)	2013/11/27	<5.0		ug/L	
			Total Uranium (U)	2013/11/27	<0.10		ug/L	
			Total Vanadium (V)	2013/11/27	<0.50		ug/L	
			Total Zinc (Zn)	2013/11/27	<5.0		ug/L	
		RPD	Total Aluminum (Al)	2013/11/27	NC		%	20
			Total Antimony (Sb)	2013/11/27	NC		%	20
			Total Arsenic (As)	2013/11/27	NC		%	20
			Total Barium (Ba)	2013/11/27	NC		%	20
			Total Beryllium (Be)	2013/11/27	NC		%	20
			Total Boron (B)	2013/11/27	NC		%	20
			Total Cadmium (Cd)	2013/11/27	NC		%	20
			Total Calcium (Ca)	2013/11/27	2.0		%	20
			Total Chromium (Cr)	2013/11/27	NC		%	20
			Total Cobalt (Co)	2013/11/27	NC		%	20
			Total Copper (Cu)	2013/11/27	NC		%	20
			Total Iron (Fe)	2013/11/27	NC		%	20
			Total Lead (Pb)	2013/11/27	NC		%	20
			Total Magnesium (Mg)	2013/11/27	0.1		%	20
			Total Manganese (Mn)	2013/11/27	NC		%	20
			Total Molybdenum (Mo)	2013/11/27	NC		%	20
			Total Nickel (Ni)	2013/11/27	NC		%	20
			Total Phosphorus (P)	2013/11/27	NC		%	20
			Total Potassium (K)	2013/11/27	0.8		%	20
			Total Selenium (Se)	2013/11/27	NC		%	20
			Total Silver (Ag)	2013/11/27	NC		%	20
			Total Sodium (Na)	2013/11/27	0.3		%	20
			Total Strontium (Sr)	2013/11/27	1.3		%	20
			Total Thallium (Tl)	2013/11/27	NC		%	20
			Total Tin (Sn)	2013/11/27	NC		%	20
			Total Titanium (Ti)	2013/11/27	NC		%	20
			Total Uranium (U)	2013/11/27	NC		%	20
			Total Vanadium (V)	2013/11/27	NC		%	20
			Total Zinc (Zn)	2013/11/27	NC		%	20
3436003	MC	Matrix Spike [TZ8254-08]	Mercury (Hg)	2013/11/27		99	%	80 - 120
		Spiked Blank	Mercury (Hg)	2013/11/27		104	%	80 - 120
		Method Blank	Mercury (Hg)	2013/11/27	<0.00010		mg/L	
		RPD [TZ8254-08]	Mercury (Hg)	2013/11/27	NC		%	20
3436229	VIV	Matrix Spike	Total Aluminum (Al)	2013/11/27		NC	%	80 - 120
			Total Antimony (Sb)	2013/11/27		112	%	80 - 120

Quality Assurance Report (Continued)

Maxxam Job Number: MB3K1890

QA/QC Batch Num	Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
3436229	VIV	Matrix Spike	Total Arsenic (As)	2013/11/27		104	%	80 - 120
			Total Barium (Ba)	2013/11/27		99	%	80 - 120
			Total Beryllium (Be)	2013/11/27		108	%	80 - 120
			Total Bismuth (Bi)	2013/11/27		98	%	80 - 120
			Total Boron (B)	2013/11/27		106	%	80 - 120
			Total Cadmium (Cd)	2013/11/27		106	%	80 - 120
			Total Calcium (Ca)	2013/11/27		NC	%	80 - 120
			Total Chromium (Cr)	2013/11/27		106	%	80 - 120
			Total Cobalt (Co)	2013/11/27		103	%	80 - 120
			Total Copper (Cu)	2013/11/27		99	%	80 - 120
			Total Iron (Fe)	2013/11/27		103	%	80 - 120
			Total Lead (Pb)	2013/11/27		102	%	80 - 120
			Total Magnesium (Mg)	2013/11/27		105	%	80 - 120
			Total Manganese (Mn)	2013/11/27		105	%	80 - 120
			Total Molybdenum (Mo)	2013/11/27		112	%	80 - 120
			Total Nickel (Ni)	2013/11/27		100	%	80 - 120
			Total Phosphorus (P)	2013/11/27		101	%	80 - 120
			Total Potassium (K)	2013/11/27		98	%	80 - 120
			Total Silicon (Si)	2013/11/27		92	%	80 - 120
			Total Selenium (Se)	2013/11/27		104	%	80 - 120
			Total Silver (Ag)	2013/11/27		103	%	80 - 120
			Total Sodium (Na)	2013/11/27		NC	%	80 - 120
			Total Strontium (Sr)	2013/11/27		106	%	80 - 120
			Total Thallium (Tl)	2013/11/27		102	%	80 - 120
			Total Tin (Sn)	2013/11/27		108	%	80 - 120
			Total Titanium (Ti)	2013/11/27		106	%	80 - 120
			Total Uranium (U)	2013/11/27		107	%	80 - 120
			Total Vanadium (V)	2013/11/27		107	%	80 - 120
			Total Zinc (Zn)	2013/11/27		103	%	80 - 120
		Spiked Blank	Total Aluminum (Al)	2013/11/27		108	%	80 - 120
			Total Antimony (Sb)	2013/11/27		112	%	80 - 120
			Total Arsenic (As)	2013/11/27		105	%	80 - 120
			Total Barium (Ba)	2013/11/27		103	%	80 - 120
			Total Beryllium (Be)	2013/11/27		107	%	80 - 120
			Total Bismuth (Bi)	2013/11/27		104	%	80 - 120
			Total Boron (B)	2013/11/27		104	%	80 - 120
			Total Cadmium (Cd)	2013/11/27		109	%	80 - 120
			Total Calcium (Ca)	2013/11/27		103	%	80 - 120
			Total Chromium (Cr)	2013/11/27		107	%	80 - 120
			Total Cobalt (Co)	2013/11/27		105	%	80 - 120
			Total Copper (Cu)	2013/11/27		104	%	80 - 120
			Total Iron (Fe)	2013/11/27		104	%	80 - 120
			Total Lead (Pb)	2013/11/27		106	%	80 - 120
			Total Magnesium (Mg)	2013/11/27		107	%	80 - 120
			Total Manganese (Mn)	2013/11/27		108	%	80 - 120
			Total Molybdenum (Mo)	2013/11/27		109	%	80 - 120
			Total Nickel (Ni)	2013/11/27		103	%	80 - 120
			Total Phosphorus (P)	2013/11/27		108	%	80 - 120
			Total Potassium (K)	2013/11/27		94	%	80 - 120
			Total Silicon (Si)	2013/11/27		91	%	80 - 120
			Total Selenium (Se)	2013/11/27		103	%	80 - 120
			Total Silver (Ag)	2013/11/27		107	%	80 - 120
			Total Sodium (Na)	2013/11/27		105	%	80 - 120
			Total Strontium (Sr)	2013/11/27		106	%	80 - 120
			Total Thallium (Tl)	2013/11/27		105	%	80 - 120

Quality Assurance Report (Continued)

Maxxam Job Number: MB3K1890

QA/QC Batch Num Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
3436229 VIV	Spiked Blank	Total Tin (Sn)	2013/11/27		107	%	80 - 120
		Total Titanium (Ti)	2013/11/27		106	%	80 - 120
		Total Uranium (U)	2013/11/27		108	%	80 - 120
		Total Vanadium (V)	2013/11/27		105	%	80 - 120
		Total Zinc (Zn)	2013/11/27		108	%	80 - 120
	Method Blank	Total Aluminum (Al)	2013/11/27	<5.0		ug/L	
		Total Antimony (Sb)	2013/11/27	<0.50		ug/L	
		Total Arsenic (As)	2013/11/27	<1.0		ug/L	
		Total Barium (Ba)	2013/11/27	<2.0		ug/L	
		Total Beryllium (Be)	2013/11/27	<0.50		ug/L	
		Total Bismuth (Bi)	2013/11/27	<1.0		ug/L	
		Total Boron (B)	2013/11/27	<10		ug/L	
		Total Cadmium (Cd)	2013/11/27	<0.10		ug/L	
		Total Calcium (Ca)	2013/11/27	<200		ug/L	
		Total Chromium (Cr)	2013/11/27	<5.0		ug/L	
		Total Cobalt (Co)	2013/11/27	<0.50		ug/L	
		Total Copper (Cu)	2013/11/27	1.6, RDL=1.0		ug/L	
		Total Iron (Fe)	2013/11/27	<100		ug/L	
		Total Lead (Pb)	2013/11/27	<0.50		ug/L	
		Total Magnesium (Mg)	2013/11/27	<50		ug/L	
		Total Manganese (Mn)	2013/11/27	<2.0		ug/L	
		Total Molybdenum (Mo)	2013/11/27	<0.50		ug/L	
		Total Nickel (Ni)	2013/11/27	<1.0		ug/L	
		Total Phosphorus (P)	2013/11/27	<100		ug/L	
		Total Potassium (K)	2013/11/27	<200		ug/L	
		Total Silicon (Si)	2013/11/27	54, RDL=50		ug/L	
		Total Selenium (Se)	2013/11/27	<2.0		ug/L	
		Total Silver (Ag)	2013/11/27	<0.10		ug/L	
		Total Sodium (Na)	2013/11/27	<100		ug/L	
		Total Strontium (Sr)	2013/11/27	<1.0		ug/L	
		Total Thallium (Tl)	2013/11/27	<0.050		ug/L	
		Total Tin (Sn)	2013/11/27	<1.0		ug/L	
		Total Titanium (Ti)	2013/11/27	<5.0		ug/L	
		Total Uranium (U)	2013/11/27	<0.10		ug/L	
		Total Vanadium (V)	2013/11/27	<0.50		ug/L	
		Total Zinc (Zn)	2013/11/27	5.6, RDL=5.0		ug/L	
	RPD	Total Aluminum (Al)	2013/11/27	0.1		%	20
		Total Cadmium (Cd)	2013/11/27	NC		%	20
		Total Chromium (Cr)	2013/11/27	NC		%	20
		Total Copper (Cu)	2013/11/27	NC		%	20
		Total Iron (Fe)	2013/11/27	NC		%	20
		Total Lead (Pb)	2013/11/27	NC		%	20
		Total Nickel (Ni)	2013/11/27	NC		%	20
		Total Zinc (Zn)	2013/11/27	NC		%	20
3436783 NS1	QC Standard	Total Dissolved Solids	2013/11/26		98	%	90 - 110
	Method Blank	Total Dissolved Solids	2013/11/26	<10		mg/L	
	RPD	Total Dissolved Solids	2013/11/26	2.6		%	25
3437543 PBA	Matrix Spike						
	[TZ8252-07]	Dissolved Aluminum (Al)	2013/11/28		99	%	80 - 120
		Dissolved Antimony (Sb)	2013/11/28		104	%	80 - 120
		Dissolved Arsenic (As)	2013/11/28		96	%	80 - 120
		Dissolved Barium (Ba)	2013/11/28		94	%	80 - 120
		Dissolved Beryllium (Be)	2013/11/28		100	%	80 - 120
		Dissolved Bismuth (Bi)	2013/11/28		95	%	80 - 120
		Dissolved Boron (B)	2013/11/28		NC	%	80 - 120

Quality Assurance Report (Continued)

Maxxam Job Number: MB3K1890

QA/QC Batch Num	Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
3437543	PBA	Matrix Spike						
		[TZ8252-07]	Dissolved Cadmium (Cd)	2013/11/28		101	%	80 - 120
			Dissolved Calcium (Ca)	2013/11/28		NC	%	80 - 120
			Dissolved Chromium (Cr)	2013/11/28		98	%	80 - 120
			Dissolved Cobalt (Co)	2013/11/28		97	%	80 - 120
			Dissolved Copper (Cu)	2013/11/28		92	%	80 - 120
			Dissolved Iron (Fe)	2013/11/28		96	%	80 - 120
			Dissolved Lead (Pb)	2013/11/28		96	%	80 - 120
			Dissolved Magnesium (Mg)	2013/11/28		NC	%	80 - 120
			Dissolved Manganese (Mn)	2013/11/28		99	%	80 - 120
			Dissolved Molybdenum (Mo)	2013/11/28		100	%	80 - 120
			Dissolved Nickel (Ni)	2013/11/28		93	%	80 - 120
			Dissolved Phosphorus (P)	2013/11/28		104	%	80 - 120
			Dissolved Potassium (K)	2013/11/28		98	%	80 - 120
			Dissolved Selenium (Se)	2013/11/28		100	%	80 - 120
			Dissolved Silicon (Si)	2013/11/28		100	%	80 - 120
			Dissolved Silver (Ag)	2013/11/28		88	%	80 - 120
			Dissolved Sodium (Na)	2013/11/28		NC	%	80 - 120
			Dissolved Strontium (Sr)	2013/11/28		NC	%	80 - 120
			Dissolved Thallium (Tl)	2013/11/28		97	%	80 - 120
			Dissolved Tin (Sn)	2013/11/28		101	%	80 - 120
			Dissolved Titanium (Ti)	2013/11/28		99	%	80 - 120
			Dissolved Uranium (U)	2013/11/28		99	%	80 - 120
			Dissolved Vanadium (V)	2013/11/28		99	%	80 - 120
			Dissolved Zinc (Zn)	2013/11/28		96	%	80 - 120
		Spiked Blank	Dissolved Aluminum (Al)	2013/11/28		102	%	80 - 120
			Dissolved Antimony (Sb)	2013/11/28		105	%	80 - 120
			Dissolved Arsenic (As)	2013/11/28		97	%	80 - 120
			Dissolved Barium (Ba)	2013/11/28		96	%	80 - 120
			Dissolved Beryllium (Be)	2013/11/28		101	%	80 - 120
			Dissolved Bismuth (Bi)	2013/11/28		99	%	80 - 120
			Dissolved Boron (B)	2013/11/28		97	%	80 - 120
			Dissolved Cadmium (Cd)	2013/11/28		103	%	80 - 120
			Dissolved Calcium (Ca)	2013/11/28		99	%	80 - 120
			Dissolved Chromium (Cr)	2013/11/28		100	%	80 - 120
			Dissolved Cobalt (Co)	2013/11/28		99	%	80 - 120
			Dissolved Copper (Cu)	2013/11/28		96	%	80 - 120
			Dissolved Iron (Fe)	2013/11/28		98	%	80 - 120
			Dissolved Lead (Pb)	2013/11/28		99	%	80 - 120
			Dissolved Magnesium (Mg)	2013/11/28		101	%	80 - 120
			Dissolved Manganese (Mn)	2013/11/28		100	%	80 - 120
			Dissolved Molybdenum (Mo)	2013/11/28		99	%	80 - 120
			Dissolved Nickel (Ni)	2013/11/28		96	%	80 - 120
			Dissolved Phosphorus (P)	2013/11/28		101	%	80 - 120
			Dissolved Potassium (K)	2013/11/28		99	%	80 - 120
			Dissolved Selenium (Se)	2013/11/28		102	%	80 - 120
			Dissolved Silicon (Si)	2013/11/28		102	%	80 - 120
			Dissolved Silver (Ag)	2013/11/28		93	%	80 - 120
			Dissolved Sodium (Na)	2013/11/28		102	%	80 - 120
			Dissolved Strontium (Sr)	2013/11/28		103	%	80 - 120
			Dissolved Thallium (Tl)	2013/11/28		97	%	80 - 120
			Dissolved Tin (Sn)	2013/11/28		102	%	80 - 120
			Dissolved Titanium (Ti)	2013/11/28		99	%	80 - 120
			Dissolved Uranium (U)	2013/11/28		100	%	80 - 120
			Dissolved Vanadium (V)	2013/11/28		100	%	80 - 120

Quality Assurance Report (Continued)

Maxxam Job Number: MB3K1890

QA/QC Batch Num Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
3437543 PBA	Spiked Blank	Dissolved Zinc (Zn)	2013/11/28		99	%	80 - 120
	Method Blank	Dissolved Aluminum (Al)	2013/11/28	<5.0		ug/L	
		Dissolved Antimony (Sb)	2013/11/28	<0.50		ug/L	
		Dissolved Arsenic (As)	2013/11/28	<1.0		ug/L	
		Dissolved Barium (Ba)	2013/11/28	<2.0		ug/L	
		Dissolved Beryllium (Be)	2013/11/28	<0.50		ug/L	
		Dissolved Bismuth (Bi)	2013/11/28	<1.0		ug/L	
		Dissolved Boron (B)	2013/11/28	<10		ug/L	
		Dissolved Cadmium (Cd)	2013/11/28	<0.10		ug/L	
		Dissolved Calcium (Ca)	2013/11/28	<200		ug/L	
		Dissolved Chromium (Cr)	2013/11/28	<5.0		ug/L	
		Dissolved Cobalt (Co)	2013/11/28	<0.50		ug/L	
		Dissolved Copper (Cu)	2013/11/28	<1.0		ug/L	
		Dissolved Iron (Fe)	2013/11/28	<100		ug/L	
		Dissolved Lead (Pb)	2013/11/28	<0.50		ug/L	
		Dissolved Magnesium (Mg)	2013/11/28	<50		ug/L	
		Dissolved Manganese (Mn)	2013/11/28	<2.0		ug/L	
		Dissolved Molybdenum (Mo)	2013/11/28	<0.50		ug/L	
		Dissolved Nickel (Ni)	2013/11/28	<1.0		ug/L	
		Dissolved Phosphorus (P)	2013/11/28	<100		ug/L	
		Dissolved Potassium (K)	2013/11/28	<200		ug/L	
		Dissolved Selenium (Se)	2013/11/28	<2.0		ug/L	
		Dissolved Silicon (Si)	2013/11/28	<50		ug/L	
		Dissolved Silver (Ag)	2013/11/28	<0.10		ug/L	
		Dissolved Sodium (Na)	2013/11/28	150, RDL=100		ug/L	
		Dissolved Strontium (Sr)	2013/11/28	1.4, RDL=1.0		ug/L	
		Dissolved Thallium (Tl)	2013/11/28	<0.050		ug/L	
		Dissolved Tin (Sn)	2013/11/28	<1.0		ug/L	
		Dissolved Titanium (Ti)	2013/11/28	<5.0		ug/L	
		Dissolved Uranium (U)	2013/11/28	<0.10		ug/L	
		Dissolved Vanadium (V)	2013/11/28	<0.50		ug/L	
		Dissolved Zinc (Zn)	2013/11/28	<5.0		ug/L	
	RPD [TZ8252-07]	Dissolved Aluminum (Al)	2013/11/28	NC		%	20
		Dissolved Antimony (Sb)	2013/11/28	NC		%	20
		Dissolved Arsenic (As)	2013/11/28	NC		%	20
		Dissolved Barium (Ba)	2013/11/28	2.1		%	20
		Dissolved Beryllium (Be)	2013/11/28	NC		%	20
		Dissolved Bismuth (Bi)	2013/11/28	NC		%	20
		Dissolved Boron (B)	2013/11/28	4.2		%	20
		Dissolved Cadmium (Cd)	2013/11/28	NC		%	20
		Dissolved Calcium (Ca)	2013/11/28	3.6		%	20
		Dissolved Chromium (Cr)	2013/11/28	NC		%	20
		Dissolved Cobalt (Co)	2013/11/28	NC		%	20
		Dissolved Copper (Cu)	2013/11/28	NC		%	20
		Dissolved Iron (Fe)	2013/11/28	NC		%	20
		Dissolved Lead (Pb)	2013/11/28	NC		%	20
		Dissolved Magnesium (Mg)	2013/11/28	4.7		%	20
		Dissolved Manganese (Mn)	2013/11/28	4.0		%	20
		Dissolved Molybdenum (Mo)	2013/11/28	8.9		%	20
		Dissolved Nickel (Ni)	2013/11/28	NC		%	20
		Dissolved Phosphorus (P)	2013/11/28	NC		%	20
		Dissolved Potassium (K)	2013/11/28	2.9		%	20
		Dissolved Selenium (Se)	2013/11/28	NC		%	20
		Dissolved Silicon (Si)	2013/11/28	3.5		%	20
		Dissolved Silver (Ag)	2013/11/28	NC		%	20

Quality Assurance Report (Continued)

Maxxam Job Number: MB3K1890

QA/QC Batch Num	Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
3437543	PBA	RPD [TZ8252-07]	Dissolved Sodium (Na)	2013/11/28	4.4		%	20
			Dissolved Strontium (Sr)	2013/11/28	2.7		%	20
			Dissolved Thallium (Tl)	2013/11/28	NC		%	20
			Dissolved Tin (Sn)	2013/11/28	NC		%	20
			Dissolved Titanium (Ti)	2013/11/28	NC		%	20
			Dissolved Uranium (U)	2013/11/28	NC		%	20
			Dissolved Vanadium (V)	2013/11/28	NC		%	20
			Dissolved Zinc (Zn)	2013/11/28	NC		%	20

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.
Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.
QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.
Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.
Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.
NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spiked amount was not sufficiently significant to permit a reliable recovery calculation.
NC (RPD): The RPD was not calculated. The level of analyte detected in the parent sample and its duplicate was not sufficiently significant to permit a reliable calculation.

Validation Signature Page

Maxxam Job #: B3K1890

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

Cristina Carriere

Cristina Carriere, Scientific Services

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Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Your Project #: 021-1228
Site#: 021-1228
Site Location: TANSLEY QUARRY
Your C.O.C. #: 44283303, 442833-03-01

Attention: Josip Balaban
Golder Associates Ltd
6925 Century Ave
Suite 100
Mississauga, ON
L5N 7K2

Report Date: 2013/11/29

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B3K2554

Received: 2013/11/22, 11:47

Sample Matrix: Water
Samples Received: 1

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Method Reference
Alkalinity	1	N/A	2013/11/25	CAM SOP-00448	SM 2320B
Anions	1	N/A	2013/11/26	CAM SOP-00435	SM 4110B
Conductivity	1	N/A	2013/11/25	CAM SOP-00414	SM 2510
Free (WAD) Cyanide	1	N/A	2013/11/28	CAM SOP-00457	Ontario MOE CN-E3015
Fluoride	1	2013/11/22	2013/11/25	CAM SOP-00449	APHA 4500FC
Hardness (calculated as CaCO3)	1	N/A	2013/11/29	CAM SOP 00102	SM 2340 B
Mercury in Water by CVAA	1	2013/11/27	2013/11/28	CAM SOP-00453	SW-846 7470A
Dissolved Metals by ICPMS	1	N/A	2013/11/28	CAM SOP-00447	EPA 6020
Total Metals Analysis by ICPMS	1	N/A	2013/11/28	CAM SOP-00447	EPA 6020
Total Ammonia-N	1	N/A	2013/11/26	CAM SOP-00441	US GS I-2522-90
Nitrate (NO3) and Nitrite (NO2) in Water (1)	1	N/A	2013/11/27	CAM SOP-00440	SM 4500 NO3I/NO2B
pH	1	N/A	2013/11/25	CAM SOP-00413	SM 4500H+ B
Phenols (4AAP)	1	N/A	2013/11/26	CAM SOP-00444	MOE ROPHEN-E3179
Orthophosphate	1	N/A	2013/11/25	CAM SOP-00461	EPA 365.1
Sulphide	1	N/A	2013/11/26	CAM SOP-00455	SM 4500-S G
Total Dissolved Solids	1	N/A	2013/11/25	CAM SOP-00428	APHA 2540C
Total Phosphorus (Colourimetric)	1	2013/11/26	2013/11/27	CAM SOP-00407	APHA 4500 P,B,F
Low Level Total Suspended Solids	1	N/A	2013/11/25	CAM SOP-00428	SM 2540D
Turbidity	1	N/A	2013/11/23	CAM SOP-00417	APHA 2130B

Remarks:

Maxxam Analytics has performed all analytical testing herein in accordance with ISO 17025 and the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act. All methodologies comply with this document and are validated for use in the laboratory. The methods and techniques employed in this analysis conform to the performance criteria (detection limits, accuracy and precision) as outlined in the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act. Reporting results to two significant figures at the RDL is to permit statistical evaluation and is not intended to be an indication of analytical precision.

The CWS PHC methods employed by Maxxam conform to all prescribed elements of the reference method and performance based elements have been validated. All modifications have been validated and proven equivalent following the 'Alberta Environment Draft Addenda to the CWS-PHC, Appendix 6, Validation of Alternate Methods'. Documentation is

Your Project #: 021-1228
Site#: 021-1228
Site Location: TANSLEY QUARRY
Your C.O.C. #: 44283303, 442833-03-01

Attention: Josip Balaban
Golder Associates Ltd
6925 Century Ave
Suite 100
Mississauga, ON
L5N 7K2

Report Date: 2013/11/29

CERTIFICATE OF ANALYSIS

-2-

available upon request. Maxxam has made the following improvements to the CWS-PHC reference benchmark method: (i) Headspace for F1; and, (ii) Mechanical extraction for F2-F4. Note: F4G cannot be added to the C6 to C50 hydrocarbons. The extraction date for samples field preserved with methanol for F1 and Volatile Organic Compounds is considered to be the date sampled.

Maxxam Analytics is accredited for all specific parameters as required by Ontario Regulation 153/04. Maxxam Analytics is limited in liability to the actual cost of analysis unless otherwise agreed in writing. There is no other warranty expressed or implied. Samples will be retained at Maxxam Analytics for three weeks from receipt of data or as per contract.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) Values for calculated parameters may not appear to add up due to rounding of raw data and significant figures.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Antonella Brasil, Project Manager
Email: ABrasil@maxxam.ca
Phone# (905) 817-5817

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Total cover pages: 2

Maxxam Job #: B3K2554
Report Date: 2013/11/29

Golder Associates Ltd
Client Project #: 021-1228
Site Location: TANSLEY QUARRY
Sampler Initials: JB

RESULTS OF ANALYSES OF WATER

Maxxam ID		UA2149		
Sampling Date		2013/11/22		
COC Number		442833-03-01		
	Units	**MW05-INT**	**RDL**	**QC Batch**
Calculated Parameters				
Hardness (CaCO3)	mg/L	320	1.0	3432546
Inorganics				
Total Ammonia-N	mg/L	1.7	0.050	3434858
Conductivity	umho/cm	1100	1.0	3433702
Total Dissolved Solids	mg/L	628	10	3434036
Fluoride (F-)	mg/L	0.43	0.10	3433703
Free Cyanide	mg/L	<0.0020	0.0020	3436668
Orthophosphate (P)	mg/L	<0.010	0.010	3434052
pH	pH	7.89		3433704
Phenols-4AAP	mg/L	<0.0010	0.0010	3433985
Total Phosphorus	mg/L	0.14	0.002	3436454
Total Suspended Solids	mg/L	240	5	3434041
Sulphide	mg/L	<0.020	0.020	3434645
Turbidity	NTU	170	0.4	3433317
Alkalinity (Total as CaCO3)	mg/L	270	1.0	3433701
Nitrite (N)	mg/L	0.27	0.010	3433688
Dissolved Chloride (Cl)	mg/L	110	1.0	3434524
Nitrate (N)	mg/L	0.20	0.10	3433688
Nitrate + Nitrite	mg/L	0.47	0.10	3433688
Dissolved Bromide (Br-)	mg/L	1.2	1.0	3434524
Dissolved Sulphate (SO4)	mg/L	140	1.0	3434524

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam Job #: B3K2554
Report Date: 2013/11/29

Golder Associates Ltd
Client Project #: 021-1228
Site Location: TANSLEY QUARRY
Sampler Initials: JB

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		UA2149		
Sampling Date		2013/11/22		
COC Number		442833-03-01		
	Units	**MW05-INT**	**RDL**	**QC Batch**
Metals				
Mercury (Hg)	mg/L	<0.00010	0.00010	3437570
Dissolved Aluminum (Al)	ug/L	<5.0	5.0	3439159
Total Aluminum (Al)	ug/L	1500	5.0	3438059
Dissolved Antimony (Sb)	ug/L	<0.50	0.50	3439159
Total Antimony (Sb)	ug/L	<0.50	0.50	3438059
Dissolved Arsenic (As)	ug/L	1.3	1.0	3439159
Total Arsenic (As)	ug/L	100	1.0	3438059
Dissolved Barium (Ba)	ug/L	19	2.0	3439159
Total Barium (Ba)	ug/L	61	2.0	3438059
Dissolved Beryllium (Be)	ug/L	<0.50	0.50	3439159
Total Beryllium (Be)	ug/L	<0.50	0.50	3438059
Dissolved Bismuth (Bi)	ug/L	<1.0	1.0	3439159
Total Bismuth (Bi)	ug/L	<1.0	1.0	3438059
Dissolved Boron (B)	ug/L	2300	10	3439159
Total Boron (B)	ug/L	2400	10	3438059
Dissolved Cadmium (Cd)	ug/L	<0.10	0.10	3439159
Total Cadmium (Cd)	ug/L	0.28	0.10	3438059
Dissolved Calcium (Ca)	ug/L	79000	1000	3439159
Total Calcium (Ca)	ug/L	90000	1000	3438059
Dissolved Chromium (Cr)	ug/L	<5.0	5.0	3439159
Total Chromium (Cr)	ug/L	<5.0	5.0	3438059
Dissolved Cobalt (Co)	ug/L	<0.50	0.50	3439159
Total Cobalt (Co)	ug/L	1.3	0.50	3438059
Dissolved Copper (Cu)	ug/L	<1.0	1.0	3439159
Total Copper (Cu)	ug/L	8.0	1.0	3438059
Dissolved Iron (Fe)	ug/L	<100	100	3439159
Total Iron (Fe)	ug/L	30000	100	3438059
Dissolved Lead (Pb)	ug/L	<0.50	0.50	3439159
Total Lead (Pb)	ug/L	3.2	0.50	3438059
Dissolved Magnesium (Mg)	ug/L	30000	50	3439159
Total Magnesium (Mg)	ug/L	32000	50	3438059
Dissolved Manganese (Mn)	ug/L	31	2.0	3439159

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		UA2149		
Sampling Date		2013/11/22		
COC Number		442833-03-01		
	Units	**MW05-INT**	**RDL**	**QC Batch**
Total Manganese (Mn)	ug/L	110	2.0	3438059
Dissolved Molybdenum (Mo)	ug/L	4.0	0.50	3439159
Total Molybdenum (Mo)	ug/L	5.3	0.50	3438059
Dissolved Nickel (Ni)	ug/L	<1.0	1.0	3439159
Total Nickel (Ni)	ug/L	2.9	1.0	3438059
Dissolved Phosphorus (P)	ug/L	<100	100	3439159
Total Phosphorus (P)	ug/L	150	100	3438059
Dissolved Potassium (K)	ug/L	17000	200	3439159
Total Potassium (K)	ug/L	18000	200	3438059
Dissolved Selenium (Se)	ug/L	<2.0	2.0	3439159
Dissolved Silicon (Si)	ug/L	5500	50	3439159
Total Silicon (Si)	ug/L	11000	50	3438059
Total Selenium (Se)	ug/L	<2.0	2.0	3438059
Dissolved Silver (Ag)	ug/L	<0.10	0.10	3439159
Total Silver (Ag)	ug/L	<0.10	0.10	3438059
Dissolved Sodium (Na)	ug/L	81000	100	3439159
Total Sodium (Na)	ug/L	86000	100	3438059
Dissolved Strontium (Sr)	ug/L	12000	1.0	3439159
Total Strontium (Sr)	ug/L	14000	1.0	3438059
Dissolved Thallium (Tl)	ug/L	<0.050	0.050	3439159
Total Thallium (Tl)	ug/L	<0.050	0.050	3438059
Dissolved Tin (Sn)	ug/L	<1.0	1.0	3439159
Total Tin (Sn)	ug/L	<1.0	1.0	3438059
Dissolved Titanium (Ti)	ug/L	<5.0	5.0	3439159
Total Titanium (Ti)	ug/L	40	5.0	3438059
Dissolved Uranium (U)	ug/L	0.40	0.10	3439159
Total Uranium (U)	ug/L	0.62	0.10	3438059
Dissolved Vanadium (V)	ug/L	<0.50	0.50	3439159
Total Vanadium (V)	ug/L	4.7	0.50	3438059
Dissolved Zinc (Zn)	ug/L	<5.0	5.0	3439159
Total Zinc (Zn)	ug/L	17	5.0	3438059

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam Job #: B3K2554
Report Date: 2013/11/29

Golder Associates Ltd
Client Project #: 021-1228
Site Location: TANSLEY QUARRY
Sampler Initials: JB

Test Summary

Maxxam ID UA2149
Sample ID MW05-INT
Matrix Water

Collected 2013/11/22
Shipped
Received 2013/11/22

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3433701	N/A	2013/11/25	Surinder Rai
Anions	IC	3434524	N/A	2013/11/26	Fari Dehdezi
Conductivity	COND	3433702	N/A	2013/11/25	Surinder Rai
Free (WAD) Cyanide	TECH/CN	3436668	N/A	2013/11/28	Xuanhong Qiu
Fluoride	F	3433703	2013/11/22	2013/11/25	Surinder Rai
Hardness (calculated as CaCO3)		3432546	N/A	2013/11/29	Automated Statchk
Mercury in Water by CVAA	CVAA	3437570	2013/11/27	2013/11/28	Magdalena Carlos
Dissolved Metals by ICPMS	ICP/MS	3439159	N/A	2013/11/28	Prempal Bhatti
Total Metals Analysis by ICPMS	ICP/MS	3438059	N/A	2013/11/28	Hua Ren
Total Ammonia-N	LACH/NH4	3434858	N/A	2013/11/26	Charles Opoku-Ware
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	3433688	N/A	2013/11/27	Shobhana Bavisiya
pH	PH	3433704	N/A	2013/11/25	Surinder Rai
Phenols (4AAP)	TECH/PHEN	3433985	N/A	2013/11/26	Bramdeo Motiram
Orthophosphate	AC	3434052	N/A	2013/11/25	Alina Dobreanu
Sulphide	ISE/S	3434645	N/A	2013/11/26	Neil Dassanayake
Total Dissolved Solids	SLDS	3434036	N/A	2013/11/25	Malik Kai Morgan John
Total Phosphorus (Colourimetric)	LACH/P	3436454	2013/11/26	2013/11/27	Viorica Rotaru
Low Level Total Suspended Solids	SLDS	3434041	N/A	2013/11/25	Subhashchandra Patel
Turbidity	TURB	3433317	N/A	2013/11/23	Neil Dassanayake

Package 1	6.7°C

Each temperature is the average of up to three cooler temperatures taken at receipt

GENERAL COMMENTS

Results relate only to the items tested.

Golder Associates Ltd
Attention: Josip Balaban
Client Project #: 021-1228
P.O. #:
Site Location: TANSLEY QUARRY

Quality Assurance Report

Maxxam Job Number: MB3K2554

QA/QC Batch Num	Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
3433317	NYS	QC Standard	Turbidity	2013/11/22		101	%	85 - 115
		Method Blank	Turbidity	2013/11/22	<0.2		NTU	
		RPD	Turbidity	2013/11/22	NC		%	20
3433688	S_B	Matrix Spike	Nitrite (N)	2013/11/27		105	%	80 - 120
			Nitrate (N)	2013/11/27		93	%	80 - 120
		Spiked Blank	Nitrite (N)	2013/11/27		105	%	80 - 120
			Nitrate (N)	2013/11/27		96	%	80 - 120
		Method Blank	Nitrite (N)	2013/11/27	<0.010		mg/L	
			Nitrate (N)	2013/11/27	<0.10		mg/L	
		RPD	Nitrite (N)	2013/11/27	NC		%	25
			Nitrate (N)	2013/11/27	NC		%	25
3433701	SAU	Spiked Blank	Alkalinity (Total as CaCO3)	2013/11/25		98	%	85 - 115
		Method Blank	Alkalinity (Total as CaCO3)	2013/11/25	<1.0		mg/L	
		RPD	Alkalinity (Total as CaCO3)	2013/11/25	0.4		%	25
3433702	SAU	Spiked Blank	Conductivity	2013/11/25		103	%	85 - 115
		Method Blank	Conductivity	2013/11/25	<1.0		umho/cm	
		RPD	Conductivity	2013/11/25	0		%	25
3433703	SAU	Matrix Spike	Fluoride (F-)	2013/11/25		102	%	80 - 120
		Spiked Blank	Fluoride (F-)	2013/11/25		101	%	80 - 120
		Method Blank	Fluoride (F-)	2013/11/25	<0.10		mg/L	
		RPD	Fluoride (F-)	2013/11/25	NC		%	20
3433985	BMO	Matrix Spike	Phenols-4AAP	2013/11/26		95	%	80 - 120
		Spiked Blank	Phenols-4AAP	2013/11/26		100	%	85 - 115
		Method Blank	Phenols-4AAP	2013/11/26	<0.0010		mg/L	
		RPD	Phenols-4AAP	2013/11/26	NC		%	25
3434036	MMJ	QC Standard	Total Dissolved Solids	2013/11/25		98	%	90 - 110
		Method Blank	Total Dissolved Solids	2013/11/25	<10		mg/L	
		RPD	Total Dissolved Solids	2013/11/25	2.3		%	25
3434041	SUP	QC Standard	Total Suspended Solids	2013/11/25		100	%	85 - 115
		Method Blank	Total Suspended Solids	2013/11/25	<1		mg/L	
		RPD	Total Suspended Solids	2013/11/25	NC		%	25
3434052	ADB	Matrix Spike	Orthophosphate (P)	2013/11/25		NC	%	75 - 125
		Spiked Blank	Orthophosphate (P)	2013/11/25		99	%	80 - 120
		Method Blank	Orthophosphate (P)	2013/11/25	<0.010		mg/L	
		RPD	Orthophosphate (P)	2013/11/25	0.5		%	25
3434524	FD	Matrix Spike	Dissolved Chloride (Cl)	2013/11/26		NC (1)	%	80 - 120
			Dissolved Bromide (Br-)	2013/11/26		99	%	80 - 120
			Dissolved Sulphate (SO4)	2013/11/26		99	%	80 - 120
		Spiked Blank	Dissolved Chloride (Cl)	2013/11/26		96	%	80 - 120
			Dissolved Bromide (Br-)	2013/11/26		94	%	80 - 120
			Dissolved Sulphate (SO4)	2013/11/26		95	%	80 - 120
		Method Blank	Dissolved Chloride (Cl)	2013/11/26	<1.0		mg/L	
			Dissolved Bromide (Br-)	2013/11/26	<1.0		mg/L	
			Dissolved Sulphate (SO4)	2013/11/26	<1.0		mg/L	
		RPD	Dissolved Chloride (Cl)	2013/11/26	1.8		%	20
			Dissolved Sulphate (SO4)	2013/11/26	NC		%	20
3434645	NYS	Matrix Spike	Sulphide	2013/11/26		88	%	80 - 120
		Spiked Blank	Sulphide	2013/11/26		88	%	80 - 120
		Method Blank	Sulphide	2013/11/26	<0.020		mg/L	
		RPD	Sulphide	2013/11/26	NC		%	20
3434858	COP	Matrix Spike	Total Ammonia-N	2013/11/26		103	%	80 - 120
		Spiked Blank	Total Ammonia-N	2013/11/26		100	%	85 - 115
		Method Blank	Total Ammonia-N	2013/11/26	<0.050		mg/L	
		RPD	Total Ammonia-N	2013/11/26	1.2		%	20
3436454	VRO	Matrix Spike	Total Phosphorus	2013/11/27		98	%	80 - 120

Quality Assurance Report (Continued)

Maxxam Job Number: MB3K2554

QA/QC Batch Num	Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
3436454	VRO	QC Standard	Total Phosphorus	2013/11/27		106	%	80 - 120
		Spiked Blank	Total Phosphorus	2013/11/27		102	%	80 - 120
		Method Blank	Total Phosphorus	2013/11/27	<0.002		mg/L	
		RPD	Total Phosphorus	2013/11/27	NC		%	20
3436668	XQI	Matrix Spike	Free Cyanide	2013/11/28		106	%	80 - 120
		Spiked Blank	Free Cyanide	2013/11/28		105	%	80 - 120
		Method Blank	Free Cyanide	2013/11/28	<0.0020		mg/L	
		RPD	Free Cyanide	2013/11/28	NC		%	20
3437570	MC	Matrix Spike	Mercury (Hg)	2013/11/28		92	%	80 - 120
		Spiked Blank	Mercury (Hg)	2013/11/28		93	%	80 - 120
		Method Blank	Mercury (Hg)	2013/11/28	<0.00010		mg/L	
		RPD	Mercury (Hg)	2013/11/28	NC		%	20
3438059	HRE	Matrix Spike	Total Aluminum (Al)	2013/11/28		86	%	80 - 120
			Total Antimony (Sb)	2013/11/28		108	%	80 - 120
			Total Arsenic (As)	2013/11/28		105	%	80 - 120
			Total Barium (Ba)	2013/11/28		101	%	80 - 120
			Total Beryllium (Be)	2013/11/28		91	%	80 - 120
			Total Bismuth (Bi)	2013/11/28		105	%	80 - 120
			Total Boron (B)	2013/11/28		82	%	80 - 120
			Total Cadmium (Cd)	2013/11/28		105	%	80 - 120
			Total Calcium (Ca)	2013/11/28		NC	%	80 - 120
			Total Chromium (Cr)	2013/11/28		103	%	80 - 120
			Total Cobalt (Co)	2013/11/28		102	%	80 - 120
			Total Copper (Cu)	2013/11/28		103	%	80 - 120
			Total Iron (Fe)	2013/11/28		103	%	80 - 120
			Total Lead (Pb)	2013/11/28		103	%	80 - 120
			Total Magnesium (Mg)	2013/11/28		86	%	80 - 120
			Total Manganese (Mn)	2013/11/28		104	%	80 - 120
			Total Molybdenum (Mo)	2013/11/28		109	%	80 - 120
			Total Nickel (Ni)	2013/11/28		106	%	80 - 120
			Total Phosphorus (P)	2013/11/28		98	%	80 - 120
			Total Potassium (K)	2013/11/28		86	%	80 - 120
			Total Silicon (Si)	2013/11/28		87	%	80 - 120
			Total Selenium (Se)	2013/11/28		102	%	80 - 120
			Total Silver (Ag)	2013/11/28		99	%	80 - 120
			Total Sodium (Na)	2013/11/28		82	%	80 - 120
			Total Strontium (Sr)	2013/11/28		NC	%	80 - 120
			Total Thallium (Tl)	2013/11/28		100	%	80 - 120
			Total Tin (Sn)	2013/11/28		106	%	80 - 120
			Total Titanium (Ti)	2013/11/28		108	%	80 - 120
			Total Uranium (U)	2013/11/28		109	%	80 - 120
			Total Vanadium (V)	2013/11/28		105	%	80 - 120
			Total Zinc (Zn)	2013/11/28		102	%	80 - 120
		Spiked Blank	Total Aluminum (Al)	2013/11/28		101	%	80 - 120
			Total Antimony (Sb)	2013/11/28		106	%	80 - 120
			Total Arsenic (As)	2013/11/28		106	%	80 - 120
			Total Barium (Ba)	2013/11/28		106	%	80 - 120
			Total Beryllium (Be)	2013/11/28		106	%	80 - 120
			Total Bismuth (Bi)	2013/11/28		108	%	80 - 120
			Total Boron (B)	2013/11/28		102	%	80 - 120
			Total Cadmium (Cd)	2013/11/28		105	%	80 - 120
			Total Calcium (Ca)	2013/11/28		104	%	80 - 120
			Total Chromium (Cr)	2013/11/28		102	%	80 - 120
			Total Cobalt (Co)	2013/11/28		106	%	80 - 120
			Total Copper (Cu)	2013/11/28		107	%	80 - 120

Golder Associates Ltd
Attention: Josip Balaban
Client Project #: 021-1228
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Quality Assurance Report (Continued)

Maxxam Job Number: MB3K2554

QA/QC Batch Num Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
3438059 HRE	Spiked Blank	Total Iron (Fe)	2013/11/28		104	%	80 - 120
		Total Lead (Pb)	2013/11/28		106	%	80 - 120
		Total Magnesium (Mg)	2013/11/28		103	%	80 - 120
		Total Manganese (Mn)	2013/11/28		105	%	80 - 120
		Total Molybdenum (Mo)	2013/11/28		108	%	80 - 120
		Total Nickel (Ni)	2013/11/28		109	%	80 - 120
		Total Phosphorus (P)	2013/11/28		101	%	80 - 120
		Total Potassium (K)	2013/11/28		94	%	80 - 120
		Total Silicon (Si)	2013/11/28		99	%	80 - 120
		Total Selenium (Se)	2013/11/28		106	%	80 - 120
		Total Silver (Ag)	2013/11/28		102	%	80 - 120
		Total Sodium (Na)	2013/11/28		102	%	80 - 120
		Total Strontium (Sr)	2013/11/28		107	%	80 - 120
		Total Thallium (Tl)	2013/11/28		103	%	80 - 120
		Total Tin (Sn)	2013/11/28		106	%	80 - 120
		Total Titanium (Ti)	2013/11/28		106	%	80 - 120
		Total Uranium (U)	2013/11/28		110	%	80 - 120
		Total Vanadium (V)	2013/11/28		103	%	80 - 120
		Total Zinc (Zn)	2013/11/28		109	%	80 - 120
	Method Blank	Total Aluminum (Al)	2013/11/29	<5.0		ug/L	
		Total Antimony (Sb)	2013/11/29	<0.50		ug/L	
		Total Arsenic (As)	2013/11/29	<1.0		ug/L	
		Total Barium (Ba)	2013/11/29	<2.0		ug/L	
		Total Beryllium (Be)	2013/11/29	<0.50		ug/L	
		Total Bismuth (Bi)	2013/11/29	<1.0		ug/L	
		Total Boron (B)	2013/11/29	12, RDL=10		ug/L	
		Total Cadmium (Cd)	2013/11/29	<0.10		ug/L	
		Total Calcium (Ca)	2013/11/29	<200		ug/L	
		Total Chromium (Cr)	2013/11/29	<5.0		ug/L	
		Total Cobalt (Co)	2013/11/29	<0.50		ug/L	
		Total Copper (Cu)	2013/11/29	<1.0		ug/L	
		Total Iron (Fe)	2013/11/29	<100		ug/L	
		Total Lead (Pb)	2013/11/29	<0.50		ug/L	
		Total Magnesium (Mg)	2013/11/29	<50		ug/L	
		Total Manganese (Mn)	2013/11/29	<2.0		ug/L	
		Total Molybdenum (Mo)	2013/11/29	<0.50		ug/L	
		Total Nickel (Ni)	2013/11/29	<1.0		ug/L	
		Total Phosphorus (P)	2013/11/29	<100		ug/L	
		Total Potassium (K)	2013/11/29	<200		ug/L	
		Total Silicon (Si)	2013/11/29	86, RDL=50		ug/L	
		Total Selenium (Se)	2013/11/29	<2.0		ug/L	
		Total Silver (Ag)	2013/11/29	<0.10		ug/L	
		Total Sodium (Na)	2013/11/29	<100		ug/L	
		Total Strontium (Sr)	2013/11/29	<1.0		ug/L	
		Total Thallium (Tl)	2013/11/29	<0.050		ug/L	
		Total Tin (Sn)	2013/11/29	<1.0		ug/L	
		Total Titanium (Ti)	2013/11/29	<5.0		ug/L	
		Total Uranium (U)	2013/11/29	<0.10		ug/L	
		Total Vanadium (V)	2013/11/29	<0.50		ug/L	
		Total Zinc (Zn)	2013/11/29	<5.0		ug/L	
	RPD	Total Aluminum (Al)	2013/11/28	NC		%	20
		Total Antimony (Sb)	2013/11/28	NC		%	20
		Total Arsenic (As)	2013/11/28	NC		%	20
		Total Barium (Ba)	2013/11/28	1.8		%	20
		Total Beryllium (Be)	2013/11/28	NC		%	20

Quality Assurance Report (Continued)

Maxxam Job Number: MB3K2554

QA/QC Batch Num	Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
3438059	HRE	RPD	Total Bismuth (Bi)	2013/11/28	NC		%	20
			Total Boron (B)	2013/11/28	NC		%	20
			Total Cadmium (Cd)	2013/11/28	NC		%	20
			Total Calcium (Ca)	2013/11/28	1.6		%	20
			Total Chromium (Cr)	2013/11/28	NC		%	20
			Total Cobalt (Co)	2013/11/28	NC		%	20
			Total Copper (Cu)	2013/11/28	5.1		%	20
			Total Iron (Fe)	2013/11/28	NC		%	20
			Total Lead (Pb)	2013/11/28	NC		%	20
			Total Magnesium (Mg)	2013/11/28	1.1		%	20
			Total Manganese (Mn)	2013/11/28	1.1		%	20
			Total Molybdenum (Mo)	2013/11/28	NC		%	20
			Total Nickel (Ni)	2013/11/28	NC		%	20
			Total Phosphorus (P)	2013/11/28	NC		%	20
			Total Potassium (K)	2013/11/28	0.9		%	20
			Total Silicon (Si)	2013/11/28	1.5		%	20
			Total Selenium (Se)	2013/11/28	NC		%	20
			Total Silver (Ag)	2013/11/28	NC		%	20
			Total Sodium (Na)	2013/11/28	2.3		%	20
			Total Strontium (Sr)	2013/11/28	2.4		%	20
			Total Thallium (Tl)	2013/11/28	5.1		%	20
			Total Tin (Sn)	2013/11/28	NC		%	20
			Total Titanium (Ti)	2013/11/28	NC		%	20
			Total Uranium (U)	2013/11/28	NC		%	20
			Total Vanadium (V)	2013/11/28	NC		%	20
			Total Zinc (Zn)	2013/11/28	2.1		%	20
3439159	PBA	Matrix Spike	Dissolved Aluminum (Al)	2013/11/28		97	%	80 - 120
			Dissolved Antimony (Sb)	2013/11/28		107	%	80 - 120
			Dissolved Arsenic (As)	2013/11/28		98	%	80 - 120
			Dissolved Barium (Ba)	2013/11/28		96	%	80 - 120
			Dissolved Beryllium (Be)	2013/11/28		100	%	80 - 120
			Dissolved Bismuth (Bi)	2013/11/28		97	%	80 - 120
			Dissolved Boron (B)	2013/11/28		97	%	80 - 120
			Dissolved Cadmium (Cd)	2013/11/28		102	%	80 - 120
			Dissolved Calcium (Ca)	2013/11/28		NC	%	80 - 120
			Dissolved Chromium (Cr)	2013/11/28		99	%	80 - 120
			Dissolved Cobalt (Co)	2013/11/28		98	%	80 - 120
			Dissolved Copper (Cu)	2013/11/28		93	%	80 - 120
			Dissolved Iron (Fe)	2013/11/28		96	%	80 - 120
			Dissolved Lead (Pb)	2013/11/28		99	%	80 - 120
			Dissolved Magnesium (Mg)	2013/11/28		95	%	80 - 120
			Dissolved Manganese (Mn)	2013/11/28		98	%	80 - 120
			Dissolved Molybdenum (Mo)	2013/11/28		103	%	80 - 120
			Dissolved Nickel (Ni)	2013/11/28		95	%	80 - 120
			Dissolved Phosphorus (P)	2013/11/28		97	%	80 - 120
			Dissolved Potassium (K)	2013/11/28		95	%	80 - 120
			Dissolved Selenium (Se)	2013/11/28		100	%	80 - 120
			Dissolved Silicon (Si)	2013/11/28		96	%	80 - 120
			Dissolved Silver (Ag)	2013/11/28		98	%	80 - 120
			Dissolved Sodium (Na)	2013/11/28		95	%	80 - 120
			Dissolved Strontium (Sr)	2013/11/28		NC	%	80 - 120
			Dissolved Thallium (Tl)	2013/11/28		100	%	80 - 120
			Dissolved Tin (Sn)	2013/11/28		102	%	80 - 120
			Dissolved Titanium (Ti)	2013/11/28		95	%	80 - 120
			Dissolved Uranium (U)	2013/11/28		103	%	80 - 120

Golder Associates Ltd
Attention: Josip Balaban
Client Project #: 021-1228
P.O. #:
Site Location: TANSLEY QUARRY

Quality Assurance Report (Continued)

Maxxam Job Number: MB3K2554

QA/QC Batch Num	Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
3439159	PBA	Matrix Spike	Dissolved Vanadium (V)	2013/11/28		99	%	80 - 120
			Dissolved Zinc (Zn)	2013/11/28		95	%	80 - 120
		Spiked Blank	Dissolved Aluminum (Al)	2013/11/28		99	%	80 - 120
			Dissolved Antimony (Sb)	2013/11/28		106	%	80 - 120
			Dissolved Arsenic (As)	2013/11/28		98	%	80 - 120
			Dissolved Barium (Ba)	2013/11/28		101	%	80 - 120
			Dissolved Beryllium (Be)	2013/11/28		102	%	80 - 120
			Dissolved Bismuth (Bi)	2013/11/28		100	%	80 - 120
			Dissolved Boron (B)	2013/11/28		98	%	80 - 120
			Dissolved Cadmium (Cd)	2013/11/28		102	%	80 - 120
			Dissolved Calcium (Ca)	2013/11/28		97	%	80 - 120
			Dissolved Chromium (Cr)	2013/11/28		99	%	80 - 120
			Dissolved Cobalt (Co)	2013/11/28		99	%	80 - 120
			Dissolved Copper (Cu)	2013/11/28		98	%	80 - 120
			Dissolved Iron (Fe)	2013/11/28		97	%	80 - 120
			Dissolved Lead (Pb)	2013/11/28		101	%	80 - 120
			Dissolved Magnesium (Mg)	2013/11/28		98	%	80 - 120
			Dissolved Manganese (Mn)	2013/11/28		99	%	80 - 120
			Dissolved Molybdenum (Mo)	2013/11/28		102	%	80 - 120
			Dissolved Nickel (Ni)	2013/11/28		96	%	80 - 120
			Dissolved Phosphorus (P)	2013/11/28		99	%	80 - 120
			Dissolved Potassium (K)	2013/11/28		97	%	80 - 120
			Dissolved Selenium (Se)	2013/11/28		101	%	80 - 120
			Dissolved Silicon (Si)	2013/11/28		98	%	80 - 120
			Dissolved Silver (Ag)	2013/11/28		97	%	80 - 120
			Dissolved Sodium (Na)	2013/11/28		96	%	80 - 120
			Dissolved Strontium (Sr)	2013/11/28		103	%	80 - 120
			Dissolved Thallium (Tl)	2013/11/28		101	%	80 - 120
			Dissolved Tin (Sn)	2013/11/28		103	%	80 - 120
			Dissolved Titanium (Ti)	2013/11/28		96	%	80 - 120
			Dissolved Uranium (U)	2013/11/28		103	%	80 - 120
			Dissolved Vanadium (V)	2013/11/28		98	%	80 - 120
			Dissolved Zinc (Zn)	2013/11/28		99	%	80 - 120
		Method Blank	Dissolved Aluminum (Al)	2013/11/28	<5.0		ug/L	
			Dissolved Antimony (Sb)	2013/11/28	<0.50		ug/L	
			Dissolved Arsenic (As)	2013/11/28	<1.0		ug/L	
			Dissolved Barium (Ba)	2013/11/28	<2.0		ug/L	
			Dissolved Beryllium (Be)	2013/11/28	<0.50		ug/L	
			Dissolved Bismuth (Bi)	2013/11/28	<1.0		ug/L	
			Dissolved Boron (B)	2013/11/28	16, RDL=10		ug/L	
			Dissolved Cadmium (Cd)	2013/11/28	<0.10		ug/L	
			Dissolved Calcium (Ca)	2013/11/28	<200		ug/L	
			Dissolved Chromium (Cr)	2013/11/28	<5.0		ug/L	
			Dissolved Cobalt (Co)	2013/11/28	<0.50		ug/L	
			Dissolved Copper (Cu)	2013/11/28	<1.0		ug/L	
			Dissolved Iron (Fe)	2013/11/28	<100		ug/L	
			Dissolved Lead (Pb)	2013/11/28	<0.50		ug/L	
			Dissolved Magnesium (Mg)	2013/11/28	<50		ug/L	
			Dissolved Manganese (Mn)	2013/11/28	<2.0		ug/L	
			Dissolved Molybdenum (Mo)	2013/11/28	<0.50		ug/L	
			Dissolved Nickel (Ni)	2013/11/28	<1.0		ug/L	
			Dissolved Phosphorus (P)	2013/11/28	<100		ug/L	
			Dissolved Potassium (K)	2013/11/28	<200		ug/L	
			Dissolved Selenium (Se)	2013/11/28	<2.0		ug/L	
			Dissolved Silicon (Si)	2013/11/28	<50		ug/L	

Quality Assurance Report (Continued)

Maxxam Job Number: MB3K2554

QA/QC Batch Num Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
3439159 PBA	Method Blank	Dissolved Silver (Ag)	2013/11/28	<0.10		ug/L	
		Dissolved Sodium (Na)	2013/11/28	<100		ug/L	
		Dissolved Strontium (Sr)	2013/11/28	<1.0		ug/L	
		Dissolved Thallium (Tl)	2013/11/28	<0.050		ug/L	
		Dissolved Tin (Sn)	2013/11/28	<1.0		ug/L	
		Dissolved Titanium (Ti)	2013/11/28	<5.0		ug/L	
		Dissolved Uranium (U)	2013/11/28	<0.10		ug/L	
		Dissolved Vanadium (V)	2013/11/28	<0.50		ug/L	
		Dissolved Zinc (Zn)	2013/11/28	<5.0		ug/L	
	RPD	Dissolved Aluminum (Al)	2013/11/28	NC		%	20
		Dissolved Antimony (Sb)	2013/11/28	NC		%	20
		Dissolved Arsenic (As)	2013/11/28	NC		%	20
		Dissolved Barium (Ba)	2013/11/28	3.5		%	20
		Dissolved Beryllium (Be)	2013/11/28	NC		%	20
		Dissolved Bismuth (Bi)	2013/11/28	NC		%	20
		Dissolved Boron (B)	2013/11/28	NC		%	20
		Dissolved Cadmium (Cd)	2013/11/28	NC		%	20
		Dissolved Calcium (Ca)	2013/11/28	1.2		%	20
		Dissolved Chromium (Cr)	2013/11/28	NC		%	20
		Dissolved Cobalt (Co)	2013/11/28	NC		%	20
		Dissolved Copper (Cu)	2013/11/28	NC		%	20
		Dissolved Iron (Fe)	2013/11/28	NC		%	20
		Dissolved Lead (Pb)	2013/11/28	NC		%	20
		Dissolved Magnesium (Mg)	2013/11/28	2.2		%	20
		Dissolved Manganese (Mn)	2013/11/28	1.8		%	20
		Dissolved Molybdenum (Mo)	2013/11/28	NC		%	20
		Dissolved Nickel (Ni)	2013/11/28	NC		%	20
		Dissolved Phosphorus (P)	2013/11/28	NC		%	20
		Dissolved Potassium (K)	2013/11/28	1.1		%	20
		Dissolved Selenium (Se)	2013/11/28	NC		%	20
		Dissolved Silicon (Si)	2013/11/28	1.5		%	20
		Dissolved Silver (Ag)	2013/11/28	NC		%	20
		Dissolved Sodium (Na)	2013/11/28	2.2		%	20
		Dissolved Strontium (Sr)	2013/11/28	0.3		%	20
		Dissolved Thallium (Tl)	2013/11/28	1.5		%	20
		Dissolved Tin (Sn)	2013/11/28	NC		%	20
		Dissolved Titanium (Ti)	2013/11/28	NC		%	20
		Dissolved Uranium (U)	2013/11/28	NC		%	20
		Dissolved Vanadium (V)	2013/11/28	NC		%	20
		Dissolved Zinc (Zn)	2013/11/28	2.7		%	20

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.
Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.
QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.
Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.
Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.
NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spiked amount was not sufficiently significant to permit a reliable recovery calculation.
NC (RPD): The RPD was not calculated. The level of analyte detected in the parent sample and its duplicate was not sufficiently significant to permit a reliable calculation.
(1) The recovery in the matrix spike was not calculated (NC). Spiked concentration was less than 2x that native to the sample.

Validation Signature Page

Maxxam Job #: B3K2554

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

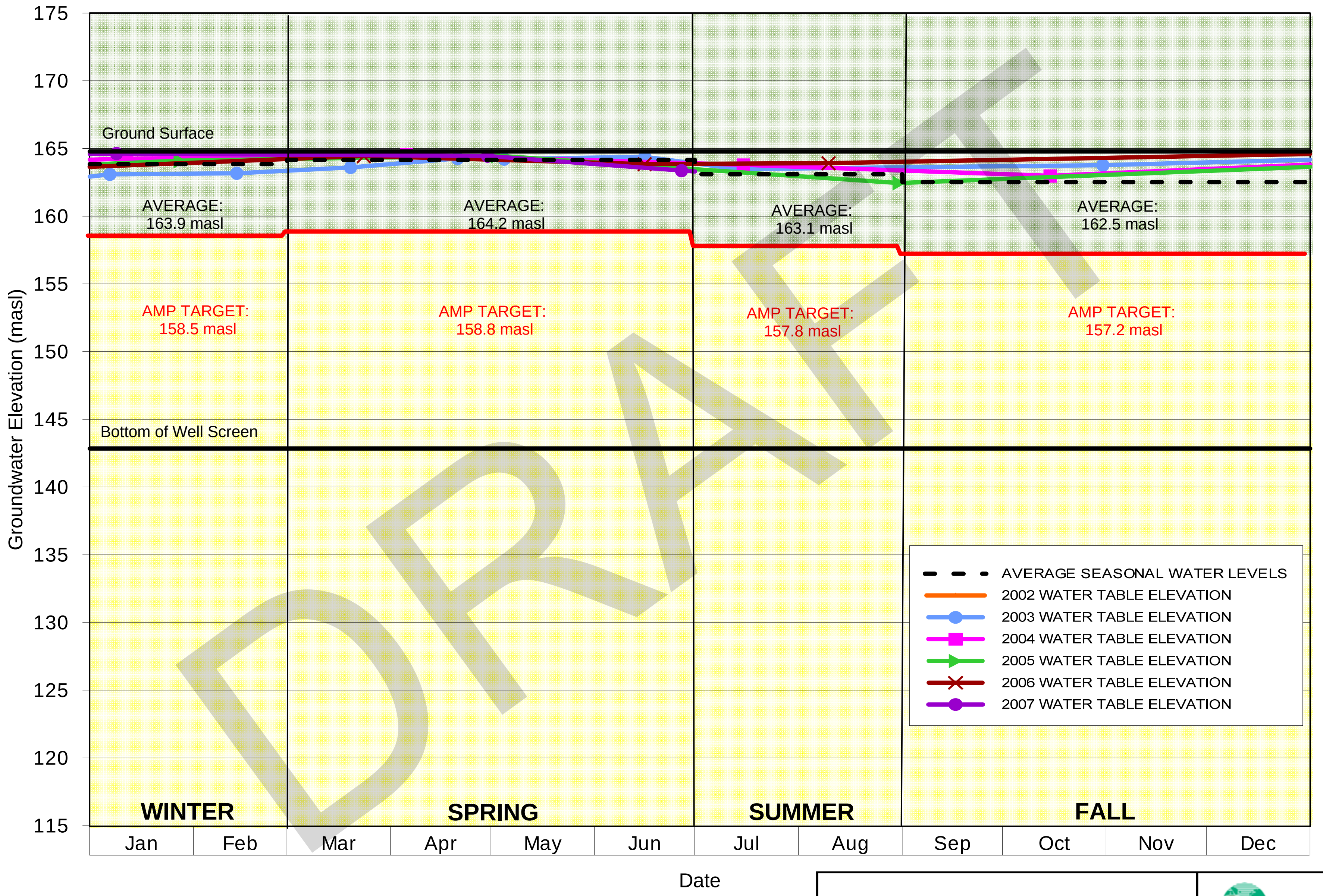
Cristina Carriere

Cristina Carriere, Scientific Services

APPENDIX F

Target Water Level Graphs

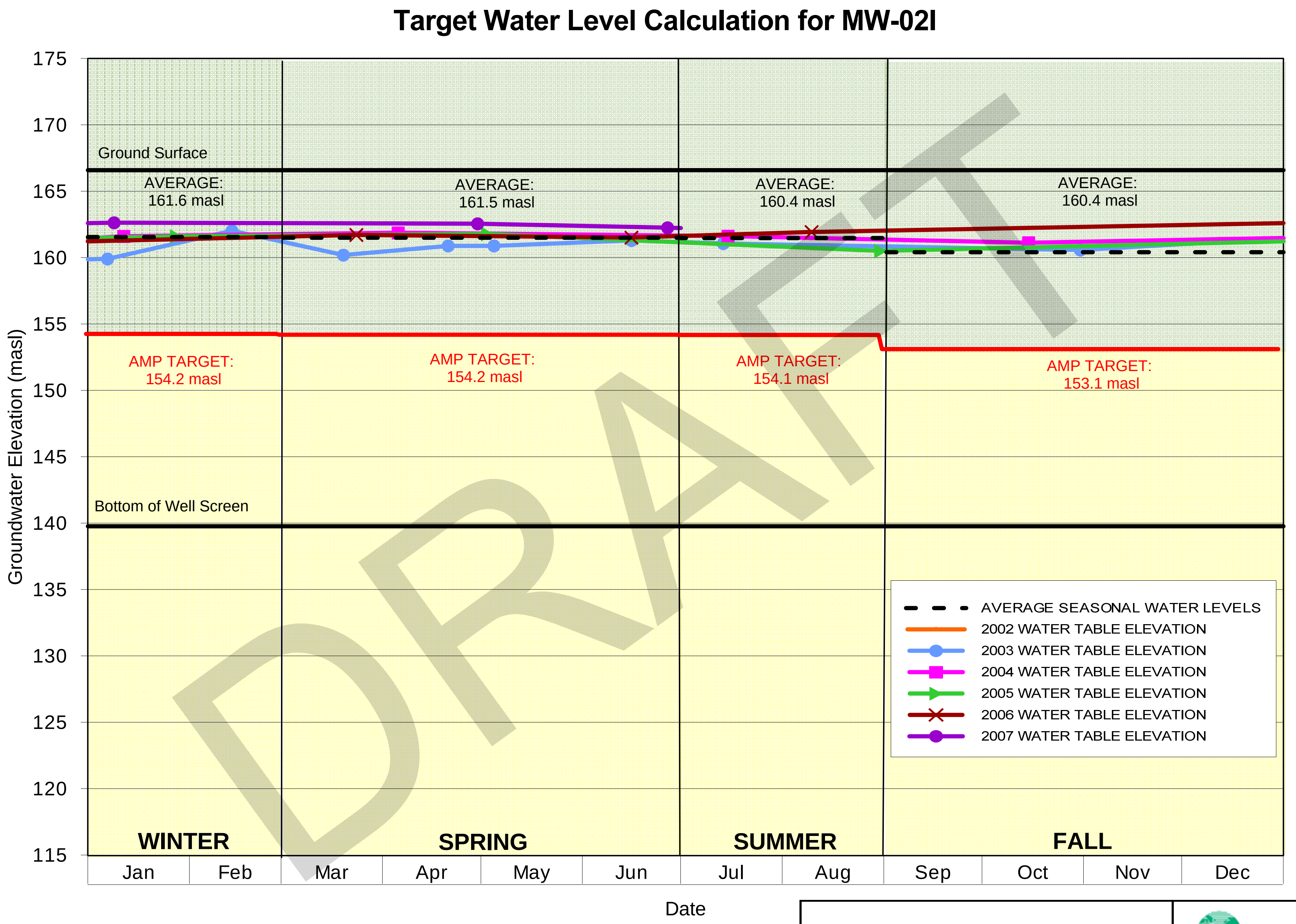
Target Water Level Calculation for MW-01I



Tansley Quarry

Golder Associates

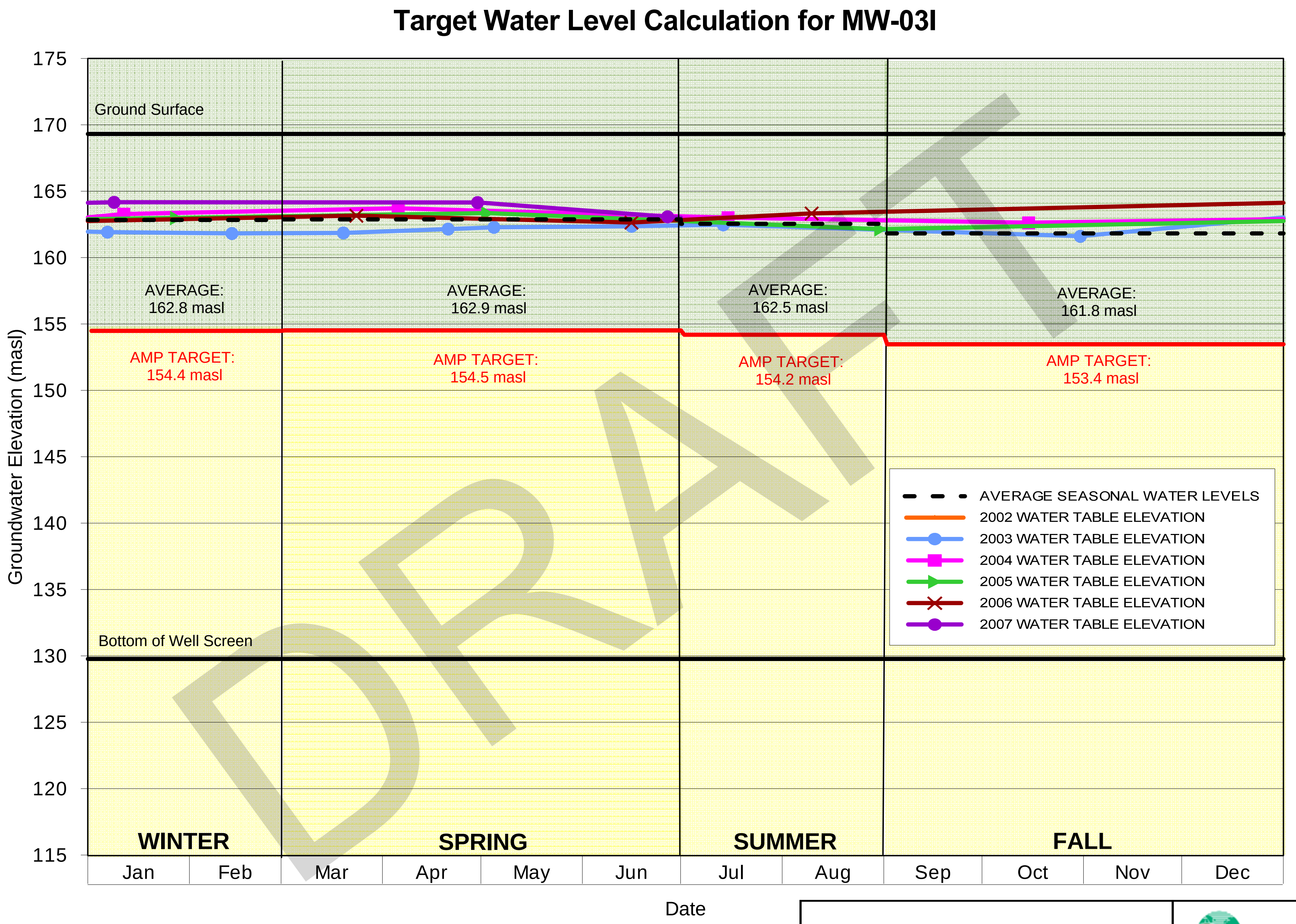
DRAWN: LB	APPROVED: SW	DATE: January 2014
PROJECT: 021-1228		FIGURE: F.1



Tansley Quarry

Golder Associates

DRAWN: LB	APPROVED: SW	DATE: January 2014
PROJECT: 021-1228		FIGURE: F.2



Tansley Quarry

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DRAWN: LB	APPROVED: SW	DATE: January 2014
PROJECT: 021-1228		FIGURE: F.3

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