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2016 ANNUAL MONITORING REPORT

Tansley Quarry
Forterra Brick Ltd.
Burlington, Ontario

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REPORT

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Golder Associates

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1.0 INTRODUCTION

1.1 Background and Purpose

In 2002, Golder Associates Ltd. (Golder) was retained by Forterra Brick Ltd. (Forterra, formerly Hanson Brick Ltd.) 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, Forterra entered into an Agreement with a number of private well owners comprising the Tremaine Neighbourhood Association (TNA). Forterra also entered into a Private Communal Water System (PCWS) Agreement and an Adaptive Groundwater Management Plan (AMP) Agreement with the Region of Halton on May 8, 2007. Both agreements provide that Forterra 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 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 since 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 Forterra'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 and Forestry (MNRF) on December 20, 2007 based upon a 9-drawing Site Plan. The AMP and Drawing 7 of the Site Plan provided for a long term groundwater monitoring program, with monthly reports during Year 1 and annual reports thereafter.

Forterra obtained Ministry of Environment and Climate Change (MOECC) Permit to Take Water (PTTW) No. 1718-8WPJUV, dated September 14, 2012 to govern quarry dewatering activities at the site (Appendix A). PTTW No. 1718-8WPJUV expired on December 17, 2014 and was replaced by PTTW No. 7877-9TEJUU on May 1, 2015. PTTW No. 7877-9TEJUU allows for pumping of water from the quarry sump at a maximum rate of 3,000 litres per minute (L/min), 24 hours per day for a maximum daily discharge rate of 4,320,000 L/day. PTTW No. 0477-AAPPNB was issued on June 8, 2016 and expires on April 30, 2025. The permit replaces PTTW No. 7877-9TEJUU. The current PTTW reflects an administrative amendment due to the change of ownership from Hanson Brick Ltd. to Forterra Brick Ltd.

1.2 Site Description and Quarry Development

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 2A). 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 by the MNRF.

Forterra'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. Forterra re-initiated 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. Forterra 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 2016.

Figures 2A and 2B shows the operational progress at the Tansley Quarry. Figure 3 provides cross sections North-South and East-West across the excavation based on the 2012 elevation survey. The operational progress is summarized below:

- 2009: 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 Forterra, the quarry floor elevation was estimated at approximately 148 masl and the elevation of the base of the sump estimated at approximately 146 masl.
- 2010: Forterra 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.
- 2012 – 2013: 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.
- 2014: The quarry sump was deepened to an elevation of approximately 137.5 masl with the floor of the quarry at an elevation of approximately 138.5 masl. At the end of 2014, the quarry floor was flooded over an area measuring approximately 75 m by 50 m (Figure 2B). As per the approved quarry site plans, the process of expanding the open excavation to the northwest commenced with the removal of the woodlot north of the sump and decant pond. Approximately 75,000 m^3 of overburden within the area shown on Figure 2B was

scheduled for removal by the end of January 2015. The excavated material was used to expand the berm adjacent to the Canadian National Railway (CNR) line.

- 2015: Stripping of overburden and building of overburden stockpiles continued in 2015. Mining of shale resulted in deepening the quarry floor and enlarging the quarry sump. The elevation of the sump floor (133.60 masl) was approximately 2 meters below the water elevation in the sump (135.60 masl) by Fall 2015.
- 2016: The sump was slightly enlarged but not deepened in 2016. There were no further changes to the excavation area. Approximately 30,000 cubic metres of shale was shipped from existing stockpiles on site.

The quarry sump discharges directly to a batch treatment decant pond located adjacent to the sinking cut. Water in the decant pond is allowed to settle for at least 24 hours prior to being discharged. Water quality testing is completed prior to and during each metered release. Prior to 2013, the decant pond was 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. The C of A has since been replaced with Amended Environmental Certificate Approval (ECA) No. 8944-8MKKNA issued on April 17, 2013 (Appendix A). Under ECA No. 8944-8MKKNA, four wet ponds will be constructed to further attenuate post-development peak flow and enhance water quality. An annual ECA report is prepared by Golder and submitted to the MOECC by March 31st of each year. These reports are publically available from the MOECC.

1.3 Precipitation

Figure 4 shows the monthly precipitation for the Millgrove Station and Hamilton Airport from 2002 to 2016. 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. The Hamilton Airport station was monitored by Environment Canada until 2011. The station is currently monitored and the data quality checked by NAV CANADA. The annual precipitation totals from 2002 to 2016 are provided in Table 1. The data indicate that the area received approximately 836.7 mm of precipitation in 2016, approximately 12% more than received in 2015 (703.3 mm).

Figure 5A and Figure 5B shows the water budget (precipitation and surplus) for the Hamilton Airport from 2002 to 2009 and 2010 to 2016 respectively. 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, and on an average annual basis, 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 four months of the year, i.e., January 2016 to April 2016. The highest precipitation (approximately 145 mm) was observed in March 2016. The water budget indicates that little water was available for infiltration and runoff from May to December 2016.

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 quarry.

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 was operated daily while site operations were in progress.

A summary of the 2016 records of sump discharge are presented in Table 2 and summarized on Figure 6. Pumping volumes provided by Forterra are usually collected by a flow meter installed on the discharge line from the pump. However, the meter was damaged in 2015 and daily discharge rates were estimated using the pump flow rate and the number of hours pumped. The meter was replaced on September 30, 2016 and subsequent discharge rates were based on the meter readings. Based on the data provided, in 2016, the pump was operated for 170 days at pumping rates ranging from 26 L/min to 1,200 L/min. This was below the maximum permitted pumping rate of 3,000 L/min. Over the 2016 period, the daily discharge rate from the sump ranged between 10,000 L/day to 460,000 L/day. Based on these volumes, the discharge rate did not exceed the maximum permitted daily rate of 4,320,000 L/day.

The total estimated volume of water pumped from the quarry in 2016 was 47,582,510 L based on the reported daily pumping volumes provided by Forterra. For comparison, the estimated volume pumped during 2015 was 36,081,500 L.

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 and off-site MW-Series well nests, off-site TW-Series wells and a number of private wells.

The on-site and off-site MW-Series monitoring well network comprises a total of 11 well nests. 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-03I 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 Forterra'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 is pinched.

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 the 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 3, and where possible, associated with an MOECC Water Well Record number. The MOECC 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 removed by the tenants in June 2008. The logger in the Wiggins well was removed in 2013 following decommissioning of the well. The domestic wells were not surveyed in elevation. Instead, approximate ground surface elevation was estimated from Ontario Base Map (OBM) contour plans.

Water level elevations based on manual water level measurements are presented in Table 4. 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 700 m north of the base of the quarry excavation. This nest is comprised of an overburden well, an intermediate shale well and a deep shale well. In 2016, groundwater levels in the overburden well varied between 164.0 masl and 164.54 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). It should be noted that the well was dry in October and November 2016 and has on occasion been dry in the past. Groundwater levels in the intermediate well were approximately the same as those of the overburden well and varied between 161.49 masl and 164.75 masl. This is within the historical range of water levels. Groundwater levels in the deep bedrock well ranged from 158.91 masl to 160.28 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 groundwater level in the deep shale well is approximately 3.5 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 700 m north of the base of the quarry excavation. The nest is comprised of an overburden well, an intermediate shale well and a deep shale well. In 2016, groundwater levels in the overburden well ranged between 164.94 masl and 166.54 masl. This is within the historical range of water levels observed for the well. Over the 2002 to 2016 period, groundwater levels in the overburden showed minimal fluctuation except during the summer dry periods. Groundwater levels in the intermediate shale well varied between 160.62 masl and 161.63 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 154.72masl and 155.61 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. The groundwater level rose by approximately 6.5 m in the deep shale well 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 2014 and early 2015, water levels in the deep well steadily declined to approximately 2.5 m below the bedrock surface and have remained at that depth throughout 2016.

Based on water quality results there appears to be no hydraulic connection between the deep and intermediate wells.

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 700 m north of the base of the quarry excavation. 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).

In 2016, groundwater levels in the overburden well ranged between 163.91 masl and 165.69 masl and groundwater levels in the intermediate well ranged between 160.97 masl and 162.61 masl (Figure C.3). These groundwater levels all occur in the overburden and are indicative of a slight downward hydraulic gradient. Both the overburden and intermediate shale well showed a decline in groundwater levels in 2007. Since 2009 and through 2016 the groundwater levels in the overburden well have rebounded to pre-2007 levels. The groundwater levels in the intermediate well have remained consistent since the start of shale mining in 2007 through to 2016 and are within historical groundwater level ranges. The groundwater levels in both the overburden and intermediate wells respond to seasonal fluctuations. The post-2007 vertical separation of the groundwater levels between the overburden and intermediate shale wells is indicative of downward hydraulic gradients similar to that observed at well nest MW-02. This is consistent with the other monitoring wells at the site suggesting that at MW-03, the pre-2007 data may not have been representative. The separation of overburden and intermediate shale water levels may be due to drainage of bedrock fractures due to lowering of groundwater levels from a combination of lower precipitation and possibly the initiation of the sinking cut in summer 2007 (but due to distance is unlikely). It should be noted that the groundwater levels in the intermediate shale well have remained relatively constant since 2007 and as of 2013 the water level continued to rise. Water levels have not responded to the increasing depth of the sump.

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, with the northwest expansion of the quarry footprint, is approximately 340 m from the base of the quarry excavation. During 2016, groundwater levels in the overburden well ranged between 165.09 masl and 166.86 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 in 2016 occur at the top of the bedrock surface, approximately 4 to 5 m below pre-sinking cut levels. In 2016, groundwater levels in the intermediate well ranged between 158.64 masl and 159.71 masl (Figure C.4). This is within the historical range of groundwater level fluctuations observed between 2009 and 2015.

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 and water levels are therefore not considered representative of this location. In early 2015, water levels in the deep shale well in nest MW-04 rebounded by approximately 32 m. Groundwater levels are now similar to 2009 water levels i.e., between 150 and 152 masl. Well MW-04 is located on the western edge of the quarry site near the CNR berm which has been receiving overburden material from the stripping of the woodlot north of the quarry. Based on the water level response, it is likely that the deep well seal has been compromised. The chloride concentration in the deep well significantly reduced from 16000 – 45,000 mg/L to 540 mg/L in November 2015 and 500 mg/L in November 2016; indicative of dilution of the deep groundwater. It is recommended that the well nest be replaced.

3.1.5 Well Nest MW-05

Well nest MW-05 is located at the southwestern end of the quarry site and is approximately 85 m southwest of the base of the quarry excavation. This well nest is comprised of an overburden well, overburden/bedrock straddle well, intermediate well and a deep well. During 2016, groundwater levels in the overburden well ranged between 159.03 masl and 161.41 masl. Groundwater levels in the straddle well ranged between 157.95 masl and 159.72 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 corresponded 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 fluctuated by approximately 1.5 m between 147.55 masl and 148.94 masl. Groundwater levels in 2016 were relatively constant ranging from 147.99 masl to 148.94 masl. Based on the comparatively close proximity of MW-05 to the shale pit and the current pit floor elevation of approximately 135.6 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 65 m northeast of base of the quarry excavation. During 2016, the groundwater levels in the overburden well ranged between 158.53 masl and 161.27 masl. 2016 groundwater levels in the straddle well were similar to the overburden groundwater levels, ranging between 158.63 masl and 161.04 masl. The 2016 groundwater levels at both wells were within the range observed historically. In general, the groundwater levels in the overburden and straddle wells declined by approximately 4 m from the groundwater levels observed before the initiation of the sinking cut in August 2007. The decline in water levels can be attributed to the proximity of the wells to the excavation however these water levels have remained stable since 2009 and are not responding to the deepening of the quarry sump over the years

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 approximately 465 m north of the base of the quarry excavation. The well nest is comprised of an overburden and deep shale well. In 2016, the groundwater levels in the overburden well varied between 163.08 masl and 165.36 masl (Figure C.7). Groundwater levels have shown a slight seasonal fluctuation over the 2002 to 2016 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 2016 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 in 2013 and the trend has continued into 2016 with the groundwater levels approximately 3 m below the bedrock surface but is still above the pre-sinking cut water elevation It is unlikely that the changes in water levels at MW-07 shale well are due to quarry dewatering as:

- Water levels rose to above bedrock interface when the sump was lowered by approximately 5 m at the end of 2010;
- Water levels remained elevated despite continued lowering of the sump to 137.5 masl in 2012; and
- Water levels in the shale well continued to decline even when there was no change in sump depth.

Groundwater levels in MW-07D remained relatively stable in 2016. A similar response was noted in well MW-02D 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 approximately 300 m north of the base of the quarry excavation. 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 by approximately 1 m to 2 m since 2007. The post-sinking cut groundwater levels in the intermediate well continue to show seasonal fluctuations although the range of post-sinking cut groundwater level fluctuation has declined. The groundwater levels in the intermediate shale well have not responded to the deepening of the quarry sump over the years.

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 and returned to coincide with the overburden well in 2014 although site dewatering activities remained the same. Seasonal groundwater fluctuations continue to be observed in all wells throughout 2016.

3.1.9 Well Nest MW-09

With the northwest expansion of the quarry footprint in late 2014/early 2015, well nest MW-09 is currently located approximately 120 m from the base of the quarry excavation and approximately 5 m from the northwest 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 overburden/bedrock surface straddle well experienced a decline in water level of approximately 7.5 m during development of the overburden sinking cut in 2007. The groundwater levels remained relatively stable from 2008 to the end of 2014 with fluctuations of approximately 2 m between 155 masl and 157 masl. In 2015, the groundwater levels remained relatively stable at approximately 155 masl and in 2016 groundwater levels started to decline mid-year to an elevation of 154 masl. The decline in water levels can be attributed to quarry dewatering and the relative proximity of the well to the active quarry face.

Historically, the overburden well demonstrated a strong seasonal fluctuation of approximately 5 m varying in elevation from approximately 160 masl to 165 masl. This is consistent with recharge related to the occurrence of seasonal surface flooding within the area of the well due to fall rains and spring freshet. The strong seasonal fluctuations started to decrease in magnitude in 2015 with the expansion of quarry. In 2016, groundwater levels varied between 160.12 masl and 163.12 masl; a fluctuation of 3 m. The lowering water levels in both the overburden and straddle wells in 2016 is likely due to the proximity of the well to the quarry face and reduced recharge from seasonal surface flooding of the woodlot that has since been stripped (Figure C.9).

3.1.10 Well Nest MW-10

Well nest MW-10 is located approximately 190 m northwest of the base of the quarry excavation. 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 18 m since 2010 and is now at an elevation of approximately 141.5 masl, similar to the elevation of the quarry sump. Water level monitoring indicates that this well may 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 due to low precipitation and the initiation of the sinking cut in 2007. Water levels subsequently showed seasonal fluctuation which continued through to 2014 with a similar magnitude. During 2015 the extremes of the seasonal fluctuation was less than in previous years likely due to encroachment of the quarry face and reduced recharge from seasonal surface flooding of the woodlot that has since been stripped. The wells showed typical seasonal fluctuations during the 2016. It should be noted that water levels have gradually increased since 2011 and have not responded to the deepening of the quarry sump over the years.

3.1.11 Well Nest MW-11

Well nest MW-11 is located approximately 320 m northwest of the base of the quarry excavation 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 in the deep shale wells has risen approximately 15 m since the end of 2010 and now sits approximately 10 m above 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). In 2016, the groundwater levels in both wells ranged between approximately 163.19 masl and 166.4 masl. Groundwater levels in the overburden and straddle wells occur in the overburden within approximately 4 m of ground surface. There does not appear to be any 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. In 2016, groundwater levels ranged between 163.34 masl and 165.86 masl and showed a slight seasonal level fluctuation trend (Figure C.12). The water levels were consistent with historical trends and 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 and remained dry in 2016 (Figure C.13). Although well TW-2 has not been decommissioned the condition of the seal and well casing is noted during quarterly monitoring events.

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. In 2016, groundwater levels at well TW-3 ranged between 155.25 masl and 158.64 masl and was within the historical range of water levels observed since 2008 (Figure C.14). Groundwater level fluctuations at well TW-3 were similar to the water level fluctuations in the nearby 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 and based on 1 m topographic contours. 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, Forterra installed a cistern at the Featherstone residence as the primary water supply. The Featherstone residence was connected to the PCWS in May 2013. Since pumping of the well stopped in December 2008, the well water levels have risen to approximately 165 masl to 166 masl. In 2016, water levels in the Featherstone well were consistent with the post-December 2008 historical observation at the well.

Finucci Well

Groundwater levels in the Finucci well, located approximately 420 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. The pump was removed from the Finucci well and the residence was connected to the PCWS in May 2013. The well is no longer used as a water supply for the home. The well water levels have since risen to approximately 166 masl to 167 masl.

Hendervale Wells

The Hendervale wells are located approximately 400 m to 600 m west of the quarry. MOECC 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. In 2015, the static water level in the Hendervale Main Barn well ranged between 161.5 masl and 164.0 masl (Figure C.17) and was within the range of historical water levels. It should be noted that the depth of the data logger in the well is determined by the location of the pump in the well. The data logger is currently suspended in a drop tube in the well, however it is located above the pump to avoid entangling the data logger and direct read cable with the pump wires.

The Hendervale Cottage well (Figure C.18) and Hendervale House well (Figure C.21) show no pumping activity in 2016 with the water level stable 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 the second half of 2016 that resulted in a drawdown of approximately 5 to 7 m which recovered to historical levels toward the end of the year. This may be due to the usage of water for 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 interconnected cisterns on the site. The Hendervale house and cottage were connected to the PCWS in May 2013 however the Hendervale House well and Hendervale Cottage well were retained for use by the owner.

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. A similar pattern of groundwater fluctuation was observed in 2016, as observed in previous years.

- **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. Forterra 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 Wiggins residence was connected to the PCWS in May 2013. 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 148 masl and 161 masl in 2016 (Figure C.25) and showed a pattern indicative of seasonal groundwater fluctuations and a 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. The Bekkers residence was connected to the PCWS in May 2013 however the well was retained for use by the owner.

4.0 GROUNDWATER QUALITY

Groundwater quality sampling of MW-Series monitoring wells and off-site private wells was conducted on November 14, 2016 (domestic wells) and between November 21 and 24, 2016 (MW-Series wells). 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 existing 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-05S (Dup 1), MW-01I (Dup 2) and MW-03I (Dup 3). 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 Monitoring Wells

In order to provide baseline water quality relative to nearby private wells, groundwater samples were taken from 10 piezometer nests (MW-01 to MW-10) located on the Tansley Quarry site and one off-site piezometer nest (MW-11) located on the Hendervale property. 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 of analysis are provided in Appendix E.

Table 5 provides a summary of water quality exceedances of ODWS. In general, the analytical results were below the ODWS criteria with the exception of aluminum, alkalinity, arsenic, barium, boron, cadmium, chloride, chromium, copper, hardness, iron, lead, manganese, nitrite as N, pH, sodium, sulphide sulphate, turbidity and uranium.

- **Operational Guidelines (OG):** aluminum (0.15 mg/L to 250 mg/L) exceeded the ODWS Operational Guidelines (OG) of 0.1 mg/L in all monitoring wells. Alkalinity (510 mg/L to 730 mg/L) exceeded the ODWS OG in wells MW-02O, MW-08O and MW-08D only. Hardness exceeded the ODWS OG of 80-100 mg/L in all samples with concentrations ranging between 230 mg/L to 33,000 mg/L. The pH of the duplicate sample taken from well MW-01I (6.49) was below the OG range of 6.5-8.5. The ODWS indicates that 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.

- **Aesthetic Objectives (AO):** chloride, iron, manganese, sodium, sulphide, sulphate, and turbidity exceeded the ODWS Aesthetic Objectives (AO). The chloride concentration (340 mg/L to 50,000 mg/L) exceeded the AO of 250 mg/L at 13 of the 30 wells sampled. Chloride exceedances were observed in the intermediate, straddle and deep shale wells only. The concentration of iron (1.1 mg/L to 350 mg/L) exceeded the ODWS criteria of 0.3 mg/L in all wells. The manganese concentration in samples taken from all wells (0.086 mg/L to 14 mg/L) exceeded the AO of 0.05 mg/L in all wells except for MW-10I. Samples taken at all the wells exceeded the AO criteria (5.1 to 10,000 NTU) for turbidity of 5 NTU. Sulphate (510 mg/L to 1,900 mg/L) exceeded the AO of 500 mg/L in 19 of the 30 wells sampled. The concentration of sulphide exceeded the AO of 0.05 mg/L at wells MW-02O, MW-06D and MW-11O only. Although sodium exceeded the AO of 200 mg/L in 14 of the 30 wells sampled, all wells exceeded the 20 mg/L criteria at which the Medical Officer of Health should be notified as sodium at these concentrations could affect persons on sodium-restricted diets.

  The ODWS AO are non-health-related criteria that reflect parameters that may impair the colour, smell or taste of water.

- **Maximum Acceptable Concentration (MAC):** barium, cadmium, chromium, lead, nitrate, nitrite 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 (1.1 mg/L to 3.6 mg/L) exceeded the MAC of 1 mg/L in wells MW-06O, MW-06S, MW-09O, MW-09S, and MW-11O. The MAC for cadmium (0.005 mg/L) was exceeded in seven wells with concentrations ranging between 0.0051 mg/L and 0.017 mg/L. Chromium (0.072 mg/L to 6 mg/L) exceeded the MAC of 0.05 mg/L at 12 of the 30 wells sampled. The lead concentration (0.015 mg/L to 0.13 mg/L) exceeded the MAC of 0.01 mg/L at 11 of the 30 wells sampled. Uranium (0.04 mg/L) exceeded the MAC of 0.02 mg/L at MW-06D. Uranium may result in kidney damage when ingested in large quantities. The nitrite concentration at well MW-07D (2.4 mg/L) exceeded the MAC of 1 mg/L and the concentration of nitrate (80.2 mg/L) exceeded the MAC of (10 mg/L) at well MW-06D. High nitrate and nitrite concentrations are usually a by-product of fertilizer application, or animal wastes leaching into groundwater. However, based upon water levels in well MW-06D, the seal does not appear to be compromised and therefore should not be influenced by surface water. It should be noted that well MW-06D has not been sampled in the past due to insufficient amount of sample and therefore there is no historical water quality available for comparison. In addition, this sample is not likely representative of existing groundwater as it was noted to be turbid (230 NTU). Based on this anomalous nitrate concentration, it is recommended that future samples be collected using low flow methods to minimize turbidity. Well MW-06D will be sampled during the annual quality program conducted in the Fall.

  Nitrite detections in well MW-07D occurred in 2013 (0.017 mg/L) and 2014 (0.283 mg/L) and nitrite concentrations exceeded ODWS in 2015 (3.85 mg/L) and 2.40 mg/L in 2016. It should be noted that nitrite has also been detected in the overburden well MW-07O from 2009 to 2011 (0.01 to 0.09 mg/L) and 2013 to 2016 (0.011 to 0.029 mg/L). Across the site there are nitrite detections in overburden, shallow rock and deep rock. Occurrences of nitrite may be due to the prior use of the site as agricultural lands.

- **IInterim Maximum Acceptable Concentrations (IMAC):** 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 seven of the 30 wells sampled, with concentrations ranging between 0.045 mg/L to

0.14 mg/L. Arsenic is a carcinogen and must be removed by treatment if present in drinking water at levels above this concentration. Boron concentrations (5.2 mg/L to 8.6 mg/L) exceeded the ODWS IMAC of 5 mg/L in intermediate shale wells MW-04I and MW-08I, straddle well MW-09Sand deep shale wells (MW-01D, MW 02D, MW-04D, MW-06D, MW-07D, MW-10D, and MW-11D). 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 6. The 2016 analytical results were below the PWQO with the exception of aluminum, arsenic, boron, cadmium, cobalt, copper, iron, lead, molybdenum, nickel, pH, total phosphorous, silver, thallium, uranium, vanadium and zinc. The pH at well MW-01D (6.49) was below the PWQO range of 6.5-8.5.

It should be noted that unfiltered water samples were collected for analysis of metals for comparison to PWQO in Table 6. 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 existing in the shallow overburden, with salinity increasing with depth as seen in the MW-05 well nest where chloride in the shallow overburden well (depth = 8.7 m) ranges between 13 and 44 mg/L, the intermediate well (depth = 24.7 m) ranges between 67 and 176 mg/L and the deep well (depth = 44 m) ranges between 50,200 mg/L and 59,000 mg/L. High salinity is associated with the deep shale pore water where the low hydraulic conductivity of the shale bedrock has limited existing groundwater recharge and circulation.

4.2 Private Wells

Groundwater quality has been collected from a network of private wells since 2002. These wells include Bekkers, Eno/Myers, Featherstone, Finucci, Hendervale House, Hendervale Cottage, Hendervale Main Barn, Hendervale ABC Barns, Hendervale XYZ Barns, Robinson, Sicard, Simms, Stevenson, Sugiyama and Wiggins. However, a number of these wells are no longer accessible as indicated below:

- The Eno/Myers, Sugiyama and Sicard wells were inaccessible as the residents were not at home.
- There is no pump installed in the Featherstone and Finucci wells. Pumping at the Featherstone well stopped in December 2008. The pump was removed from the Finucci well on June 26 2014.
- Stevenson, Wiggins and Robinson wells were decommissioned on June 14, 2013.
- 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 other sources to augment barn supplies.

It should be noted that the Eno/Myers, Featherstone, Finucci, Hendervale (Hendervale Cottage and Hendervale House), Wiggins, Hansen, Robinson and Bekkers properties are connected to the PCWS. The Sugiyama and Sicard properties are on cisterns supplied with water by Forterra.

In 2016, groundwater samples were collected from the Bekkers well, the Simms well, Hendervale House, and Hendervale Cottage. A water sample was also taken from the Hendervale Barn cistern at the Hendervale Main Barn tap. The tap sample represents a combination of groundwater from the ABC, XYZ and Main Barn wells and possibly from external sources.

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 the ODWS are summarized in Table 7. The results of the groundwater samples collected from Simms, Bekkers, Hendervale House and Cottage wells and the Barn cistern exceeded ODWS OG for hardness are summarized below.

- Groundwater samples collected from all wells exceeded the hardness ODWS criteria of 80-100 mg/L, which remains consistent with historic private well sampling results. The ODWS OG criteria are non-health-related.
- The concentration of iron (1 mg/L) and turbidity (11 NTU) in the untreated water sample collected from the Hendervale Barn Cistern exceeded the ODWS AO of 0.3 mg/L and 5 NTU respectively. High turbidity and iron have historically been observed in the water from the cistern. It should be noted that the cistern may obtain water from the ABC Barn, XYZ and Main Barn wells, as well as other sources.
- Chloride (290 mg/L), manganese (0.25 mg/L), sodium (210 mg/L) and sulphate (800 mg/L) exceeded the ODWS AO in the untreated water sample taken from the Bekkers well. With the exception of manganese, the concentration of these parameters were within the range of historical concentrations obtained for water from the Bekkers well. The concentration of manganese was higher than the observed historical range of 0.011 mg/L to 0.15 mg/L.

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	

Loggers have been installed in all the on-site overburden, straddle and selected intermediate and deep shale wells as outlined below.

Well		Logger Installed	
		Yes	No
MW-01	Overburden		●
	Intermediate	●	
	Deep	●	
MW-02	Overburden	●	
	Intermediate		●

Well		Logger Installed	
		Yes	No
	Deep	●	
MW-03	Overburden	●	
	Intermediate	●	
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	●	

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.

5.2 Well Repairs and Water Supply Systems Modification

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

Date	Work Completed
June 2008	Forterra'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. As per the March 2007 TNA Agreement, Forterra 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 communal reservoir was commissioned in February 2013 and the PCWS fully operational in April 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, Forterra continues to supply water to the cisterns installed on the property.
2014	No additional works or modifications were undertaken by, or on behalf of Forterra.
2015	No additional works or modifications were undertaken by, or on behalf of Forterra.
2016	No additional works or modifications were undertaken by, or on behalf of Forterra.

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 December 2016) initiation of quarrying activities.

6.1 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 (approximately 1 m to 2 m in response to the sinking cut) and MW-09 straddle well (approximately 7.5 m in response to the sinking cut). All of these wells are within 350 m of the base of the quarry excavation.

The deep shale wells in well nests 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 may 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 little potential for significant interaction between the water wells and the quarry. The same pattern was observed in well MW-04D between 2010 and 2014, however in early 2015, water levels in well MW-04D rebounded by approximately 32 m to pre-sinking cut levels i.e., between 162 and 163 masl. Groundwater levels were subsequently lowered due to water quality sampling conducted in November 2016 and recovered to approximately 153 masl by the end of 2016. Based on the water level response, it is likely that this deep well seal has been compromised. As further evidence, it should be noted that the chloride concentration in the deep well significantly reduced from 16,000 – 45,000 mg/L to 500 - 540 mg/L in November 2015 and 2016 indicative of dilution of the deep groundwater.

The deep shale wells in well nests MW-01, MW-02, MW-07 and MW-08, and the intermediate shale well in well nest MW-03 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. These wells have not shown sustained responses to quarry dewatering activities.

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

6.2 Radius of Influence

Based upon the groundwater level response seen in all monitoring wells, relative to quarry extraction and sump excavation, the radius of influence is within 350 m of the base of the quarry excavation as show on Figure 8. This radius of influence is specifically based upon the groundwater level lowering observed at on-site wells MW-04, MW-05, MW-06, MW-08 and MW-09 which showed a lowering of water levels between approximately 1 m to 12 m in the intermediate and straddle shale wells.

Although the groundwater levels in the overburden wells in the MW-04, MW-05, MW-08 and MW-09 well nests have recovered to within pre-sinking cut levels, the groundwater levels in the intermediate and straddle shale wells in well nests MW-04, MW-05 MW-06, MW-08 and MW-09 have not recovered to pre-sinking cut levels and therefore are responding to the dewatering activities as a part of quarrying. These intermediate and straddle wells have varying water level responses as outlined below:

- The water levels in wells MW-04I, MW-05I, and MW-08I declined after initiation of the sinking cut and have remained relatively stable since 2013. Water levels at these location have showed a response to deepening of the quarry sump over time.
- The water level in straddle well MW-06S declined after initiation of the sinking cut and have not rebounded to pre-sinking cut levels. Although depressed, the water levels at this location respond to seasonality.
- Although a 5-year record of pre-sinking cut water levels is not available for straddle well MW-09S, based on the post August 2007 data, water levels declined after initiation of the sinking cut but showed a slight increasing trend from 2008 to 2014 despite lowering of the quarry sump. However, the groundwater levels at MW-09S declined to approximately 155 masl at the beginning of 2015 coincident with the lowering of the quarry sump from 137 masl to 133 masl. Groundwater levels remained relatively stable through 2015 until mid-2016, when the groundwater levels further declined.

These observations are consistent with anisotropy associated with the interconnectivity of the fractures in the shale bedrock. The water level lowering is largely attributed to the exposure of the shale bedrock fracture surface at the quarry face which allows groundwater seepage into the quarry as well as lowering of water levels in the overlying sand alluvium.

6.3 Well Interference Response

On March 21, 2007 Forterra entered into an Agreement with a number of private well owners comprising the Tremaine Neighbourhood Association (TNA). Forterra also entered into an Adaptive Management Plan (AMP) Agreement with the Region of Halton on May 8, 2007 (Appendix A). Both agreements provide that Forterra 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 Forterra 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, Forterra 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, Robinson and Bekkers. The Eno/Myers residence was connected to the PCWS in June 2013. Backflow preventers were installed at all residences.

The Sugiyama and Sicard properties, both located south of Highway 407, will not be connected to the PCWS but will instead be connected to Halton Region's Tremaine Road Urban Watermain Extension. In the interim, Forterra continues to supply water to the cisterns installed on the property.

As indicated in Section 6.1, groundwater level data showed that groundwater level lowering occurred in close proximity to the quarry excavation (Figure 9). Consistent with this observation, no private water well complaints were received by Forterra in 2016.

6.4 Impacts on Surface Water

As the on-site water courses are intermittent features and not groundwater fed, impacts to surface water features are limited to the effects of the discharged water on the downstream environment. Discharge from the quarry sump is regulated by ECA No. 8944-8MKKNA (Appendix A) issued on April 17, 2013.

The ECA also requires that, prior to discharging from the decant pond, the pond contents must have been allowed to settle for a minimum of 24 hours and the contents must be sampled for water quality.

The ECA requirements ensure that the discharged water will not contain suspended material or oils and grease that may negatively affect the downstream water features. In addition, sediment traps have been deployed along the site boundary to reduce the suspended sediment load in surface runoff leaving the site. An ECA report is submitted to the MOECC on an annual basis.

6.5 Impacts on Natural Environment

Based upon the natural features that are present on the Tansley Quarry site and their characteristics, no significant negative impacts were noted from the Tansley Quarry water takings and discharges. No on-site plant community is dependent upon the groundwater resource and no off-site vegetation within the zone of groundwater drawdown is dependent upon groundwater. Considering no individual species of plants on or around the site are dependent upon groundwater resources, no negative impact upon the locally resident plants or wildlife has occurred.

The roadside wetlands and the on-site drainage features are adapted to cycles of periodic inundation and drying. All of the plants present in these areas are tolerant of seasonal drying and no negative impacts from the periodic discharge of quarry water are expected. An on-site settling pond and sediment traps and filter cloth-covered dikes are present at the upstream ends of the culverts discharging from the site. These should continue to be a satisfactory means of removing entrained sediments from the drainage features that carry water off the site.

7.0 REVIEW OF NUMERICAL GROUNDWATER MODEL

Section 5.2(h) of the Tansley Quarry AMP requires that the numerical model be “updated for the year that the Sinking Cut Stage is completed, and prior to commencing excavation beyond the northern limit of the Sinking Cut Stage.” According to Forterra, the sinking cut will not be completed for another 3 to 5 years. However, in late 2014, Forterra began to clear the woodlots located north of the existing sinking cut excavation as shown on Figure

2B. Therefore to meet the terms of the AMP, Golder reviewed the predictions of the numerical model and compared these predictions to the measured groundwater levels.

Table 8 provides a comparison of modelled drawdown in the overburden and upper bedrock at the end of the sinking cut stage (Golder, 2008, Figure 8.11) with the drawdown observed at the monitoring wells at the end of 2016. The following provides a summary of the model results relative to 2016 field observations:

- In all instances the modelled drawdown was greater than observed, which is expected since the modelled sinking cut was larger than the current excavation. Furthermore, the model considers a long-term response rather than the relatively short-term responses observed in some of the wells.
- Over half the modelled drawdown results were within 2 m of observed. This suggests a reasonable degree of correlation between simulated and actual measured groundwater levels at these locations.
- The greatest difference between simulated and observed drawdown occurred at monitoring wells in close proximity (less than 200 m) to the excavation where modelled drawdown was greater than actual measured drawdown in the groundwater table. These differences could be attributable to several factors, including:
- The actual sinking cut being smaller than modelled;
- Local discrete fracture flow dominating the system;
- The model mesh resolution immediately surrounding the quarry is large enough such that a greater "average drawdown per area" is predicted local to the quarry. This tends to be exacerbated in low permeability environments such as shale, i.e. the "tightness" of the drawdown cone is not finely resolved but instead average over a larger radius of influence.

A quantitative comparison to model results is likely premature at this stage, other than we can say that our model, which simulates a future condition, has drawdown results greater than currently observed, as would be expected given that the sinking cut excavation is not yet complete.

Based on these findings, the observed data to date generally agrees with the model predictions. However, the drawdown and model results should be reviewed when the sinking cut more closely approximates the configuration modelled (Golder 2008, Figure 8.11) in order to draw more definitive conclusions.

8.0 STATUS OF CURRENT MONITORING PROGRAM

The configuration of wells in the current monitoring program, 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.

The deep shale monitoring wells at MW-05, MW-06, MW-09, MW-10 and MW-11 are completed in extremely low permeability shale and may not recover in the near future. Historically, a number of these deep wells had insufficient water for analysis, but where enough water is obtained a sample will be submitted.

Water level monitoring in the off-site private wells remain unchanged with the exception of the Wiggins well which was decommissioned in June 2013.

9.0 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 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 of drawdown respectively 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.

The below table provides a summary of the trigger water level elevations and the range of 2016 water level elevations. Based on the water level summary, no contingency measures are proposed at this time.

Trigger Well	**AMP Target Water Level Elevation (masl)**	**2016 Water Level Elevation (masl)**	**Available Drawdown before Target Level is Reached (m)**	**Contingency Measures Required**
MW-01I	157.2 - 158.5	162.01	3.5 - 4.8	None
MW-02I	153.1 - 154.2	160.62	6.4 - 7.5	None
MW-03I	153.4 - 154.5	161.20	6.7 - 7.8	None

10.0 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, it is our opinion that 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 permeability of the shale layers assigned in the model seem to be slightly higher than the permeability demonstrated in the field based on water level monitoring therefore 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 three to five years based on the current demand for the shale. However, as the quarry expands, the monitoring network will be assessed to ensure that it adequately monitors the effects of quarry development.

Due to the conservative nature of the predictive model, no revision is considered necessary for the potential zone of influence. 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 considered to be required at this time with respect to water supplies.

11.0 SUMMARY AND CONCLUSIONS

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

- During 2016, the maximum daily taking from the sump was 460,000 L/day. This rate of taking did not exceed the maximum allowable daily rate of 4,320,000 L/day as specified by the site water taking permit PTTW No. 0477-AAPPNB.
- In general, the 2016 groundwater level monitoring results were consistent with the previous years' monitoring confirming long term trends since monitoring began.
- The 2016 groundwater level trends for the deep shale wells 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.
- Quarry related groundwater level lowering in the range of 2 m to 13 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 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.
- 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 salinity increases with depth.
- The groundwater quality parameters in the monitoring wells were below the ODWS criteria with the exception of aluminum, alkalinity, arsenic, barium, boron, cadmium, chloride, chromium, hardness, iron, lead, manganese, nitrate as N, nitrite as N, pH, sodium, sulphide, sulphate, turbidity, and uranium. These exceedances are considered to be naturally occurring in groundwater in the shale bedrock. It should be

noted that pH at well MW-01D was not within the ODWS criteria range, and high sediment content in MW-06D may have skewed the results.

- The groundwater quality parameters in the monitoring wells were below PWQO with the exception of aluminum, arsenic, boron, cadmium, cobalt, copper, iron, lead, molybdenum, nickel, pH, phosphorous, silver, thallium, uranium, vanadium and zinc. These exceedances are considered to be naturally occurring in groundwater in the shale bedrock. It should be noted that the pH at well MW-01D was not within the PWQO criteria range.
- Groundwater quality in the Bekkers, Simms, Hendervale House and Hendervale Cottage wells showed a non-health related ODWS OG exceedance of hardness. This is consistent with historical trends. The water from the Bekkers well also showed ODWS AO exceedances of chloride, manganese, sodium, and sulphate. These parameters have historically exceeded the ODWS at the Bekkers well. The water from the Hendervale Barn Cistern (taken at the Main Barn tap) showed an ODWS exceedance of hardness and iron. This is consistent with historical trends.
- No water well complaints were received by Forterra in 2016.

12.0 RECOMMENDATIONS

- Monitoring of groundwater levels should be continued in 2017 as outlined in the AMP.
- Water quality sampling should be conducted annually at MW-Series well nests and private wells as per the AMP.
- Assess trigger levels in monitoring wells MW-01, 02 and 03 as part of subsequent annual reporting as per Section 9 above.

13.0 REFERENCES

Golder Associates Ltd. 2008. Initial Monitoring Report and Updated Hydrogeological Assessment of Tansley Quarry – Hanson Brick Ltd., Burlington, Ontario.

Report Signature Page

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TABLES

Table 1

Annual Precipitation (Millgrove and Hamilton Airport)
Tansley Quarry - Forterra Brick Ltd.

Year	Total Annual Precipitation (mm)
2003	1016
2004	942
2005	1049.8
2006	1033.3
2007	702.2
2008	1107.9
2009	1097
2010	971.2
2011	1116.9
2012	798
2013	1026.2
2014	864.4
2015	745.4
2016	838.8

Notes:

1) Data from 2003 to 2006 from the Millgrove Station (discontinued).

2) Data from 2006 to 2015 from the Hamilton Airport Station.

Table 2
2016 Daily Sump Discharge
Tansley Quarry - Forterra Brick Ltd.

Date	Total Hours Pumped	Total Daily Volume Pumped	Estimated Flow Rate
	(hrs)	(Litres/day)	Litres/min
1-Jan-16			
2-Jan-16			
3-Jan-16			
4-Jan-16			
5-Jan-16			
6-Jan-16			
7-Jan-16			
8-Jan-16	2.5	120,000	800
9-Jan-16			
10-Jan-16			
11-Jan-16			
12-Jan-16	4.0	192,000	800
13-Jan-16			
14-Jan-16			
15-Jan-16	6.0	396,000	1100
16-Jan-16			
17-Jan-16			
18-Jan-16			
19-Jan-16	4.0	264,000	1100
20-Jan-16	6.0	396,000	1100
21-Jan-16	6.3	456,500	1200
22-Jan-16	5.0	300,000	1000
23-Jan-16			
24-Jan-16			
25-Jan-16			
26-Jan-16	6.4	346,500	900
27-Jan-16	6.6	395,000	1000
28-Jan-16	6.3	337,500	900
29-Jan-16	3.8	202,500	900
30-Jan-16			
31-Jan-16			
1-Feb-16	6.5	351,000	900
2-Feb-16	5.3	256,000	800
3-Feb-16			
4-Feb-16			
5-Feb-16	4.6	247,500	900
6-Feb-16			
7-Feb-16			
8-Feb-16	6.3	375,000	1000
9-Feb-16	6.0	360,000	1000
10-Feb-16	5.4	325,000	1000
11-Feb-16	4.3	260,000	1000
12-Feb-16	4.3	255,000	1000
13-Feb-16			
14-Feb-16			
15-Feb-16			
16-Feb-16	5.4	325,000	1000
17-Feb-16			
18-Feb-16			
19-Feb-16	4.3	260,000	1000
20-Feb-16			
21-Feb-16			
22-Feb-16	6.6	395,000	1000

Table 2
2016 Daily Sump Discharge
Tansley Quarry - Forterra Brick Ltd.

Date	Total Hours Pumped	Total Daily Volume Pumped	Estimated Flow Rate
	(hrs)	(Litres/day)	Litres/min
23-Feb-16	5.2	310,000	1000
24-Feb-16	4.7	252,000	900
25-Feb-16	5.0	360,000	1200
26-Feb-16	4.9	354,000	1200
27-Feb-16	5.2	346,000	1100
28-Feb-16			
29-Feb-16			
1-Mar-16			
2-Mar-16			
3-Mar-16			
4-Mar-16			
5-Mar-16			
6-Mar-16			
7-Mar-16			
8-Mar-16			
9-Mar-16			
10-Mar-16	3.5	168,000	800
11-Mar-16	6.8	364,500	900
12-Mar-16			
13-Mar-16			
14-Mar-16	6.2	333,000	900
15-Mar-16	5.7	340,000	1000
16-Mar-16	6.8	405,000	1000
17-Mar-16	6.4	385,000	1000
18-Mar-16			
19-Mar-16			
20-Mar-16			
21-Mar-16			
22-Mar-16			
23-Mar-16	6.9	415,000	1000
24-Mar-16	5.4	325,000	1000
25-Mar-16			
26-Mar-16			
27-Mar-16			
28-Mar-16	6.1	405,000	1100
29-Mar-16	7.5	450,000	1000
30-Mar-16	7.3	440,000	1000
31-Mar-16	2.6	155,000	1000
1-Apr-16			
2-Apr-16			
3-Apr-16			
4-Apr-16			
5-Apr-16			
6-Apr-16	6.9	415,000	1000
7-Apr-16	6.7	400,000	1000
8-Apr-16	7.5	450,000	1000
9-Apr-16			
10-Apr-16			
11-Apr-16	6.5	390,000	1000
12-Apr-16	7.7	460,000	1000
13-Apr-16			
14-Apr-16			
15-Apr-16	7.0	420,000	1000

Table 2
2016 Daily Sump Discharge
Tansley Quarry - Forterra Brick Ltd.

Date	Total Hours Pumped	Total Daily Volume Pumped	Estimated Flow Rate
	(hrs)	(Litres/day)	Litres/min
16-Apr-16			
17-Apr-16			
18-Apr-16	6.5	390,000	1000
19-Apr-16	2.7	160,000	1000
20-Apr-16	7.3	435,000	1000
21-Apr-16	7.0	420,000	1000
22-Apr-16	6.8	369,000	900
23-Apr-16			
24-Apr-16			
25-Apr-16			
26-Apr-16	6.9	373,500	900
27-Apr-16	7.3	391,500	900
28-Apr-16	7.5	405,000	900
29-Apr-16	6.3	304,000	800
30-Apr-16			
1-May-16			
2-May-16	6.5	312,000	800
3-May-16	7.1	340,000	800
4-May-16			
5-May-16	3.5	189,000	900
6-May-16	7.2	387,000	900
7-May-16			
8-May-16			
9-May-16	6.8	324,000	800
10-May-16	7.2	344,000	800
11-May-16	8.2	391,500	800
12-May-16	7.1	340,000	800
13-May-16	6.3	342,000	900
14-May-16			
15-May-16			
16-May-16			
17-May-16	5.3	288,000	900
18-May-16	7.1	382,500	900
19-May-16	6.0	288,000	800
20-May-16	7.0	336,000	800
21-May-16			
22-May-16			
23-May-16			
24-May-16	6.1	292,000	800
25-May-16	6.3	262,500	700
26-May-16			
27-May-16	5.8	315,000	900
28-May-16			
29-May-16			
30-May-16	7.3	348,000	800
31-May-16	5.3	256,000	800
1-Jun-16	6.9	332,000	800
2-Jun-16	6.9	332,000	800
3-Jun-16	6.2	296,000	800
4-Jun-16			
5-Jun-16			
6-Jun-16	6.6	316,000	800
7-Jun-16			

Table 2
2016 Daily Sump Discharge
Tansley Quarry - Forterra Brick Ltd.

Date	Total Hours Pumped	Total Daily Volume Pumped	Estimated Flow Rate
	(hrs)	(Litres/day)	Litres/min
8-Jun-16	3.0	162,000	900
9-Jun-16	6.5	351,000	900
10-Jun-16	7.2	387,000	900
11-Jun-16			
12-Jun-16			
13-Jun-16	6.1	292,000	800
14-Jun-16	5.8	276,000	800
15-Jun-16	6.8	328,000	800
16-Jun-16	6.7	283,000	700
17-Jun-16			
18-Jun-16			
19-Jun-16			
20-Jun-16			
21-Jun-16	6.3	300,000	800
22-Jun-16	7.2	344,000	800
23-Jun-16	6.1	292,000	800
24-Jun-16	5.5	264,000	800
25-Jun-16			
26-Jun-16			
27-Jun-16			
28-Jun-16	6.0	254,000	700
29-Jun-16	6.3	266,000	700
30-Jun-16	7.2	301,000	700
1-Jul-16			
2-Jul-16			
3-Jul-16			
4-Jul-16			
5-Jul-16	6.3	262,500	700
6-Jul-16	7.1	255,000	600
7-Jul-16			
8-Jul-16	0.9	38,500	700
9-Jul-16			
10-Jul-16			
11-Jul-16	5.8	280,000	800
12-Jul-16	4.9	206,500	700
13-Jul-16	6.4	231,000	600
14-Jul-16	5.0	180,000	600
15-Jul-16	7.4	267,000	600
16-Jul-16			
17-Jul-16			
18-Jul-16			
19-Jul-16	5.8	210,000	600
20-Jul-16	6.4	231,000	600
21-Jul-16	5.9	177,500	500
22-Jul-16	5.3	157,500	500
23-Jul-16			
24-Jul-16			
25-Jul-16			
26-Jul-16	7.5	225,000	500
27-Jul-16	6.3	190,000	580
28-Jul-16			
29-Jul-16			
30-Jul-16			

Table 2
2016 Daily Sump Discharge
Tansley Quarry - Forterra Brick Ltd.

Date	Total Hours Pumped	Total Daily Volume Pumped	Estimated Flow Rate
	(hrs)	(Litres/day)	Litres/min
31-Jul-16			
1-Aug-16			
2-Aug-16	5.4	162,500	500
3-Aug-16	6.0	180,000	500
4-Aug-16			500
5-Aug-16	1.3	37,500	500
6-Aug-16			
7-Aug-16			
8-Aug-16			
9-Aug-16	2.8	82,500	500
10-Aug-16			
11-Aug-16			
12-Aug-16	1.8	55,000	500
13-Aug-16			
14-Aug-16			
15-Aug-16	6.4	192,500	500
16-Aug-16	5.5	165,000	500
17-Aug-16	7.5	225,000	500
18-Aug-16	5.2	155,000	500
19-Aug-16			
20-Aug-16			
21-Aug-16			
22-Aug-16			
23-Aug-16	8.0	240,000	500
24-Aug-16			
25-Aug-16			
26-Aug-16			
27-Aug-16			
28-Aug-16			
29-Aug-16			
30-Aug-16			
31-Aug-16	7.8	232,500	500
1-Sep-16	7.5	270,000	600
2-Sep-16	7.6	273,000	600
3-Sep-16			
4-Sep-16			
5-Sep-16			
6-Sep-16	7.0	252,000	600
7-Sep-16	7.1	255,000	600
8-Sep-16	7.5	270,000	600
9-Sep-16	7.3	220,000	500
10-Sep-16			
11-Sep-16			
12-Sep-16	7.5	270,000	600
13-Sep-16	7.2	258,000	600
14-Sep-16	7.1	255,000	600
15-Sep-16			
16-Sep-16			
17-Sep-16			
18-Sep-16			
19-Sep-16	7.0	252,000	600
20-Sep-16	7.7	276,000	600
21-Sep-16			

Table 2
2016 Daily Sump Discharge
Tansley Quarry - Forterra Brick Ltd.

Date	Total Hours Pumped	Total Daily Volume Pumped	Estimated Flow Rate
	(hrs)	(Litres/day)	Litres/min
22-Sep-16	7.0	252,000	600
23-Sep-16	6.9	249,000	600
24-Sep-16			
25-Sep-16			
26-Sep-16			
27-Sep-16	7.5	270,000	600
28-Sep-16	7.6	273,000	600
29-Sep-16	7.5	270,000	600
30-Sep-16	1.5		500
30-Sep-16	4.3	134,000	527
1-Oct-16			
2-Oct-16			
3-Oct-16			
4-Oct-16	3.2	114,380	602
5-Oct-16	7.3	256,080	582
6-Oct-16	7.2	208,550	485
7-Oct-16	7.0	210,000	500
8-Oct-16			
9-Oct-16			
10-Oct-16			
11-Oct-16			
12-Oct-16			
13-Oct-16	6.6	201,000	508
14-Oct-16	6.1	219,000	600
15-Oct-16			
16-Oct-16			
17-Oct-16	5.8	191,000	547
18-Oct-16	4.6	164,000	600
19-Oct-16	7.7	277,000	600
20-Oct-16	6.4	232,000	600
21-Oct-16	4.9	160,000	540
22-Oct-16			
23-Oct-16			
24-Oct-16			
25-Oct-16	5.6	229,000	682
26-Oct-16	6.3	281,000	744
27-Oct-16	5.3	225,000	710
28-Oct-16	5.1	223,000	733
29-Oct-16			
30-Oct-16			
31-Oct-16	5.8	260,000	745
1-Nov-16	6.5	227,000	582
2-Nov-16	5.6	172,000	513
3-Nov-16	6.1	258,000	707
4-Nov-16	6.6	187,000	473
5-Nov-16			
6-Nov-16			
7-Nov-16			
8-Nov-16	7.8	195,000	419
9-Nov-16	6.2	257,000	695
10-Nov-16	6.3	285,000	750
11-Nov-16	7.5	320,000	711
12-Nov-16			

Table 2
2016 Daily Sump Discharge
Tansley Quarry - Forterra Brick Ltd.

Date	Total Hours Pumped	Total Daily Volume Pumped	Estimated Flow Rate
	(hrs)	(Litres/day)	Litres/min
13-Nov-16			
14-Nov-16	6.3	273,000	718
15-Nov-16			
16-Nov-16	6.5	10,000	26
17-Nov-16	6.6	279,000	706
18-Nov-16			
19-Nov-16			
20-Nov-16			
21-Nov-16			
22-Nov-16			
23-Nov-16	5.1	201,000	659
24-Nov-16	6.4	300,000	779
25-Nov-16			
26-Nov-16			
27-Nov-16			
28-Nov-16			
29-Nov-16			
30-Nov-16	4.5	170,000	630
1-Dec-16	5.8	325,000	930
2-Dec-16	6.4	297,000	769
3-Dec-16			
4-Dec-16			
5-Dec-16	6.0	276,000	764
6-Dec-16	6.1	298,000	812
7-Dec-16	6.0	289,000	809
8-Dec-16			
9-Dec-16			
10-Dec-16			
11-Dec-16			
12-Dec-16			
13-Dec-16	2.8	126,000	739
14-Dec-16			
15-Dec-16			
16-Dec-16			
17-Dec-16			
18-Dec-16			
19-Dec-16			
20-Dec-16			
21-Dec-16			
22-Dec-16	5.0	249,000	824
23-Dec-16	4.5	200,000	744
24-Dec-16			
25-Dec-16			
26-Dec-16			
27-Dec-16			
28-Dec-16	6.1	301,000	817
29-Dec-16	3.7	179,000	803
30-Dec-16			
31-Dec-16			
2016 Annual Total	**1038.2**	**47,582,510**	

Note:

1) Hours pumped, total daily volume and estimated flow rates provided by Forterra Brick Ltd.

2) Calculated flow rate based on total daily volume pumped and total hours pumped.

Table 3
Private Well Details
Tansley Quarry - Forterra 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 4
Groundwater Level Elevations in MW-Series and TW-Series Wells
September 30, 2002 to November 21, 2016
Tansley Quarry - Forterra 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	7-Jan-03	14-Feb-03	20-Mar-03
		Easting (m)	Northing (m)												
MW-01	Overburden	596395	4809597	164.78	0.76	165.54								163.16	163.60
	Intermediate			164.78	0.80	165.58		162.56	162.56	162.28	162.36	162.51	163.10	163.18	163.61
	Deep			164.78	0.75	165.53		160.39	160.30	160.14	160.06	159.41	159.43	159.74	159.62
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
	Intermediate			166.58	0.76	167.34		160.36	160.31	160.09	160.07	159.79	159.90	162.02	160.19
	Deep			166.58	0.74	167.32		152.93	153.15	152.79	152.77	152.50	152.60	152.61	152.69
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
	Intermediate			169.31	0.75	170.06	162.04	162.04	162.06	162.00	161.96	162.04	161.92	161.82	161.86
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
	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
	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
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
	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
	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
	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
	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
	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
	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
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
	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
	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
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.
   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
Groundwater Level Elevations in MW-Series and TW-Series Wells
September 30, 2002 to November 21, 2016
Tansley Quarry - Forterra Brick Ltd

Hole	Piezometer	Location		Ground Elev (m)	Stick-up (m)	Top of pipe elevation (masl)	21-Apr-03	5-May-03	16-Jun-03	14-Jul-03	31-Oct-03	12-Jan-04	5-Apr-04	15-Jul-04	15-Oct-04
		Easting (m)	Northing (m)												
MW-01	Overburden	596395	4809597	164.78	0.76	165.54	164.29	164.09	164.40	163.52	163.80	164.31	164.57	163.82	163.02
	Intermediate			164.78	0.80	165.58	164.27	164.23	164.39	163.49	163.78	164.25	164.55	163.80	162.99
	Deep			164.78	0.75	165.53	160.19	160.26	160.41	160.23	159.79	160.59	160.80	160.60	160.22
MW-02	Overburden	596248	4809618	166.58	0.78	167.36	166.35	166.31	166.23	165.65	165.93	166.10	166.29	165.88	165.27
	Intermediate			166.58	0.76	167.34	160.88	160.88	161.29	161.06	160.57	161.61	161.87	161.62	161.12
	Deep			166.58	0.74	167.32	152.73	152.77	152.70	152.72	152.89	153.02	153.09	153.15	153.01
MW-03	Overburden	596108	4809606	169.31	0.81	170.12	162.14	162.01	162.41	162.61	162.16	163.40	163.68	162.65	162.76
	Intermediate			169.31	0.75	170.06	162.15	162.28	162.36	162.47	161.61	163.28	163.71	163.02	162.63
MW-04	Overburden	595911	4809070	167.85	0.97	168.82	164.81	165.04	165.41	165.21	164.71	166.10	166.37	165.87	164.71
	Intermediate			167.85	0.94	168.79	161.80	162.03	162.37	162.00	161.71	162.72	163.17	162.69	162.12
	Deep			167.85	0.87	168.72	164.65	164.93	161.24	163.06	162.75	162.81	163.36	163.10	162.01
MW-05	Overburden	596135	4808768	166.88	0.88	167.76	160.40	160.73	162.16	161.70	160.45	161.50	163.66	161.97	160.66
	Intermediate			166.88	0.84	167.72	159.61	159.75	160.22	159.40	159.25	160.24	160.78	160.15	159.45
	Deep			166.88	0.81	167.69	132.16	132.20	132.32	132.44	132.75	132.94	133.10	133.16	133.11
	Straddle	596134	4808769	167.03	0.95	167.98									
MW-06	Overburden	596355	4808896	165.97	0.98	166.95	162.31	162.82	163.58	162.92	162.11	163.66	164.33	163.76	163.25
	Deep			165.97	0.90	166.87	162.36	162.85	163.67	162.61	161.58	163.71	164.32	163.91	162.85
	Straddle	596351	4808892	166.05	0.84	166.89									
MW-07	Overburden	596099	4809348	166.89	0.85	167.74	164.07	164.24	164.79	164.43	163.79	165.12	165.32	165.54	164.32
	Deep			166.89	0.87	167.76	152.28	152.27	152.29	152.38	152.53	152.70	152.72	152.86	152.57
MW-08	Overburden	596295	4809190	162.79	0.87	163.66	161.09	161.07	161.39	161.06	160.39	161.62	161.85	161.51	160.99
	Intermediate			162.79	0.84	163.63	160.78	160.80	161.13	160.88	160.33	161.31	161.58	161.26	160.83
	Deep			162.79	0.82	163.61	161.09	161.06	161.39	161.07	160.42	161.64	161.86	161.51	161.03
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.
   The overburden ranged from 7 m to 9 m thick in the boreholes on-site.
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Table 4
Groundwater Level Elevations in MW-Series and TW-Series Wells
September 30, 2002 to November 21, 2016
Tansley Quarry - Forterra Brick Ltd

Hole	Piezometer	Location		Ground Elev (m)	Stick-up (m)	Top of pipe	28-Jan-05	3-May-05	31-Aug-05	24-Mar-06	16-Jun-06	10-Aug-06	9-Jan-07	30-Apr-07	27-Jun-07
		Easting (m)	Northing (m)			elevation (masl)									
MW-01	Overburden	596395	4809597	164.78	0.76	165.54	164.10	164.48	165.54	164.45	163.84	163.94	165.54	164.45	163.40
	Intermediate			164.78	0.80	165.58	164.11	164.47	162.46	164.45	163.86	163.93	164.64	164.45	163.38
	Deep			164.78	0.75	165.53	160.62	160.74	159.76	160.70	160.61	160.79	160.90	161.27	160.75
MW-02	Overburden	596248	4809618	166.58	0.78	167.36	166.30	166.21	165.16	166.15	165.69	165.93	166.40	166.25	165.51
	Intermediate			166.58	0.76	167.34	161.60	161.78	160.50	161.71	161.51	161.93	162.63	162.55	162.25
	Deep			166.58	0.74	167.32	152.99	153.06	152.93	152.95	153.04	153.01	153.26	153.21	153.12
MW-03	Overburden	596108	4809606	169.31	0.81	170.12	162.64	163.17	162.05	163.06	162.08	163.68	164.37	164.01	162.36
	Intermediate			169.31	0.75	170.06	162.99	163.35	162.14	163.16	162.64	163.33	164.17	164.15	163.08
MW-04	Overburden	595911	4809070	167.85	0.97	168.82	165.72	166.39	164.56	166.14	165.80	165.95	166.77	166.45	165.10
	Intermediate			167.85	0.94	168.79	162.80	163.35	161.31	163.01	162.75	162.52	163.54	163.61	162.77
	Deep			167.85	0.87	168.72	163.42	163.97	161.98	163.20	162.95	162.81	164.15	163.69	162.81
MW-05	Overburden	596135	4808768	166.88	0.88	167.76	161.34	163.96	160.75	162.94	162.16	161.47	163.36	163.66	161.85
	Intermediate			166.88	0.84	167.72	161.73	161.05	158.41	160.45	160.19	159.79	160.90	161.07	160.23
	Deep			166.88	0.81	167.69	133.47	133.71	133.94	134.25		134.49	134.75	134.89	134.99
	Straddle	596134	4808769	167.03	0.95	167.98									
MW-06	Overburden	596355	4808896	165.97	0.98	166.95	163.13	164.29	163.27	164.32	163.80	163.63	164.58	164.34	163.97
	Deep			165.97	0.90	166.87	163.43	164.34	162.07	164.19	163.25	163.34	164.46	164.48	163.23
	Straddle	596351	4808892	166.05	0.84	166.89									
MW-07	Overburden	596099	4809348	166.89	0.85	167.74	164.95	165.21	163.91	165.08	164.75	164.96	165.63	165.38	164.39
	Deep			166.89	0.87	167.76	152.47	152.58	152.60	152.56	152.61	152.67	152.93	152.91	152.83
MW-08	Overburden	596295	4809190	162.79	0.87	163.66	161.73	161.90	160.56	162.04	161.70	161.83	162.55	162.45	161.59
	Intermediate			162.79	0.84	163.63	161.29	161.46	160.21	161.43	161.22	161.56	162.31	162.06	161.42
	Deep			162.79	0.82	163.61	161.68	161.91	160.58	162.06	161.72	161.86	162.57	162.44	161.61
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.
   The overburden ranged from 7 m to 9 m thick in the boreholes on-site.
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3. Deep wells have screen intervals at depths between 100' and 150' below ground, (30 m to 50 m).

Table 4
Groundwater Level Elevations in MW-Series and TW-Series Wells
September 30, 2002 to November 21, 2016
Tansley Quarry - Forterra Brick Ltd

Hole	Piezometer	Location		Ground Elev (m)	Stick-up (m)	Top of pipe	7-Aug-07	9-Aug-07	30-Aug-07	6-Dec-07	7-Dec-07	16-Jan-08	23-Jan-08	24-Jan-08	25-Jan-08
		Easting (m)	Northing (m)			elevation (masl)									AFTER TEST
MW-01	Overburden	596395	4809597	164.78	0.76	165.54		165.54	165.54	165.54		163.73			
	Intermediate			164.78	0.80	165.58		162.63	162.34	161.14		163.75			
	Deep			164.78	0.75	165.53		160.32	160.04	159.53		158.35			
MW-02	Overburden	596248	4809618	166.58	0.78	167.36		165.11	164.94	165.33		166.08			
	Intermediate			166.58	0.76	167.34		161.95	161.77	160.93		160.56			
	Deep			166.58	0.74	167.32		153.09	153.06	153.21		153.13			
MW-03	Overburden	596108	4809606	169.31	0.81	170.12		162.49	161.92	161.10		161.20			
	Intermediate			169.31	0.75	170.06		162.29	162.00	160.02		158.91			
MW-04	Overburden	595911	4809070	167.85	0.97	168.82		163.79	163.60	162.48		162.97			
	Intermediate			167.85	0.94	168.79		161.28	160.95	157.84		156.27			
	Deep			167.85	0.87	168.72		161.37	161.02	157.95		156.35	156.39		156.25
MW-05	Overburden	596135	4808768	166.88	0.88	167.76	160.98	160.92	160.63		159.88	159.70		159.72	
	Intermediate			166.88	0.84	167.72	160.17	159.91	159.69		153.55	150.23		149.45	
	Deep			166.88	0.81	167.69	135.69	135.06	135.13		146.46	146.38		146.32	
	Straddle	596134	4808769	167.03	0.95	167.98	160.66	160.62	160.35		158.56	157.58		157.44	157.46
MW-06	Overburden	596355	4808896	165.97	0.98	166.95	163.79	163.78	163.68	163.07		162.77		162.69	161.26
	Deep			165.97	0.90	166.87	162.07	162.05	161.70	159.37		158.96		159.20	152.91
	Straddle	596351	4808892	166.05	0.84	166.89	161.91	161.84	161.46	158.77		159.44		159.55	159.56
MW-07	Overburden	596099	4809348	166.89	0.85	167.74		163.84	163.49	161.62		161.28	161.27		161.50
	Deep			166.89	0.87	167.76		152.81	152.78		152.84	152.77	152.81		152.44
MW-08	Overburden	596295	4809190	162.79	0.87	163.66		160.96	160.60	159.56		159.21		159.15	160.11
	Intermediate			162.79	0.84	163.63		160.91	160.55	160.12		158.69	158.67		158.57
	Deep			162.79	0.82	163.61		160.99	160.63	159.63		159.17	159.20		157.65
MW-09	Overburden	596166	4809014	165.53	0.76	166.29	163.42	163.31	162.70	160.50		160.04	159.97		159.94
	Straddle	596166	4809014		0.82	166.35	161.86	161.83	161.43	156.77		154.32	154.38	154.35	154.44
	Deep	596164	4809012		1.06	166.59	125.54	125.38	125.44	125.53		125.54	125.51		151.51
MW-10	Overburden	596045	4809002	166.77	0.88	167.65	163.88	163.79	163.16	160.89		160.22	160.17		160.42
	Intermediate	596045	4809002		0.94	167.71	162.36	162.31	161.91	159.06		157.81	157.85		157.55
	Deep	596046	4809003		0.83	167.60	125.09	124.88	125.03	125.25		125.30	125.30		158.38
MW-11	Overburden	595869	4808946	168.31	1.01	169.32	163.42	163.37	163.14		162.41	163.03		163.44	163.47
	Straddle	595870	4808946		1.04	169.35	163.58	163.58	163.61		162.48	163.20		163.42	163.43
	Deep	595871	4808948		1.12	169.42	126.30	125.19	125.32		125.51	125.58		125.55	153.89
TW-1		595581	4808946	167.64	0.88	168.52						162.58			
TW-2		595621	4810361	176.33	0.82	177.15						Dry			
TW-3		596411	4810003	166.85	0.70	167.55						155.11			

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
Groundwater Level Elevations in MW-Series and TW-Series Wells
September 30, 2002 to November 21, 2016
Tansley Quarry - Forterra Brick Ltd

Hole	Piezometer	Location		Ground Elev (m)	Stick-up (m)	Top of pipe elevation (masl)	31-Jan-08	26-Feb-08	28-Mar-08	24-Apr-08	26-May-08	26-Jun-08	28-Jul-08	27-Aug-08	29-Sep-08
		Easting (m)	Northing (m)												
MW-01	Overburden	596395	4809597	164.78	0.76	165.54	163.48	164.40	164.46	164.10	164.00	163.99	164.25	164.11	163.99
	Intermediate			164.78	0.80	165.58	163.50	164.42	164.45	164.10	164.01	164.02	164.24	164.11	164.00
	Deep			164.78	0.75	165.53	158.19	158.27	158.32	158.43	158.42	158.27	158.39	158.63	158.75
MW-02	Overburden	596248	4809618	166.58	0.78	167.36	165.85	166.19	166.38	166.12	166.06	165.98	166.22	166.15	166.06
	Intermediate			166.58	0.76	167.34	160.42	160.25	160.15	160.13	160.12	160.03	159.96	159.96	160.07
	Deep			166.58	0.74	167.32	153.06	153.05	152.96	152.88	152.90	152.81	152.81	152.74	152.73
MW-03	Overburden	596108	4809606	169.31	0.81	170.12	161.17	161.86	161.81	162.05	160.92	160.60	159.88	161.12	162.90
	Intermediate			169.31	0.75	170.06	158.88	159.30	159.49	159.81	159.82	159.46	159.41	159.74	160.44
MW-04	Overburden	595911	4809070	167.85	0.97	168.82	163.19	163.88	164.48	164.65	164.64	164.50	164.55	164.97	164.97
	Intermediate			167.85	0.94	168.79	156.10	156.52	156.84	157.17	157.23	156.91	157.07	157.54	157.89
	Deep			167.85	0.87	168.72	156.16	156.81	156.96	157.27	157.29	157.04	157.14	157.70	158.10
MW-05	Overburden	596135	4808768	166.88	0.88	167.76	159.69	159.82	160.36	161.93	161.32	160.58	160.17	160.61	160.42
	Intermediate			166.88	0.84	167.72	149.40	150.21	149.40	149.60	149.88	149.16	149.64	150.00	150.29
	Deep			166.88	0.81	167.69	146.31	146.34	146.31	146.29	146.28	146.27	146.23	146.20	146.19
	Straddle	596134	4808769	167.03	0.95	167.98	157.36	157.72	158.23	159.06	158.58	157.80	157.52	158.03	157.92
MW-06	Overburden	596355	4808896	165.97	0.98	166.95	161.24	161.17	161.09	161.03	160.95	160.90	160.82	160.75	160.71
	Deep			165.97	0.90	166.87	152.63	151.60	150.65	149.95	149.17	148.65	148.28	148.17	148.22
	Straddle	596351	4808892	166.05	0.84	166.89	159.56	159.52	159.54	159.97	159.86	159.54	159.52	160.00	159.81
MW-07	Overburden	596099	4809348	166.89	0.85	167.74	161.45	162.09	162.92	163.33	163.42	163.13	163.11	163.88	164.01
	Deep			166.89	0.87	167.76	152.38	152.60	152.45	152.28	152.35	152.29	152.27	152.18	152.19
MW-08	Overburden	596295	4809190	162.79	0.87	163.66	159.01	159.00	159.23	159.36	159.33	159.26	159.39	159.65	159.74
	Intermediate			162.79	0.84	163.63	158.51	158.73	158.83	158.96	158.95	158.81	159.01	159.28	159.41
	Deep			162.79	0.82	163.61	158.97	159.02	159.21	159.34	159.30	159.22	159.38	159.63	159.74
MW-09	Overburden	596166	4809014	165.53	0.76	166.29	159.81	159.96	161.40	162.54	162.80	162.27	162.26	163.54	162.88
	Straddle	596166	4809014		0.82	166.35	154.31	154.76	154.91	155.01	155.02	154.90	155.19	155.63	155.82
	Deep	596164	4809012		1.06	166.59	151.33	151.18	151.00	150.93	150.85	150.78	150.72	150.63	150.57
MW-10	Overburden	596045	4809002	166.77	0.88	167.65	160.20	160.68	162.86	164.21	164.33	163.62	163.62	164.65	164.15
	Intermediate	596045	4809002		0.94	167.71	157.55	157.99	159.15	160.02	160.31	159.82	159.97	161.01	161.07
	Deep	596046	4809003		0.83	167.60	156.90	155.94	155.43	155.10	154.82	154.59	154.37	154.17	153.99
MW-11	Overburden	595869	4808946	168.31	1.01	169.32	163.37	164.25	164.84	164.99	164.66	164.37	164.68	165.03	164.72
	Straddle	595870	4808946		1.04	169.35	163.28	164.05	164.63	164.81	164.46	164.45	164.48	164.80	164.78
	Deep	595871	4808948		1.12	169.42	153.67	151.94	151.75	151.68	151.64	151.58	151.53	151.48	151.45
TW-1		595581	4808946	167.64	0.88	168.52		163.77	164.12	164.26	163.77	163.26	163.84	164.52	164.10
TW-2		595621	4810361	176.33	0.82	177.15		Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
TW-3		596411	4810003	166.85	0.70	167.55		155.95	156.09	155.14	155.09	155.28	154.67	154.70	154.73

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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Table 4
Groundwater Level Elevations in MW-Series and TW-Series Wells
September 30, 2002 to November 21, 2016
Tansley Quarry - Forterra Brick Ltd

Hole	Piezometer	Location		Ground Elev (m)	Stick-up (m)	Top of pipe	7-Oct-08	28-Oct-08	21-Nov-08	23-Dec-08	21-Jan-09	27-Apr-09	24-Jul-09	26-Oct-09	30-Nov-09
		Easting (m)	Northing (m)			elevation (masl)									
MW-01	Overburden	596395	4809597	164.78	0.76	165.54	164.17	164.33	164.38	164.44	164.46	164.59	163.95	164.29	164.36
	Intermediate			164.78	0.80	165.58	164.18	164.27	164.39	164.45	164.46	164.58	163.95	164.29	164.35
	Deep			164.78	0.75	165.53	158.77	158.81	158.86	159.19	159.27	159.49	158.84	158.91	159.02
MW-02	Overburden	596248	4809618	166.58	0.78	167.36	166.09	165.96	166.15	166.43	166.13	166.38	165.77	165.87	165.95
	Intermediate			166.58	0.76	167.34	160.11	160.63	160.79	161.15	161.35	161.70	160.82	160.93	161.07
	Deep			166.58	0.74	167.32	152.73	152.52	152.55	152.59	152.66	152.69	152.75	152.62	152.64
MW-03	Overburden	596108	4809606	169.31	0.81	170.12	163.00	162.75	162.90	163.35	163.82	164.78	163.95	163.86	164.81
	Intermediate			169.31	0.75	170.06	160.50	160.50	160.56	160.98	161.36	161.66	160.52	160.27	160.24
MW-04	Overburden	595911	4809070	167.85	0.97	168.82	164.71	164.68	164.63	165.16	165.37	165.96	164.72	164.60	164.78
	Intermediate			167.85	0.94	168.79	157.92	157.95	157.96	158.43	158.88	159.02	157.56	157.24	157.17
	Deep			167.85	0.87	168.72	157.95	132.85	133.12	133.43	133.80	144.65	151.33	151.83	151.94
MW-05	Overburden	596135	4808768	166.88	0.88	167.76	160.34	159.91	159.89	160.09	160.78	162.47	160.57	159.82	159.63
	Intermediate			166.88	0.84	167.72	150.16	150.21	149.99	150.39	150.99	150.39	147.96	147.89	147.80
	Deep			166.88	0.81	167.69	146.17	133.08	133.13	133.18	133.33	133.49	133.70	133.81	133.88
	Straddle	596134	4808769	167.03	0.95	167.98	157.86	157.75	157.67	158.17	158.93	160.31	158.69	158.25	158.13
MW-06	Overburden	596355	4808896	165.97	0.98	166.95	160.69	159.56	159.46	160.02	160.08	160.52	159.64	159.37	159.36
	Deep			165.97	0.90	166.87	148.24	152.06	152.94	152.05	151.56	160.60	159.21	159.34	159.19
	Straddle	596351	4808892	166.05	0.84	166.89	159.76	159.65	159.59	160.12	160.18	158.22	159.74	159.46	159.33
MW-07	Overburden	596099	4809348	166.89	0.85	167.74	163.97	164.14	164.13	164.55	164.59	164.84	163.87	163.92	164.03
	Deep			166.89	0.87	167.76	152.08	151.90	151.91	151.89	152.06	152.03	152.06	151.95	152.05
MW-08	Overburden	596295	4809190	162.79	0.87	163.66	159.77	159.85	159.94	160.28	160.40	160.72		160.13	160.22
	Intermediate			162.79	0.84	163.63	159.42	159.45	159.50	159.77	159.94	160.19		159.56	159.71
	Deep			162.79	0.82	163.61	159.77	159.83	159.94	160.28	160.39	160.71		160.06	160.15
MW-09	Overburden	596166	4809014	165.53	0.76	166.29	162.63	162.40	162.16	163.89	164.14	164.64	162.43	154.69	161.18
	Straddle	596166	4809014		0.82	166.35	155.81	155.89	155.77	156.10	156.40	156.30	155.08	161.29	154.77
	Deep	596164	4809012		1.06	166.59	150.53	127.40	127.44	127.45	127.61	127.86	128.19	128.48	128.65
MW-10	Overburden	596045	4809002	166.77	0.88	167.65	163.90	163.56	163.34	164.93	165.45	166.25	163.53	162.53	162.62
	Intermediate	596045	4809002		0.94	167.71	161.02	160.40	160.40	161.42	161.84	162.01	159.90	159.21	159.16
	Deep	596046	4809003		0.83	167.60	154.03	133.52	133.73	133.96	134.20	134.89	135.58	136.00	136.17
MW-11	Overburden	595869	4808946	168.31	1.01	169.32	164.61	164.33	164.48	165.21	165.21	166.06	164.15	163.99	164.04
	Straddle	595870	4808946		1.04	169.35	164.61	164.39	164.47	165.08	165.18	165.95	164.40	164.19	164.32
	Deep	595871	4808948		1.12	169.42	151.39	132.63	132.70	132.82	133.04	133.51	134.11	134.60	134.81
TW-1		595581	4808946	167.64	0.88	168.52		163.69	163.86	164.71	164.69	165.38	168.52	163.89	
TW-2		595621	4810361	176.33	0.82	177.15		Dry	Dry	Dry	Dry	Dry	Dry	Dry	
TW-3		596411	4810003	166.85	0.70	167.55		155.66	162.98	156.66	156.83	156.55	167.55	155.91	

Notes:
1. Shallow wells have screened intervals no deeper than 30' (9 m) below ground, completed in overburden.
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Table 4
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September 30, 2002 to November 21, 2016
Tansley Quarry - Forterra Brick Ltd

Hole	Piezometer	Location		Ground Elev (m)	Stick-up (m)	Top of pipe	26-Jan-10	5-Mar-10	12-Mar-10	25-Mar-10	26-Apr-10	19-May-10	28-Jun-10	27-Jul-10	31-Aug-10
		Easting (m)	Northing (m)			elevation (masl)									
MW-01	Overburden	596395	4809597	164.78	0.76	165.54	164.46			164.49				164.33	
	Intermediate			164.78	0.80	165.58	164.45			164.50				164.31	
	Deep			164.78	0.75	165.53	159.22			159.30				159.17	
MW-02	Overburden	596248	4809618	166.58	0.78	167.36	166.26			166.31			166.18	166.13	
	Intermediate			166.58	0.76	167.34	161.03			161.12			161.04	160.91	
	Deep			166.58	0.74	167.32	152.64			152.62			152.69	152.66	
MW-03	Overburden	596108	4809606	169.31	0.81	170.12	164.01			163.98				163.97	
	Intermediate			169.31	0.75	170.06	160.37			160.28				160.26	
MW-04	Overburden	595911	4809070	167.85	0.97	168.82	165.20	164.86		165.73	165.81	165.68	165.46	165.09	164.77
	Intermediate			167.85	0.94	168.79	157.20	157.00		157.20	157.37	157.30	157.27	157.12	157.02
	Deep			167.85	0.87	168.72	125.84	126.01		126.06	126.15	126.27	126.35	126.52	126.88
MW-05	Overburden	596135	4808768	166.88	0.88	167.76	159.77	159.62		159.97	160.64	160.72	160.60	160.36	160.07
	Intermediate			166.88	0.84	167.72	147.85	147.73		147.80	147.72	147.66	147.59	147.55	147.44
	Deep			166.88	0.81	167.69	127.03	127.06	127.07	127.08	127.12	127.14	127.17	127.16	127.19
	Straddle	596134	4808769	167.03	0.95	167.98	158.08	157.82	157.87	158.21	158.64	158.59	158.46	158.27	157.98
MW-06	Overburden	596355	4808896	165.97	0.98	166.95	159.76		159.73					159.87	
	Deep			165.97	0.90	166.87	138.83		138.95					139.17	
	Straddle	596351	4808892	166.05	0.84	166.89	159.83		159.87					159.77	
MW-07	Overburden	596099	4809348	166.89	0.85	167.74	164.26			164.56				164.03	
	Deep			166.89	0.87	167.76	152.06			152.01				151.96	
MW-08	Overburden	596295	4809190	162.79	0.87	163.66	161.15			161.38				162.06	
	Intermediate			162.79	0.84	163.63	159.85			160.00				159.79	
	Deep			162.79	0.82	163.61	161.10			161.40				162.06	
MW-09	Overburden	596166	4809014	165.53	0.76	166.29	161.95			163.35				162.50	
	Straddle	596166	4809014		0.82	166.35	154.92			155.09				155.12	
	Deep	596164	4809012		1.06	166.59	126.24			126.32				126.55	
MW-10	Overburden	596045	4809002	166.77	0.88	167.65	163.34			164.70				163.96	
	Intermediate	596045	4809002		0.94	167.71	159.06			159.73				159.49	
	Deep	596046	4809003		0.83	167.60	124.93			125.17				125.86	
MW-11	Overburden	595869	4808946	168.31	1.01	169.32	164.53	164.13			165.47	165.25	164.99	164.59	163.99
	Straddle	595870	4808946		1.04	169.35	164.73	164.38			165.38	165.18	164.89	164.56	164.20
	Deep	595871	4808948		1.12	169.42	136.59	136.71			137.11	137.16	137.42	137.51	137.70
TW-1		595581	4808946	167.64	0.88	168.52	164.38			165.19				164.39	
TW-2		595621	4810361	176.33	0.82	177.15	Dry			Dry				Dry	
TW-3		596411	4810003	166.85	0.70	167.55	156.83			156.53				155.10	

Notes:
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   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 21, 2016
Tansley Quarry - Forterra Brick Ltd

Hole	Piezometer	Location		Ground Elev (m)	Stick-up (m)	Top of pipe elevation (masl)	30-Sep-10	18-Oct-10	1-Dec-10	23-Dec-10	26-Jan-11	24-Feb-11	21-Mar-11	18-Apr-11	19-May-11
		Easting (m)	Northing (m)												
MW-01	Overburden	596395	4809597	164.78	0.76	165.54		164.37			164.23			164.58	
	Intermediate			164.78	0.80	165.58		164.37			164.23			164.60	
	Deep			164.78	0.75	165.53		159.16			159.46			159.77	
MW-02	Overburden	596248	4809618	166.58	0.78	167.36		166.12			165.83			166.37	
	Intermediate			166.58	0.76	167.34		160.97			161.20			161.62	
	Deep			166.58	0.74	167.32		153.03			154.25			156.43	
MW-03	Overburden	596108	4809606	169.31	0.81	170.12		163.88			164.31			164.71	
	Intermediate			169.31	0.75	170.06		160.19			160.51			160.92	
MW-04	Overburden	595911	4809070	167.85	0.97	168.82	164.64	164.93	165.54	165.37	165.23	165.28	165.80	165.95	166.22
	Intermediate			167.85	0.94	168.79	156.98	157.08	157.30	157.41	157.42	157.41	157.65	157.92	158.20
	Deep			167.85	0.87	168.72	126.96	127.01	123.88	123.93	124.07	124.15	124.21	124.31	124.40
MW-05	Overburden	596135	4808768	166.88	0.88	167.76	159.83	159.85	159.85	159.96	159.88	159.79	160.34	161.04	162.63
	Intermediate			166.88	0.84	167.72	147.36	147.46	147.44	147.45	147.46	147.47	147.60	147.66	147.85
	Deep			166.88	0.81	167.69	127.24	127.21	127.24	127.26	127.29	127.32	127.34	127.37	127.38
	Straddle	596134	4808769	167.03	0.95	167.98	157.81	157.89	157.86	157.83	157.72	157.70	158.20	158.60	159.69
MW-06	Overburden	596355	4808896	165.97	0.98	166.95		159.36			159.55			160.32	
	Deep			165.97	0.90	166.87		139.30			137.40			137.49	
	Straddle	596351	4808892	166.05	0.84	166.89		159.17			159.66			160.43	
MW-07	Overburden	596099	4809348	166.89	0.85	167.74		164.10			164.15	164.27		164.76	
	Deep			166.89	0.87	167.76		152.00			152.60	152.92		154.03	
MW-08	Overburden	596295	4809190	162.79	0.87	163.66		161.94			161.70			162.30	
	Intermediate			162.79	0.84	163.63		159.83			160.08			160.47	
	Deep			162.79	0.82	163.61		161.95			161.69			162.28	
MW-09	Overburden	596166	4809014	165.53	0.76	166.29		161.21			162.84			164.57	
	Straddle	596166	4809014		0.82	166.35		155.14			155.47			155.91	
	Deep	596164	4809012		1.06	166.59		126.67			126.84			126.97	
MW-10	Overburden	596045	4809002	166.77	0.88	167.65		163.02			164.19			166.34	
	Intermediate	596045	4809002		0.94	167.71		159.29			159.91			161.31	
	Deep	596046	4809003		0.83	167.60		126.30			127.17			127.90	
MW-11	Overburden	595869	4808946	168.31	1.01	169.32	163.79	164.35	165.16	165.00	164.72	164.86	165.64	165.94	166.33
	Straddle	595870	4808946		1.04	169.35	164.12	164.48	165.23	164.91	164.70	164.71	165.32	165.50	165.75
	Deep	595871	4808948		1.12	169.42	137.90	137.96	129.45	129.51	129.62	129.74	129.82	129.92	130.03
TW-1		595581	4808946	167.64	0.88	168.52		164.50			164.27			165.55	
TW-2		595621	4810361	176.33	0.82	177.15		Dry			Dry			Dry	
TW-3		596411	4810003	166.85	0.70	167.55		155.71			156.69			157.15	

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
Groundwater Level Elevations in MW-Series and TW-Series Wells
September 30, 2002 to November 21, 2016
Tansley Quarry - Forterra Brick Ltd

Hole	Piezometer	Location		Ground Elev (m)	Stick-up (m)	Top of pipe elevation (masl)	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	27-Jan-12
		Easting (m)	Northing (m)												
MW-01	Overburden	596395	4809597	164.78	0.76	165.54		163.47		Dry				164.52	164.62
	Intermediate			164.78	0.80	165.58		163.48		162.86				164.53	164.635
	Deep			164.78	0.75	165.53		159.44		159.14				160.02	160.115
MW-02	Overburden	596248	4809618	166.58	0.78	167.36		165.76		165.48		166.10		166.40	166.435
	Intermediate			166.58	0.76	167.34		161.21		160.82		161.35		161.76	161.845
	Deep			166.58	0.74	167.32		158.40		158.19		158.63		159.02	159.185
MW-03	Overburden	596108	4809606	169.31	0.81	170.12		164.48		163.96		164.40		164.81	165.078
	Intermediate			169.31	0.75	170.06		160.82		160.43		160.72		161.09	161.31
MW-04	Overburden	595911	4809070	167.85	0.97	168.82	165.92	165.59		164.74	165.47	165.72	165.75	166.25	166.29
	Intermediate			167.85	0.94	168.79	158.16	157.68		157.46	157.77	157.71	157.97	158.32	158.48
	Deep			167.85	0.87	168.72	124.51	124.63		124.77	124.88	124.94	124.06	119.17	124.25
MW-05	Overburden	596135	4808768	166.88	0.88	167.76	162.10	161.22	160.54	160.24	160.15	160.19	160.13	160.49	160.69
	Intermediate			166.88	0.84	167.72	147.69	147.49	147.55	147.44	147.47	147.35	147.49	147.56	147.54
	Deep			166.88	0.81	167.69	127.40	127.41	127.45	127.46	127.46	127.47	126.11	126.15	126.18
	Straddle	596134	4808769	167.03	0.95	167.98	159.15	158.49	158.14	157.96	158.09	158.06	158.22	158.59	158.4671
MW-06	Overburden	596355	4808896	165.97	0.98	166.95		159.97		159.36		159.27		159.98	
	Deep			165.97	0.90	166.87		137.60		137.67		137.73	137.10	137.18	
	Straddle	596351	4808892	166.05	0.84	166.89		160.06		159.41		159.34		160.09	
MW-07	Overburden	596099	4809348	166.89	0.85	167.74		164.17		163.63		164.50		165.01	
	Deep			166.89	0.87	167.76		156.74		156.71		157.01		156.95	
MW-08	Overburden	596295	4809190	162.79	0.87	163.66		162.30		162.17		162.36		163.17	
	Intermediate			162.79	0.84	163.63		160.11		159.74		160.29		160.74	
	Deep			162.79	0.82	163.61		162.32		162.17		162.35		159.66	
MW-09	Overburden	596166	4809014	165.53	0.76	166.29		163.19		161.59		161.24		163.06	
	Straddle	596166	4809014		0.82	166.35		155.74		155.50		155.75		156.22	
	Deep	596164	4809012		1.06	166.59		127.14		127.26		127.56		126.58	
MW-10	Overburden	596045	4809002	166.77	0.88	167.65		164.59		162.91		163.29		164.90	
	Intermediate	596045	4809002		0.94	167.71		160.68		160.08		160.50		161.57	
	Deep	596046	4809003		0.83	167.60		129.13		130.06		131.10		129.32	
MW-11	Overburden	595869	4808946	168.31	1.01	169.32		164.64		163.97	164.59	164.96	165.07	165.98	166
	Straddle	595870	4808946		1.04	169.35		164.98		164.00	164.90	165.09	165.18	165.73	165.814
	Deep	595871	4808948		1.12	169.42	130.24	129.51		130.92	131.20	131.45	128.90	129.01	129.197
TW-1		595581	4808946	167.64	0.88	168.52		164.52		163.72				165.54	
TW-2		595621	4810361	176.33	0.82	177.15		Dry		Dry				Dry	
TW-3		596411	4810003	166.85	0.70	167.55		154.52		155.32				156.79	

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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Table 4
Groundwater Level Elevations in MW-Series and TW-Series Wells
September 30, 2002 to November 21, 2016
Tansley Quarry - Forterra Brick Ltd

Hole	Piezometer	Location		Ground Elev (m)	Stick-up (m)	Top of pipe	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	164.49	164.46	164.17	163.88	163.69	162.9	164.25	
	Intermediate			164.78	0.80	165.58	164.495	164.465	164.175	163.895	163.695	162.905	164.265	
	Deep			164.78	0.75	165.53	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	166.33	166.32	166.095		165.81	165.355	165.935	
	Intermediate			166.58	0.76	167.34	161.9	161.89	161.685		161.34	160.86	161.15	
	Deep			166.58	0.74	167.32	159.25	159.23	159.11		158.88	158.46	158.655	
MW-03	Overburden	596108	4809606	169.31	0.81	170.12	165.198	165.258	165.088		164.688	164.078	164.073	
	Intermediate			169.31	0.75	170.06	161.51	161.47	161.16		161.09	160.54	160.56	
MW-04	Overburden	595911	4809070	167.85	0.97	168.82	166.3	166.255	165.89	165.6	165.56	164.37	164.87	
	Intermediate			167.85	0.94	168.79	158.56	158.605	158.16	158.05	158.29	157.685	157.81	
	Deep			167.85	0.87	168.72	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	161	161.23	160.975		160.37	159.62	159.58	
	Intermediate			166.88	0.84	167.72	147.565	147.565	147.455		147.53	147.355	147.55	
	Deep			166.88	0.81	167.69	126.18	126.21	126.25		126.28	126.33	126.37	
	Straddle	596134	4808769	167.03	0.95	167.98	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	165.89	165.88	165.32		164.63	163.205	163.695	
	Straddle	595870	4808946		1.04	169.35	165.709	165.749	165.319		165.019	163.604	164.279	
	Deep	595871	4808948		1.12	169.42	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:
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Table 4
Groundwater Level Elevations in MW-Series and TW-Series Wells
September 30, 2002 to November 21, 2016
Tansley Quarry - Forterra 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	20-Mar-14	11-Apr-14	3-Jul-14	29-Sep-14
		Easting (m)	Northing (m)											
MW-01	Overburden	596395	4809597	164.78	0.76	165.54	164.5	163.91	164.01	164.44	Frozen	164.55	163.72	163.74
	Intermediate			164.78	0.80	165.58	164.51	163.92	164.04	164.45	Frozen	164.55	163.75	163.76
	Deep			164.78	0.75	165.53	160.19	160.09	159.74	159.96	160.16		160.11	159.67
MW-02	Overburden	596248	4809618	166.58	0.78	167.36	166.3	166.01	165.77	166.02	Frozen	166.37	165.82	165.61
	Intermediate			166.58	0.76	167.34	162.1	161.83	161.42	161.7	161.83		161.73	161.54
	Deep			166.58	0.74	167.32	158.86	158.02	157.09	156.7	156.3		155.99	155.67
MW-03	Overburden	596108	4809606	169.31	0.81	170.12	165.22	165.22	164.82	165.09	165.23		165.39	165.05
	Intermediate			169.31	0.75	170.06	161.6	161.74	161.27	161.51	161.75		161.7	161.69
MW-04	Overburden	595911	4809070	167.85	0.97	168.82	166.12	166.32	165.6	166.11	166.49		166.33	166.02
	Intermediate			167.85	0.94	168.79	158.94	159.02	158.55	158.84	159.1		158.79	159.06
	Deep			167.85	0.87	168.72	129.54	130.06	130.52	130.82	129.27		129.72	130.25
MW-05	Overburden	596135	4808768	166.88	0.88	167.76	160.97	161.29	160.2	160.1	160.43		161.49	160.51
	Intermediate			166.88	0.84	167.72	147.98	148.15	148.21	148.24	148.39		148.18	148.52
	Deep			166.88	0.81	167.69	125.65	125.7	125.76	125.78	125.87		125.94	126.01
	Straddle	596134	4808769	167.03	0.95	167.98	158.84	158.84	158.22	158.34	158.84		159.14	158.62
MW-06	Overburden	596355	4808896	165.97	0.98	166.95	160.52	160.16	159.54	159.11	160.34		160.13	159.59
	Deep			165.97	0.90	166.87	137.53	137.71	137.89	138	138.22		138.41	137.98
	Straddle	596351	4808892	166.05	0.84	166.89	160.64	159.93	159.31	159.23	160.46		160.07	159.72
MW-07	Overburden	596099	4809348	166.89	0.85	167.74	165.17	164.88	164.1	164.61	165.07		164.75	164.31
	Deep			166.89	0.87	167.76	156.81	156.23	155.41	155.19	154.63		154.42	154.17
MW-08	Overburden	596295	4809190	162.79	0.87	163.66	163.19	163.12	162.8	163.16	162.81		162.52	162.35
	Intermediate			162.79	0.84	163.63	160.9	160.77	160.36	160.67	160.82		160.73	160.61
	Deep			162.79	0.82	163.61	161.27	161.12	160.7	161.22	162.78		162.49	162.29
MW-09	Overburden	596166	4809014	165.53	0.76	166.29	164.2	164.1	162.17	161.89	164.09		163.89	162.64
	Straddle	596166	4809014		0.82	166.35	156.65	156.65	156.23	156.41	156.64		156.47	156.48
	Deep	596164	4809012		1.06	166.59	126.8	127.09	127.46	127.93	127.1		127.97	128.79
MW-10	Overburden	596045	4809002	166.77	0.88	167.65	166.12	165.58	163.53	163.42	165.88		165.35	164.11
	Intermediate	596045	4809002		0.94	167.71	163.35	163.18	161.84	161.83	163.39		162.84	162.25
	Deep	596046	4809003		0.83	167.60	134.84	137.43	139.39	140.62	139.55		141.3	142.61
MW-11	Overburden	595869	4808946	168.31	1.01	169.32	165.5	165.83	164.13	164.65	165.45		165.13	164.66
	Straddle	595870	4808946		1.04	169.35	165.43	165.3	164.98	165.52	165.84		165.92	165.37
	Deep	595871	4808948		1.12	169.42	131.51	133.23	134.58	135.63	135.34		137.23	138.74
TW-1		595581	4808946	167.64	0.88	168.52	165.61		164.16	165.01	165.42		165.1	164.68
TW-2		595621	4810361	176.33	0.82	177.15	Dry		Dry	Dry	Dry		Dry	Dry
TW-3		596411	4810003	166.85	0.70	167.55	157.46		156.68	157.51	157.47		156.98	156.85

Notes:
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Table 4
Groundwater Level Elevations in MW-Series and TW-Series Wells
September 30, 2002 to November 21, 2016
Tansley Quarry - Forterra Brick Ltd

Hole	Piezometer	Location		Ground Elev (m)	Stick-up (m)	Top of pipe	17-Nov-14	2-Apr-15	25-Jun-15	24-Sep-15	16-Nov-15	18-Mar-16	20-Jun-16	5-Oct-16
		Easting (m)	Northing (m)			elevation (masl)								
MW-01	Overburden	596395	4809597	164.78	0.76	165.54	163.68	164.5	163.79	162.72	163.34	164.54	164	
	Intermediate			164.78	0.80	165.58	163.71	164.52	163.82	162.73	163.36	164.55	162.33	
	Deep			164.78	0.75	165.53	159.94	159.71	159.7	159.37	159.39	159.99	159.82	
MW-02	Overburden	596248	4809618	166.58	0.78	167.36	165.54	166.01	165.86	165.2	164.51	166.36	165.76	165.2
	Intermediate			166.58	0.76	167.34	161.5	161.42	161.31	160.87	160.91	161.63	161.37	160.62
	Deep			166.58	0.74	167.32	155.65	155.25	155.75	155.58	155.35	155.45	155.28	155.38
MW-03	Overburden	596108	4809606	169.31	0.81	170.12	165.02	164.85	165.01	164.63	164.68	165.15	165.24	164.28
	Intermediate			169.31	0.75	170.06	161.67	161.53	161.7	161.39	161.34	161.8	162	161.2
MW-04	Overburden	595911	4809070	167.85	0.97	168.82	165.81	166.04	166.04	165.27	165.24	166.49	166.19	165.3
	Intermediate			167.85	0.94	168.79	159	158.91	159.07	158.6	158.76	159.28	159.31	158.42
	Deep			167.85	0.87	168.72	130.55	162.06	162.5	162.1	161.76	150.49	151.64	152.52
MW-05	Overburden	596135	4808768	166.88	0.88	167.76	160.16	159.89	160.22	159.69	159.5	159.98	161	159.79
	Intermediate			166.88	0.84	167.72	148.48	148.44	148.47	148.21	148.49	148.6	148.61	148.3
	Deep			166.88	0.81	167.69	126.02	126.12	126.17	126.22	126.25	126.32	126.44	126.45
	Straddle	596134	4808769	167.03	0.95	167.98	158.43	158.61	158.71	158.15	158.13	158.78	159.12	158.22
MW-06	Overburden	596355	4808896	165.97	0.98	166.95	159.35	159.35	159.73	159.19	158.87	160.1	160.26	159.11
	Deep			165.97	0.90	166.87	138.62	138.84	138.95	139.05	139.11	139.2	139.3	139.37
	Straddle	596351	4808892	166.05	0.84	166.89	159.47	159.47	159.84	159.31	159	160.21	160.02	159.24
MW-07	Overburden	596099	4809348	166.89	0.85	167.74	164.11	164.53	164.44	163.75	163.5	165.03	164.63	163.46
	Deep			166.89	0.87	167.76	154.18	153.77	153.89	153.85	153.73	153.61	153.54	153.27
MW-08	Overburden	596295	4809190	162.79	0.87	163.66	162.45	161.95	162.03	161.38	161.39	161.81	162.12	161.55
	Intermediate			162.79	0.84	163.63	160.58	160.36	160.32	159.96	160	160.68	160.39	159.72
	Deep			162.79	0.82	163.61	162.42	161.89	161.97	161.32	161.33	161.75	162.1	161.48
MW-09	Overburden	596166	4809014	165.53	0.76	166.29	162.11	160.56	160.72	160.45	160.7	162.88	161.57	160.26
	Straddle	596166	4809014		0.82	166.35	156.41	155.36	155.29	154.96	155.04	155.42	155.02	154.27
	Deep	596164	4809012		1.06	166.59	129.26	127.32	128.14	128.95	129.44	128.5	129.57	130.68
MW-10	Overburden	596045	4809002	166.77	0.88	167.65	163.47	163.56	164.54	164.32	164.87	166.59	165.43	164.05
	Intermediate	596045	4809002		0.94	167.71	161.82	161.68	162.05	161.79	162.14	163.76	162.86	161.85
	Deep	596046	4809003		0.83	167.60	143.25	140.65	141.38	142.03	142.35	139.62	140.5	141.13
MW-11	Overburden	595869	4808946	168.31	1.01	169.32	164.39	164.72	164.72	163.54	163.47	165.4	164.63	164.12
	Straddle	595870	4808946		1.04	169.35	165.14	165.38	165.4	164.4	164.38	165.91	165.36	164.35
	Deep	595871	4808948		1.12	169.42	139.56	138.55	139.9	141.17	141.87	140.41	141.89	143.18
TW-1		595581	4808946	167.64	0.88	168.52	164.32	164.96	164.81	163.81	163.75	165.34	164.74	163.52
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	157.15	156.72	156.81	156.72	156.9	157.77	157.01	155.44

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
Groundwater Level Elevations in MW-Series and TW-Series Wells
September 30, 2002 to November 21, 2016
Tansley Quarry - Forterra Brick Ltd

Hole	Piezometer	Location		Ground Elev (m)	Stick-up (m)	Top of pipe elevation (masl)	6-Oct-16	21-Nov-16
		Easting (m)	Northing (m)					
MW-01	Overburden	596395	4809597	164.78	0.76	165.54		
	Intermediate			164.78	0.80	165.58	162.01	161.59
	Deep			164.78	0.75	165.53	159.19	159.07
MW-02	Overburden	596248	4809618	166.58	0.78	167.36		165.11
	Intermediate			166.58	0.76	167.34		160.63
	Deep			166.58	0.74	167.32		155.43
MW-03	Overburden	596108	4809606	169.31	0.81	170.12		164
	Intermediate			169.31	0.75	170.06		161.09
MW-04	Overburden	595911	4809070	167.85	0.97	168.82		165.18
	Intermediate			167.85	0.94	168.79		158.42
	Deep			167.85	0.87	168.72		152.85
MW-05	Overburden	596135	4808768	166.88	0.88	167.76		159.56
	Intermediate			166.88	0.84	167.72		148.29
	Deep			166.88	0.81	167.69		126.48
	Straddle	596134	4808769	167.03	0.95	167.98		158.13
MW-06	Overburden	596355	4808896	165.97	0.98	166.95		158.83
	Deep			165.97	0.90	166.87		139.38
	Straddle	596351	4808892	166.05	0.84	166.89		158.97
MW-07	Overburden	596099	4809348	166.89	0.85	167.74		163.13
	Deep			166.89	0.87	167.76		153.45
MW-08	Overburden	596295	4809190	162.79	0.87	163.66		161.55
	Intermediate			162.79	0.84	163.63		159.76
	Deep			162.79	0.82	163.61		161.53
MW-09	Overburden	596166	4809014	165.53	0.76	166.29		160.29
	Straddle	596166	4809014		0.82	166.35		162.48
	Deep	596164	4809012		1.06	166.59		131.19
MW-10	Overburden	596045	4809002	166.77	0.88	167.65		163.81
	Intermediate	596045	4809002		0.94	167.71		161.77
	Deep	596046	4809003		0.83	167.60		141.39
MW-11	Overburden	595869	4808946	168.31	1.01	169.32		163.37
	Straddle	595870	4808946		1.04	169.35		164.24
	Deep	595871	4808948		1.12	169.42		143.68
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. 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 5
Summary of 2016 Groundwater Quality Exeedances of ODWS
MW-Series Monitoring Wells
Tansley Quarry - Forterra Brick Ltd.

Parameter	Aluminum	Alkalinity	Arsenic	Barium	Boron	Cadmium	Chloride	Chromium	Hardness	Iron	Lead	Manganese	Nitrate as N	Nitrite as N	pH	Sodium	Sulphide	Sulphate	Turbidity	Uranium
ODWS	0.1	30-500	0.025	1	5	0.005	250	0.05	80-100	0.3	0.01	0.05	10	1	6.5-8.5	200	0.05	500	5	0.02
	mg/L	mg CaCO$_3$/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg CaCO$_3$/L	mg/L	mg/L	mg/L	mg/L	mg/L	pH Units	mg/L	mg/L	mg/L	NTU	mg/L
	OG	OG	IMAC	MAC	IMAC	MAC	AO	MAC	OG	AO	MAC	AO	MAC	MAC	OG	AO	AO	AO	AO	MAC
MW-01O	**Not Sampled**																			
MW-01I	26								1100	46.0	0.023	1.20						620	1500	
MW-01I Duplicate	21								1100	34.0	0.017	0.83			6.49			620	1000	
MW-01D	0.23				6.00		11000	0.16	6200	11.0		1.20				5700		1700	27	
MW-02O	24	730							1900	46.0	0.015	1.50					0.61	1200	3800	
MW-02I	3.9								1000	5.6		0.26						1000	180	
MW-02D	5.1				6.10		13000		7000	13.0		1.20				5700		1900	280	
MW-03O	18								870	35.0	0.016	2.60						850	1900	
MW-03I	8.8						7600		6000	12.0		1.00				3800		1400	310	
MW-03I Duplicate	9.5						7700		6000	13.0		1.00				3800		1500	260	
MW-04O	7.9								470	8.1		0.37							220	
MW-04I	4.8				7.20		1100		1500	5.4		0.29				820		1500	170.00	
MW-04D	0.15				7.80	0.00580	500		1100	1.1		0.23				470		1200	5.1	
MW-05O	23								480	38.0	0.025	1.90							440	
MW-05S	4.1					0.00510			230	6.1		0.28							100	
MW-05S Duplicate	4.3					0.00690			240	6.2		0.23							150	
MW-05I	1.2		0.14						380	37.0		0.11							160	
MW05D	**Not Sampled**																			
MW-06O	220		0.073	2.70				0.28	440	290.0	0.086	9.90							9400	
MW-06O	220		0.073	2.70				0.28	440	290.0	0.086	9.90							9400	
MW-06D	6.8				8.60	0.00850	24000	6	18000	21.0		2.90	80.20			10000	0.071	1300	230	0.04
MW-07O	9.3								460	18.0		0.55							900	
MW-07D	0.33				6.60	0.01700	11000	0.08	8100	1.3		1.00		2.4		4700		1500	23	
MW-08O	6.5	550							900	13.0		0.34							1900	
MW-08I	3.5				6.50		3400		3000	7.5		0.51				1600		1000	220	
MW-08D	0.28	510				0.00670		0.072	710	2.3		0.09				210		510	310	
MW-09O	120		0.05	1.10				0.26	330	170.0	0.062	7.50							6300	
MW-09S	250		0.058	3.60	5.80		340	0.37	750	290.0	0.12	13.00				260		600	6100	
MW-09D	3.7						50000		33000	25.0		5.20				21000		1200	120	
MW-10O	2.8								470	2.6		0.11							440	
MW-10I	0.57								390	1.6									16	
MW-10D	1.6				8.20	0.00570	46000	0.83	33000	19.0		5.20				17000		1200	290	
MW-11O	230		0.098	3.40				0.58	400	350.0	0.13	14.00					0.089		10000	
MW-11S	98		0.045					0.14	380	140.0	0.052	7.80							2100	
MW-11D	1.8				5.20		37000	0.38	29000	23.0		4.70				17000		1200	230	

Note:

1. ODWS: Ontario Drinking Water Standard, June 2006.

AO: Aesthetic Objective; MAC: Maximum Acceptable Concentration:

IMAC: Interim Maximum Acceptable Concentration; OG: Operational Guideline

Table 6
Summary of 2016 Groundwater Quality Exeedances of PWQO
MW-Series Monitoring Wells
Tansley Quarry - Forterra Brick Ltd.

Parameter	Aluminum	Arsenic	Boron	Cadmium	Cobalt	Copper	Iron	Lead	Molybdenum	Nickel	pH	Total Phosphorous	Silver	Thallium	Uranium	Vanadium	Zinc
PWQO	[0.075]	[0.005]	0.2	0.0005	0.0009	[0.005]	0.3	[0.005]	0.04	0.025	6.5-8.5	0.01	0.0001	0.0003	0.005	0.006	0.02
	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	pH Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
MW-01O	Not Sampled																
MW-01I	26	0.011			0.024	0.035	46	0.023		0.043		1.4	0.00011		0.016	0.05	0.11
MW-01I Duplicate	21	0.0087			0.018	0.026	34	0.017		0.033		0.91			0.015	0.038	0.086
MW-01D	0.23		6		0.0055		11			0.34	6.49						
MW-02O	24	0.0076	0.31		0.019	0.041	46	0.015		0.041		1.5	0.00015		0.011	0.047	0.13
MW-02I	3.9		2.1		0.0026		5.6					0.11				0.0077	
MW-02D	5.1	0.009	6.1				13									0.014	0.038
MW-03O	18	0.016	1.2	0.00058	0.015	0.046	35	0.016		0.031		2.2				0.037	0.12
MW-03I	8.8		4.8	0.0013	0.01	0.01	12									0.01	0.12
MW-03I Duplicate	9.5		5	0.00096		0.01	13									0.01	0.11
MW-04O	7.9				0.0046	0.0076	8.1	0.006				0.15			0.0053	0.014	0.024
MW-04I	4.8		7.2				5.4									0.0084	
MW-04D	0.15		7.8	0.0058		0.006	1.1			0.059					0.0066		0.042
MW-05O	23	0.01		0.0017	0.017	0.089	38	0.025		0.036		1.1	0.00			0.04	0.11
MW-05S	4.1	0.025	1.9	0.0051	0.0027	0.011	6.1					0.23				0.0082	0.036
MW-05S Duplicate	4.3	0.025	1.9	0.0069	0.0028	0.012	6.2					0.19	0.00011			0.0077	0.041
MW-05I	1.2	0.14	2.5	0.00054	0.00097	0.0073	37					0.12					
MW-05D	Not Sampled																
MW-06O	220	0.073	0.67	0.0014	0.16	0.25	290	0.086		0.33		10		0.0022	0.0089	0.34	0.85
MW-06O	220	0.073	0.67	0.0014	0.16	0.25	290	0.086		0.33		10		0.0022	0.0089	0.34	0.85
MW-06D	6.8	0.0087	8.6	0.01	0.024	0.13	21	0.0077	0.23	0.89		0.78			0.04	0.042	0.069
MW-07O	9.3	0.0083	4.6	0.00054	0.0086	0.017	18	0.0078				0.46			0.0077	0.019	0.051
MW-07D	0.33		6.6	0.017	0.0057	0.018	1.3			0.1		0.14	0.00044		0.0077		0.17
MW-08O	6.5	0.0075	1.9	0.0015	0.0057	0.011	13					0.23			0.0068	0.014	0.038
MW-08I	3.5		6.5	0.00062	0.0029	0.0052	7.5	0.0058								0.01	
MW-08D	0.28		1.6	0.0067		0.0091	2.3										0.041
MW-09O	120	0.05	0.95	0.00	0.12	0.084	170	0.062		0.22		5.1		0.0011	0.0059	0.2	0.6
MW-09S	250	0.058	5.8	0.0023	0.19	0.14	290	0.12		0.44		11	0.0012	0.002	0.0099	0.38	0.9
MW-09D	3.7		4.6				25										
MW-10O	2.8			0.00	0.002		2.6										
MW-10I	0.57	0.014	0.77	0.0032			1.6										0.022
MW-10D	1.6		8.2	0.0057			19		0.059	0.56					0.015		0.088
MW-11O	230	0.098	0.43	0.0012	0.17	0.51	350	0.13		0.38		10	0.00	0.002	0.011	0.38	0.99
MW-11S	98	0.045	2.2		0.071	0.17	140	0.05		0.15		7.2		0.00097		0.17	0.36
MW-11D	1.8	0.013	5.2	0.0045		0.012	23		0.041	0.31					0.01		0.36

Note:

1. PWQO: Provincial Water Quality Objectives, July 1994
2. Square brackets indicate interim objective.
3. Cadmium standard is 0.0002 mg/L when hardness < 100 mg/L and 0.0005 mg/L when hardness > 100 mg/L

Table 7
Summary of 2016 Groundwater Quality Exeedances of ODWS
Private Wells
Tansley Quarry - Forterra Brick Ltd.

Parameter	Chloride	Hardness	Iron	Manganese	Sodium	Sulphate	Turbidity
ODWS	250	80-100	0.3	0.05	20/200 [3]	500	5
	mg/L	mg CaCO3/L	mg/L	mg/L	mg/L	mg/L	NTU
	AO	OG	AO	AO	AO	AO	AO
Finucci	Not sampled - well not in use						
Featherstone	Not sampled - well not in use						
Sicard	Not sampled - well not in use						
Sugiyami	Not sampled - well not in use						
Eno/Myers	Not sampled - well not in use						
Hendervale House		120					
Hendervale Cottage		120					
Hendervale Barn Cistern (Main Barn Tap)		500	1				11
Simms		330					
Bekkers	290	940		0.25	210	800	

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

3. 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.

Table 8
Modeled and Predicted Drawdown
Tansley Quarry - Forterra Brick Ltd.

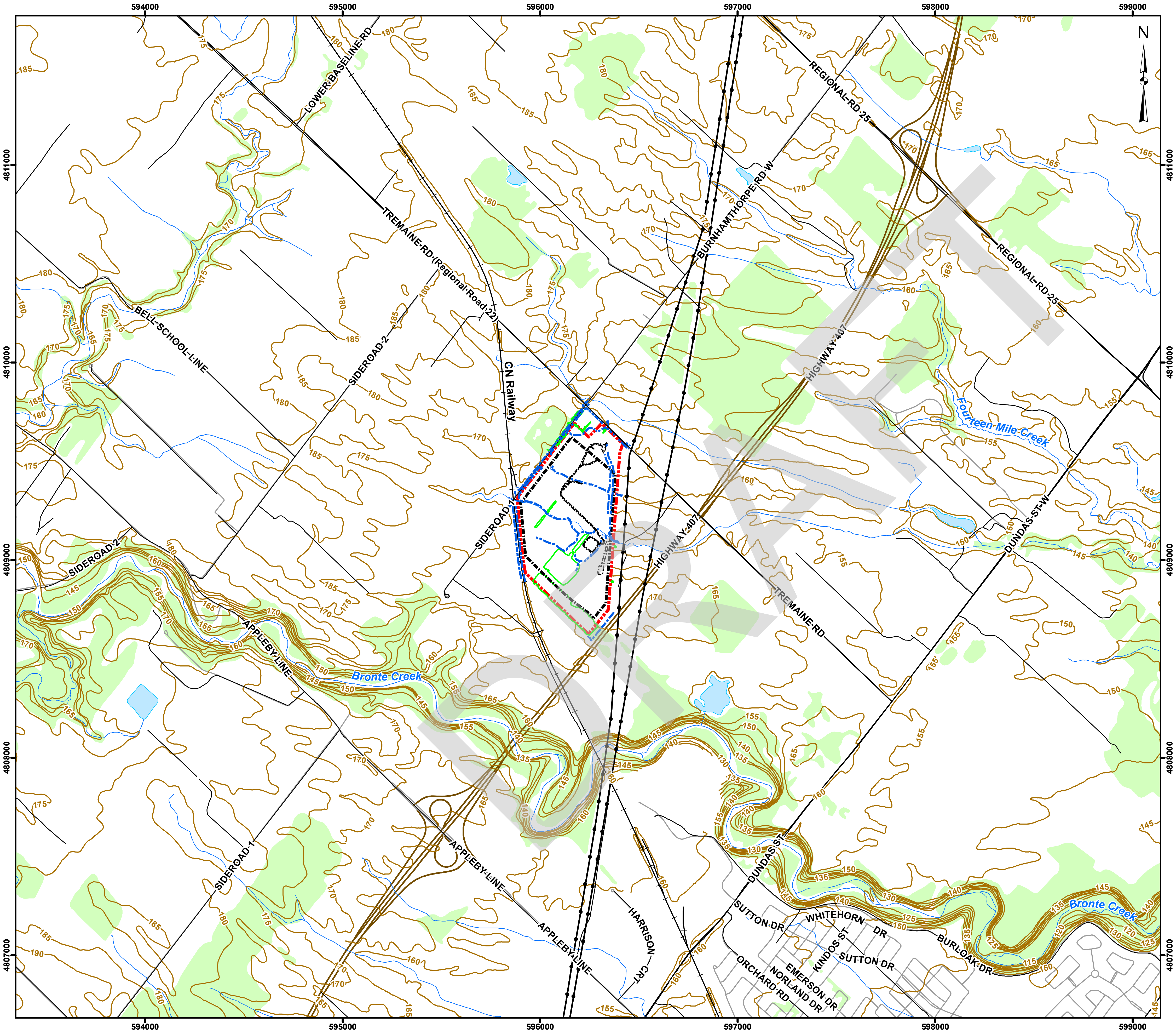
Well ID	Model simulated drawdown based on Figure 8.11(1) (m)	Estimated drawdown after 2007 sinking cut initiation (m)	Estimated drawdown based on 2016 water level measurements (m)
MW-01	<1	1.3	0.3
MW-02	<1	0	0
MW-03	<1	2.9	0.8
MW-04	4.5	5.8	2.7
MW-05	12	8.8	10.3
MW-06	16	2.5	3.1
MW-07	1.5	1.7	0
MW-08	5	1.0	1.0
MW-09	11	7.9	7.6
MW-10	7.5	5.8	0.5
MW-11	4.5	2.0	0
Featherstone	<1	0	0
Finucci	3	1.9	0
Hendervale House	2	0.8	1.0
Hendervale Cottage	2	1.3	0
Hendervale Barn	4	No data	0
Hendervale ABC Barn	2.2	1.3	0
Hendervale XYZ Barn	2	0.8	0

Notes:

1) Golder Associates Ltd. 2008. Initial Monitoring Report and Updated Hydrogeological Assessment of Tansley Quarry – Hanson Brick Ltd., Burlington, Ontario.

2) Pre-sinking cut initiation water level data not available for Simms, Wiggins and Bekkers private wells. These well were predicted to have a drawdown of <1 m.

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
Kilometres

PROJECT
TANSLEY QUARRY
2016 ANNUAL MONITORING REPORT
FORTERRA 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	JR	20 Mar. 2017		
CHECK	SW	20 Mar. 2017		
REVIEW	PMcC	20 Mar. 2017		

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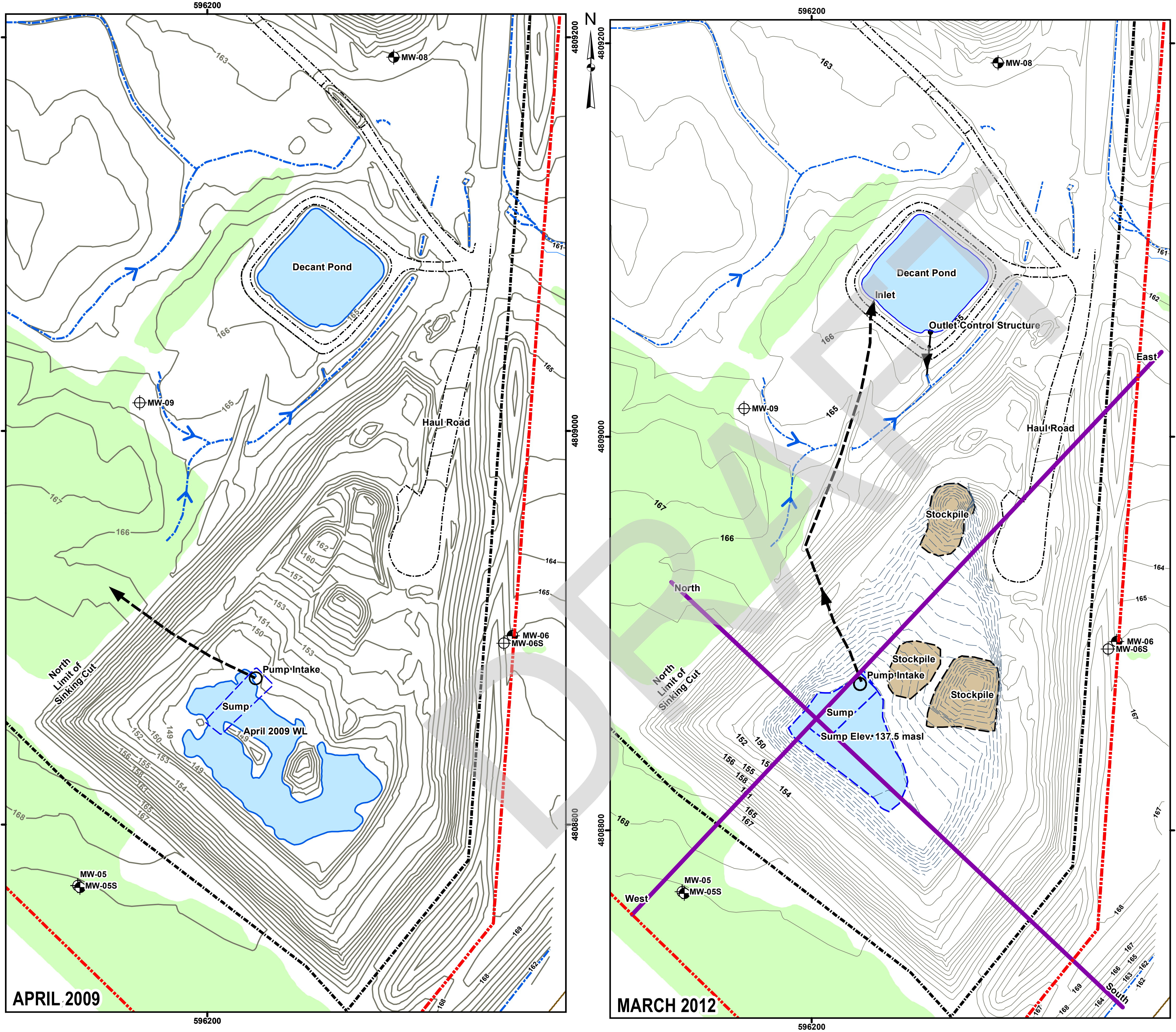

LEGEND

- ✛ 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
Metres

PROJECT
TANSLEY QUARRY
2016 ANNUAL MONITORING REPORT
FORTERRA BRICK LTD.

TITLE
OPERATIONAL PROGRESS
2009 – 2012

Golder Associates
Mississauga, Ontario

PROJECT NO. 021-1228			SCALE 1:2,000	Ver. 1.0
DESIGN	KD	18 Dec. 2006		
GIS	JR	20 Mar. 2017		
CHECK	SW	20 Mar. 2017		
REVIEW	PMcC	20 Mar. 2017		

FIGURE: 2A

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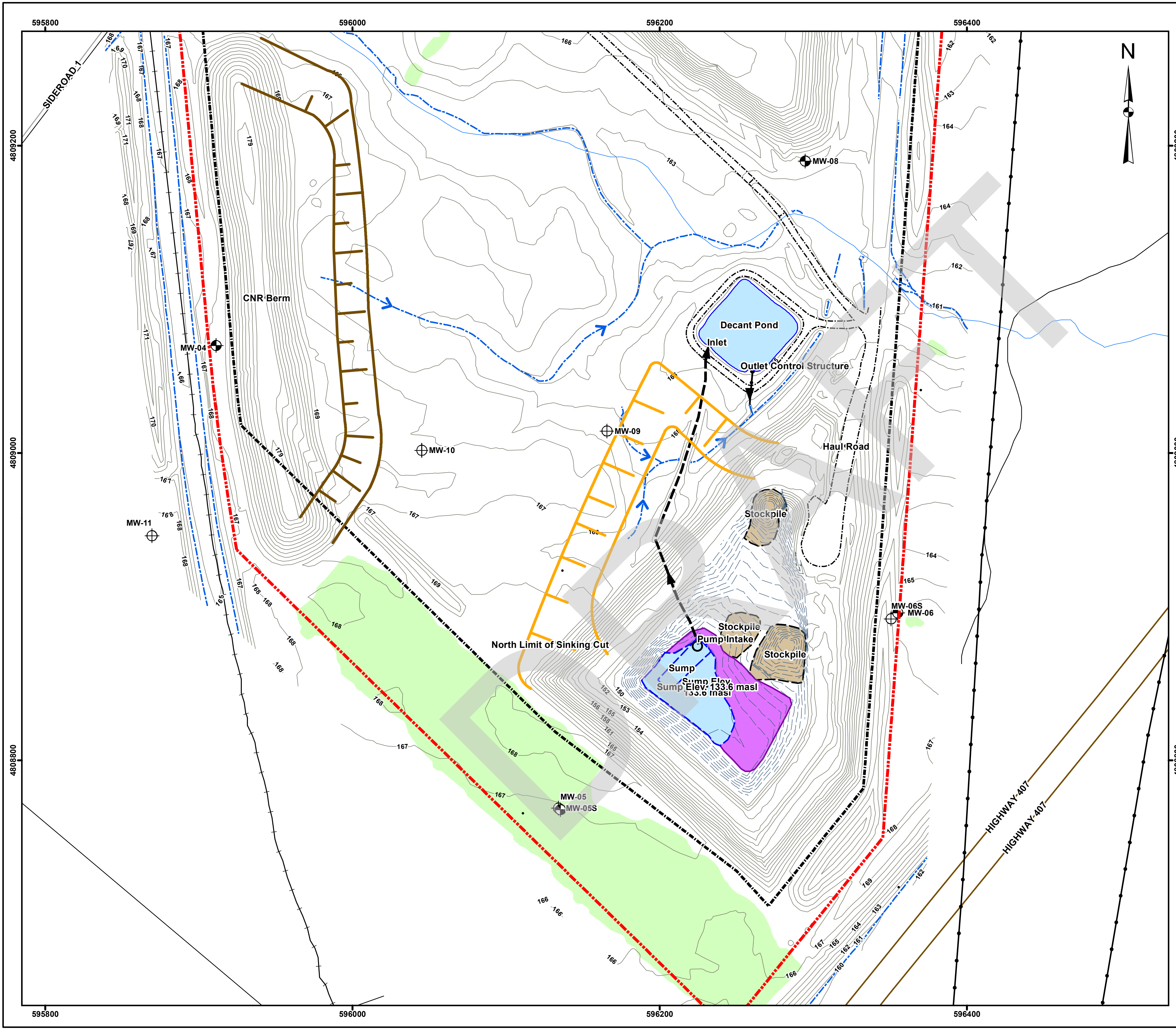

LEGEND

- ⌖ Monitoring Well (Golder, 2002)
- ⌖ Monitoring Well (Golder, 2007)
- ⌖ Test Well (Golder, 2007)
- ── Road
- ─┼─ Railway
- ── Extent of Overburden Removal (2:1 Slope)
- ── Extent of CNR Berm (2:1 Slope)
- ‐ ‐ Ditch
- ── Watercourse
- 🟪 Flooded Quary Floor
- ▨ Stockpile
- 🟩 Wooded Area
- 🟥 Property Boundary
- ⬛ Limit of Extraction

NOTES

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.
4. Wooded area northwest of the sinking cut removed by Forterra in 2014.
5. Quarry floor flooded at end of 2014.
6. Overburden removed from area northwest of sinking cut stored in CNR berm. (by Forterra)
7. 2015 sump elevation = 133.60 masl
   2015 sump water level = 135.60 masl

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 50 100 150 200
Metres

PROJECT
TANSLEY QUARRY
2016 ANNUAL MONITORING REPORT
FORTERRA BRICK LTD.

TITLE
OPERATIONAL PROGRESS 2014-2015

Golder Associates
Mississauga, Ontario

PROJECT NO. 021-1228		
DESIGN	KD	18 Dec. 2006
GIS	JR	20 Mar. 2017
CHECK	SW	20 Mar. 2017
REVIEW	PMcC	20 Mar. 2017

SCALE
Ver. 1.0

FIGURE: 2B

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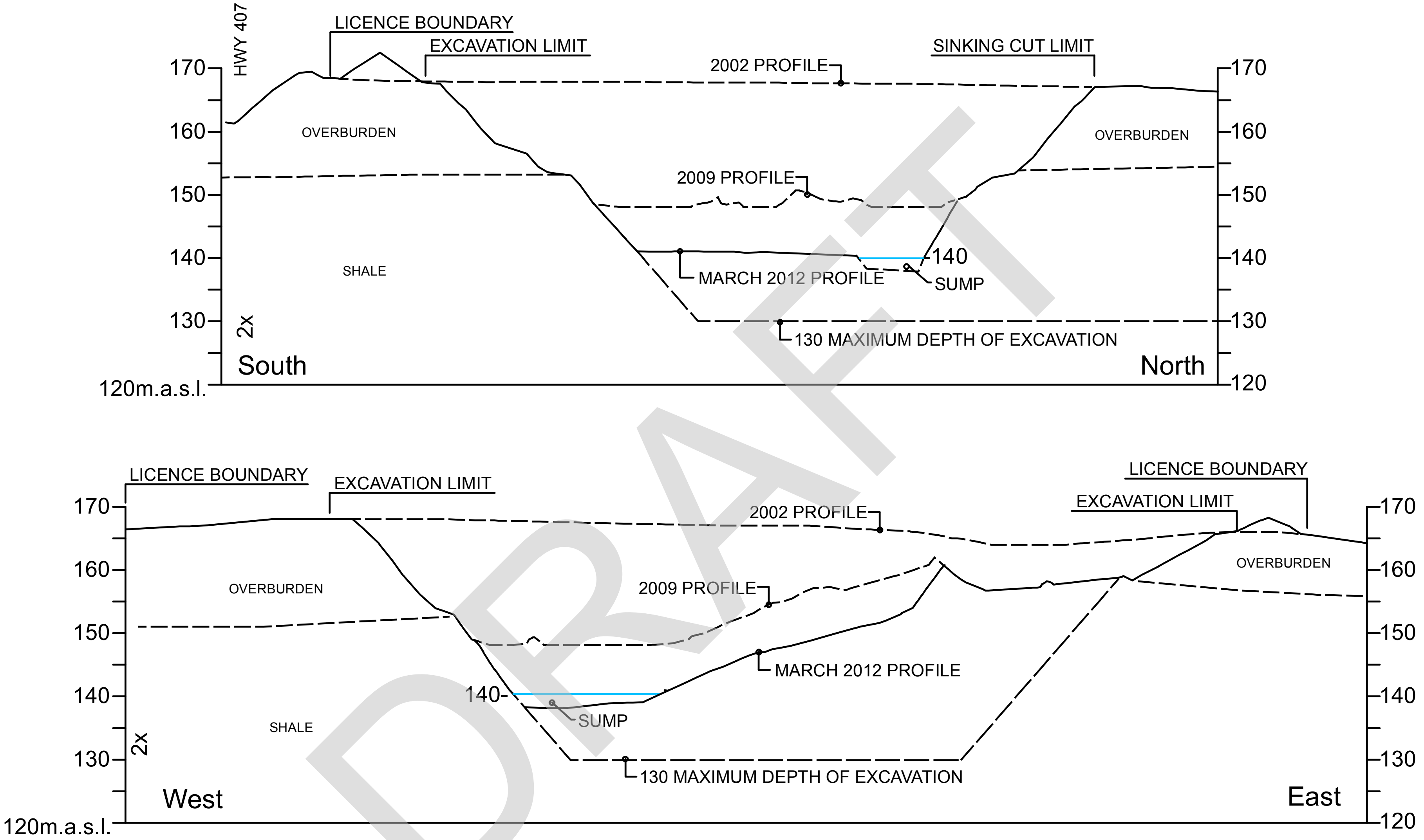

SOURCE:

Long Environmental Consultants Inc., April 2012.

PROJECT
TANSLEY QUARRY
2016 ANNUAL MONITORING REPORT
FORTERRA BRICK LTD.

TITLE
CROSS - SECTIONS

Golder Associates
Mississauga, Ontario

PROJECT NO. 021-1228			SCALE AS SHOWN	REV. 0.0
DESIGN	KD	12 Apr. 2012	**FIGURE: 3**	
GIS	JR	20 Mar. 2017		
CHECK	SW	20 Mar. 2017		
REVIEW	PMcC	20 Mar. 2017		

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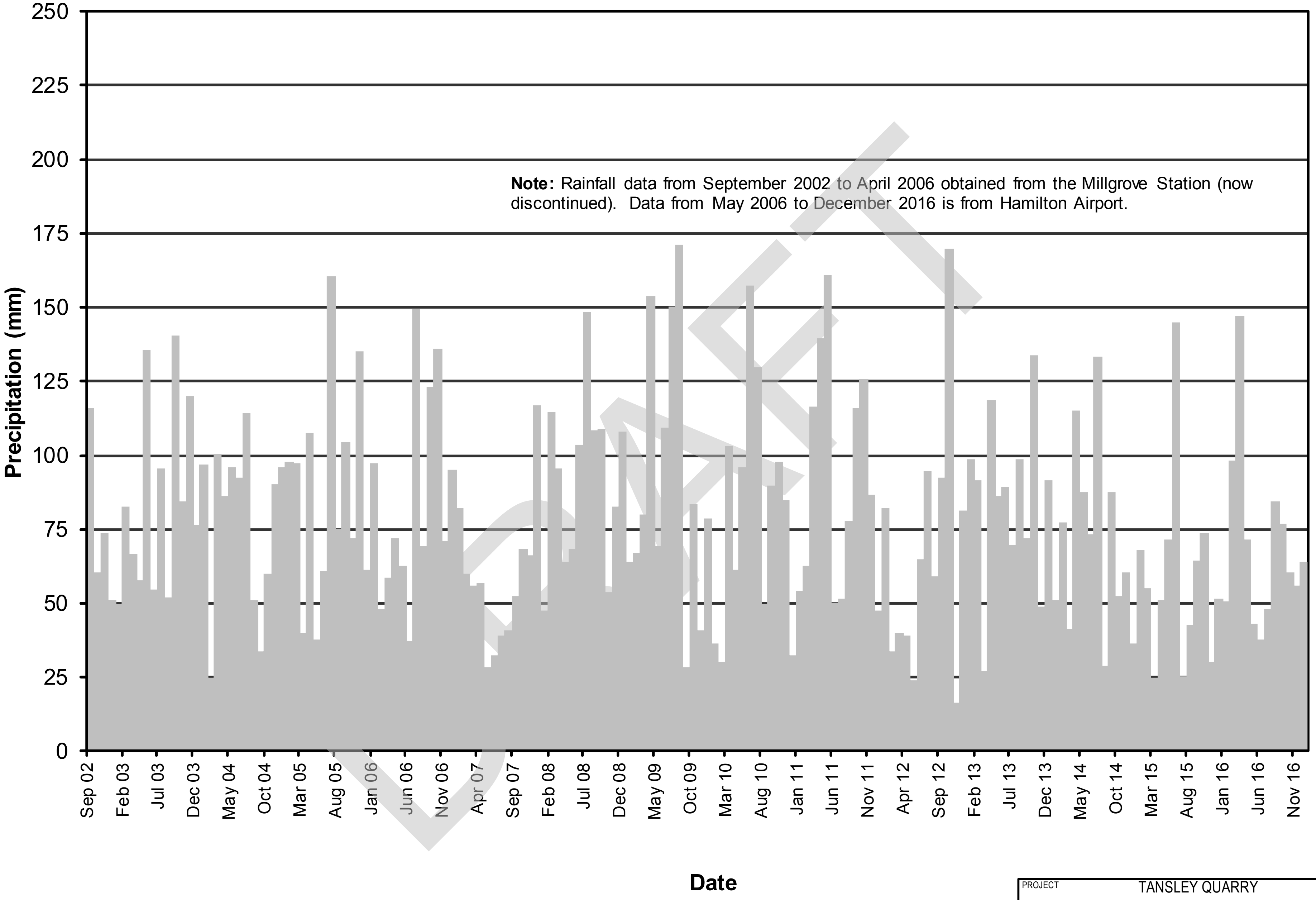

Note: Rainfall data from September 2002 to April 2006 obtained from the Millgrove Station (now discontinued). Data from May 2006 to December 2016 is from Hamilton Airport.

PROJECT
TANSLEY QUARRY
2016 ANNUAL MONITORING REPORT
FORTERRA 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	JR	20 Mar. 2017	
	CHECK	SW	20 Mar. 2017	
	REVIEW	PMcC	20 Mar. 2017	

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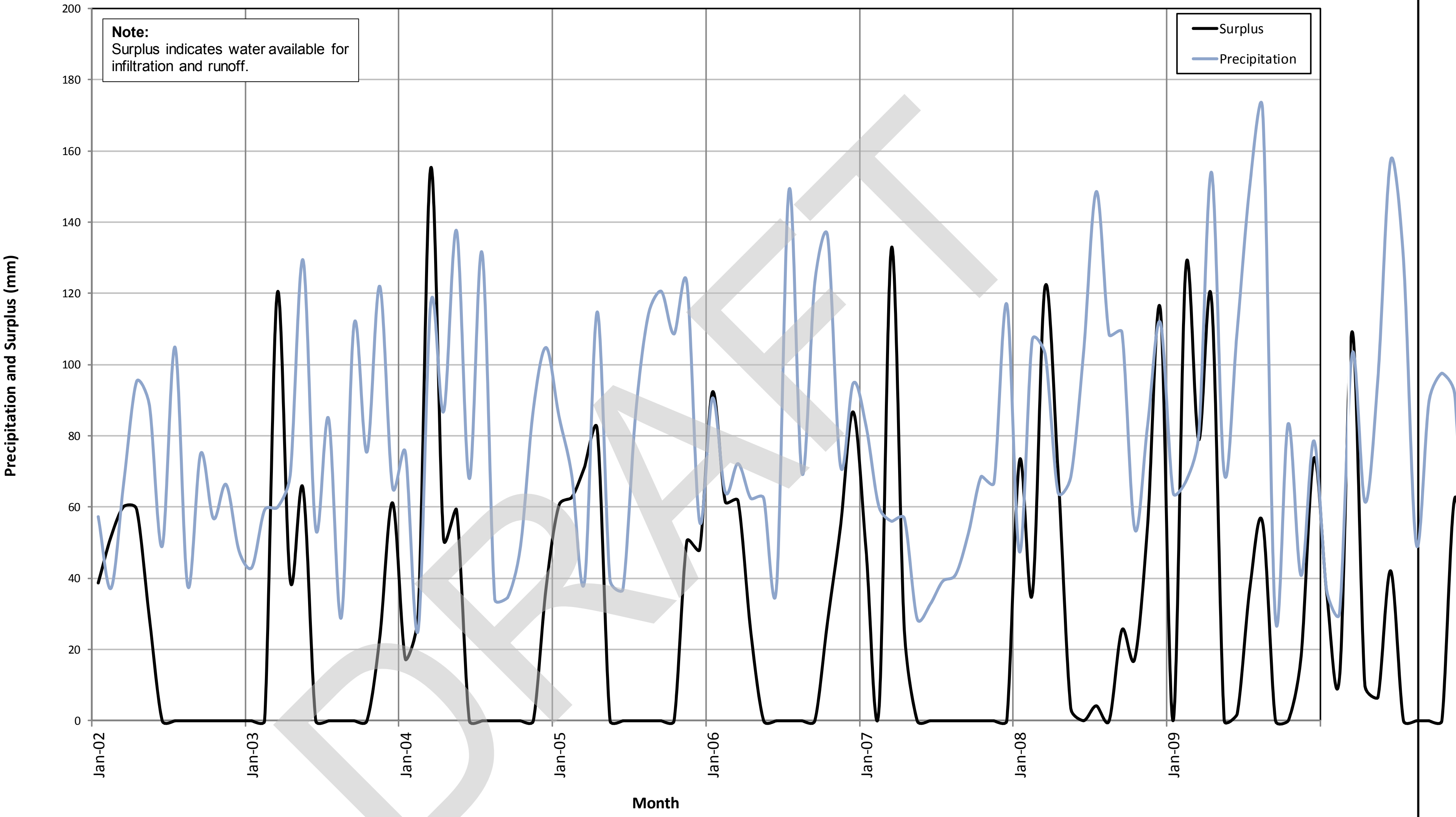


NOTE

1) Surplus indicates water available for infiltration and runoff.
2) Monthly water budget estimate using daily data to Jan. 14, 2014;
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.

PROJECT
TANSLEY QUARRY
2016 ANNUAL MONITORING REPORT
FORTERRA BRICK LTD.

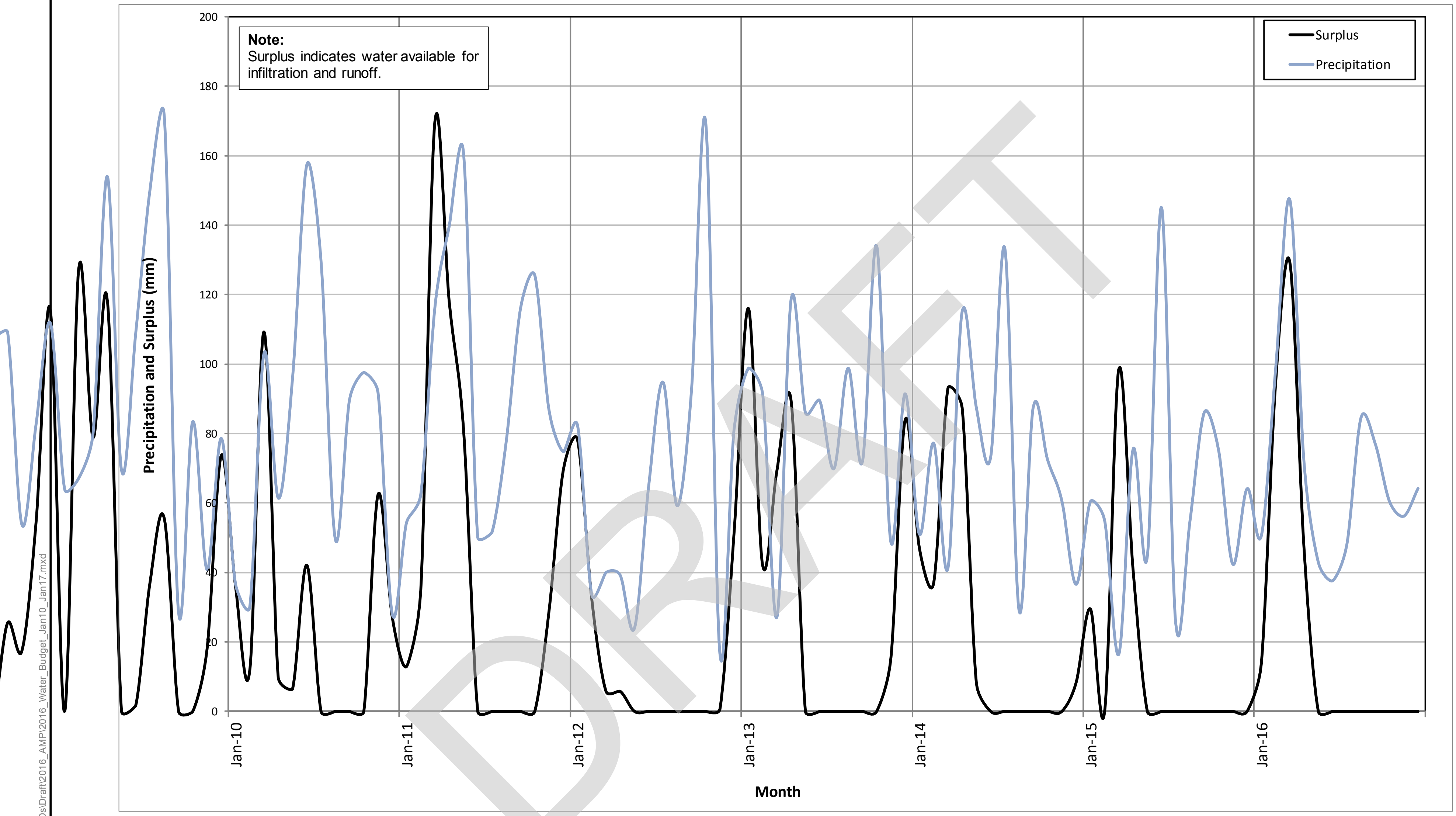
TITLE
WATER BUDGET - HAMILTON AIRPORT
JANUARY 2002 - JANUARY 2010

Golder Associates
Mississauga, Ontario

PROJECT NO. 021-1228			SCALE AS SHOWN	REV. 0.0
DESIGN	KD	12 Apr. 2012		
GIS	JR	20 Mar. 2017		
CHECK	SW	20 Mar. 2017		
REVIEW	PMcC	20 Mar. 2017		

FIGURE: 5.1

G:\Projects\2002\021-1228_Tremaine_Quarry\GIS\MXDs\Draft\2016_AMP\2016_Water_Budget_Jan02_Jan10.mxd



NOTE

1) Surplus indicates water available for infiltration and runoff.
2) Monthly water budget estimate using daily data to Jan. 14, 2014;
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.

PROJECT
TANSLEY QUARRY
2016 ANNUAL MONITORING REPORT
FORTERRA BRICK LTD.

TITLE
WATER BUDGET - HAMILTON AIRPORT
JANUARY 2010 - JANUARY 2017

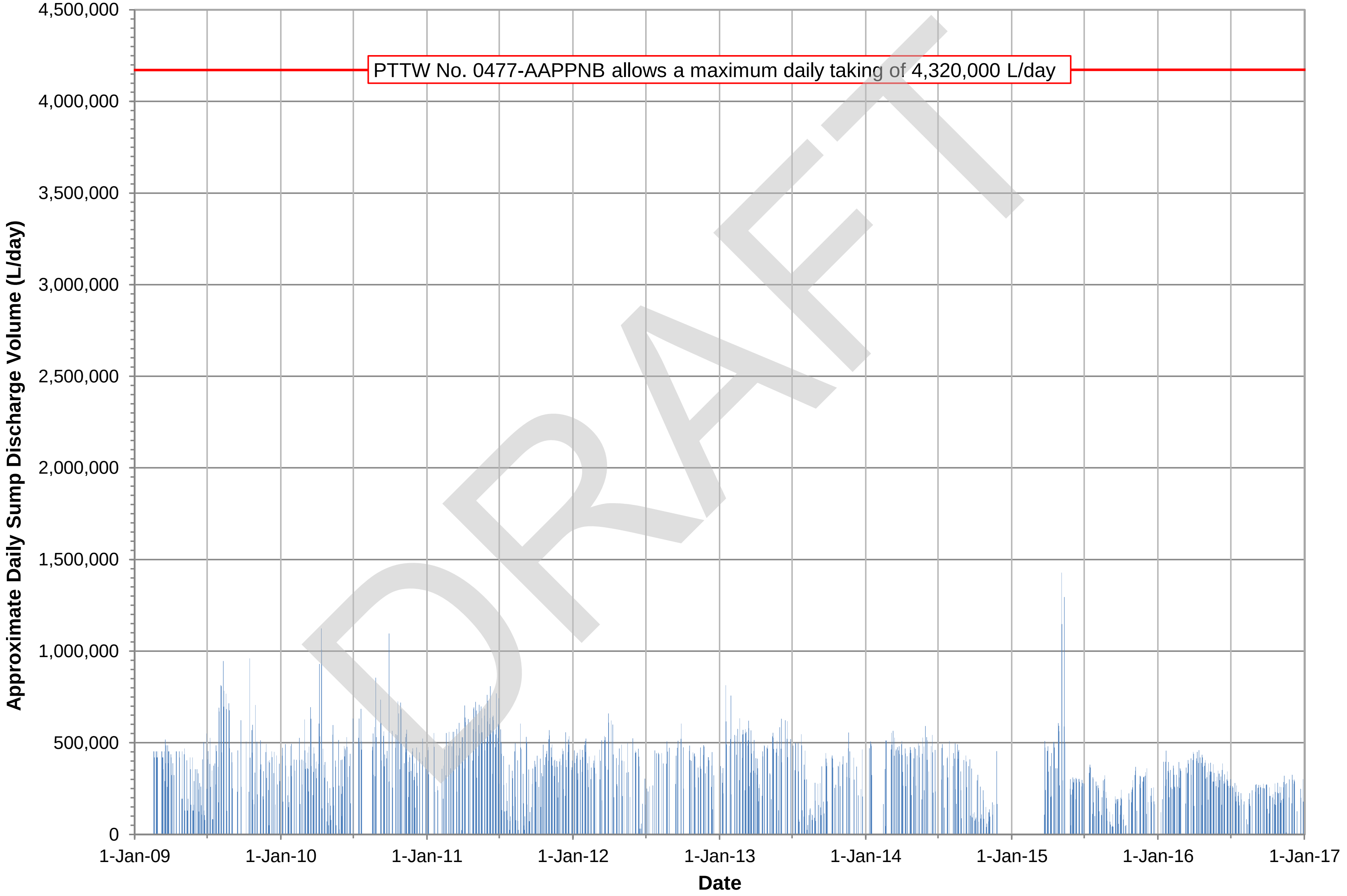
Golder Associates
Mississauga, Ontario

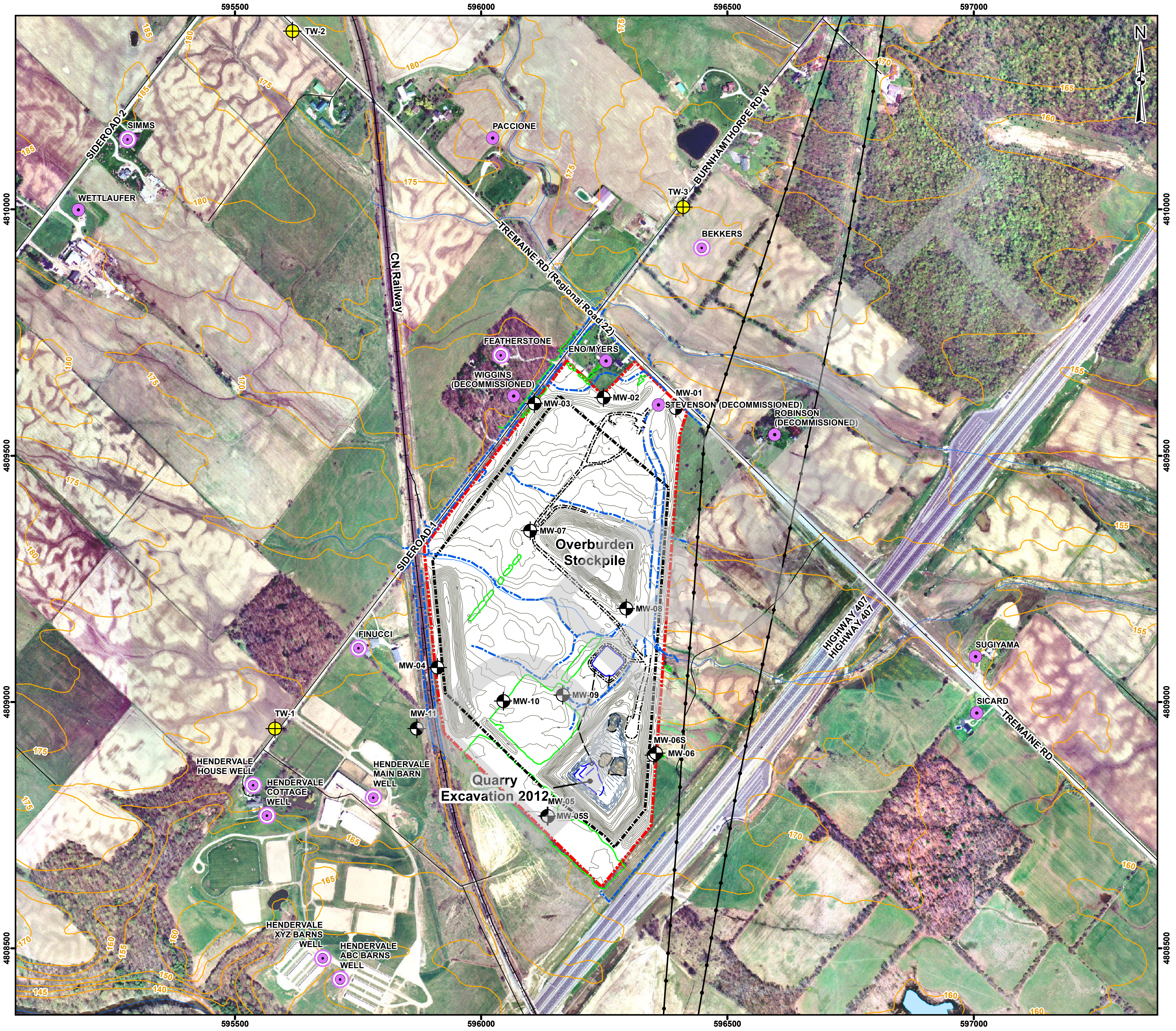
PROJECT NO. 021-1228			SCALE AS SHOWN
DESIGN	KD	12 Apr. 2012	REV. 0.0
GIS	JR	20 Mar. 2017	
CHECK	SW	20 Mar. 2017	
REVIEW	PMcC	20 Mar. 2017	

FIGURE: 5.2

G:\Projects\2002\021-1228_Tremaine_Quarry\GIS\MXDs\Draft\2016_AMP\2016_Water_Budget_Jan10_Jan17.mxd

2009 to 2016 Daily Sump Discharge Volumes
Tansley Quarry - Hanson Brick Ltd.





LEGEND

- ● Private Well
- ◉ Private Well with Level Logger Installed
- ⊕ Monitoring Well (Golder, 2002 & 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.

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.

0 100 200 400 600
Metres

PROJECT
TANSLEY QUARRY
2016 ANNUAL MONITORING REPORT
FORTERRA BRICK LTD.

TITLE
MONITORING WELL NETWORK

Golder Associates
Mississauga, Ontario

PROJECT NO. 021-1228			SCALE 1:8,000	Ver. 1.0
DESIGN	KD	18 Dec. 2006	FIGURE: 7	
GIS	JR	20 Mar. 2017		
CHECK	SW	20 Mar. 2017		
REVIEW	PMcC	20 Mar. 2017		

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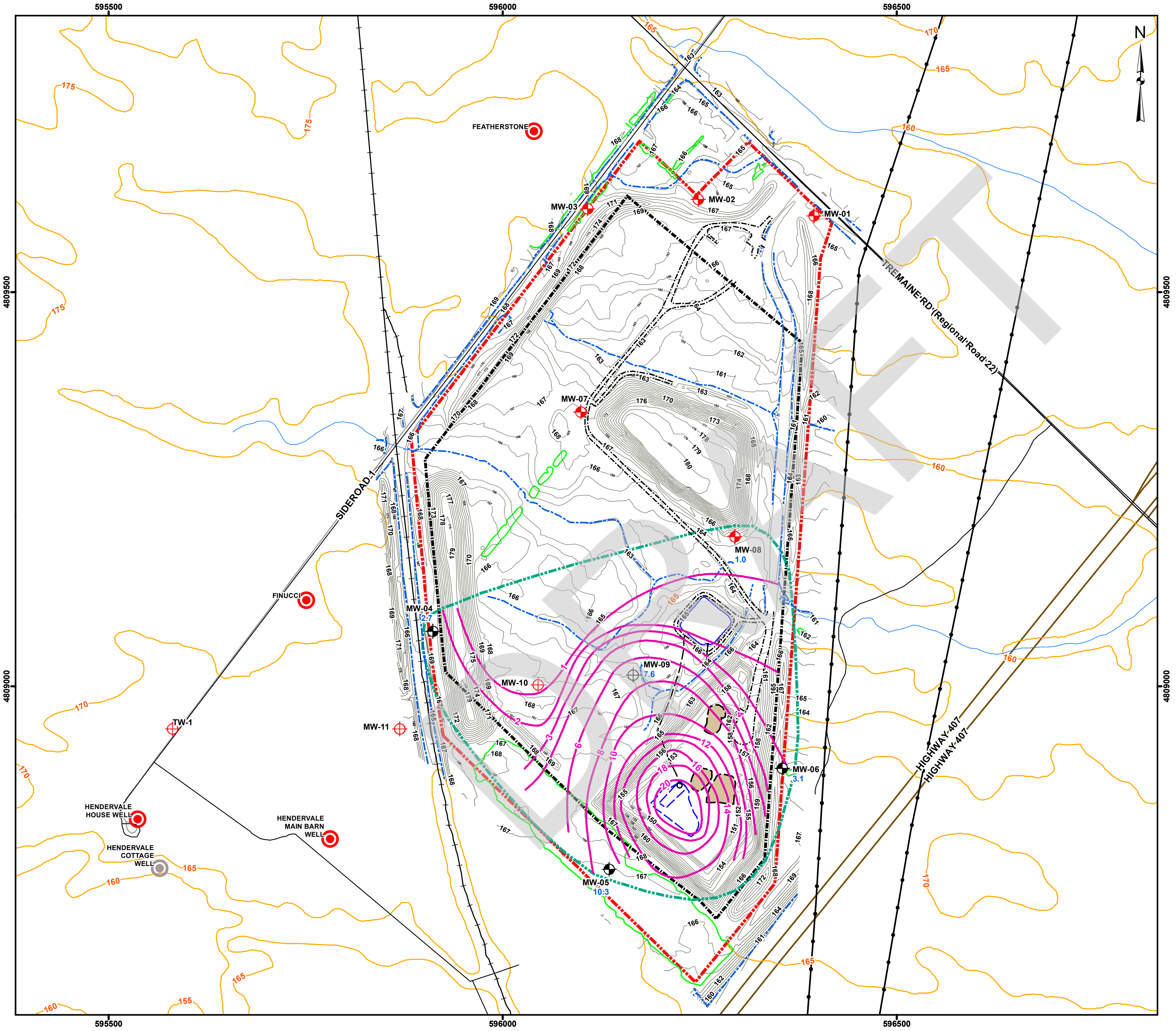

LEGEND

Wells Not Impacted by Quarrying Activities

- ● Private Well
- ◉ Private Well with Level Logger Installed
- ⊕ Monitoring Well (Golder, 2002)
- ⊕ Monitoring Well/Test Well (Golder, 2007)
- ◉ Private Overburden Well

Wells Influenced by Quarrying Activities

- ⊕ Monitoring Well (Golder, 2002)
- ⊕ Monitoring Well (Golder, 2007)
- Railways
- Utility Line
- Topographic Elevation Contour (5m Interval)
- Drawdown Contour (1 or 2 m interval)
- 2009 Topographic Elevation Contour (1m Interval)
- 2012 Topographic Elevation Contour (1m Interval)
- Ditch
- Watercourse
- Waterbody
- Tree Lot
- Limit of Extraction
- Property Boundary
- Shale Stockpile
- Radius of Influence of Quarry Dewatering

NOTES

- On-Site details obtained from 2009 topographic contour map updated with 2012 field survey data provided by Long Environmental Consultants Inc.
- NA = Not Applicable

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

Metres

PROJECT

TANSLEY QUARRY
2016 ANNUAL MONITORING REPORT
FORTERRA BRICK LTD.

TITLE

DRAWDOWN IN UPPER (INTERMEDIATE) SHALE
OCTOBER 2016

Golder Associates
Mississauga, Ontario

PROJECT NO. 021-1228			SCALE 1:5,000	Ver. 1.0
DESIGN	KD	18 Dec. 2006	FIGURE: 8	
GIS	JR	27 Apr. 2017		
CHECK	SW	27 Apr. 2017		
REVIEW	PMcC	27 Apr. 2017		

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APPENDIX A

Regulatory Permits and Agreements

May 9, 2007

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

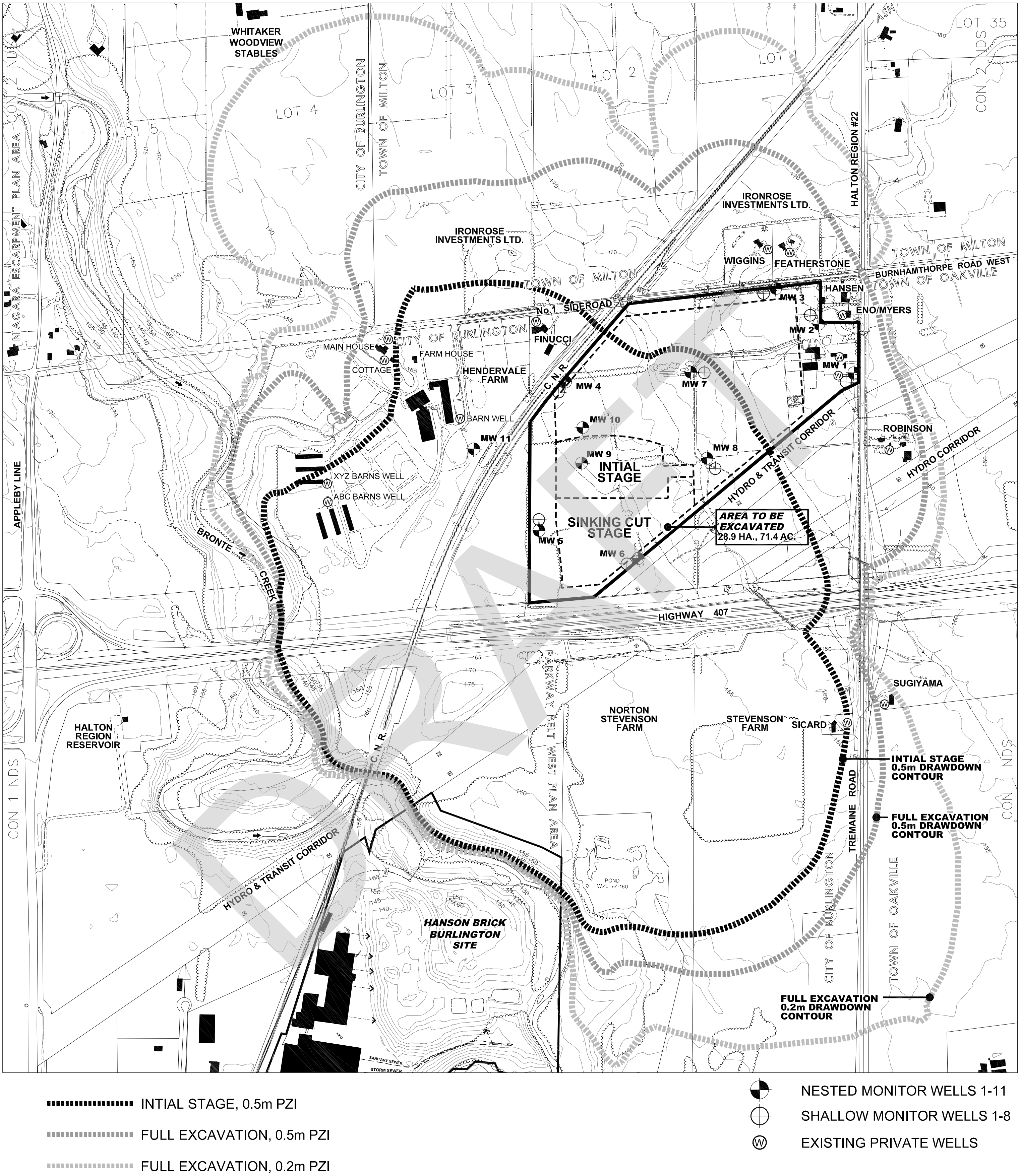
Successful Well Restoration as defined in subsection 6.8 b)

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

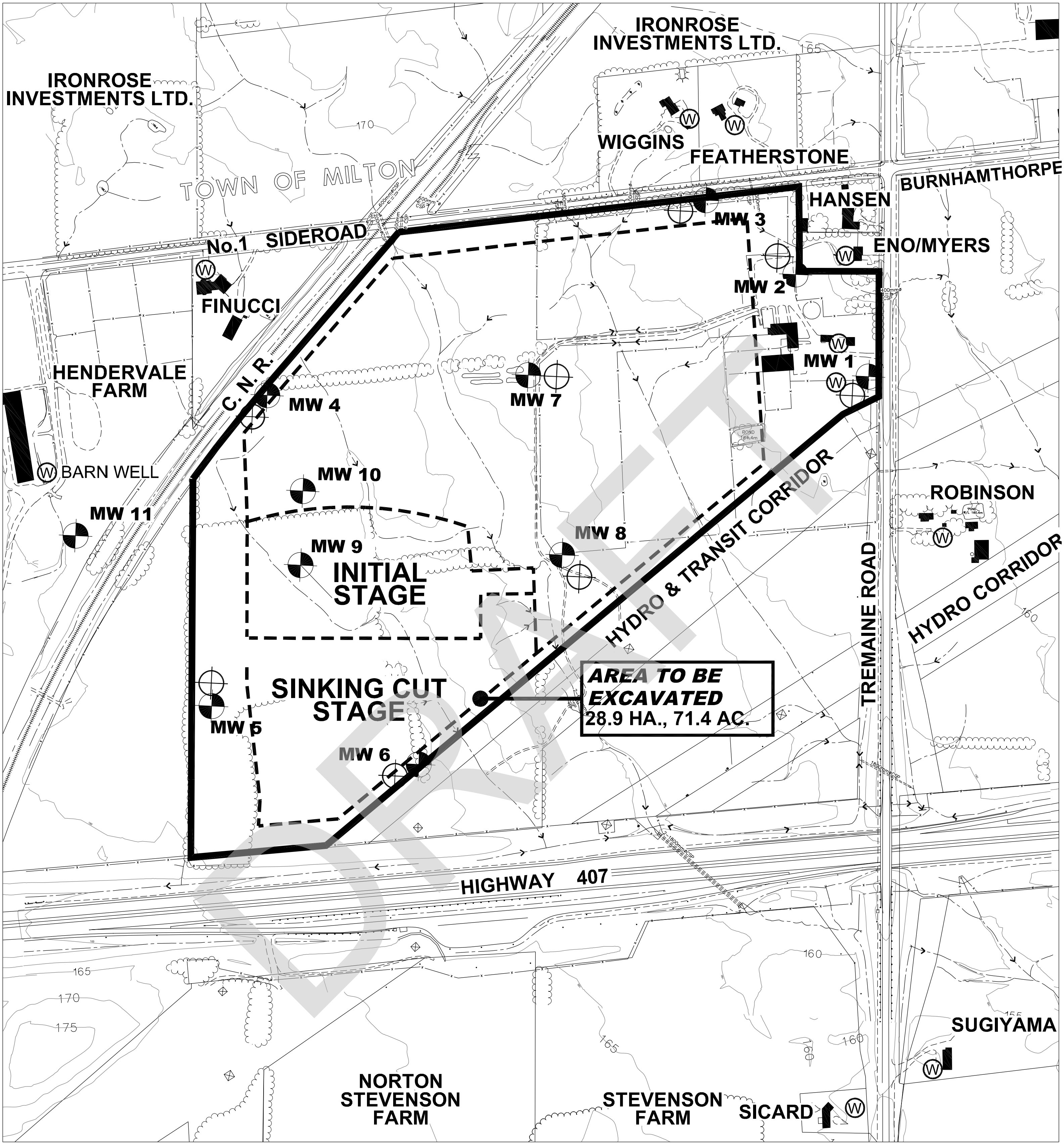
Figure 1

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

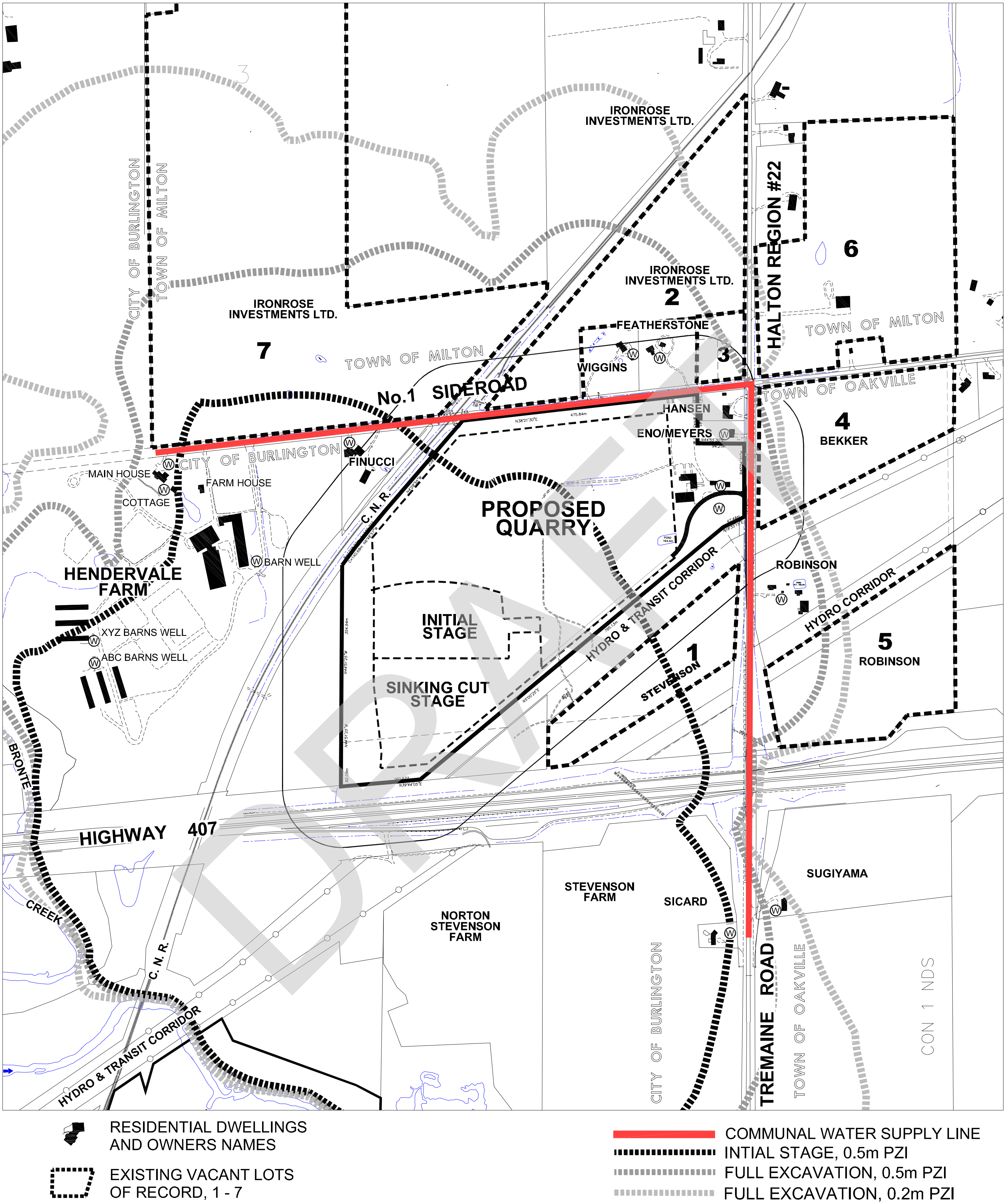


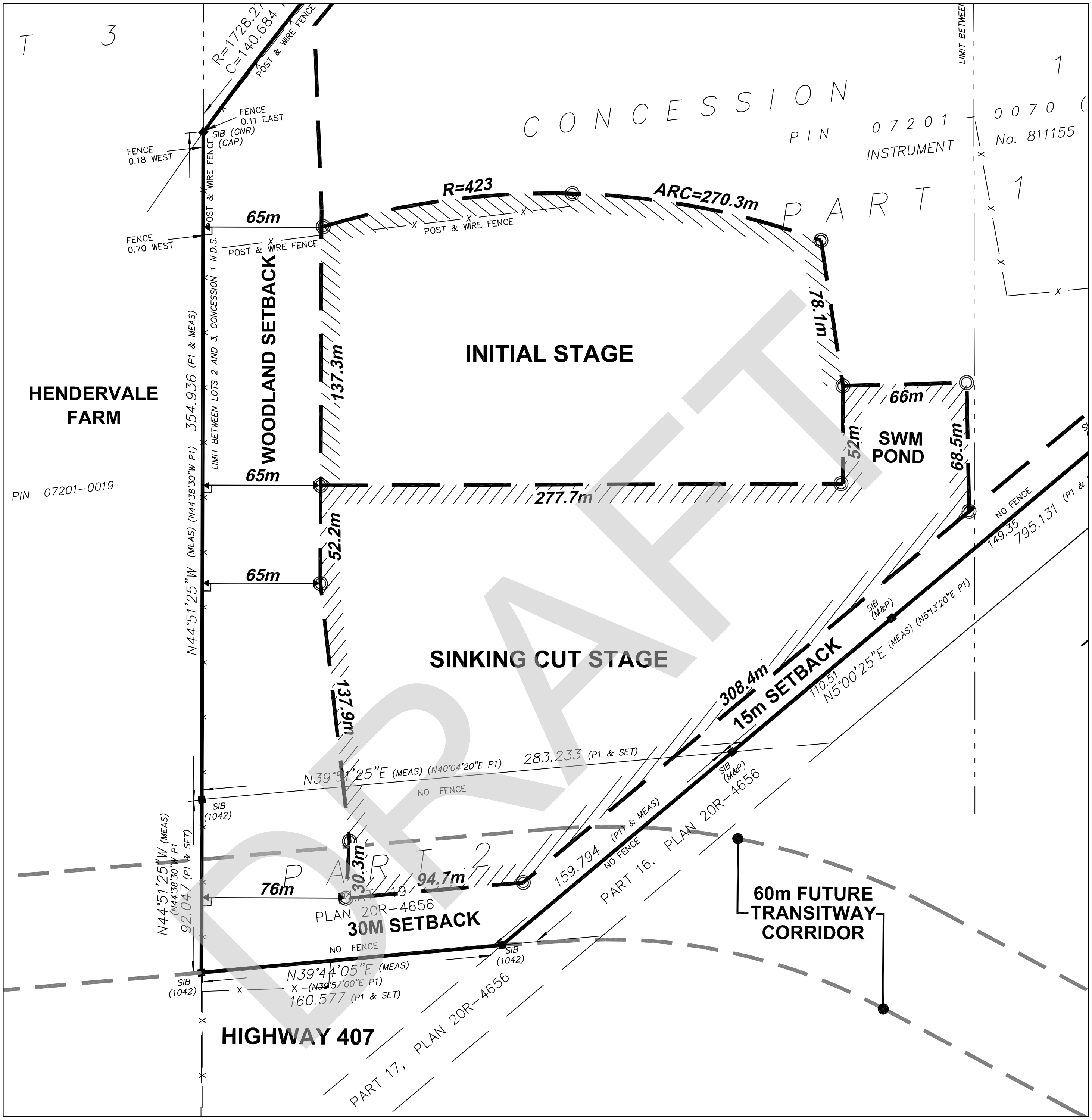
Figure 3

COMMUNAL WATER SUPPLY LINE

Scale: 1 : 10,000

13 November 2006

Hanson Brick Ltd., Tremaine Quarry
ADAPTIVE GROUNDWATER MANAGEMENT PLAN



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

NORTH

Scale: 1:3,000

13 November 2006

Hanson Brick Ltd., Tremaine Quarry
ADAPTIVE GROUNDWATER MANAGEMENT PLAN

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.

Ontario

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 and Climate Change
Central Region
Technical Support Section
Water Resources
8th Floor
5775 Yonge St
Toronto ON M2M 4J1
Fax: (416) 325-6347
Tel: (416) 326-3781

Ministère de l'Environnement et de l'Action en matière de changement climatique
Direction régionale du Centre
8e étage
5775 rue Yonge
Toronto ON M2M 4J1
Télécopieur: (416) 325-6347
Tél:(416) 326-3781

Ontario

May 1, 2015

Hanson Brick Ltd./Briques Hanson Ltée
5155 Dundas St W
Burlington, Ontario, L7R 3Y2
Canada

Attention: Mr. Jack Hewitt

RE: Permit To Take Water - Tansley Quarry
Concession 1 Former Township of Nelson Part 1 & 2 Plan 20R-14660
Burlington, Regional Municipality of Halton
Reference Number 0372-9RXFAY

Please find attached **Permit To Take Water No. 7877-TEJUU** issued to **Hanson Brick Ltd./Briques Hanson Ltée** which authorizes the withdrawal of water in accordance with the application for this Permit to Take Water, dated December 17, 2014 and signed by Mr. Jack Hewitt for Hanson Brick Ltd./Briques Hanson Ltée.

This Permit expires on **April 30, 2025.** The Permit must be kept available for inspection by Ontario Ministry of the Environment and Climate Change staff.

Please note, Ontario Regulation 387/04 "Water Taking" requires all water takers to report daily water taking amounts to the Water Taking Reporting System (WTRS) electronic database: https://www.lrcsde.lrc.gov.on.ca/wtrs/. Daily water taking must be reported on a calendar year basis. If no water is taken, then a "no taking" report must be entered. Please consult the Regulation and Section 4 of this Permit for monitoring requirements.

If you have questions about reporting requirements, please call the WTRS Help Desk at 416-235-6322 (toll free: 1-877-344-2011) or by email, WTRSHelpdesk@ontario.ca. It is preferred that you submit your data directly and electronically to the WTRS. Where this is impracticable, please use the Water Taking Submission Form (included as Appendix C of the *Technical Bulletin: Permit To Take Water (PTTW) - Monitoring and Reporting of Water Takings*), which can be downloaded from the above web site, and fax your completed forms to 416-235-6549 or mail them to: Water User Reporting Section, 125 Resources Rd. Toronto, ON M9P 3V6.

Take notice that in issuing this Permit to Take Water, terms and conditions pertaining to the taking of water and to the results of the taking have been imposed on **Hanson Brick Ltd./Briques Hanson Ltée** The terms and conditions have been designed to allow for the development of water resources, while providing reasonable protection to the surrounding natural environment, existing water uses and users.

One of the purposes of the issuance of a Permit is to ensure that the permitted taking(s) will not cause negative impacts to the surrounding natural environment or other water supplies which were in use prior to the date of this Permit. If the taking of water should result in any negative impacts, the Permit Holder, **Hanson Brick Ltd./Briques Hanson Ltée** will be required to restore the water supplies of those affected in a manner acceptable to the Ontario Ministry of the Environment and Climate Change or to reduce the rate and amount of taking until any negative impacts are eliminated.

Any change of address or ownership of the property for which this Permit is issued must be reported immediately to the Director. The issuance of this Permit to Take Water does not relieve you from compliance with the legislative requirements of this Ministry or any other agencies.

It is the responsibility of **Hanson Brick Ltd./Briques Hanson Ltée** to ensure that any person taking water under the authority of this Permit is familiar with and complies with the terms and conditions.

Yours truly,

H. Zhang

Helen Zhang , P.Eng.
Director, Section 34, OWRA
Central Region

File Storage Number: SI-HP-BU-C1-220
EA/CW

Sent via electronic mail to Jack Hewitt, Hanson Brick Ltd. Hewitt, Jack (Burlington) NA (Jack.Hewitt@hanson.biz)

Electronic copy to Sharon Wood, P.Geo., Golder Associates Ltd., Wood, Sharon <Sharon_Wood@golder.com>
Phyllis McCrindle, P.Geo., Golder Associates Ltd., pmccrindle@golder.com

Ministry of the Environment and Climate Change
Ministère de l'Environnement et de l'Action en matière de changement climatique

PERMIT TO TAKE WATER

Ground Water
NUMBER 7877-9TEJUU

Pursuant to Section 34.1 of the Ontario Water Resources Act, R.S.O. 1990 this Permit To Take Water is hereby issued to:

Hanson Brick Ltd./Briques Hanson Ltée
5155 Dundas St W
Burlington, Ontario, L7R 3Y2
Canada

For the water taking from: Quarry Sump

Located at: Lot 1, Concession 1 NDS, Geographic Township of Nelson
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 34.1, 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 and Climate Change.

(d) "District Office" means the Halton-Peel, Parts of Lots 1 and 2 Concession 1 District Office.

(e) "Permit" means this Permit to Take Water No. 7877-9TEJUU including its Schedules, if any, issued in accordance with Section 34.1 of the OWRA.

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

(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 December 17, 2014 and signed by Jack 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 **April 30, 2025**. 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:	4,320,000		

4. Monitoring

4.1 The Permit Holder shall maintain a daily record of all water takings. This record shall include the dates and times of water takings, the pumping rates and the total measured amounts of water pumped per day for each day that water is taken under the authorization of this Permit. 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 The Permit Holder shall implement the monitoring and mitigation measures, as described in Item 3 of Schedule A of this Permit. The Permit Holder shall keep all monitoring records available for inspection and review by Ministry staff.

4.3 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. None of these changes shall be implemented until agreed to in writing by the signing Director. 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.

4.4 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.

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 *<u>Ontario Water Resources Act</u>*, *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* *<u>Ontario Water Resources Act</u>*, *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

<u>AND</u>

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

<u>AND</u>

The Director, Section 34.1,
Ministry of the Environment and Climate Change
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 <u>www.ert.gov.on.ca</u>***

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 1st day of May, 2015.

H. Zhang

Helen Zhang, P.Eng.
Director, Section 34.1
Ontario Water Resources Act , R.S.O. 1990

Schedule A

This Schedule "A" forms part of Permit To Take Water 7877-9TEJUU, dated May 1, 2015.

1. Application for a Permit to Take Water signed by Jack Hewitt and dated December 17, 2014.

2. Golder Associates Ltd., Application for Permit to Take Water Renewal, Hanson Brick Ltd. - Tansely Quarry, Burlington, Ontario. Project No. 021-1228. Submitted to Ontario Ministry of the Environment and Climate Change, Attention: Permit to Take Water Director. Dated December 17, 2014. Attachments.

3. Golder Associates Ltd., Technical Memorandum - Proposed Permit to Take Water (PTTW) Groundwater Monitoring Program for the Tansley Quarry. Dated April 24, 2015. Addressed to: Charles Wakefield, M.A.Sc., P.Geo., Hydrogeologist Central Region Technical Support, Ministry of Environment and Climate Change, From Sharon Wood, M.Sc., P.Geo., and Phyllis McCrindle, M.Sc., P.Geo., Golder Project No. 021-1228. Attached.

021-1228 TM 2015APR24 Proposed PTTW monitoring program - Tansley Quarry.pdf

Golder Associates

TECHNICAL MEMORANDUM

DATE April 24, 2015 **PROJECT No.** 021-1228

TO Charles Wakefield, M.A.Sc., P.Geo.
Hydrogeologist, Central Region Technical Support
Ministry of Environment and Climate Change

CC Jack Hewitt, P.Eng.
Hanson Brick Ltd.

FROM Sharon Wood, M.Sc., P.Geo. **EMAIL** swood@golder.com
Phyllis McCrindle, M.Sc., P.Geo. pmccrindle@golder.com

PROPOSED PERMIT TO TAKE WATER (PTTW) GROUNDWATER MONITORING PROGRAM FOR THE TANSLEY QUARRY

1.0 INTRODUCTION

In December 2014 a permit to take water (PTTW) renewal application for the Tansley Quarry located at 3488 Tremaine Road in Burlington, Ontario was submitted to the Ministry of Environment and Climate Change (MOECC). As a part of the MOECC review, they have requested that Hanson Brick Ltd. (Hanson) provide a proposed PTTW monitoring program for the Tansley Quarry. The quarry mines shale from the Queenston Formation for use in its brick manufacturing facility located at 5155 Dundas Street West in Burlington, Ontario. Shale extraction began in January 2008 following issuance of the Aggregate Resources Act (ARA) Licence by the Ministry of Natural Resources (MNR) on December 20, 2007.

In order to proactively ensure a continuous supply of potable water to property owners whose wells may potentially be adversely affected by the quarry operation, Hanson entered into an agreement with a number of private well owners comprising the Tremaine Neighbourhood Association (TNA). In addition, Hanson also entered into a Private Communal Water System (PCWS) Agreement and an Adaptive Groundwater Management Plan (AMP) Agreement with the Region of Halton on May 8, 2007. To this end, construction of a Private Communal Water System 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 since April 2013.

The quarry requires dewatering to remove water accumulated in the quarry sump from direct precipitation and minimal 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. The quarry was dewatered under permit to take water (PTTW) No. 1718-8WPJUV which allowed for a maximum daily discharge rate of 4,320 m^3/day. During operations, water is pumped from the quarry sump into a decant pond where the water is held for at least 24 hours prior to being discharged off-site under Environmental Compliance Certificate (ECA) No. 8944-8MKKNA.

2.0 PROPOSED MONITORING PROGRAM

The below proposed PTTW monitoring program for the Tansley Quarry consists of groundwater level monitoring and groundwater quality sampling from on-site/off-site monitoring wells and off-site private wells (Figure 1).

The on-site/off-site monitoring wells are nested and are composed of overburden wells; bedrock wells that straddle the overburden-bedrock interface; and wells installed in the intermediate and deep bedrock.

The off-site Private wells are open boreholes that are completed in overburden and shallow bedrock.

2.1 Water Level Monitoring

Consistent with the current water level monitoring program, continuous groundwater level monitoring at on-site nested wells MW-01 to MW-10 and off-site nested well MW-11 will be conducted. Groundwater level monitoring will also be conducted in off-site wells TW-1, TW-2 and TW-3. However it should be noted that well TW-2 has been dry since installation in August 2007.

Also consistent with the current program, continuous groundwater level monitoring will be conducted at off-site private wells namely Hendervale ABC Barn, Hendervale XYZ Barn, Hendervale Main Barn, Hendervale House, Hendervale Cottage, Finucci, Featherstone, Simms and Bekkers wells (total of nine wells). It should be noted that a datalogger was installed in the Wettlaufer well in January 2008 but was subsequently removed and lost by the homeowner/resident in June 2008. We do not propose to reinstall the datalogger in the well as the nearby Simms well is considered to be representative of groundwater levels in the area. In addition, it should be noted that the Wiggins well has been decommissioned and therefore no water level monitoring will be conducted. However, water level monitoring will still be conducted in the vicinity of the Wiggins well (i.e. at the Featherstone well and well MW-03).

All on-site and off-site monitoring wells and private wells monitored for water levels are installed with data loggers for continuous water level monitoring with two exceptions. The first exception is the overburden well in the MW-01 well nest which is pinched. The second exception is the intermediate well in the MW-02 well nest which has a small diameter (< 1.9 cm). In both cases a datalogger cannot be installed therefore manual water levels are obtained quarterly. Dataloggers are downloaded on a quarterly basis. Dataloggers in the private wells are installed with direct read cables and dataloggers in the remaining on-site/off-site monitoring wells are installed with stainless steel cable. Table 1 summarizes the water level monitoring program.

2.2 Water Quality Monitoring

Water quality monitoring for on-site and off-site monitoring wells and off-site private wells is outlined below.

On-site/off-site monitoring wells

Consistent with the current water quality monitoring program, groundwater will be obtained from eleven monitoring well nests (MW-01, MW-02, MW-03, MW-04, MW-05, MW-06, MW-07, MW-08, MW-09, MW-10 and MW-11) that will be sampled annually in the Fall and analysed for the same suite of parameters in the existing monitoring program which includes inorganics, nutrients and metals as outlined in Table 2.

It should be noted that a number of the deep wells have historically had insufficient water for analysis, but where enough water is obtained a sample will be submitted.

Private Wells

Consistent with the current program, off-site private well groundwater quality monitoring will be conducted at the Bekkers, Eno/Myers, Simms, Hendervale House and Hendervale Cottage, Sicard and Sugiyama wells. Hendervale Main Barn, Hendervale ABC Barn and Hendervale XYZ Barn wells which all pump into an interconnected livestock watering cistern system which may also receive water from other sources. This interconnected system does not allow for discrete water samples to be obtained from the individual wells. Historically, a sample was obtained from the cistern system via a tap. If the resident can confirm that the cistern water is only groundwater then a sample will be obtained.

The private wells will be sampled at the same time as the monitoring wells on an annual basis in the Fall and will be analysed for the same suite of parameters in the existing monitoring program which includes inorganics, nutrients and metals as outlined in Table 2.

It should be noted that samples cannot be obtained from the following private wells outlined below:

- The Featherstone and Finucci wells are now connected to the PCWS and it is our understanding that they no longer have a pump and are no longer used for domestic purposes.
- Wiggins and Robinson wells are now connected to the PCWS and have been decommissioned.

Water quality samples will be collected by technicians familiar with water sampling procedures. A certified analytical laboratory will provide sample bottles containing the appropriate preservative. Water quality samples will be kept in a cooler and submitted to, and analyzed by, the analytical laboratory. An appropriate number of duplicate samples will be obtained i.e. approximately 1 duplicate for every 10 samples.

3.0 CLOSURE

It is our opinion that the private well and on-site monitoring well network outlined above will provide the necessary data on any potential groundwater level or groundwater quality impacts that may be caused by water taking activities at the Tansley Quarry. Please review the proposed program and let us know if you have any questions or concerns.

Attachments:	Table 1 – Proposed PTTW Monitoring Program
	Table 2 – Parameters for Water Quality Sampling
	Figure 1 – Proposed PTTW Monitoring Well Network

SW/PMMC/lag

n:\active\2002\1200\021-1228 - hanson brick hydrogeo burlington\correspondence\monitoring program\moecc\021-1228 tm 2015apr24 proposed pttw monitoring program - tansley quarry.docx

TABLES

Table 1
Proposed PTTW Monitoring Program
Tansley Quarry - Hanson Brick Ltd.

Well	**Proposed Program**	
	Water Level	**Water Quality**
On-Site Monitoring		
MW-01	✓	✓
MW-02	✓	✓
MW-03	✓	✓
MW-04	✓	✓
MW-05	✓	✓
MW-06	✓	✓
MW-07	✓	✓
MW-08	✓	✓
MW-09	✓	✓
MW-10	✓	✓
Off-Site Monitoring		
MW-11	✓	✓
TW-1	✓	
TW-2	✓	
TW-3	✓	
Hendervale ABC Barn	✓	✓
Hendervale XYZ Barn	✓	✓
Hendervale Main Barn	✓	✓
Hendervale House	✓	✓
Hendervale Cottage	✓	✓
Bekkers	✓	✓
Finucci	✓	
Featherstone	✓	
Simms	✓	✓
Sicard		✓
Sugiyama		✓
Eno/Myers		✓

Notes:

1) Water quality parameters are outlined on Table 2.

2) All wells identified for water level monitoring are equipped with data loggers for continuous water level monitoring with the exception of the overburden well in the MW-01 nest, the intermediate well in the MW-02 well nest and well TW-2 which is dry.

Table 2
Parameters for Water Quality Sampling
Tansley Quarry - Hanson Brick Ltd.

Inorganics	
Alkalinity	Nitrate as N
Free cyanide	Nitrite as N
Hardness	Sulphate
pH	Phenols
Chloride	Phosphate
Bromide	Sulphide
Fluoride	Total suspended solids
Turbidity	
Nutrients	
Ammonia as N	
Total phosphorous	
Metals	
Aluminum	Mercury
Antimony	Molybdenum
Arsenic	Nickel
Barium	Phosphorous
Beryllium	Potassium
Bismuth	Selenium
Boron	Silicon
Cadmium	Silver
Calcium	Sodium
Chromium	Strontium
Cobalt	Thallium
Copper	Tin
Iron	Titanium
Lead	Uranium
Magnesium	Vanadium
Manganese	Zinc

FIGURE

LEGEND

- ● Private Well
- ◉ Private Well with Level Logger Installed
- ⊕ Monitoring Well (Golder, 2002 & 2007)
- ⊕ Test Well (Golder, 2007)
- ┼ Railways
- ● Utility Line
- — 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.

0 100 200 400 600
Meters

PROJECT

TANSLEY QUARRY
HANSON BRICK LTD.

TITLE

PROPOSED PTTW MONITORING WELL NETWORK

Golder Associates
Mississauga, Ontario

PROJECT NO. 021-1228			SCALE 1:8,000	Ver. 1.0
DESIGN	KD	18 Dec. 2006	FIGURE: 1	
GIS	KD	24 Apr. 2015		
CHECK	SW	24 Apr. 2015		
REVIEW	PMMC	24 Apr. 2015		

G:\Projects\2002\021-1228_Tremaine_Quarry\GIS\MXDs\Draft\Letters\Apr2015\Proposed_MW_Network.mxd

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.

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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 *<u>Ontario Water Resources Act</u>, 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 <u>Environmental Bill of Rights</u>, 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 <u>Ontario Water Resources Act</u>, 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 each 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

AND

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

AND

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 Environmental Bill of Rights, 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. ✓

Ontario

Ministry of the Environment
Ministère de l'Environnement

AMENDED ENVIRONMENTAL COMPLIANCE APPROVAL

NUMBER 8944-8MKKNA
Issue Date: April 17, 2013

Hanson Brick Ltd.
5155 Dundas St P.O. Box 248
Burlington, Ontario
L7R 3Y2

Site Location: Tansley Quarry-2488 Tremaine Road
Lot 1 and 2, Concession 1NDS
Burlington City, Regional Municipality of Halton

You have applied under section 20.2 of Part II.1 of the *Environmental Protection Act, R.S.O. 1990, c. E. 19 (Environmental Protection Act) for approval of:*

establishment of stormwater management and sewage works for the collection, transmission, treatment and disposal of ground-water and surface water accumulating in the confines of the quarry area including the excavated area of the quarry, on an approximately 17.65ha. quarry area, of the total 38.4ha. property, and 2.30ha. external undeveloped area to provide enhanced level of water quality protection by attenuating post-development peak flow in wetponds as follows:

1. Wet Pond 1: a ponding area of approximately 7624sq.m., with a peak storage volume of 4,219cu.m. including approximately 885cu.m. of permanent storage volume to intercept run-off from an estimated catchment area of 8.92ha. and 2.3ha. external drainage area to attenuate peak 2-year storm run-off for a minimum 24hours duration to discharge into the existing 900mm diameter culvert under the Haul Road and then off-site to the Fourteen Mile Creek via the Highway 407 drainage system.
- The outlet control structures to include: a 450mm diameter perforated riser on the pond embankment, an 150mm diameter reverse slope outlet pipe into a 1.2m by 1.2m grated catchbasin complete with a 55mm diameter orifice on the 150mm pipe to control low flows; to discharge via 450mm diameter outlet pipe.
- Emergency Spillway: a 3.5m wide, 200mm deep overflow spillway to avoid embankment damage incase of orifice blockage.

2. Wet Pond 2: a ponding area of approximately 1762sq.m., with a peak storage volume of 1,911cu.m. including approximately 735cu.m. of permanent storage volume to intercept run-off from an estimated catchment area of 1.61ha. and part of drainage areas of the stockpile, to attenuate peak 25-year event storm run-off for a minimum 24hours duration to discharge into the existing 2X1800mm diameter culverts under the Haul Road and then off-site to the Fourteen Mile Creek via the Highway 407 drainage system.

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- The outlet control structures to include: a 450mm diameter perforated riser on the pond embankment, an 150mm diameter reverse slope outlet pipe into a 1.2m by 1.2m grated catchbasin complete with a 50mm diameter orifice on the 150mm pipe to control low flows; to discharge via 450mm diameter outlet pipe.

- Emergency Spillway: a 3.5m wide, 300mm deep overflow spillway to avoid embankment damage incase of orifice blockage.

3. Wet Pond 3: a ponding area of approximately 3,119sq.m., with a peak storage volume of 2,319cu.m. including approximately 685cu.m. of permanent storage volume to intercept run-off from an estimated undisturbed catchment area of 3.70ha. to attenuate peak 10-year storm run-off for a minimum 24hours duration to discharge into the existing ravine/watercourse passing through the quarry site carrying storm run-off from an estimated 79.81ha upstream external area, and then off-site to the Fourteen Mile Creek via the Highway 407 drainage system.

- The outlet control structures to include: a 450mm diameter perforated riser on the pond embankment, an 150mm diameter reverse slope outlet pipe into a 1.2m by 1.2m grated catchbasin complete with a 50mm diameter orifice on the 150mm pipe to control low flows; to discharge via 450mm diameter outlet pipe.

- Emergency Spillway: a 3.5m wide, 400mm deep overflow spillway to avoid embankment damage incase of orifice blockage.

4. Wet Pond 4: two (2) ponding areas of approximately 2065sq.m., with a peak storage volume of 1,946cu.m. including approximately 640cu.m. of permanent storage volume to intercept run-off from an estimated catchment area of 3.42ha. to attenuate peak 10-year storm run-off for a minimum 24hours duration to discharge into the existing ravine/watercourse passing through the quarry site and then off-site to the Fourteen Mile Creek via the Highway 407 drainage system.

- The outlet control structures to include: a 450mm diameter perforated riser on the pond embankment, an 150mm diameter reverse slope outlet pipe into a 1.2m by 1.2m grated catchbasin complete with a 50mm diameter orifice on the 150mm pipe to control low flows; to discharge via 450mm diameter outlet pipe.

- Emergency Spillway: a 3.5m wide, 300mm deep overflow spillway to avoid embankment damage incase of orifice blockage.

5. Pump Sump: one (1) existing sump, approximately 10 metres wide, 10 metres long and 2 metres deep, to collect ground and surface water from the active quarry process area and is equipped with a pump operating at a rate of 300 litres per minute to discharge into the decant pond as described below:

6. Decant Pond: one (1) exiting pond, size approximately 50m X 50m, 1.5m water depth and 600mm free board, providing an active volume of 2,870cubic metres, permanent storage of 1,090cu.m., including a sediment storage volume of 210cu.m. to receive de-watering liquid and storm flows from the sump pump of the active quarry area, discharging via an outlet control structure consisting of a 150mm diameter Hicken-bottom, via a 150 millimetre diameter reverse gradient pipe, control manhole and 300 millimetre diameter discharge pipe with a control valve, to an existing intermittent watercourse that drains to the Fourteen Mile Creek via the Highway 407 drainage system;

7. <u>By-pass Storm Flow:</u> storm flows from the upstream / external approximately 79.81ha. catchment area which is tributary to the existing ravine/watercourse passing through the quarry site and the quarry haul road vegetated ditches, are to continue to drain freely via the ravine within the property, to the Fourteen Mile Creek passing through the Highway 407 drainage system;

including all erosion/sedimentation control measures complete with seeding and sodding of exposed quarry materials on site, during construction, operation and all other controls of electrical equipment, monitoring and other instrumentation, piping, pumps, valves and appurtenances essential for the proper operation of the aforementioned sewage works;

as per the final plans, specifications and Stormwater Management Report and **Application for Approval of Environmental Compliance, Industrial Sewage Works and Stormwater Management Facility,** dated September 08, 2011**, prepared and submitted by** Robert J. Long, P. Eng., Long Environmental Consultants Inc. **in association with AMEC Environmental & Infrastructure, Consulting Engineers and the following previously 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 mails 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.

For the purpose of this environmental compliance approval, 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 environmental compliance approval is issued to you subject to the terms and conditions outlined below:

TERMS AND CONDITIONS

1. GENERAL PROVISIONS

(1) The *Owner* shall ensure that any person authorized to carry out work on or operate any aspect of the *Works* is notified of this *Approval* and the conditions herein and shall take all reasonable measures to ensure any such person complies with the same.

(2) 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 *Approval* , and the application for approval of the W*orks.*

(3) Where there is a conflict between a provision of any document in the schedule referred to in this *Approval* and the conditions of this *Approval* , the Conditions in this *Approval* shall take precedence, and where there is a conflict between the documents in the schedule, the document bearing the most recent date shall prevail.

(4) Where there is a conflict between the documents listed in the Schedule submitted documents, and the application, the application shall take precedence unless it is clear that the purpose of the document was to amend the application.

(5) The Conditions of this *Approval* are severable. If any Condition of this *Approval* , or the application of any requirement of this *Approval* to any circumstance, is held invalid or unenforceable, the application of such condition to other circumstances and the remainder of this *Approval* shall not be affected thereby.

2. EXPIRY OF APPROVAL

The approval issued by this *Approval* will cease to apply to those parts of the *Works* which have not been constructed within five (5) years of the date of this *Approval.*

3. CHANGE OF OWNER

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

(a) change of *Owner;*
(b) change of address of the *Owner;*
(c) change of partners where the *Owner* is or at any time becomes a partnership, and a copy of the most recent declaration filed under the Business Names Act, R.S.O. 1990, c.B17 shall be included in the notification to the *District Manager;* and
(d) change of name of the corporation where the *Owner* is or at any time becomes a corporation, and a copy of the most current information filed under the Corporations Information Act, R.S.O. 1990, c. C39 shall be included in the notification to the *District Manager* .

4. OPERATION AND MAINTENANCE.

(1) The *Owner* shall ensure that the design minimum liquid retention volume(s) is maintained in the ponds at all times.

(2) The *Owner* shall inspect the *Works* at least once a year and, if necessary, clean and maintain the *Works* to prevent the excessive build-up of sediments, oil/grit, and/or vegetation. 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.

(3) The *Owner* shall maintain a logbook to record the results of these inspections and any cleaning and maintenance operations undertaken, and shall keep the logbook at the Corporate Office for inspection by the *Ministry*. The logbook shall include the following:

(a) the name of the *Works;*

(b) the date and results of each inspection, maintenance and cleaning, including an estimate of the quantity of any materials removed; and

(c) the date of each spill within the catchment area, including follow-up actions / remedial measures undertaken.

5. RECORD KEEPING

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

6. 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.

7. DECANT POND 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) confirmation that the concentration of Total Suspended Solids is equal to or less than 15mg/L.

8. EFFLUENT LIMITS

(1) The Owner shall design, construct and operate the decant pond and other 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 Table 1.

9. 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) a grab sample shall be collected of the contents of the decant pond effluent once during each day of discharge with samples analyzed for each parameter listed in Column 2 of Table 2; and

(3) a composite sample shall be collected of the stream flows at Monitors M2 and M3 during representative run-off events of 15mm and larger as referred to in Condition 9 (6) and as described in Operation Manual for the parameters listed in Column 3 of Table 2; and

Table -2 Effluent Monitoring

Column 1	Column 2	Column 3
	M1-at Decant Pond	M2 & M3- at Steam flows
Flow Rate	Continuous	Continuous during representative storms 15mm and larger events
Sample Type	Grab	Composite
Parameter for monitoring	Total Suspended Solids, Oil& Grease, Chloride, Sulphate, Boron, Iron and Zinc.	Total Suspended Solids

(4) 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.

(5) A continuous flow measuring devices shall be installed and maintained to measure the flow rates of each effluent streams from the sewage works, with an accuracy to within plus or minus 15 per cent of the actual flow rate for the entire design range of the flow measuring device as per the following schedules:

(a) Sump Effluent: a Kobold EDM or equivalent 100mm diameter Electronic Water Meter.

(b) Decant Pond Monitor and sampler at M1: a Heron Dipper Log or equivalent level logger/transducer for storm flow and pre-release monitoring; and

(c) Stream flow Monitors M2 & M3: automated sampler (ISCO 730 Bubbler Flow Modules and ISCO 6712 Full size Portable Continuous Sampler or approved equivalents).

(6) The Owner shall measure, record and calculate the flow rate for each effluent stream on each day of sampling. The automated sampler M2 and M3 shall be programmed to take composite samples over the duration of run-off responses from the 15mm storm events and greater which would be 10 to 15 storms per year.

(7) 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.

10. 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 8, 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 *Approval* 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 *Works* are constructed in a timely manner so that standards applicable at the time of Approval of the *Works* are still applicable at the time of construction, to ensure the ongoing protection of the environment

3. Condition 3 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 *Approval* and continue to operate the works in compliance with it.

4. Condition 4 is included to require that the *Works* be properly operated and maintained such that the environment is protected .

5. Condition 5 is included to require that all records are retained for a sufficient time period to adequately evaluate the long-term operation and maintenance of the *Works.*

6. Condition 6 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.

7. Conditions 7 and 8 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.

8. Condition 9 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.

9. Condition 10 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.

Upon issuance of the environmental compliance approval, I hereby revoke Approval No(s). 4408-7AUL75 issued on February 4, 2008

In accordance with Section 139 of the Environmental Protection Act, you may by written Notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the Tribunal. Section 142 of the Environmental Protection Act provides that the Notice requiring the hearing shall state:

1. The portions of the environmental compliance approval or each term or condition in the environmental compliance 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 each portion appealed

Pursuant to subsection 139(3) of the Environmental Protection Act, a hearing may not be required with respect to any terms and conditions in this environmental compliance approval, if the terms and conditions are substantially the same as those contained in an approval that is amended or revoked by this environmental compliance approval.

The Notice should also include:

3. The name of the appellant;
4. The address of the appellant;
5. The environmental compliance approval number;
6. The date of the environmental compliance approval;
7. The name of the Director, and;
8. The municipality or municipalities within which the project is to be engaged in

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

This Notice must be served upon:

The Secretary*
Environmental Review Tribunal
655 Bay Street, Suite 1500
Toronto, Ontario
M5G 1E5

AND

The Director appointed for the purposes of
Part II.1 of the Environmental Protection 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) 212-6349, Fax: (416) 314-4506 or www.ert.gov.on.ca**

The above noted activity is approved under s.20.3 of Part II.1 of the Environmental Protection Act.

DATED AT TORONTO this 17th day of April, 2013

Edgardo Tovilla
Director
appointed for the purposes of Part II.1 of the
Environmental Protection Act

MN/
c: District Manager, MOE Halton-Peel
Robert J. Long, P. Eng., Long Environmental Consultants Inc. √

Ministry of the Environment and Climate Change
Central Region
Technical Support Section
Water Resources
8th Floor
5775 Yonge St
Toronto ON M2M 4J1
Fax: (416) 325-6347
Tel: (416) 326-3323

Ministère de l'Environnement et de l'Action en matière de changement climatique
Direction régionale du Centre
Bureau du district de Toronto
8e étage
5775 rue Yonge
Toronto ON M2M 4J1
Télécopieur: (416) 325-6347
Tél:(416) 326-3323

June 8, 2016

Forterra Brick, Ltd. / Briques Forterra, Ltee
2488 Tremaine Rd Concession 1NDS
Burlington, Ontario, L7R 3X4
Canada

Attention: Jack Hewitt

RE: Permit to Take Water: Quarry Dewatering
Concession 1 Former Township of Nelson Part 1 & 2 Plan 20R-14660
Burlington, Regional Municipality of Halton
Reference Number 0016-AAHQSZ

Dear Mr. Hewitt,

Please find attached **Permit to Take Water No. 0477-AAPPNB** issued to **Forterra Brick, Ltd. / Briques Forterra, Ltee.** The ownership change has been completed as per your request on March 3, 2016. This Permit revokes and replaces Permit No. 7877-9TEJUU issued to Hanson Brick Ltd. on May 1, 2015 which authorizes the withdrawal of water in accordance with the application that was previously submitted as referenced in Schedule "A".

This Permit is valid until **April 30, 2025** and shall be kept available on site for inspection by Ontario Ministry of the Environment and Climate Change staff.

Please note, Ontario Regulation 387/04 "Water Taking" requires all water takers to report daily water taking amounts to the Water Taking Reporting System (WTRS) electronic database: https://www.lrcsde.lrc.gov.on.ca/wtrs/. Daily water taking must be reported on a calendar year basis. If no water is taken, then a "no taking" report must be entered. Please consult the Regulation and Section 4 of this Permit for monitoring requirements.

If you have questions about reporting requirements, please call the WTRS Help Desk at 416-235-6322 (toll free: 1-877-344-2011) or by email, WTRSHelpdesk@ontario.ca. It is preferred that you submit your data directly and electronically to the WTRS. Where this is impracticable, please use the Water Taking Submission Form (included as Appendix C of the *Technical Bulletin: Permit To Take Water (PTTW) - Monitoring and Reporting of Water Takings)* , which can be downloaded from the above web site, and fax your completed forms to

416-235-6549 or mail them to: Water User Reporting Section, 125 Resources Rd. Toronto, ON M9P 3V6.

Take notice that in issuing this Permit to Take Water, terms and conditions pertaining to the taking of water and to the results of the taking have been imposed. The terms and conditions have been designed to allow for the development of water resources, while providing reasonable protection to existing water uses and users.

One of the purposes of the issuance of a Permit is to ensure that the permitted taking(s) will not cause negative impacts to the environment or other water supplies which were in use prior to the date of this Permit. If the taking of water should result in any negative impacts, the Permit Holder **Forterra Brick, Ltd. / Briques Forterra, Ltee** will be required to restore the water supplies of those affected in a manner acceptable to the Ontario Ministry of the Environment and Climate Change or to reduce the rate and amount of taking until any negative impacts are eliminated.

Any change of address or ownership of the property for which this Permit is issued must be reported immediately to the Director. The issuance of this Permit to Take Water does not relieve you from compliance with the legislative requirements of this Ministry or any other agencies.

It is the responsibility of **Forterra Brick, Ltd. / Briques Forterra, Ltee** to ensure that any person taking water under the authority of this Permit is familiar with and complies with the terms and conditions.

Yours truly,

Karoly Tajnay
Supervisor (Acting)
Central Region

File Storage Number: SI-HP-BU-C1-220

/TI

E-copy: Jack Hewitt; jack.hewitt@hanson.com

Ministry of the Environment and Climate Change
Ministère de l'Environnement et de l'Action en matière de changement climatique

AMENDED PERMIT TO TAKE WATER

Ground Water
NUMBER 0477-AAPPNB

Pursuant to Section 34.1 of the Ontario Water Resources Act, R.S.O. 1990 this Permit To Take Water is hereby issued to:

Forterra Brick, Ltd. / Briques Forterra, Ltee
2488 Tremaine Rd Concession 1NDS
Burlington, Ontario, L7R 3X4
Canada

For the water taking from: Quarry Sump

Located at: Lot 1, Concession 1 NDS, Geographic Township of Nelson
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 34.1, 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 and Climate Change.

(d) "District Office" means the Halton-Peel, Parts of Lots 1 and 2 Concession 1 District Office.

(e) "Permit" means this Permit to Take Water No. 0477-AAPPNB including its Schedules, if any, issued in accordance with Section 34.1 of the OWRA.

(f) "Permit Holder" means Forterra Brick, Ltd. / Briques Forterra, 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 December 17, 2014 and signed by Jack 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 **April 30, 2025**. 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:	4,320,000		

4. Monitoring

4.1 The Permit Holder shall maintain a daily record of all water takings. This record shall include the dates and times of water takings, the pumping rates and the total measured amounts of water pumped per day for each day that water is taken under the authorization of this Permit. 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 The Permit Holder shall implement the monitoring and mitigation measures, as described in Item 3 of Schedule A of this Permit. The Permit Holder shall keep all monitoring records available for inspection and review by Ministry staff.

4.3 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. None of these changes shall be implemented until agreed to in writing by the signing Director. 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.

4.4 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.

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 and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the Tribunal. Section 101 of the* Ontario Water Resources Act*, R.S.O. 1990, as amended, provides that the Notice requiring the 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) 326-5370
Email: ERTTribunalsecretary@ontario.ca

AND

The Director, Section 34.1, Ministry of the Environment and Climate Change
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	by Fax at	by e-mail at
(416) 212-6349	(416) 326-5370	www.ert.gov.on.ca
Toll Free 1(866) 448-2248	Toll Free 1(844) 213-3474	

This Permit cancels and replaces Permit Number 7877-9TEJUU, issued on 2015/05/01.

Dated at Toronto this 8th day of June, 2016.

Karoly Tajnay
Director, Section 34.1
Ontario Water Resources Act , R.S.O. 1990

Schedule A

This Schedule "A" forms part of Permit To Take Water 0477-AAPPNB, dated June 8, 2016.

1. Application for a Permit to Take Water signed by Jack Hewitt and dated December 17, 2014.

2. Golder Associates Ltd., Application for Permit to Take Water Renewal, Hanson Brick Ltd. - Tansely Quarry, Burlington, Ontario. Project No. 021-1228. Submitted to Ontario Ministry of the Environment and Climate Change, Attention: Permit to Take Water Director. Dated December 17, 2014. Attachments.

3. Golder Associates Ltd., Technical Memorandum - Proposed Permit to Take Water (PTTW) Groundwater Monitoring Program for the Tansley Quarry. Dated April 24, 2015. Addressed to: Charles Wakefield, M.A.Sc., P.Geo., Hydrogeologist Central Region Technical Support, Ministry of Environment and Climate Change, From Sharon Wood, M.Sc., P.Geo., and Phyllis McCrindle, M.Sc., P.Geo., Golder Project No. 021-1228. Attached.

4. Application requesting an ownership change signed by John A. Hewitt on March 3, 2016.

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:

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
		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
		Grey, firm-hard, moist SILT and CLAY TILL, gravelly, occ. cobble. (GM-ML)	4.88			
5		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*				

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: MW1

SHEET 2 OF 5

LOCATION: Refer to Plan

DRILLING DATE: Oct.1-3, 2002

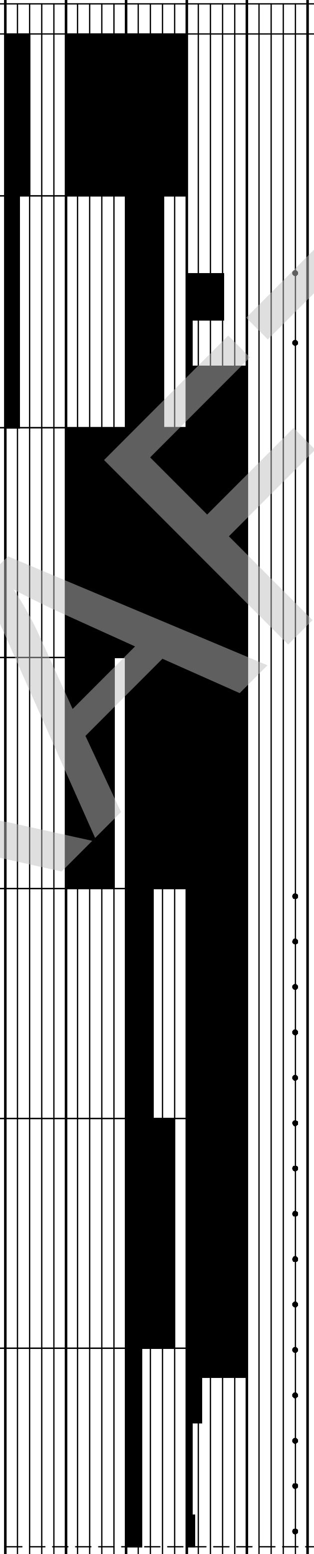
DATUM:

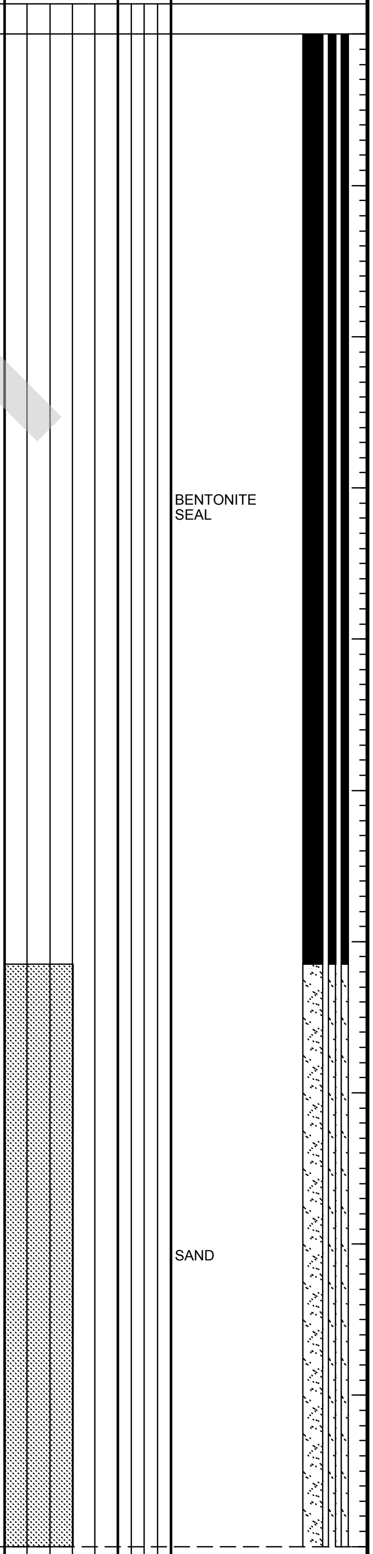
INCLINATION: -90° AZIMUTH: ---

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	SYMBOLIC LOG	ELEV. DEPTH (m)	RUN No.	PENETRATION RATE (m/min)	COLOUR % RETURN	FLUSH	DISCONTINUITY DATA TYPE AND SURFACE DESCRIPTION	NOTES WATER LEVELS INSTRUMENTATION
		--- *CONTINUED FROM PREVIOUS PAGE* ---								
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	RQ Core				4					
		Red Shale, weak, slightly weathered 10% green coloured.							BC	
16									FX	
					5				FX	
									FX	
									FX	
17									FX	
									FX	
									FX	
18		Highly friable interval. Disking every 0.25".		145.80 18.00	6				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

DRILLING DATE: Oct.1-3, 2002

DATUM:

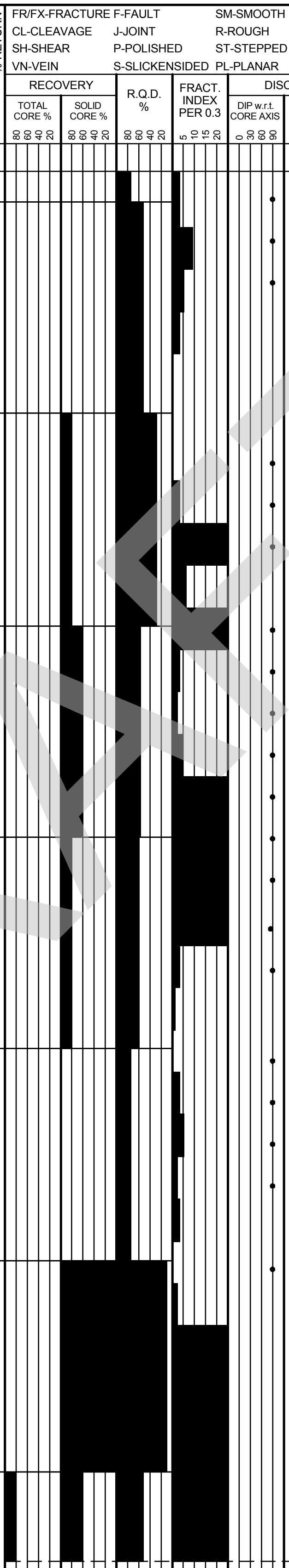
INCLINATION: -90° AZIMUTH: ---

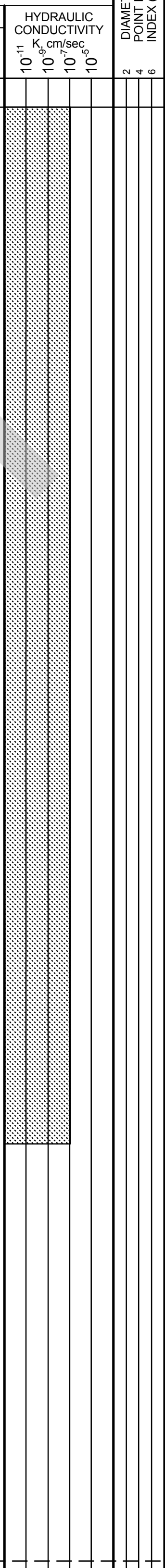
DRILL RIG: CME 75

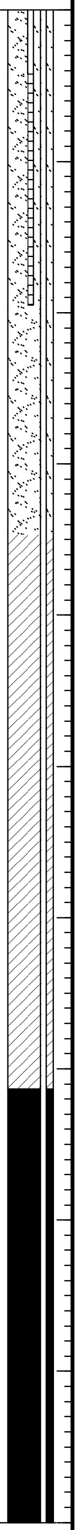
DRILLING CONTRACTOR: ALL TERRAIN DRILLING

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
		--- CONTINUED FROM PREVIOUS PAGE ---				
20	RQ Core	Red shale, slightly weathered, weak to very weak. 10% grey-green coloured bands.		7	FX FX FX	SAND
21				8		
22				9	FX/B FX/B BC	SAND
23		Friable and pitted in intervals of broken core (BC).		10	FX/B FX/B FX/B	
24					FX/B FX/B FX/B	
25		Fracture surfaces are planar and smooth to rough.		11	FX/B FX/B FX/B	PLUG BRIDGE/ROCK BRIDGE
26				12	FX/B FX/B	
27					FX/B FX/B	
28		Zone of broken core and increased weathering. Shale is highly friable, very weak and weathered.	135.96 27.84	13	FX/B BC/B BC/B BC/B	BENTONITE SEAL
29				14	BC/B	
30		*CONTINUED NEXT PAGE*				







DEPTH SCALE
1 : 50

Golder Associates

LOGGED: MR
CHECKED:

PROJECT: 021-1228

RECORD OF DRILLHOLE: MW1

SHEET 4 OF 5

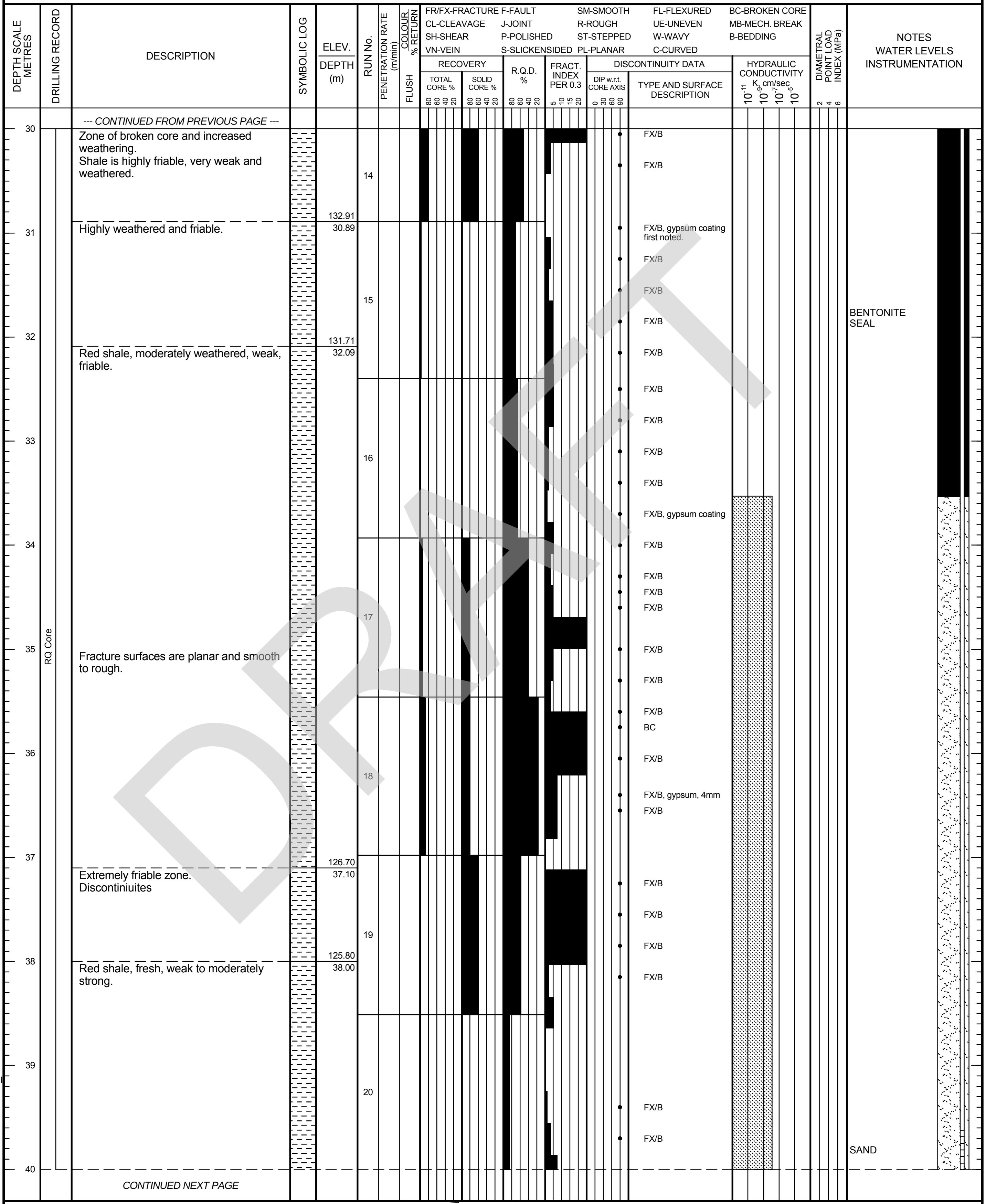
LOCATION: Refer to Plan

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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DESCRIPTION	ELEV. DEPTH (m)
Zone of broken core and increased weathering. Shale is highly friable, very weak and weathered.	132.91 30.89
Highly weathered and friable.	131.71 32.09
Red shale, moderately weathered, weak, friable. Fracture surfaces are planar and smooth to rough.	126.70 37.10
Extremely friable zone. Discontiniuites	125.80 38.00
Red shale, fresh, weak to moderately strong.	

CONTINUED NEXT PAGE

TYPE AND SURFACE DESCRIPTION:

FX/B
FX/B
FX/B, gypsum coating first noted.
FX/B
FX/B
FX/B
FX/B
FX/B
FX/B
FX/B
FX/B
FX/B, gypsum coating
FX/B
FX/B
FX/B
FX/B
FX/B
FX/B
FX/B
BC
FX/B
FX/B, gypsum, 4mm
FX/B
FX/B
FX/B
FX/B
FX/B
FX/B
FX/B

NOTES:

BENTONITE SEAL

SAND

DEPTH SCALE
1 : 50

Golder Associates

LOGGED: MR
CHECKED:

PROJECT: 021-1228

RECORD OF DRILLHOLE: MW1

SHEET 5 OF 5

LOCATION: Refer to Plan

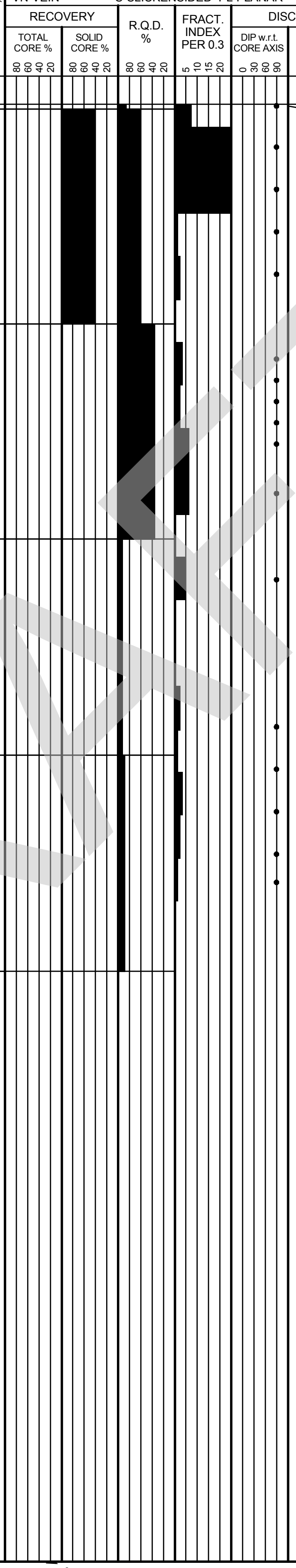
INCLINATION: -90° AZIMUTH: ---

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

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 ---					
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	
43		Red shale, fresh, weak, 10% green coloured.		120.80 43.00	23	B/FX	SAND
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							



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

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

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
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
7		TILL, very hard, dry, brown bouldery CLAY SILT TILL, occ. cobbles. (CM)	158.89 7.01	
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				

Column headings: SYMBOLIC LOG; 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)

CONTINUED NEXT PAGE

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

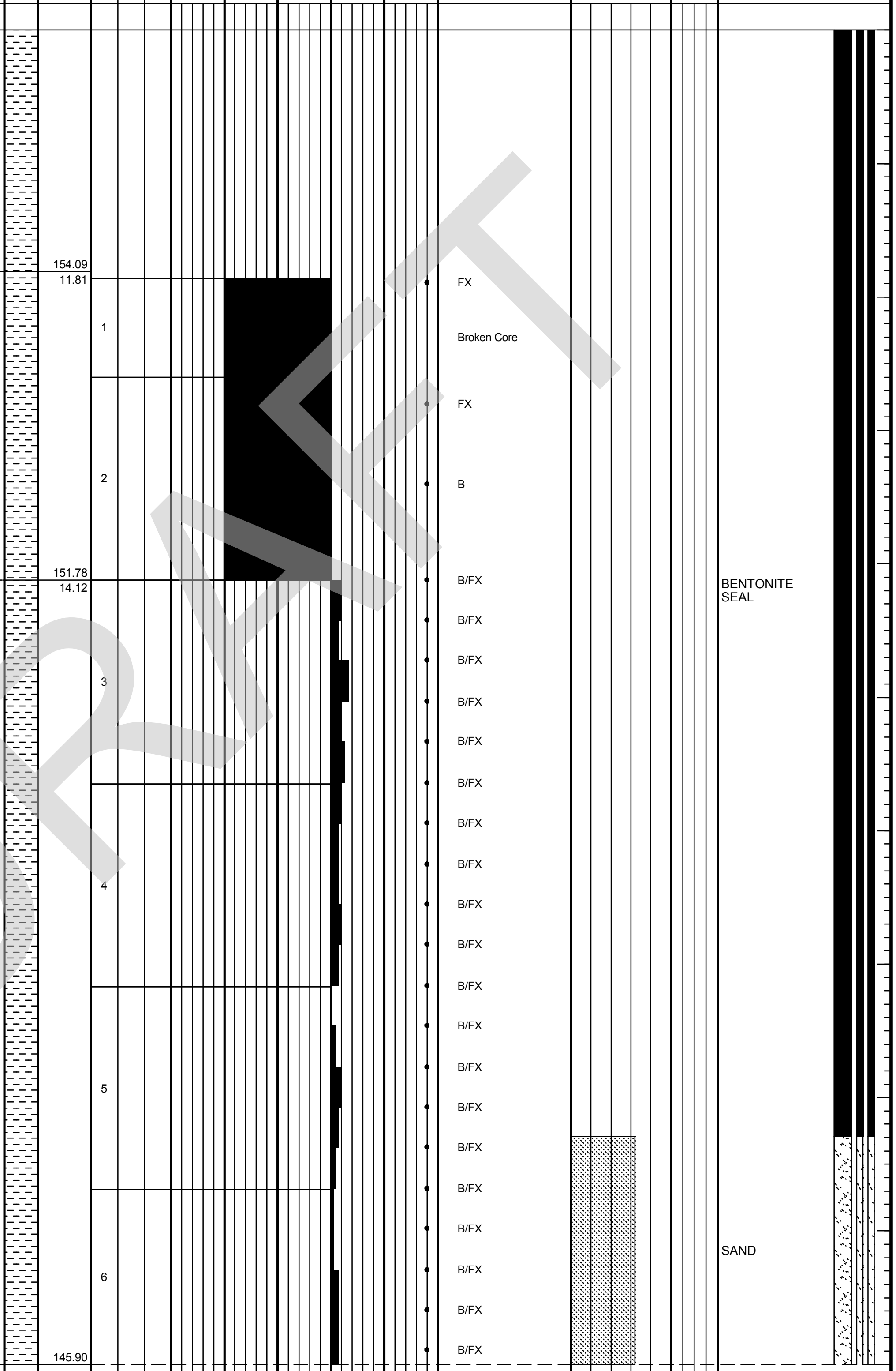
DATUM:

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



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DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	ELEV. DEPTH (m)	RUN No.	TYPE AND SURFACE DESCRIPTION	NOTES WATER LEVELS INSTRUMENTATION
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.	154.09			
11.81	HQ CORE	Red shale with occasional (10%+/-) green coloured bands, weak. This interval recovered as broken core.	11.81	1	FX	
12					Broken Core	
13				2	FX	
					B	
14			151.78			
14.12		Intact core begins.	14.12	3	B/FX	BENTONITE SEAL
					B/FX	
					B/FX	
15					B/FX	
					B/FX	
				4	B/FX	
16					B/FX	
					B/FX	
					B/FX	
					B/FX	
17				5	B/FX	
					B/FX	
					B/FX	
18					B/FX	
				6	B/FX	
					B/FX	
19					B/FX	SAND
					B/FX	
					B/FX	
20			145.90		B/FX	

CONTINUED NEXT PAGE

DEPTH SCALE
1 : 50

Golder Associates

LOGGED: MR
CHECKED:

PROJECT: 021-1228

RECORD OF DRILLHOLE: MW2

SHEET 3 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 | SYMBOLIC LOG | ELEV. DEPTH (m) | RUN No. | PENETRATION RATE (m/min) | 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 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 ---					
20		Red shale, weak, moderately weathered. Some very weak red shale bands. Friable.	20.00	6		B/FX	
						B/FX	
						B/FX	
21				7		B/FX	
						B/FX	
						B/FX	
22						B/FX	
						B/FX	SAND
				8		B/FX	
						B/FX	
23						B/FX	
		Slight strength increase to moderately strong in green coloured shale bands.	142.60 23.30			B/FX	
						B/FX	
24				9		B/FX	
						B/FX	
						B/FX	
25	HQ CORE					B/FX	
						B/FX	
				10		B/FX	
26						B/FX	
		Discontinuity surfaces are perpendicular to core axis, planar and smooth. They appear to be bedding parallel, mechanically induced fractures.				B/FX	
						B/FX	
27						B/FX	
				11		B/FX	SAND
						B/FX	
						B/FX	
28						B/FX	
						B/FX	
				12		B/FX	BENTONITE SEAL
29						B/FX	
						B/FX	
				13		B/FX	
30						B/FX	
		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

INCLINATION: -90° AZIMUTH: ---

DRILLING DATE: Sept.26&30, 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	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.			13								B/FX B/FX			
31					14								B/FX B/FX B/FX B/FX			
32													B/FX B/FX, gypsum coating B/FX			
33		First gypsum coatings on joint surfaces noted at 29.18m and 32.10m.			15								B/FX B/FX B/FX B/FX			BENTONITE SEAL
34					16								B/FX B/FX B/FX			
35													B/FX B/FX, gypsum coatings 1mm, 4mm B/FX			
36					17								B/FX B/FX B/FX			
37		Low RQD zone in red and green shales. Full of gypsum nodules.			18								B/FX B/FX B/FX, gypsum nodules B/FX			
38													B/FX B/FX			
39		As above, increased rock strength to moderately strong.			19								B/FX B/FX B/FX, gypsum nodules B/FX			SAND
40		*CONTINUED NEXT PAGE*														

DRAFT

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: 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

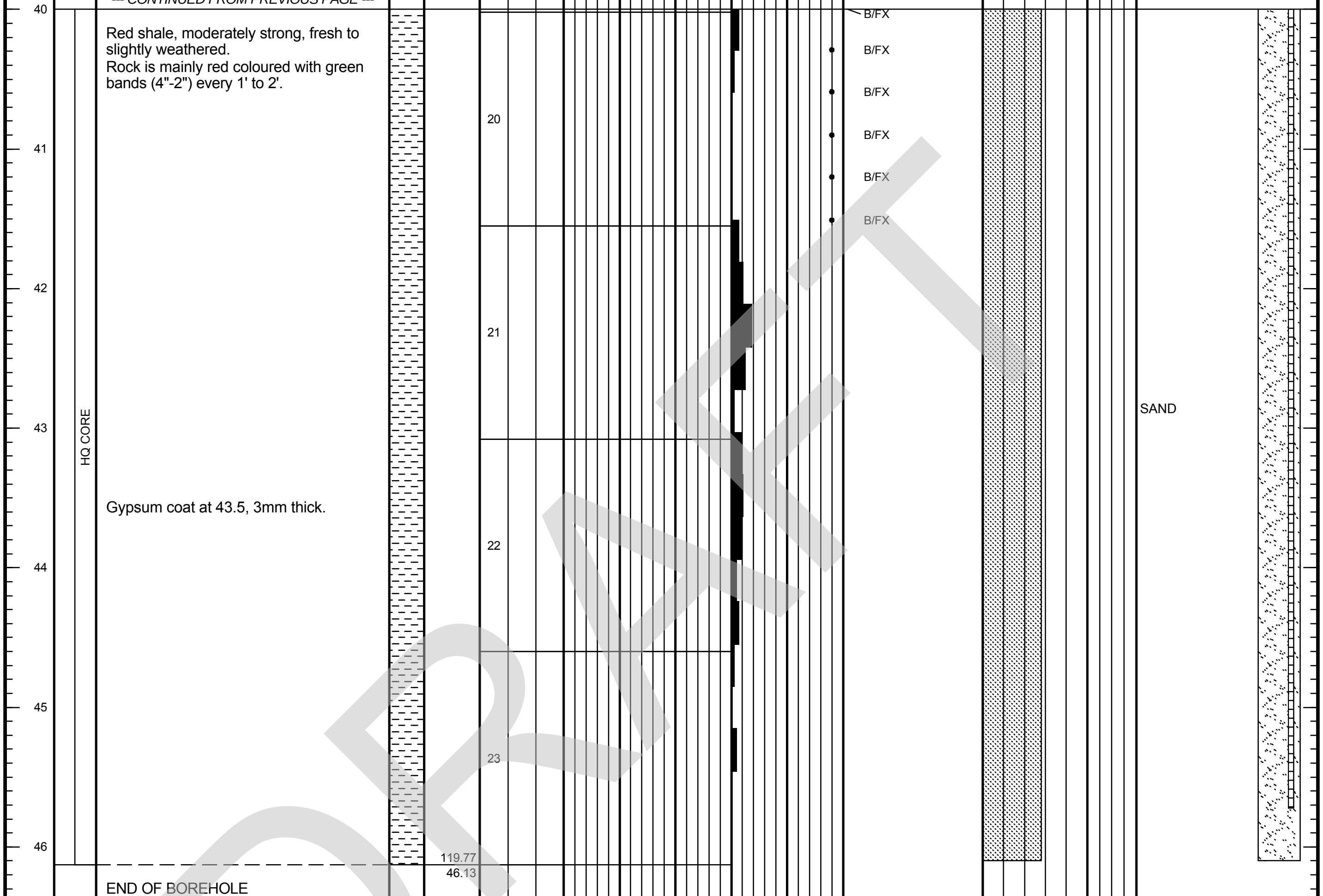
DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	RUN No.	PENETRATION RATE (m/min)	FLUSH COLOUR % RETURN	RECOVERY TOTAL CORE % 80 60 40 20	RECOVERY SOLID CORE % 80 60 40 20	R.Q.D. % 80 60 40 20	FRACT. INDEX PER 0.3 5 10 15 20	DISCONTINUITY DATA DIP w.r.t. CORE AXIS 0 30 60 90	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 ---

Red shale, moderately strong, fresh to slightly weathered.
Rock is mainly red coloured with green bands (4"-2") every 1' to 2'.

Gypsum coat at 43.5, 3mm thick.

END OF BOREHOLE



DEPTH SCALE
1 : 50

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:

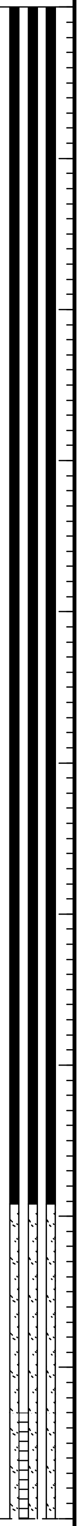
DRILL RIG: CME 75

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.		0.00 161.59													
1		TILL, moist to slightly moist, firm to hard, rooty first 0.6m, SILTY CLAY with angular cobbles and coarse gravel. (CL)		0.61													
2																	
3																	
4																	BENTONITE SEAL
5																	
6				156.10													
		TILL, moist to dry, hard, mainly SILTY CLAY (CL), some sand, gravel and cobbles. Gravel and cobbles are sub-ang to sub-rounded.		6.10													
7																	
8																	
9																	SAND
10																	



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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: MW3

SHEET 2 OF 4

LOCATION: Refer to Plan

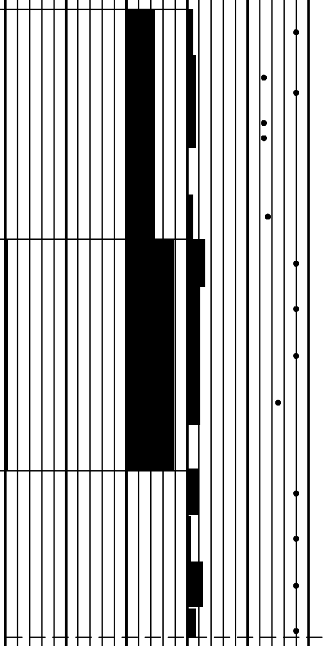
INCLINATION: -90° AZIMUTH: ---

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.	DISCONTINUITY DATA 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.		1	B,FX B,FX XJ B,FX XJ	
17					XJ	BENTONITE SEAL
18		Fractures are bedding parallel and tend to be smooth and planar.		2	B,FX B,FX B,FX B,FX XJ	
19				3	B,FX B,FX B,FX B,FX	
20		*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 | SYMBOLIC LOG | ELEV. DEPTH (m) | 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 | 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

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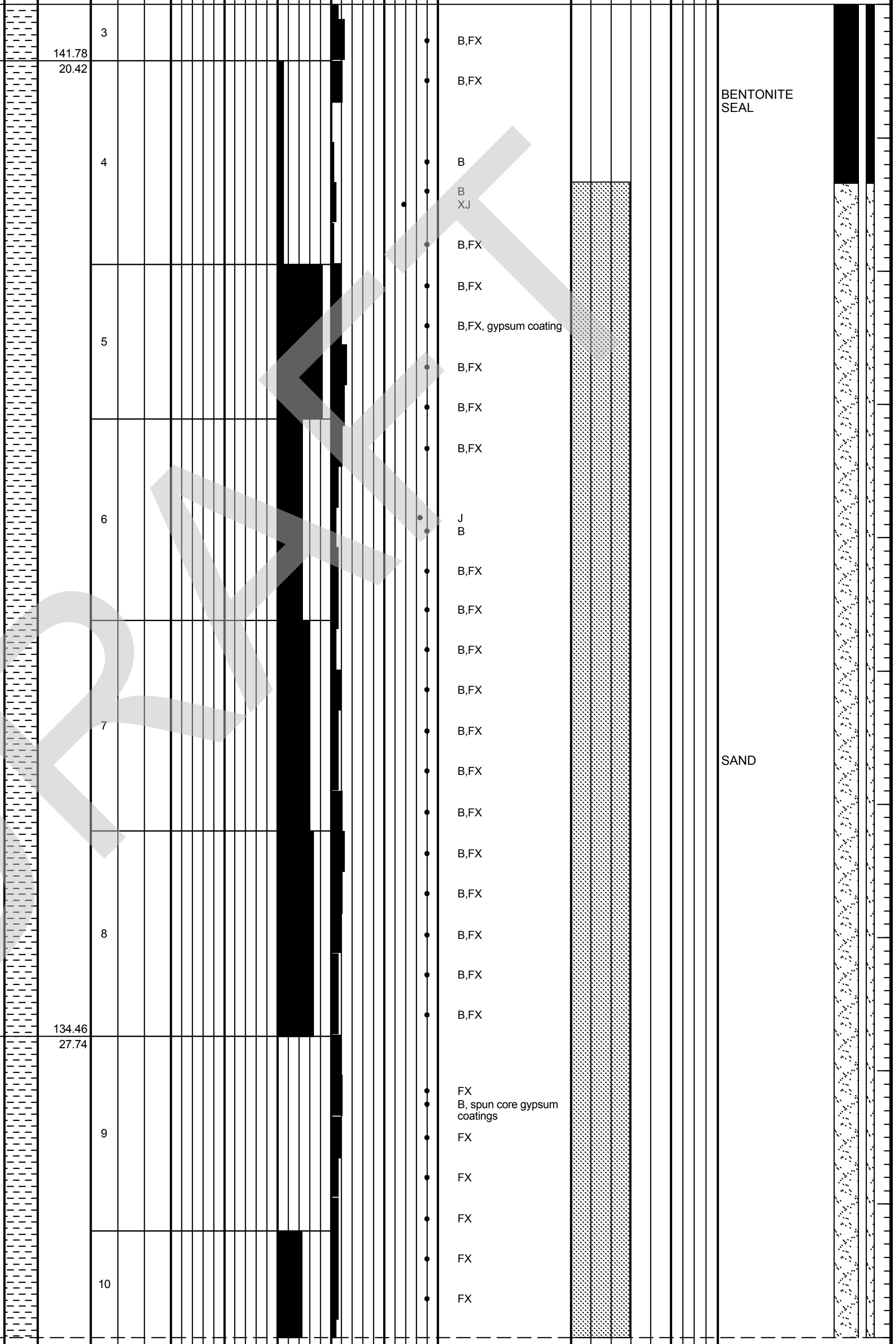

141.78
20.42

Fresh to slightly weathered, not friable, moderately strong to weak, mainly red coloured and massive with some green coloured bands.
Thinly laminated.

First noted occurence of gypsum.

Possible turbidity flow or debris torrent layer from 10.92m to 26.2m.

134.46
27.74

Red SHALE, fresh to slightly weathered, weak to medium strong, occasional green coloured bands.
Massive to thinly laminated.

Discontinuities are fractures parallel to

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

BENTONITE SEAL

SAND

CONTINUED NEXT PAGE

DEPTH SCALE
1 : 50

Golder Associates

LOGGED: MR
CHECKED:

PROJECT: 021-1228

RECORD OF DRILLHOLE: MW3

SHEET 4 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
CL-CLEAVAGE	J-JOINT	R-ROUGH	UE-UNEVEN
SH-SHEAR	P-POLISHED	ST-STEPPED	W-WAVY
VN-VEIN	S-SLICKENSIDED	PL-PLANAR	C-CURVED
BC-BROKEN CORE	MB-MECH. BREAK	B-BEDDING	

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

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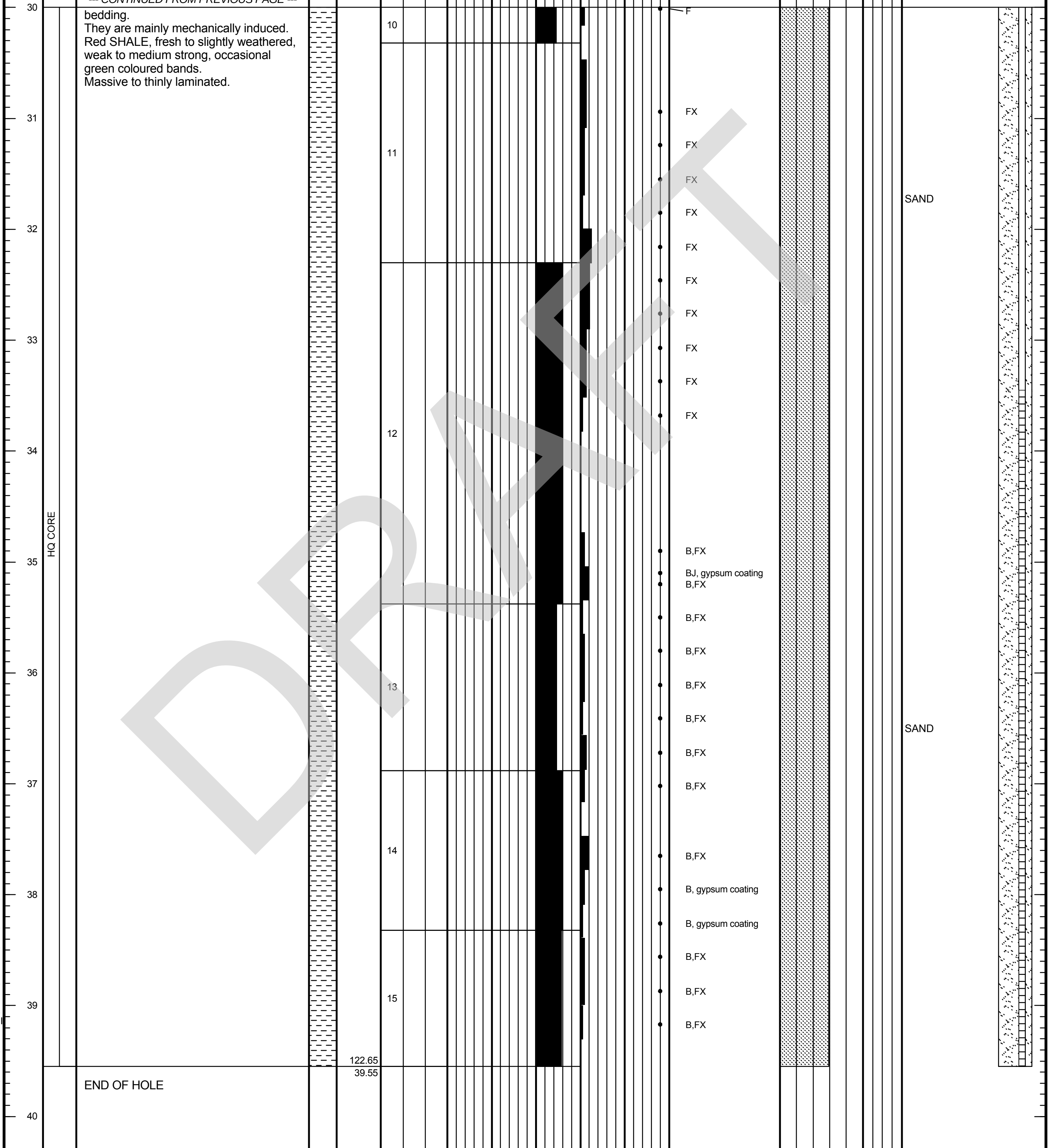


bedding.
They are mainly mechanically induced.
Red SHALE, fresh to slightly weathered, weak to medium strong, occasional green coloured bands.
Massive to thinly laminated.

122.65
39.55

END OF HOLE

RUN No.
10
11
12
13
14
15

TYPE AND SURFACE DESCRIPTION
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

SAND

SAND

DEPTH SCALE
1 : 50

LOGGED: MR
CHECKED:

PROJECT: 021-1228

RECORD OF DRILLHOLE: MW4

SHEET 1 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	ELEV. DEPTH (m)	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

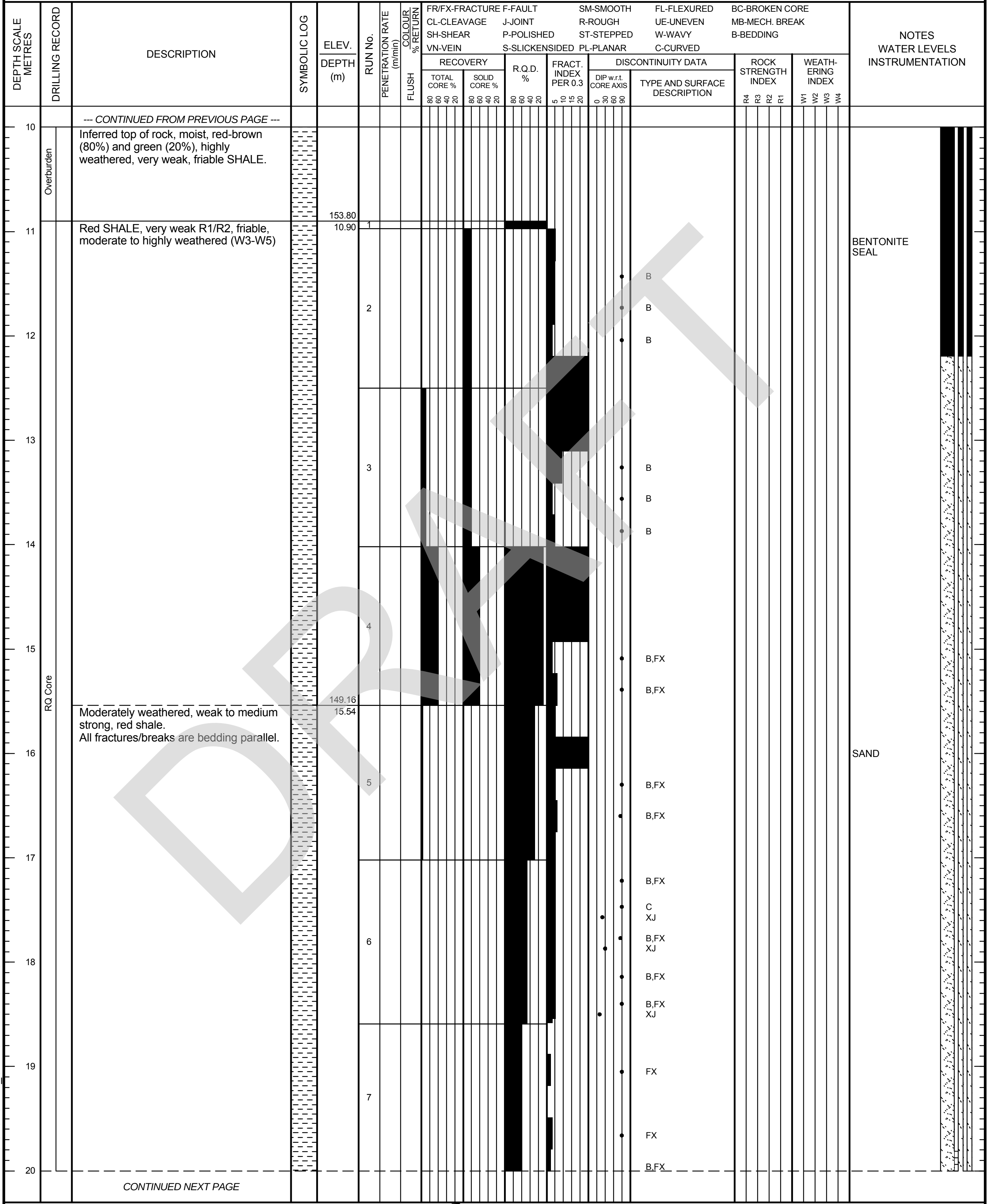
DATUM:

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



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Depth (m)	Elev.	Description
10		Inferred top of rock, moist, red-brown (80%) and green (20%), highly weathered, very weak, friable SHALE.
10.90	153.80	Red SHALE, very weak R1/R2, friable, moderate to highly weathered (W3-W5)
15.54	149.16	Moderately weathered, weak to medium strong, red shale. All fractures/breaks are bedding parallel.

Discontinuity type and surface description (in order of depth):

B
B
B
B
B
B
B,FX
B,FX
B,FX
B,FX
B,FX
C XJ
B,FX XJ
B,FX
B,FX XJ
FX
FX
B,FX

CONTINUED NEXT PAGE

DEPTH SCALE
1 : 50

LOGGED: MR

CHECKED:

PROJECT: 021-1228

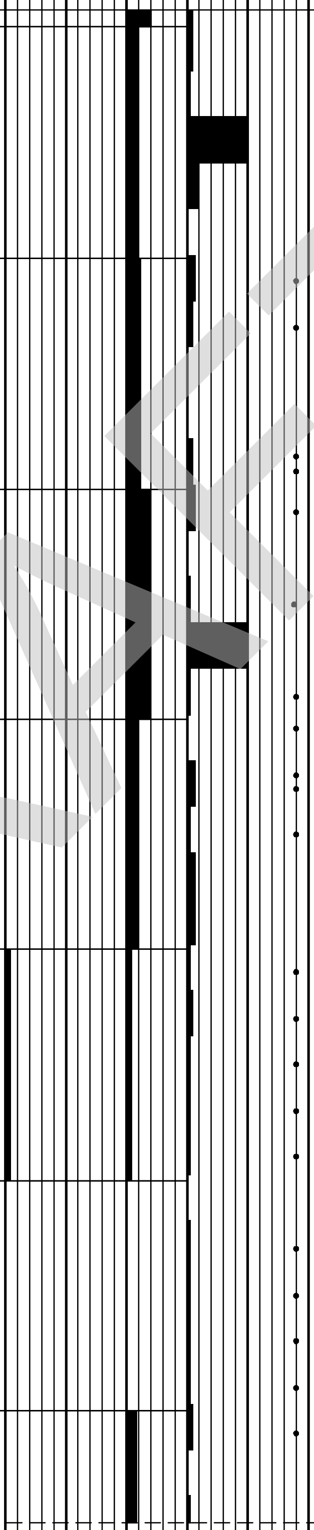
RECORD OF DRILLHOLE: MW4

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	ELEV. DEPTH (m)	RUN No.	DISCONTINUITY DATA TYPE AND SURFACE DESCRIPTION	NOTES WATER LEVELS INSTRUMENTATION
		--- CONTINUED FROM PREVIOUS PAGE ---				
20	RQ Core		144.58 20.12	7		
		SHALE, friable, moderately weathered, moderately strong, significantly more competent.			B,FX B,FX	
				8	BC	
21					B,FX	
		Weak to medium strong, friable, Tends to break along red.green colour contacts.	143.06 21.64		B,FX	
22					B,FX	
				9		
23					B,FX B	
		Fractures/breaks all bedding and smooth.			B,FX	
24				10	B,FX	
					B,FX B,FX	
25					B,FX B,FX	
				11	B,FX	
26					B,FX B,FX	
27				12	B,FX B,FX B,FX	
28						SAND
				13	B,FX B,FX	
29					B,FX B,FX	
		Slightly weathered, red (90%) and green (10%), medium strong, finely laminated SHALE.	135.44 29.26	14	FX,B	
30		*CONTINUED NEXT PAGE*				



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: 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 | 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 ---

Depth scale: 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40

Drilling record: RQ Core

Slightly weathered, red (90%) and green (10%), medium strong, finely laminated SHALE.

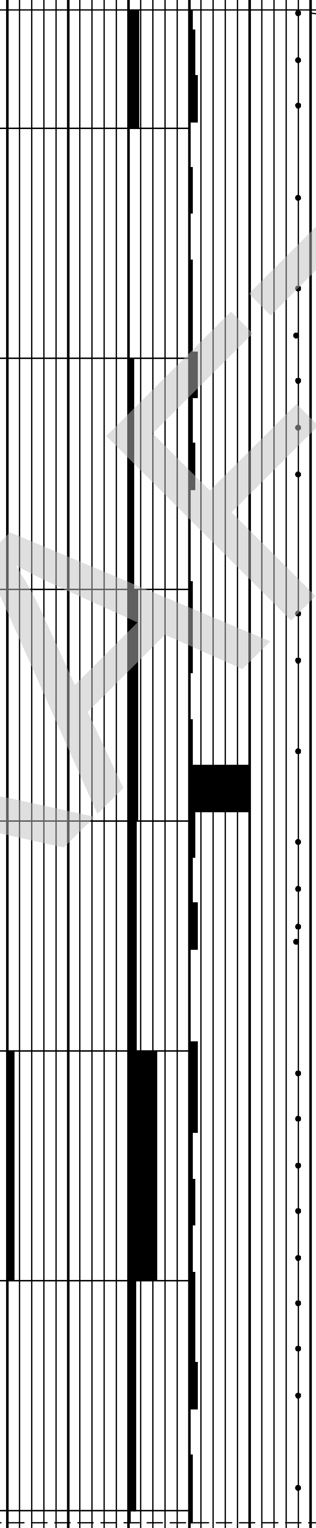
This interval not friable.

Fractures are all bedding parallel, smooth and planar.

Green portions appear to be stronger.

129.35
35.35

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



RUN No.	TYPE AND SURFACE DESCRIPTION
14	FX,B FX,B F,B
15	FX,B FX,B B,J, gypsum
16	B,FX B,FX B,FX, gypsum
17	B,FX B,FX B,FX
18	B,FX B,FX B,FX B
19	B,FX B,FX B,FX B B,FX
20	B,FX B,FX B,FX B,FX

NOTES:
SAND
BENTONITE SEAL
SAND

CONTINUED NEXT PAGE

DEPTH SCALE
1 : 50

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:

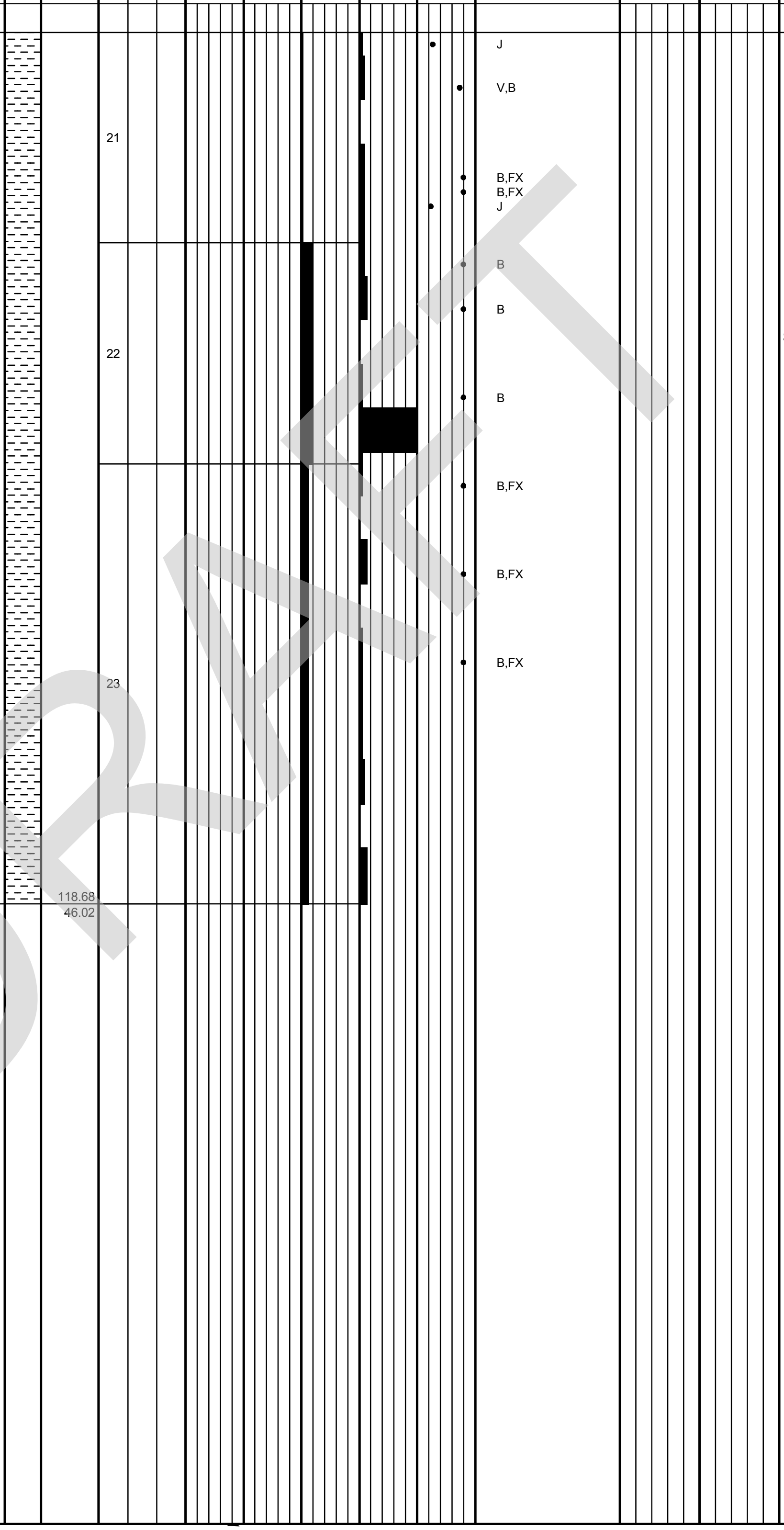
DRILL RIG: CME 75

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	NOTES WATER LEVELS INSTRUMENTATION
		--- *CONTINUED FROM PREVIOUS PAGE* ---	
40	RQ Core	Red-brown, moderately weathered (red) to slightly weathered (green) shale. Medium strong, (R2), friable (especially one day after recovery).	
42			SAND
45		Gypsum blebs/nodules at 45.24-45.24m.	
46		END OF HOLE	



DEPTH SCALE

1 : 50

LOGGED: MR

CHECKED:

PROJECT: 021-1228

RECORD OF DRILLHOLE: MW5

SHEET 1 OF 5

LOCATION: Refer to Plan

DRILLING DATE: July 10-11, 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)	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	
1		Firm, yellow-brown, moist to slightly moist, silty sand to sandy silt, some 5% gravel. (ML-TILL)	159.59 0.91	
2				BENTONITE SEAL
		Compact, moist, yellow-brown gravelly sand, some silt, trace clay, some cobbles. (TILL) (SG-ML)	158.06 2.44	
3		Yellow-brown, moist, compact, cobbley silty sand TILL. (SM)	157.30 3.20	
4				
5		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	
6		Brown, moist, compact sand, trace some silt, some sub-ang gravel & cobbles, trace clay.	154.25 6.25	
7				SAND
		Brown-yellow brown, wet, very dense sand TILL, some silt, clay, gravel and cobbles. (SM)	152.88 7.62	
8		Grey, hard to very hard SILT, some sand, moist to slightly moist, some clay. (ML)	152.12 8.38	
9		Transition from moist to wet soil: water table inferred.		BENTONITE SEAL
10				

CONTINUED NEXT PAGE

Column headings: SYMBOLIC LOG; 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; 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:

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

PROJECT: 021-1228

RECORD OF DRILLHOLE: MW5

SHEET 2 OF 5

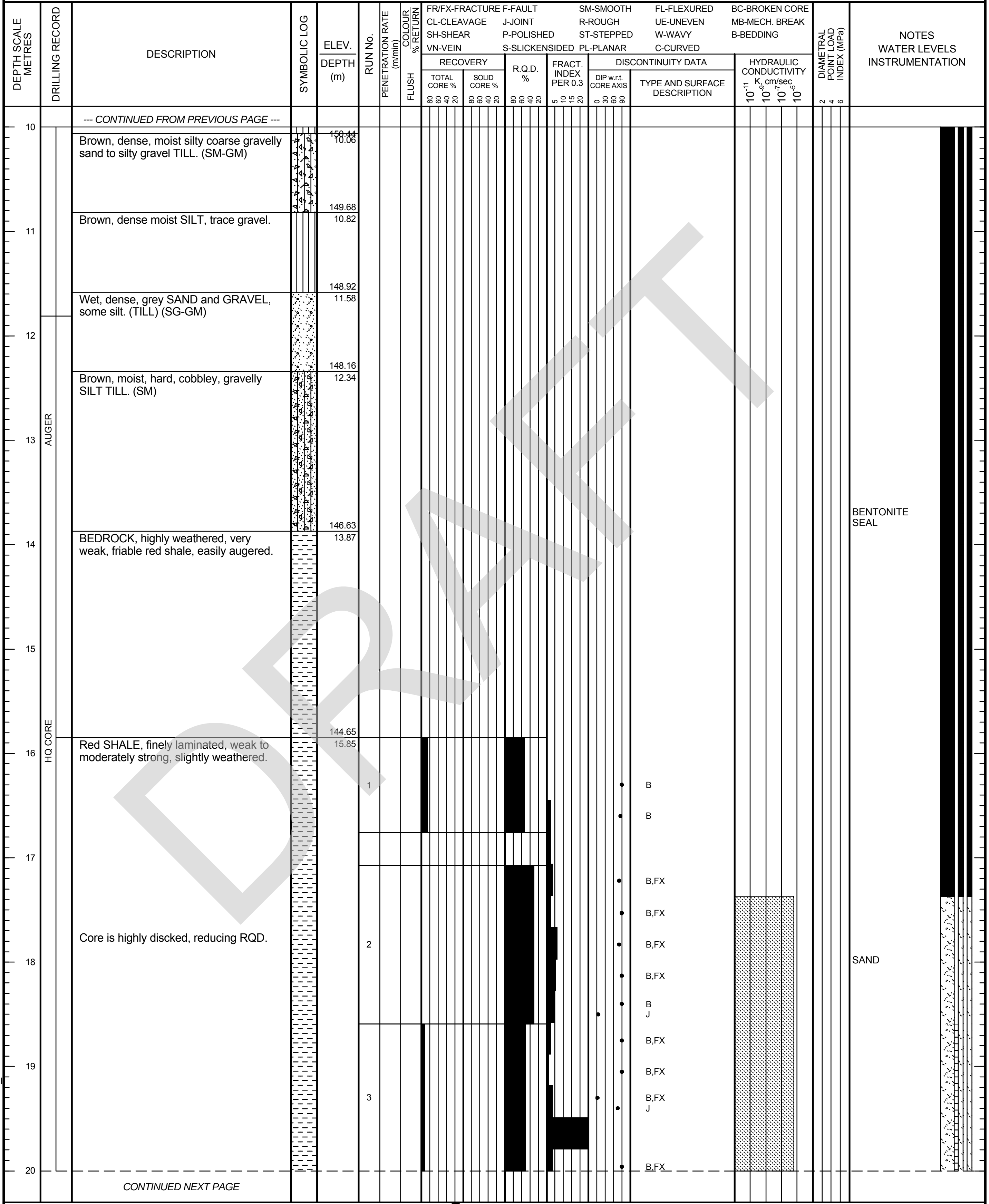
LOCATION: Refer to Plan

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



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Description	Elev. / Depth (m)
Brown, dense, moist silty coarse gravelly sand to silty gravel TILL. (SM-GM)	150.44 10.06
Brown, dense moist SILT, trace gravel.	149.68 10.82
Wet, dense, grey SAND and GRAVEL, some silt. (TILL) (SG-GM)	148.92 11.58
Brown, moist, hard, cobbley, gravelly SILT TILL. (SM)	148.16 12.34
BEDROCK, highly weathered, very weak, friable red shale, easily augered.	146.63 13.87
Red SHALE, finely laminated, weak to moderately strong, slightly weathered. Core is highly discked, reducing RQD.	144.65 15.85

Discontinuity type and surface description:

B
B
B,FX
B,FX
B,FX
B,FX
B
J
B,FX
B,FX
B,FX
J
B,FX

BENTONITE SEAL

SAND

CONTINUED NEXT PAGE

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

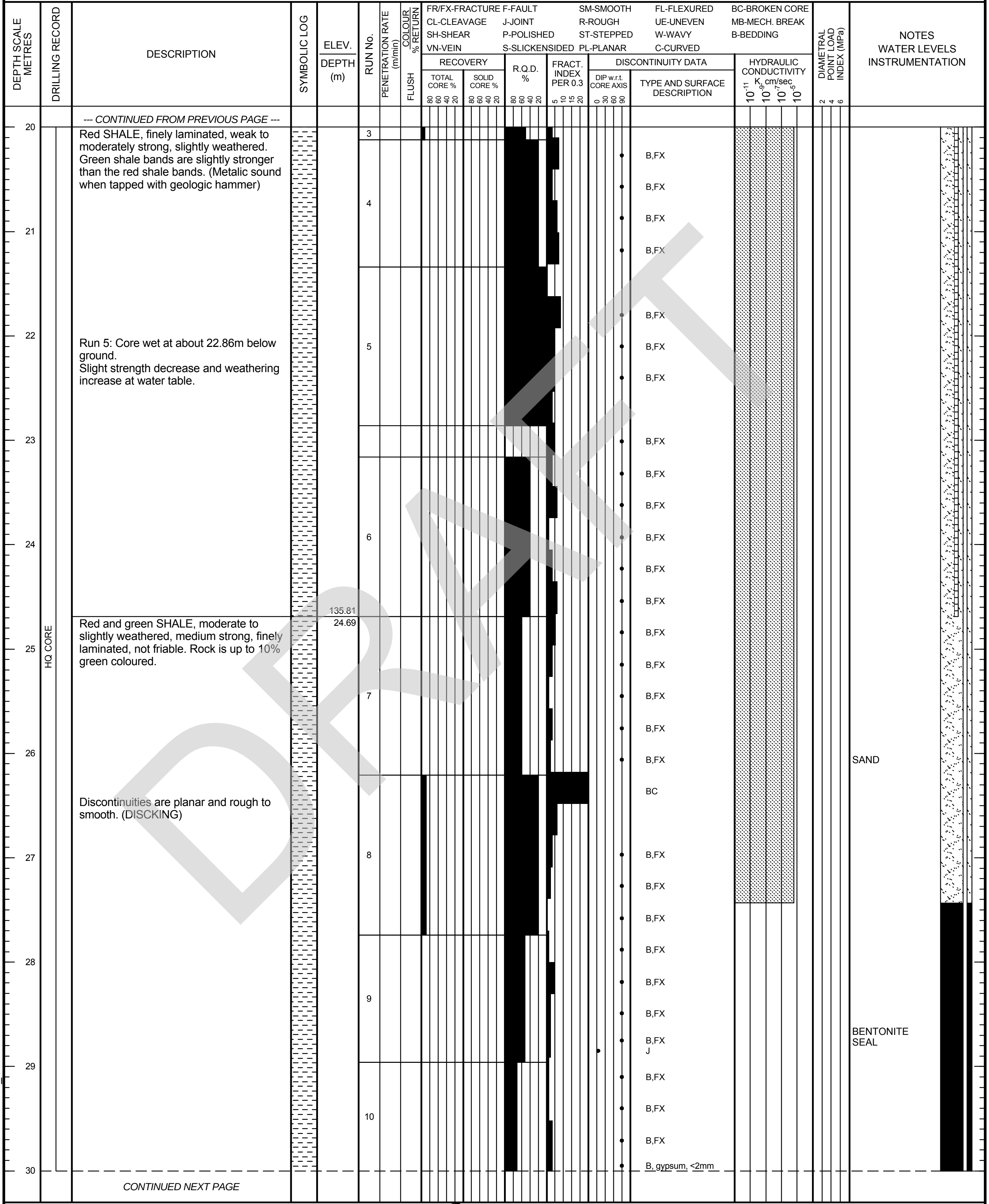
DATUM:

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



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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)

Run 5: Core wet at about 22.86m below ground.
Slight strength decrease and weathering increase at water table.

135.81
24.69

Red and green SHALE, moderate to slightly weathered, medium strong, finely laminated, not friable. Rock is up to 10% green coloured.

Discontinuities are planar and rough to smooth. (DISCKING)

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,FX
B,FX
B,FX
B,FX
B,FX
BC
B,FX
B,FX
B,FX
B,FX
B,FX
B,FX
B,FX
J
B,FX
B,FX
B,FX
B, gypsum, <2mm

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:

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, 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 (30–40 m): HQ CORE

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 – 128.50 / 32.00 – Red SHALE, moderately strong, cannot be scratched with knife, slightly weathered. Finely laminated. Friable.

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.

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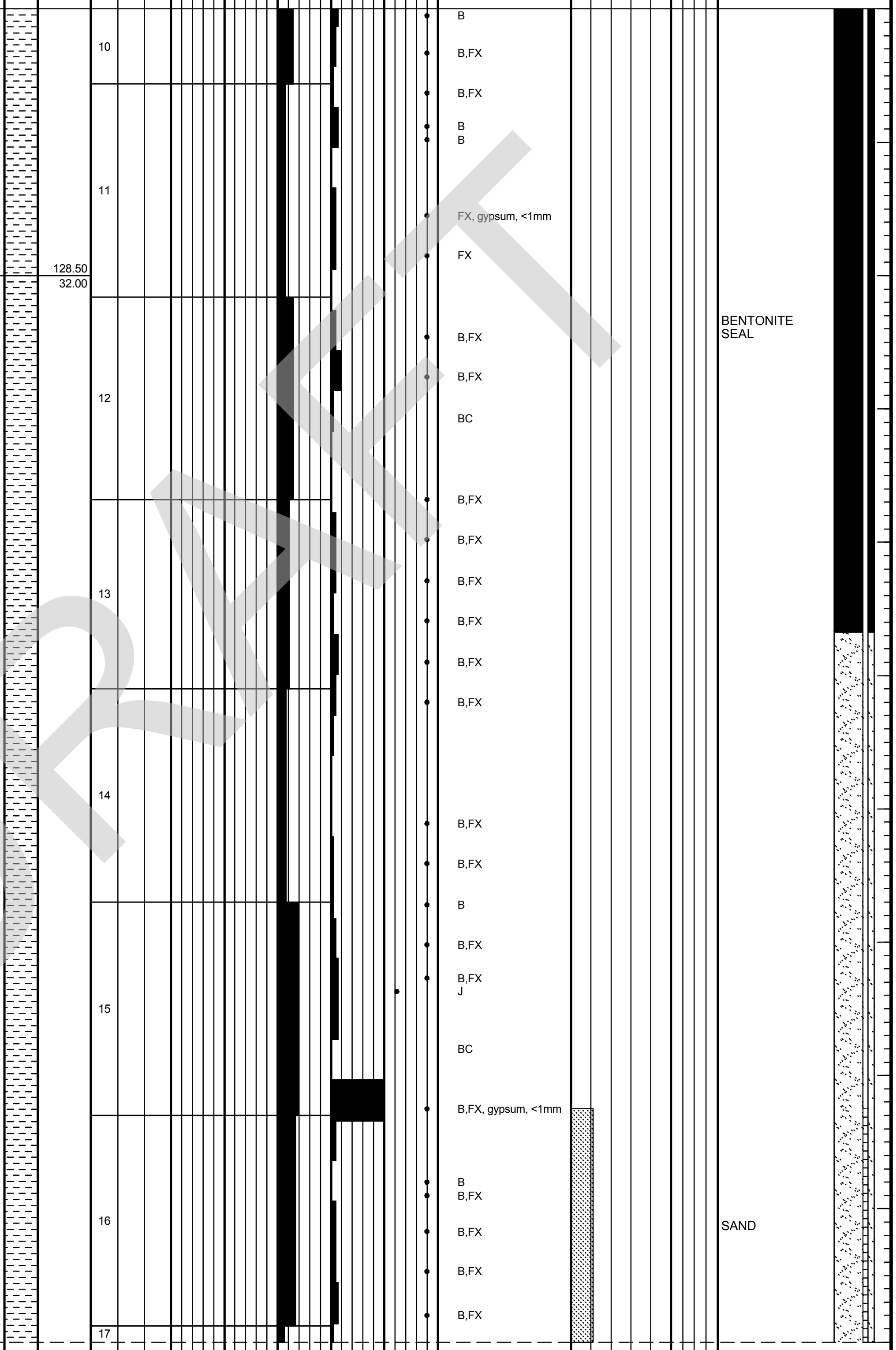


Run No.: 10, 11, 12, 13, 14, 15, 16, 17

Discontinuity type and surface description (in depth order): B; B,FX; B,FX; B; B; FX, gypsum, <1mm; FX; B,FX; B,FX; BC; B,FX; B,FX; B,FX; B,FX; B,FX; B,FX; B,FX; B,FX; B; B,FX; B,FX; J; BC; B,FX, gypsum, <1mm; B; B,FX; B,FX; B,FX; B,FX

Notes: BENTONITE SEAL (about 32.3 m); SAND (about 39 m)

DEPTH SCALE
1 : 50

Golder Associates

LOGGED: MR
CHECKED:

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

RECORD OF DRILLHOLE: MW5

PROJECT: 021-1228

SHEET 5 OF 5

LOCATION: Refer to Plan

DRILLING DATE: July 10-11, 2002

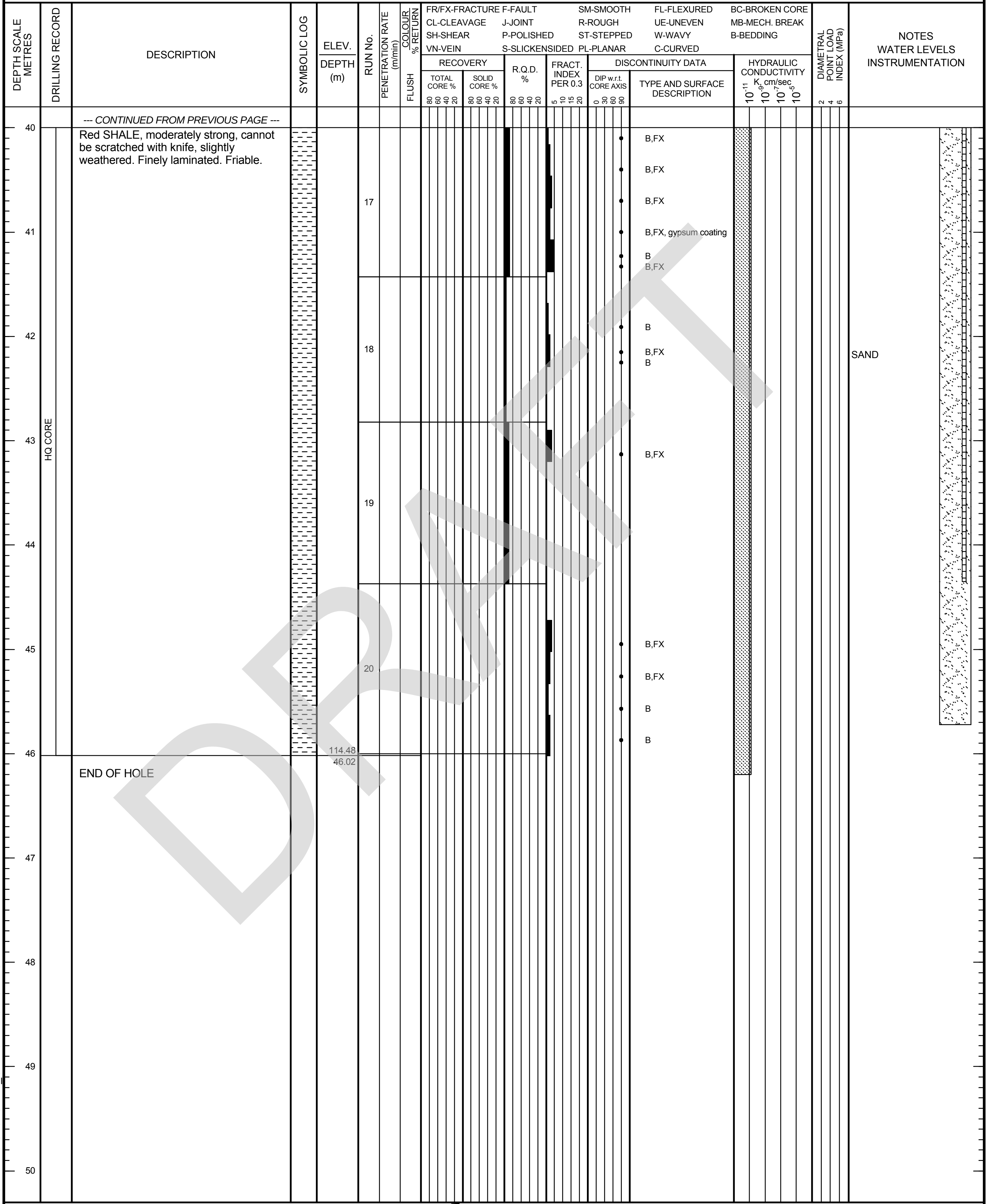
DATUM:

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



--- *CONTINUED FROM PREVIOUS PAGE* ---

Red SHALE, moderately strong, cannot be scratched with knife, slightly weathered. Finely laminated. Friable.

END OF HOLE

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
		Occasional cobbles after 2.74 m depth																			
4		Compact, moist to wet, brown SANDY SILT with some gravel, and occasional cobble, subrounded to subangular, heterogeneous (TILL)		162.83 4.20																	Grout
6		Compact, saturated, brown SAND with some gravel and silt		160.63 6.40																	
8		Compact, wet, brown SILT with some sand and gravel		158.87 8.16																	∇
		Silt layer from 28.8 m to 30.5 m																			
		Becoming clayey at 9.29 m depth																			
10																					

CONTINUED NEXT PAGE

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:

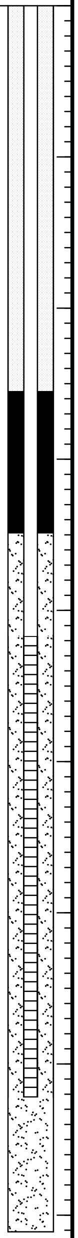
JN - Joint	BD - Bedding	PL - Planar	PO - Polished	BR - Broken Rock
FLT - Fault	FO - Foliation	CU - Curved	K - Slickensided	**NOTE:** For additional abbreviations refer to list of abbreviations & symbols.
SHR - Shear	CO - Contact	UN - Undulating	SM - Smooth	
VN - Vein	OR - Orthogonal	ST - Stepped	Ro -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

Columns: 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 ---

DESCRIPTION	ELEV.	DEPTH (m)
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		

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			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				
		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)									
											Hole Plug
21											
22											Sand
23											
24											
25											
26											Screen
27											
28											
29											
											Sand
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	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		34.67							
		NOTE:									
35		1. Borehole logging and well completion was not supervised by Golder.									
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

DRILLING DATE: July 6 and 10, 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

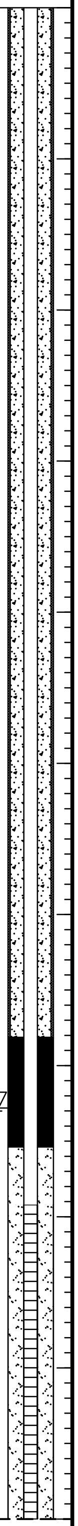
PL - Planar
CU- Curved
UN- Undulating
ST - Stepped
IR - Irregular

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)	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																	
2.4		Some gravel from 8.44 m to 2.84 m depth																			
3.35		Slightly moist, brown SANDY SILT, some clay, cobble/gravel bands (TILL)		162.70 3.35																	Cement
5.78		Wet, brown SAND and GRAVEL		160.27 5.78																	
7.2		Silty sand, reddish brown, lens of clay, gravel at 7.32 m depth																			Hole Plug ▽
																					Sand
7.92		Reddish brown SILT, trace gravel (TILL)		158.13 7.92																	
9.14		SHALE, reddish, slightly porous, slight weathering, some gravel		156.91 9.14																	Screen
10																					
		CONTINUED NEXT PAGE																			



DEPTH SCALE
1 : 50

Golder Associates

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

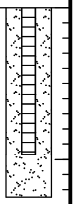
PL - Planar
CU- Curved
UN- Undulating
ST - Stepped
IR - Irregular

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)	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		Moderately weathered, thinly bedded, redish brown and green SHALE		156.00 10.05																	Screen
11				154.80																	Sand
		END OF DRILLHOLE		11.25																	
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

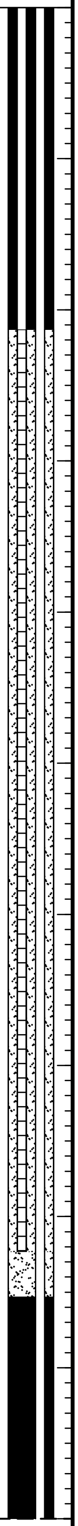
LOCATION: N 596099.40 ;E 4809348.00

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	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											
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

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

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLES NUMBER	TYPE	BLOWS/0.3m	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

Golder Associates

LOGGED:

CHECKED:

PROJECT: 021-1228

RECORD OF BOREHOLE: MW-07

SHEET 3 OF 5

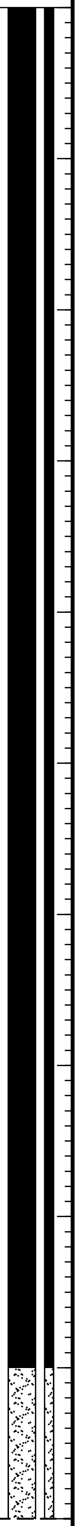
LOCATION: N 596099.40 ;E 4809348.00

BORING DATE:

DATUM: Geodetic

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

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: 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											Hole Plug
25											
26											
27											
28											
29											Sand
30		*CONTINUED NEXT PAGE*									



DEPTH SCALE
1 : 50

LOGGED:
CHECKED:

PROJECT: 021-1228

RECORD OF BOREHOLE: MW-07

SHEET 4 OF 5

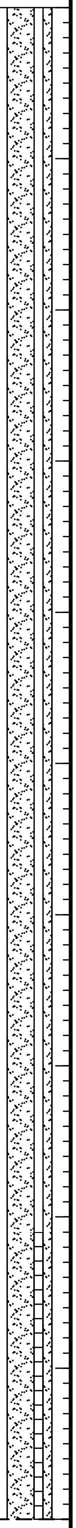
LOCATION: N 596099.40 ;E 4809348.00

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	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 ---									
30		SHALE (BEDROCK)									
31											
32											
33											
34											Sand
35											
36											
37											
38											
39											Screen
40											
		CONTINUED NEXT PAGE									



DEPTH SCALE

1 : 50

LOGGED:

CHECKED:

PROJECT: 021-1228

RECORD OF BOREHOLE: MW-07

SHEET 5 OF 5

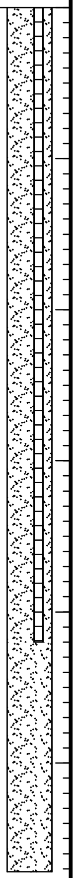
LOCATION: N 596099.40 ;E 4809348.00

BORING DATE:

DATUM: Geodetic

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

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	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											Screen
43											
44											
45											Sand
		END OF BOREHOLE NOTE: 1. Borehole logging and well completion was not supervised by Golder. This hole was originally numbered MW-12.		45.72							
46											
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			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				
		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*									

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

DEPTH SCALE

1 : 50

Golder Associates

LOGGED:

CHECKED:

PROJECT: 021-1228

RECORD OF BOREHOLE: MW-08

SHEET 2 OF 5

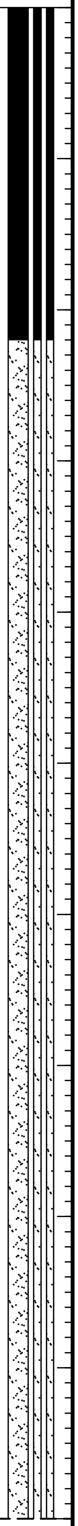
LOCATION: N 596294.70 ;E 4809190.00

BORING DATE:

DATUM: Geodetic

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

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: 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 ---									
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

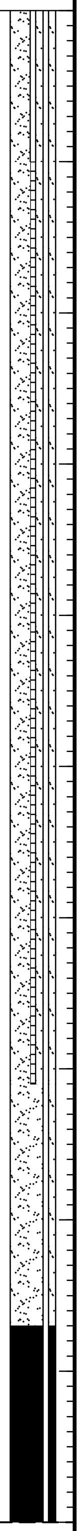
LOCATION: N 596294.70 ;E 4809190.00

BORING DATE:

DATUM: Geodetic

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

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	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)									Sand
21											
22											
23											
24											Screen
25											
26											
27											
28											Sand
29											Hole Plug
30											



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DEPTH SCALE

1 : 50

LOGGED:

CHECKED:

PROJECT: 021-1228

RECORD OF BOREHOLE: MW-08

SHEET 4 OF 5

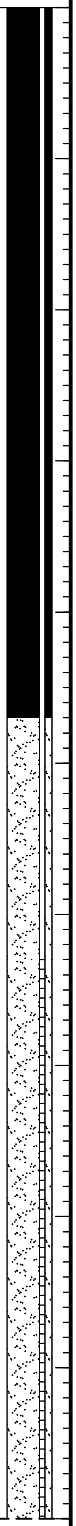
LOCATION: N 596294.70 ;E 4809190.00

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	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 ---									
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:

RECORD OF DRILLHOLE: MW-09

PROJECT: 021-1228
SHEET 1 OF 5

LOCATION: N 596166.0 ;E 4809014.0
DRILLING DATE: July 3 to 5, 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)	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		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																	
6																					(S)
7																					
8																					
		Stiff, brown SILTY CLAY with very course sand and cobbles (TILL)		157.00 8.53																	
9																					
		Stiff, reddish brown SILTY CLAY (Weathered Shale)		155.78 9.75																	(I)
10																					

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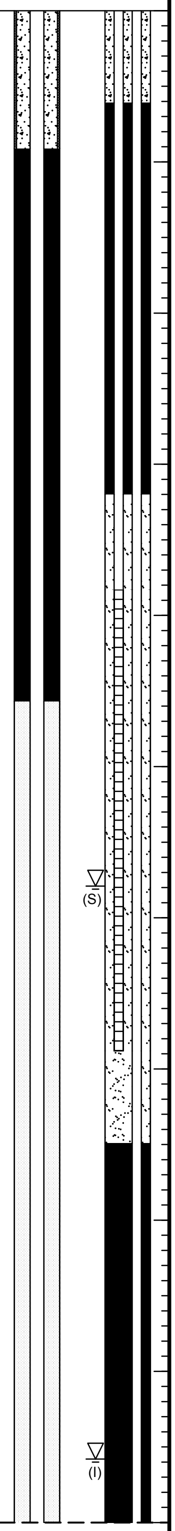


DEPTH SCALE
1 : 50

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

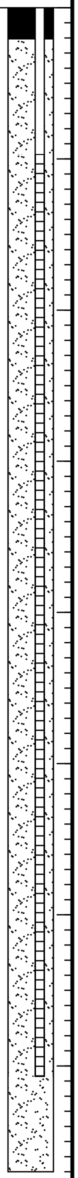
DATUM:

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.

Columns: 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

DEPTH SCALE METRES	DESCRIPTION	ELEV. DEPTH (m)	RUN No.	TYPE AND SURFACE DESCRIPTION
	--- CONTINUED FROM PREVIOUS PAGE ---			
10	Stiff, reddish brown SILTY CLAY (Weathered Shale)			
11				
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		,JN,IR,Ro
				,JN,IR,Ro
14			1	
				,JN,IR,Ro
				,JN,IR,Ro
				,FO,IR,Ro
				,BD,IR,Ro
15			2	
				,JN,IR,Ro
				,FR,IR,Ro
				,JN,IR,Ro
16				
				,FO,IR,Ro
				,JN,IR,Ro
				,JN,ST,Ro
			3	,JN,IR,Ro
				,FR,IR,Ro
17				
				,JN,IR,Ro
				,JN,IR,Ro
				,FR,IR,Ro
			4	
18				,FR,IR,Ro
			5	,JN,PL,SM
				,JN,IR,Ro
				,FO,PL,SM
19				
			6	,FO,IR,Ro
				,FO,IR,Ro
				,JN,PL,Ro
20				
	CONTINUED NEXT PAGE			



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:

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 % 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							
23															,JN,IR,Ro ,JN,IR,Ro ,JN,IR,Ro ,JN,IR,Ro ,FO,IR,SM							
24					9										,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							
26															,JN,IR,Ro ,FR,IR,SM ,JN,IR,Ro ,JN,IR,VR							
27					11										,JN,CU,SM ,JN,PL,SM							
28					12										,JN,CU,SM ,FR,IR,Ro ,JN,IR,Ro							
29															,FR,PL,Ro ,JN,UE,Ro							
					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) | 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 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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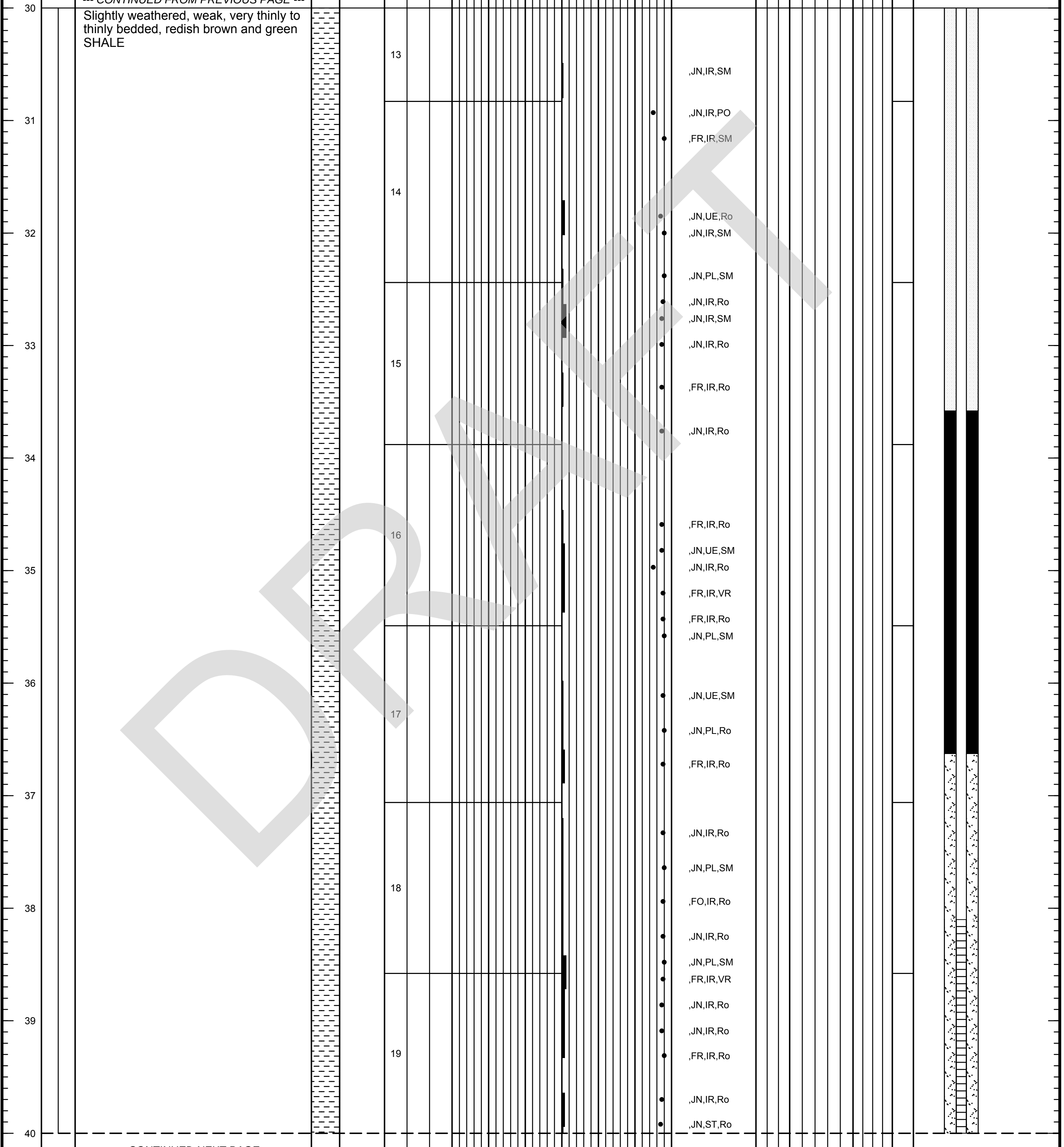

Slightly weathered, weak, very thinly to thinly bedded, redish brown and green SHALE

,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

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DEPTH SCALE
1 : 50

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

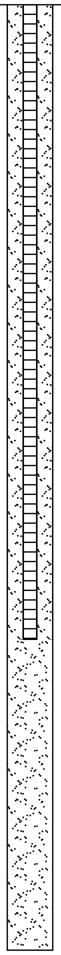
DRILLING CONTRACTOR: All-Terrain Drilling Limited

DATUM:

JN - Joint
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
		--- CONTINUED FROM PREVIOUS PAGE ---																				
40		Slightly weathered, weak, thinly bedded, redish brown and green SHALE		125.43 40.10	19 20										,JN,IR,Ro ,JN,IR,Ro ,JN,PL,SM ,JN,IR,Ro ,JN,CU,SM							
41																						∇ (D)
42					21										,FR,IR,Ro ,JN,IR,Ro ,FR,IR,Ro ,FR,IR,VR ,FR,IR,VR ,FR,IR,Ro ,JN,CU,SM							
43		Slightly weathered, weak, layered, redish brown and green SHALE		122.43 43.10	22										,JN,IR,Ro ,FR,IR,Ro ,JN,PL,SM							
44															,JN,IR,Ro ,FR,IR,SM							
45					23										,JN,PL,SM							
46		END OF DRILLHOLE		119.28 46.25																		
47																						
48																						
49																						
50																						



DEPTH SCALE
1 : 50

Golder Associates

LOGGED: AK
CHECKED: SW

PROJECT: 021-1228

RECORD OF DRILLHOLE: MW-10

SHEET 1 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

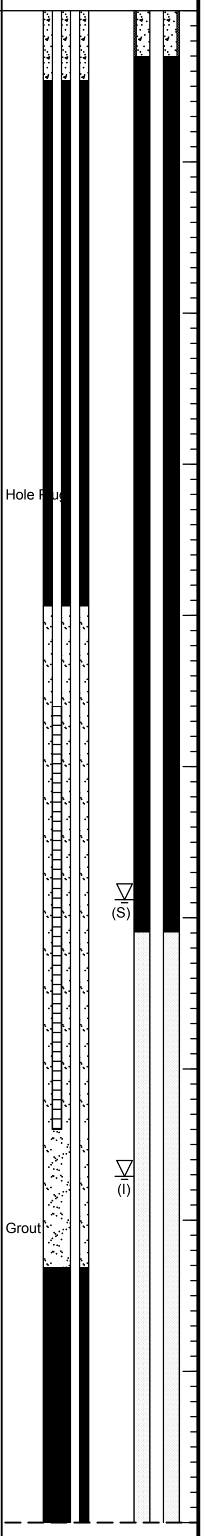
DRILLING CONTRACTOR: All-Terrain Drilling Limited

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.

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		166.78																	
0		Soft, brown clayey silt with organics and trace grey silt and gravel (TOPSOIL)																			
1 2 3		Stiff, brown to grey brown CLAYEY SILT with semiangular gravel (TILL)		0.05																	Hole P
4 5 6 7 8		Very soft, reddish brown very fine SANDY SILT with semirounded gravel and cobbles (TILL)		162.72 4.06																	Grout
		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																	
10		Stiff, grey brown very fine SANDY SILT with coarse sand, gravel and cobble s (TILL)		157.18 9.60																	



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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

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 % 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 ---																				
10				156.64 10.14																		
		Stiff, reddish brown CLAYEY SILT with semiangular gravel (TILL)																				
11		SHALE		155.81 10.97																		
12																						
13																						
14																						
		Slightly to moderately weathered, weak, very thinly to thinly bedded, redish brown and green SHALE		152.07 14.71	1										,FO,ST,Ro							
15															,JN,IR,SM							Grout
															,JN,IR,Ro							
16					3										,JN,IR,Ro ,JN,IR,VR							
															,FO,IR,Ro ,JN,IR,Ro							
17															,JN,UE,SM ,JN,IR,Ro							
					2										,FR,CU,SM ,FR,IR,Ro							
18															,JN,IR,VR ,JN,IR,Ro ,JN,IR,Ro ,FO,PL,SM							
															,JN,IR,Ro ,FO,IR,Ro							
19					4										,FO,CU,Ro ,JN,PL,SM							
															,FO,IR,Ro ,JN,IR,Ro							
					5										,JN,UE,Ro							
20															,JN,UE,Ro							
		CONTINUED NEXT PAGE																				

DEPTH SCALE
1 : 50

Golder Associates

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	

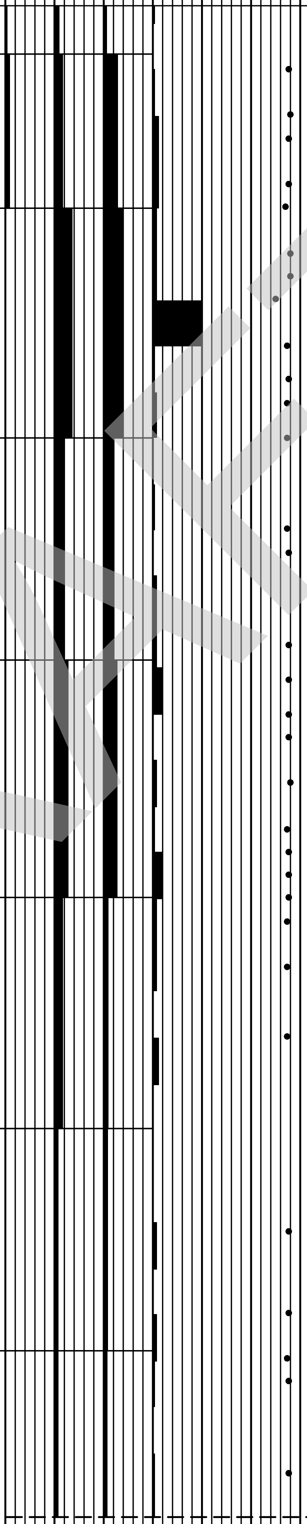
DEPTH SCALE METRES | DRILLING RECORD | DESCRIPTION | SYMBOLIC LOG | ELEV. DEPTH (m) | RUN No. | PENETRATION RATE min/(m) | FLUSH | COLOUR % RETURN | RECOVERY (TOTAL CORE % 80 60 40 20; SOLID CORE % 80 60 40 20) | R.Q.D. % 80 60 40 20 | FRACT. INDEX PER 0.3 m 5 10 15 20 | DISCONTINUITY DATA (B Angle 0 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)
20	Slightly to moderately weathered, weak, very thinly to thinly bedded, redish brown and green SHALE	145.48 21.30
21.30	Highly weathered, very weak, thinly bedded, redish brown and green SHALE	143.98 22.80
22.80	Slightly weathered, weak, redish brown and green SHALE	

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

RUN No.: 5, 6, 7, 8, 9, 10, 11, 12



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

DRILLING DATE: June 20 to 21, 2007

DATUM:

INCLINATION: -90° AZIMUTH: ---

DRILL RIG: CME - 75 Track Mount

DRILLING CONTRACTOR: All-Terrain Drilling Limited

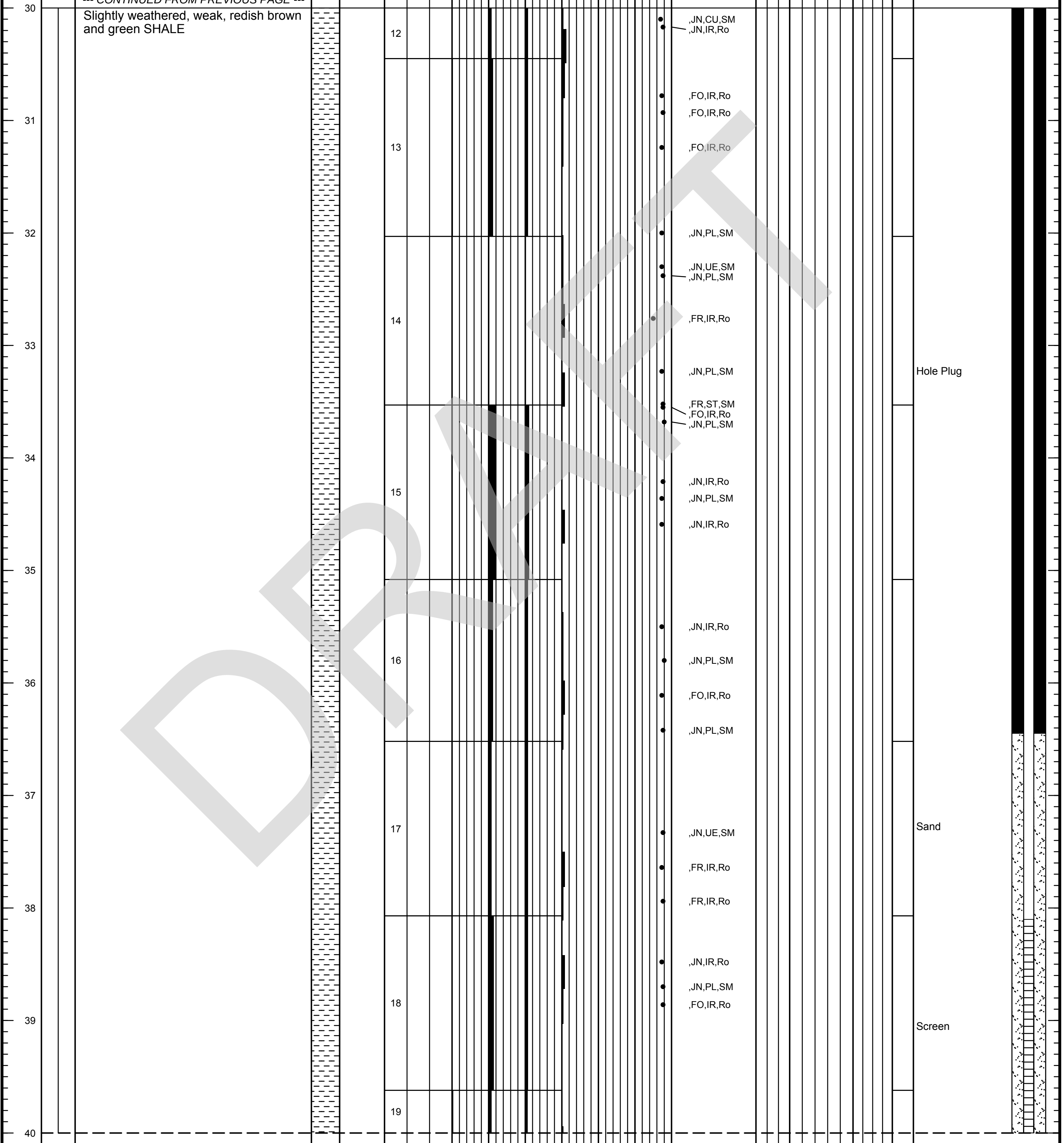
JN - Joint
FLT - Fault
SHR- Shear
VN - Vein
CJ - Conjugate
BD- Bedding
FO- Foliation
CO- Contact
OR- Orthogonal
CL - Cleavage
PL - Planar
CU- Curved
UN- Undulating
ST - Stepped
IR - Irregular
PO- Polished
K - Slickensided
SM- Smooth
Ro - Rough
MB- Mechanical Break
BR - Broken Rock

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 % (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 ---

Slightly weathered, weak, redish brown and green SHALE



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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

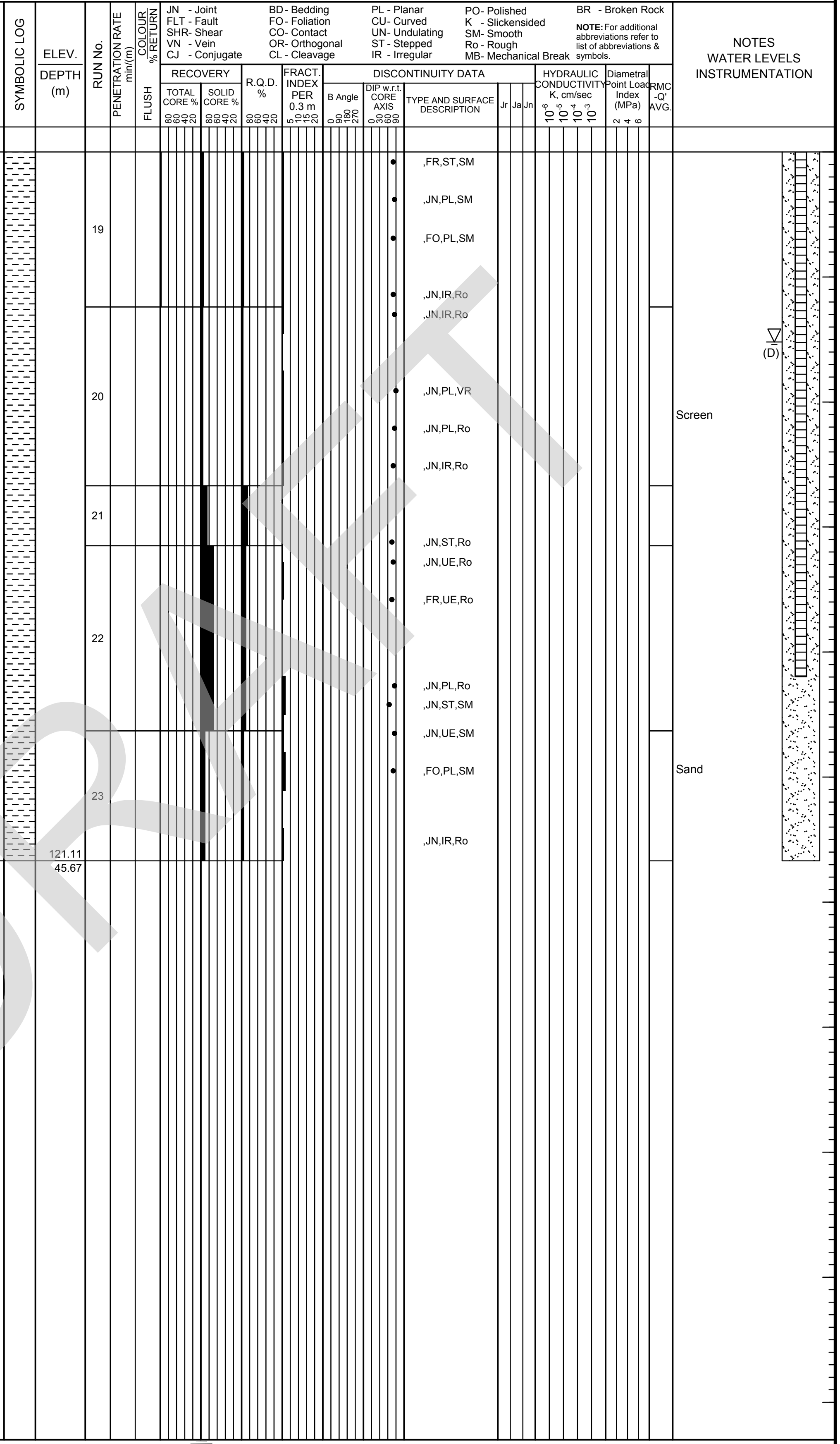
DATUM:

JN - Joint	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	ELEV. DEPTH (m)	RUN No.	DISCONTINUITY DATA TYPE AND SURFACE DESCRIPTION	NOTES WATER LEVELS INSTRUMENTATION
		--- CONTINUED FROM PREVIOUS PAGE ---				
40		Slightly weathered, weak, redish brown and green SHALE		19	,FR,ST,SM ,JN,PL,SM ,FO,PL,SM ,JN,IR,Ro ,JN,IR,Ro	
41				20	,JN,PL,VR ,JN,PL,Ro ,JN,IR,Ro	(D) Screen
42				21		
43				22	,JN,ST,Ro ,JN,UE,Ro ,FR,UE,Ro ,JN,PL,Ro ,JN,ST,SM	
44				23	,JN,UE,SM ,FO,PL,SM ,JN,IR,Ro	Sand
45			121.11 45.67			
		END OF DRILLHOLE				
46						
47						
48						
49						
50						



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

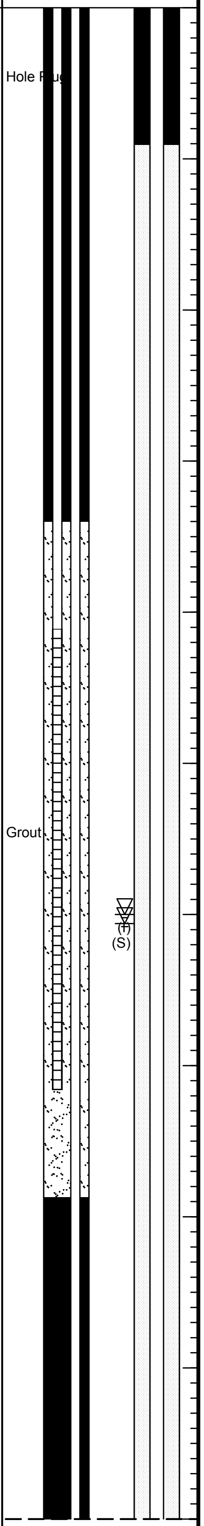
DRILL RIG: CME - 75 Track Mount

DRILLING CONTRACTOR: All-Terrain Drilling Limited

DATUM:

JN - Joint	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	

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		168.31																		
0		Compact, dry, brown SILT, trace clay (TILL)		0.00																		Hole Plug
1		Loose to compact silty clay till from 1.2 m to 2.4 m depth																				
2		Damp from 1.8 m to 2.4 m depth																				
3																						
4		Dry, brown to grey SILT, trace gravel/cobbles, angular to subangular gravel (TILL)		164.04 4.27																		
5																						Grout
6																						(S)
7		Damp, brown to grey SANDY SILT with trace subangular rounded gravel, hetero (TILL)		161.60 6.71																		
8																						
9		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	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	

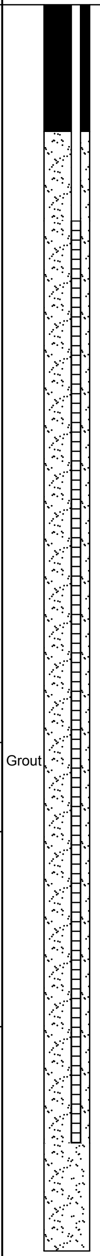
DEPTH SCALE METRES | DRILLING RECORD | DESCRIPTION | SYMBOLIC LOG | ELEV. DEPTH (m) | RUN No. | PENETRATION RATE min/(m) | FLUSH | COLOUR % RETURN | RECOVERY: TOTAL CORE % 80 60 40 20, SOLID CORE % 80 60 40 20 | R.Q.D. % 80 60 40 20 | FRACT. INDEX PER 0.3 m 5 10 15 20 | DISCONTINUITY DATA: B Angle 0 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 (m)	Description	Elev. / Depth (m)	Run No.
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
16			2
17	Moderately to highly weathered, thinly bedded, redish brown SHALE with some thin greyish green beds	151.55 16.76	3
18			
19			4
20		148.31	

Type and surface description:

,JN,IR,Ro
,JN,CU,SM
,JN,IR,Ro
,JN,IR,VR
,JN,IR,Ro
,JN,IR,Ro
,JN,IR,SM
,JN,IR,Ro
,JN,IR,SM
,JN,IR,SM
,JN,IR,Ro
,JN,IR,SM
,JN,IR,SM
,JN,IR,SM
,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
,JN,IR,SM



CONTINUED NEXT PAGE

DEPTH SCALE
1 : 50

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.

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

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

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

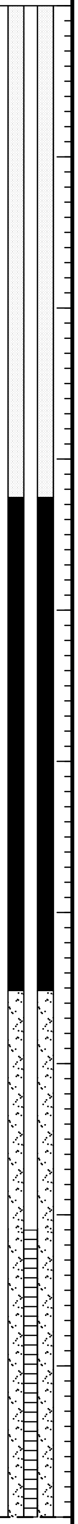
DRILLING CONTRACTOR: All-Terrain Drilling Limited

DATUM:

JN - Joint
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 ---																				
30		Slightly weathered, very thinly to thinly bedded, weak, redish brown and green SHALE																				
					11										,JN,IR,Ro							
															,JN,IR,SM							
31															,JN,IR,Ro							
					12										,JN,IR,SM							
															,JN,IR,Ro							
															,JN,IR,Ro							Grout
															,JN,IR,Ro							
32															,JN,IR,Ro							
															,JN,IR,Ro							
															,JN,IR,Ro							
33					13										,JN,IR,Ro							
															,JN,IR,Ro							
															,JN,IR,Ro							
															,JN,IR,SM							
															,JN,IR,Ro							
															,JN,UE,Ro							
34															,JN,IR,SM							
					14										,JN,IR,PO							
35																						Hole Plug
															,JN,IR,SM							
															,JN,IR,Ro							
36					15										,JN,IR,Ro							
															,JN,PL,SM							
37																						Sand
															,JN,IR,SM							
					16										,JN,PL,PO							
38															,FR,IR,Ro							
															,JN,PL,Ro							
															,JN,CU,Ro							
39					17																	Screen
															,JN,IR,Ro							
					18																	
40		*CONTINUED NEXT PAGE*																				



DEPTH SCALE
1 : 50

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

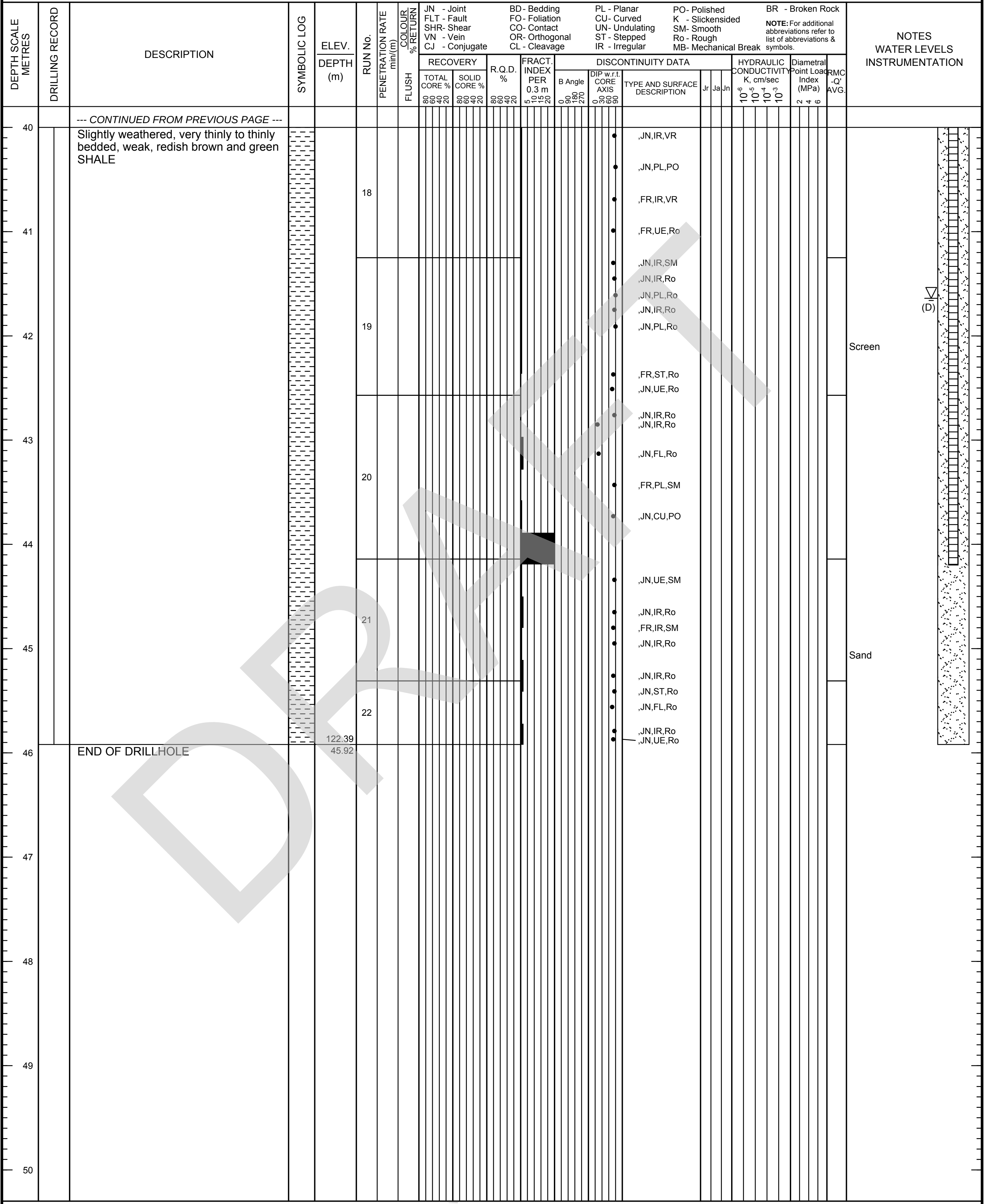
DRILL RIG: CME - 75 Track Mount

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.



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

Run No.	Type and surface description
18	,JN,IR,VR ,JN,PL,PO ,FR,IR,VR ,FR,UE,Ro
19	,JN,IR,SM ,JN,IR,Ro ,JN,PL,Ro ,JN,IR,Ro ,JN,PL,Ro ,FR,ST,Ro ,JN,UE,Ro
20	,JN,IR,Ro ,JN,IR,Ro ,JN,FL,Ro ,FR,PL,SM ,JN,CU,PO
21	,JN,UE,SM ,JN,IR,Ro ,FR,IR,SM ,JN,IR,Ro
22	,JN,IR,Ro ,JN,ST,Ro ,JN,FL,Ro ,JN,IR,Ro ,JN,UE,Ro

122.39
45.92

END OF DRILLHOLE

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: 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		167.64							
0	Air Rotary Drilling 152.4 mm Diameter	Dense, brown, fine grained SILT (TILL) (HALTON TILL)		0.00							
											▽ 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

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	Air Rotary Drilling 152.4 mm Diameter	Dense, brown, fine grained SILT, some gravel , trace clay (TILL) (HALTON TILL)									
16		Weathered red SHALE		151.66 15.98							Casing ends at 15.98m depth Open hole to 18.29m depth
		END OF BOREHOLE		149.35 18.29							

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	Air Rotary Drilling 152.4 mm Diameter	Dense, brown/grey fine grained SILT, trace gravel (TILL) (HALTON TILL)									
11											
12											
13											
14											
15											
16											
17											
18											
		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
19											
20											
		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	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	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			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				
		--- CONTINUED FROM PREVIOUS PAGE ---									
30	Air Rotary Drilling 152.4 mm Diameter	Dense, reddish brown fine grained SILT, some gravel (TILL) (HALTON TILL)		144.32							
31											
32		END OF BOREHOLE		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	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
		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

Golder Associates

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

--- CONTINUED FROM PREVIOUS PAGE ---

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	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
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							Sept. 14/07
19		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	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	Red SHALE									Casing ends at 20.4m depth Open hole to 23.62m depth
21											
22											
23				143.23							
		END OF BOREHOLE		23.62							
24											
25											
26											
27											
28											
29											
30											

DEPTH SCALE
1 : 50

Golder Associates

LOGGED: MD
CHECKED: SMD

Ontario Ministry of the Environment

Well Tag Number (Place sticker and print number below)
A 036659
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 / Last Name: BEKKERS 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: L6Y4Z3
Telephone Number (include area code):
Address of Well Location (County/District/Municipality): HALTON
Township: ~~OA~~ 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	☐ Fresh ☐ Sulphur ☐ Gas ☐ Salty ☐ Minerals ☐ Other:
13.71 m	☐ Fresh ☐ Sulphur ☐ Gas ☐ Salty ☐ Minerals ☐ Other:
21.33 m	☐ Fresh ☐ Sulphur ☐ Gas ☐ Salty ☐ 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	

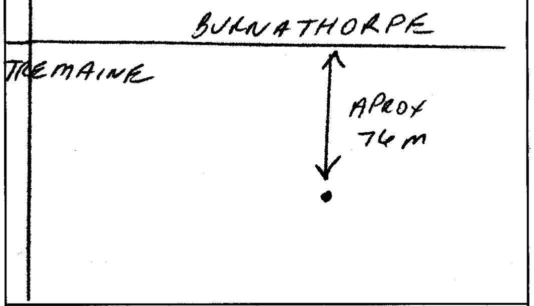
Plugging and Sealing Record

☑ 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	

Location of Well

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



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)

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

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

Ministry Use Only

Data Source
Contractor: 3030
Date Received YYYY MM DD: 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

MINISTRY OF THE ENVIRONMENT
The Ontario Water Resources Act

WATER WELL RECORD

Featherstone
30 m / 5F

Ontario

2804215

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

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 | 0012605 | 003126506 | 005320511 | 005930506 | 0067705 | 0082717

32

41 WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER
0069	1 ☒ FRESH 3 ☐ SULPHUR 2 ☐ SALTY 4 ☐ MINERAL
0074	1 ☒ FRESH 3 ☐ SULPHUR 2 ☐ SALTY 4 ☐ MINERAL
	1 ☐ FRESH 3 ☐ SULPHUR 2 ☐ SALTY 4 ☐ MINERAL
	1 ☐ FRESH 3 ☐ SULPHUR 2 ☐ SALTY 4 ☐ MINERAL
	1 ☐ FRESH 3 ☐ SULPHUR 2 ☐ SALTY 4 ☐ MINERAL

51 CASING & OPEN HOLE RECORD

INSIDE DIAM. INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET FROM	DEPTH - FEET TO
~~6 1/4~~ 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.)	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: ~~1 1/2~~ 0002 GPM
DURATION OF PUMPING: 01 HOURS 30 MINS

STATIC LEVEL	WATER LEVEL END OF PUMPING	15 MINUTES	30 MINUTES	45 MINUTES	60 MINUTES
024 FEET	080 FEET	080 FEET	080 FEET	080 FEET	080 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: 090 FEET
RECOMMENDED PUMPING RATE: 0002 1 1/2 GPM
50-53: 1000.0

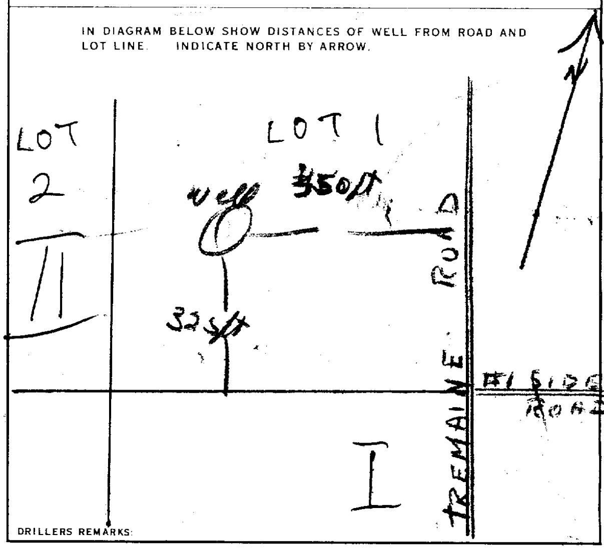
FINAL STATUS OF WELL
1 ☒ WATER SUPPLY
2 ☐ OBSERVATION WELL
3 ☐ TEST HOLE
4 ☐ RECHARGE WELL
5 ☐ ABANDONED, INSUFFICIENT SUPPLY
6 ☐ ABANDONED, POOR QUALITY
7 ☐ UNFINISHED

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

MINISTRY OF THE ENVIRONMENT COPY

FORM 7 07-091

Finucci

Ministry of the Environment
Ontario

The Ontario Water Resources Act

WATER WELL RECORD

1. PRINT ONLY IN SPACES PROVIDED
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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 10 12 17 NORTHING 18 24 RC 25 ELEVATION 26 RC 30 BASIN CODE 31 II III IV 47

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET	
				FROM	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
10-13 39	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	TO
10-11 6¼"	12 1 ☑ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE 5 ☐ PLASTIC	.188	+1	13-16 39
17-18	19 1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☑ OPEN HOLE 5 ☐ PLASTIC		39	20-23 55
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 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		MATERIAL AND TYPE (CEMENT GROUT LEAD PACKER, ETC.)
FROM	TO	
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: 4.5 GPM

DURATION OF PUMPING: 1 15-16 HOURS 0 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 19 FEET	22-24 50 FEET	26-28 50 FEET	29-31 50 FEET	32-34 50 FEET	35-37 50 FEET

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 4.0 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

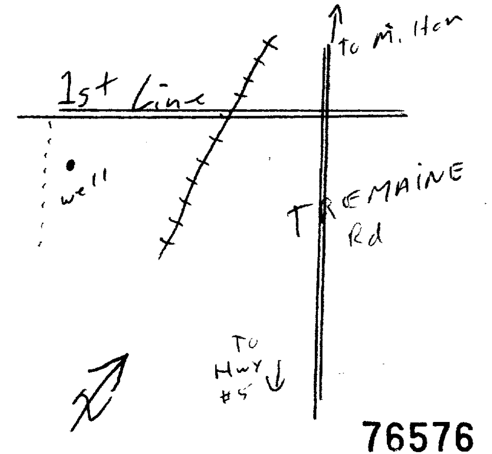
55-56
- 1 ☑ DOMESTIC
- 2 ☐ STOCK
- 3 ☐ IRRIGATION
- 4 ☐ INDUSTRIAL
- ☐ OTHER
- 5 ☐ COMMERCIAL
- 6 ☐ MUNICIPAL
- 7 ☐ PUBLIC SUPPLY
- 8 ☐ COOLING OR AIR CONDITIONING
- 9 ☐ NOT USED

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.



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: John W O'Connor

SUBMISSION DATE DAY ____ MO. ____ YR. ____

OFFICE USE ONLY

DATA SOURCE 58

CONTRACTOR 59-62 4005

DATE RECEIVED 63-68 JAN 20 1992

80

DATE OF INSPECTION

INSPECTOR

REMARKS

MINISTRY OF THE ENVIRONMENT COPY

FORM NO. 0506 (11/86) FORM 9

J.B

Hendervale House or Hendervale Cottage

WATER RESOURCES
DEC 18 1968
ONTARIO WATER
RESOURCES COMMISSION

TM. 17 Z 5T9 5T6 20 Con I DSN
4 R 4 8 0 8 6 3 CODED 5S Lot 3
lev. 5 R 0 5 5 0
in 2 4

2802793
3 3

The Ontario Water Resources Commission Act

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

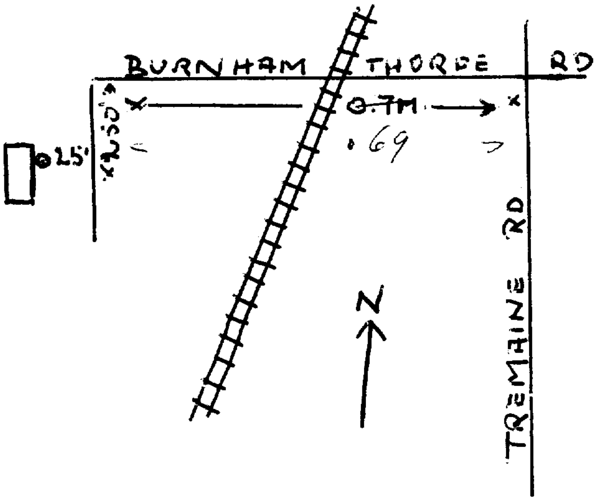
Overburden and Bedrock Record	From ft.	To ft.	Depth(s) at which water(s) found	Kind of water (fresh, salty, sulphur)
TOPSOIL	0	1	21	FRESH
BROWN CLAY	1	12		
HARDPAN	12	21		
SAND & GRAVEL	21	27		

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)

Location of Well

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



CSS.S8

Form 7 15M-60-4138

OWRC COPY

Hendervale ABC Barn or Hendervale XYZ Barn

Ministry of the Environment
Ontario

WELL # 1.

The Ontario Water Resources Act

WATER WELL RECORD

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

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	ADDRESS	DATE COMPLETED 48-53
HENDERVALE STABLES	#1 SIDE RD MILTON ONT.	DAY 05 MO 07 YR 96

21 | UTM ZONE 10 | EASTING 12-17 | NORTHING 18-24 | RC 25 | ELEVATION 26 | RC 30 | BASIN CODE 31 | II | III | IV 47

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET FROM	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
10-13 95	1 ☒ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
15-18	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
20-23	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
25-28	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
30-33	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	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.) 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	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	12 GPM	2 HOURS (15-16) ___ MINS (17-18)

STATIC LEVEL 19-21	WATER LEVEL END OF PUMPING 22-24	WATER LEVELS DURING 25: 1 ☒ PUMPING 2 ☐ RECOVERY — 15 MINUTES 26-28	30 MINUTES 29-31	45 MINUTES 32-34	60 MINUTES 35-37
39 FEET	82 FEET	64 FEET	75 FEET	82 FEET	82 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	95 FEET	10 GPM

50-53

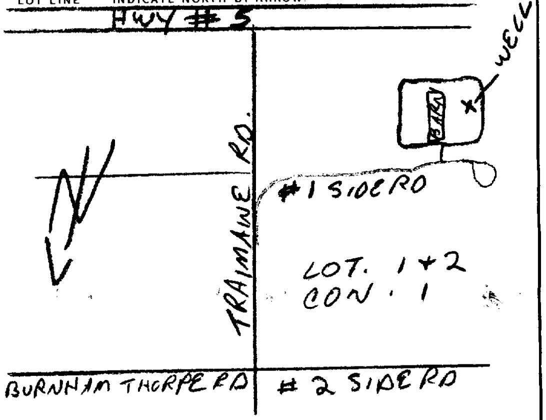
FINAL STATUS OF WELL 54
- 1 ☒ WATER SUPPLY
- 2 ☐ OBSERVATION WELL
- 3 ☐ TEST HOLE
- 4 ☐ RECHARGE WELL
- 5 ☐ ABANDONED, INSUFFICIENT SUPPLY
- 6 ☐ ABANDONED POOR QUALITY
- 7 ☐ UNFINISHED
- ☐ DEWATERING

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.



74931

DRILLERS REMARKS

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	TO-479

SIGNATURE OF TECHNICIAN/CONTRACTOR: R. Core

SUBMISSION DATE DAY ___ MO. ___ YR. ___

OFFICE USE ONLY

DATA SOURCE 58	CONTRACTOR 59-62	DATE RECEIVED 63-68	80
	1660	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 HALTON	TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE HALTON HILLS	CON. BLOCK, TRACT, SURVEY, ETC. CON. 1	LOT 25-27 1&2
OWNER (SURNAME FIRST) 28-47 HENDERVALE STABLES	ADDRESS #1 SIDE RD MILTON ONT.		DATE COMPLETED 48-53 DAY 15 MO 08 YR 96

21 UTM ZONE 10 EASTING 12 17 NORTHING 18 24 RC. 25 ELEVATION 26 RC 30 BASIN CODE 31 II III IV 47

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
10-13 103	14 1 ☐ FRESH 3 ☐ SULPHUR 2 ☒ SALTY 4 ☐ MINERALS 6 ☐ GAS
15-18	19 1 ☐ FRESH 3 ☐ SULPHUR 2 ☐ SALTY 4 ☐ MINERALS 6 ☐ GAS
20-23	24 1 ☐ FRESH 3 ☐ SULPHUR 2 ☐ SALTY 4 ☐ MINERALS 6 ☐ GAS
25-28	29 1 ☐ FRESH 3 ☐ SULPHUR 2 ☐ SALTY 4 ☐ MINERALS 6 ☐ GAS
30-33	34 80 1 ☐ FRESH 3 ☐ SULPHUR 2 ☐ SALTY 4 ☐ MINERALS 6 ☐ GAS

51 CASING & OPEN HOLE RECORD

INSIDE DIAM INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET FROM	TO
10-11 6¼	12 1 ☒ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE 5 ☐ PLASTIC	.188	+1	13-16 47
17-18 6¼	19 1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☒ OPEN HOLE 5 ☐ PLASTIC	---	47	20-23 106
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 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	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 8 GPM	DURATION OF PUMPING 15-16 17-18 1 HOURS --- MINS

STATIC LEVEL 19-21	WATER LEVEL END OF PUMPING 22-24	25 WATER LEVELS DURING 1 ☐ PUMPING 2 ☐ RECOVERY 15 MINUTES 26-28	30 MINUTES 29-31	45 MINUTES 32-34	60 MINUTES 35-37
44 FEET	95 FEET	60 FEET	78 FEET	95 FEET	95 FEET

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 43-45 101 FEET	RECOMMENDED PUMPING RATE 46-49 8 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

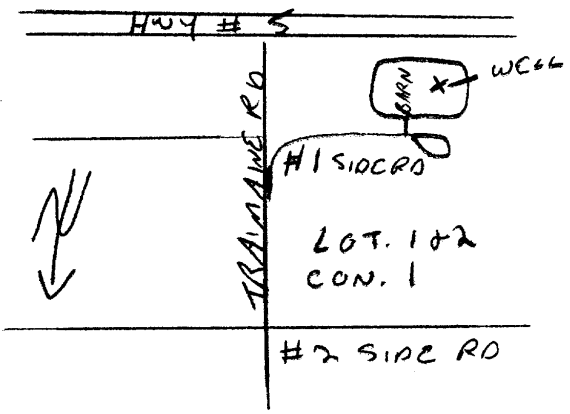
- 1 ☒ DOMESTIC
- 2 ☐ STOCK
- 3 ☐ IRRIGATION
- 4 ☐ INDUSTRIAL
- ☐ OTHER
- 5 ☐ COMMERCIAL
- 6 ☐ MUNICIPAL
- 7 ☐ PUBLIC SUPPLY
- 8 ☐ COOLING OR AIR CONDITIONING
- 9 ☐ NOT USED

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.



74934

DRILLERS REMARKS

CONTRACTOR

NAME OF WELL CONTRACTOR CORE'S WELL DRILLING	WELL CONTRACTOR'S LICENCE NUMBER 1660
ADDRESS 264 BRONTE ST .UNIT 310 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 58	CONTRACTOR 59-62 1660	DATE RECEIVED 63-68 80 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	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: 7 GPM

DURATION OF PUMPING: 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: GPM

PUMP INTAKE SET AT: FEET

WATER AT END OF TEST: 1 ☒ CLEAR 2 ☐ CLOUDY

RECOMMENDED PUMP TYPE: ☐ SHALLOW ☒ DEEP

RECOMMENDED PUMP SETTING: 50 FEET

RECOMMENDED PUMPING RATE: 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

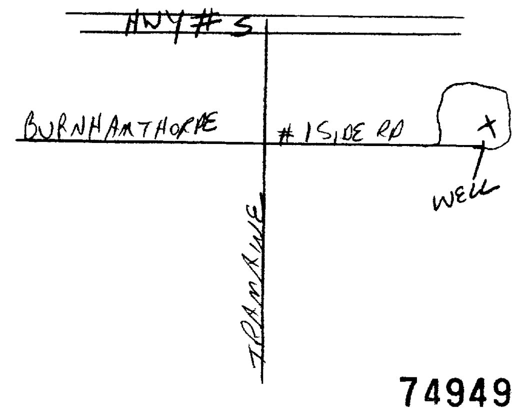
1 ☒ DOMESTIC
2 ☐ STOCK
3 ☐ IRRIGATION
4 ☐ INDUSTRIAL
☐ OTHER
5 ☐ COMMERCIAL
6 ☐ MUNICIPAL
7 ☐ PUBLIC SUPPLY
8 ☐ COOLING OR AIR CONDITIONING
9 ☐ NOT USED

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

LOCATION OF WELL

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



74949

DRILLERS REMARKS

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: R. Core

SUBMISSION DATE: DAY ______ MO. ______ YR. ____

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/5ʃ.

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	TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE	CON., BLOCK, TRACT, SURVEY, ETC.	LOT 25-27
[redacted]	BURLINGTON	1 N.D.S.	001

[redacted]63 DUNDAS ST. (#5 HWY)

DATE COMPLETED 48-53 DAY 04 MO. 09 YR. 72

[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 ~~6¼~~	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

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

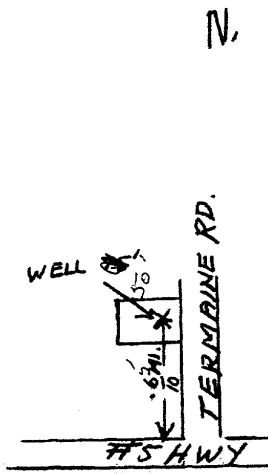
1 ☒ DOMESTIC
2 ☐ STOCK
3 ☐ IRRIGATION
4 ☐ INDUSTRIAL
☐ OTHER
5 ☐ COMMERCIAL
6 ☐ MUNICIPAL
7 ☐ PUBLIC SUPPLY
8 ☐ COOLING OR AIR CONDITIONING
9 ☐ NOT USED

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: Peter Spotwick 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

P

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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 HALTON	TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE ~~[illegible]~~ Town of Milton (Nelson	CON., BLOCK, TRACT, SURVEY, ETC. II NDS	LOT 001 4
OWNER (SURNAME FIRST) ACHILLE FARMS	ADDRESS RR 6 MILTON		DATE COMPLETED 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	16 ga	66	90
	☐ STEEL ☐ GALVANIZED ☐ CONCRETE ☐ OPEN HOLE			

SCREEN

SIZE(S) OF OPENING (SLOT NO.)	DIAMETER INCHES	LENGTH FEET
MATERIAL AND TYPE GRAVEL PAK	DEPTH TO TOP OF SCREEN 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 FEET	WATER LEVEL END OF PUMPING FEET	WATER LEVELS DURING ☐ PUMPING ☐ RECOVERY 15 MINUTES FEET 30 MINUTES FEET 45 MINUTES FEET 60 MINUTES FEET 200 GALLONS [illegible]	
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

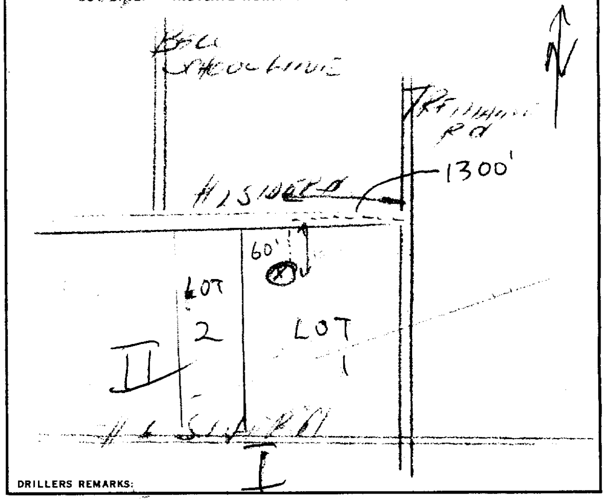
☒ DOMESTIC
☐ STOCK
☐ IRRIGATION
☐ INDUSTRIAL
☐ OTHER
☐ COMMERCIAL
☐ MUNICIPAL
☐ PUBLIC SUPPLY
☐ COOLING OR AIR CONDITIONING
☐ NOT USED

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 MILTON WELL BORING	LICENCE NUMBER 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

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

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 | 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	TO
BROWN	CLAY		LOOSE	0	12 ~~XX~~
RED	CLAY		LOOSE	12 ~~XX~~	18 ~~XX~~
RED	SHALE		HARD	18 ~~XX~~	50

31

32

41 WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER
48	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	25
	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☒ OPEN HOLE 5 ☐ PLASTIC		25	50
	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE 5 ☐ PLASTIC			

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

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	2 GPM	1 HOURS ___ MINS

WATER LEVELS DURING: 1 ☒ PUMPING 2 ☐ RECOVERY

STATIC LEVEL	WATER LEVEL END OF PUMPING	15 MINUTES	30 MINUTES	45 MINUTES	60 MINUTES
17 FEET	46 FEET	46 FEET	46 FEET	46 FEET	46 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	48 FEET	2 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

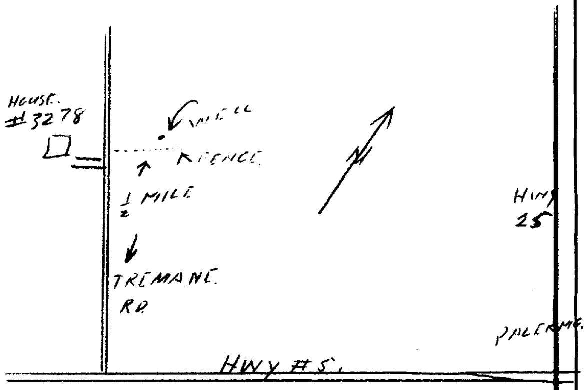
- 1 ☒ DOMESTIC
- 2 ☐ STOCK
- 3 ☐ IRRIGATION
- 4 ☐ INDUSTRIAL
- ☐ OTHER
- 5 ☐ COMMERCIAL
- 6 ☐ MUNICIPAL
- 7 ☐ PUBLIC SUPPLY
- 8 ☐ COOLING OR AIR CONDITIONING
- 9 ☐ NOT USED

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.



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: J.B. O'Connor

SUBMISSION DATE DAY ___ MO. ___ YR. ___

OFFICE USE ONLY

DATA SOURCE	CONTRACTOR	DATE RECEIVED
	4005	SEP 12 1990

DATE OF INSPECTION | INSPECTOR

REMARKS

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FORM NO. 0506 (11/86) FORM 9

APPENDIX C

Groundwater Level Hydrographs

Figure C.1: Monitoring Well MW-01 Hydrograph
Tansley Quarry - Forterra Brick Ltd.

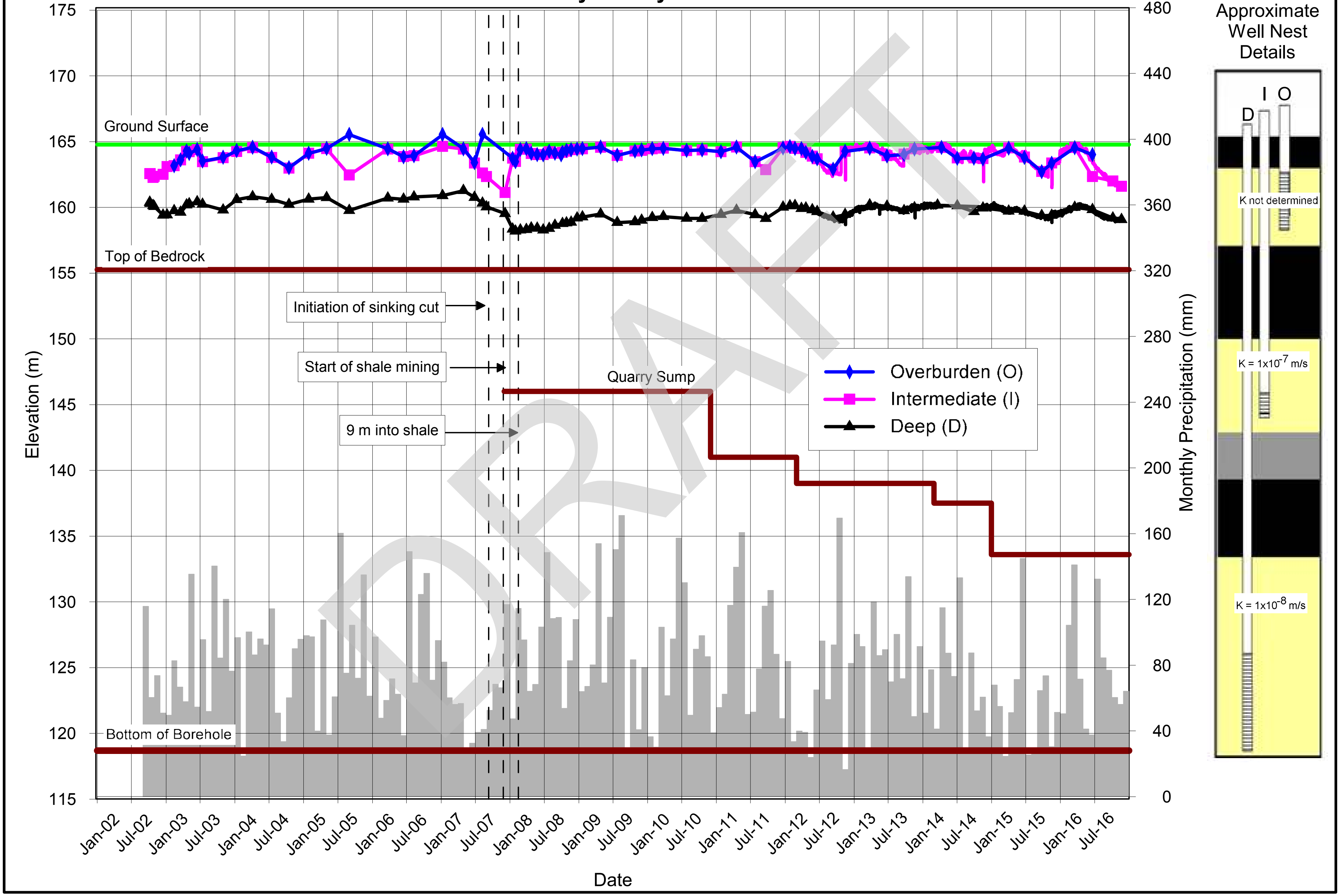
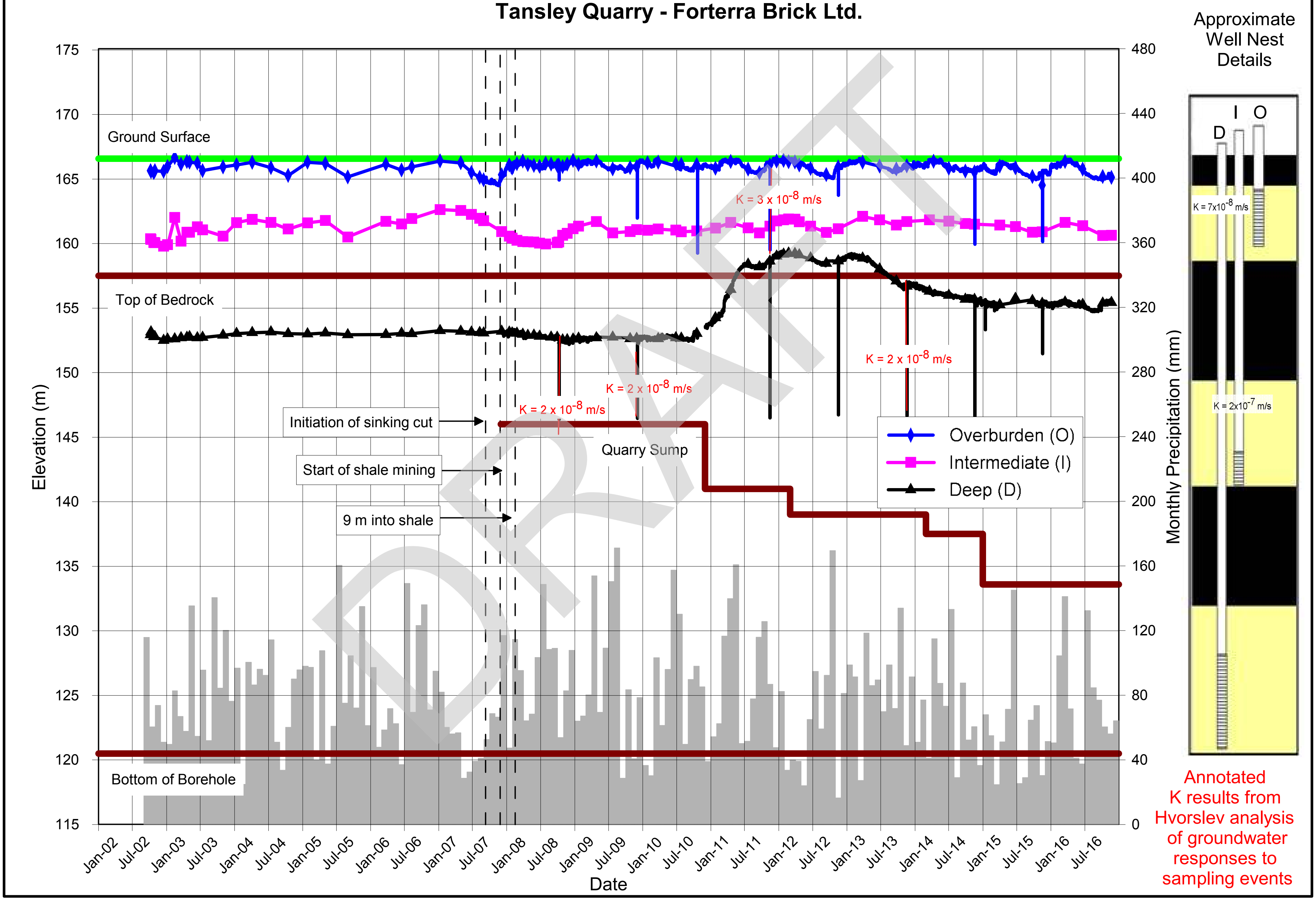


Figure C.2: Monitoring Well MW-02 Hydrograph
Tansley Quarry - Forterra Brick Ltd.



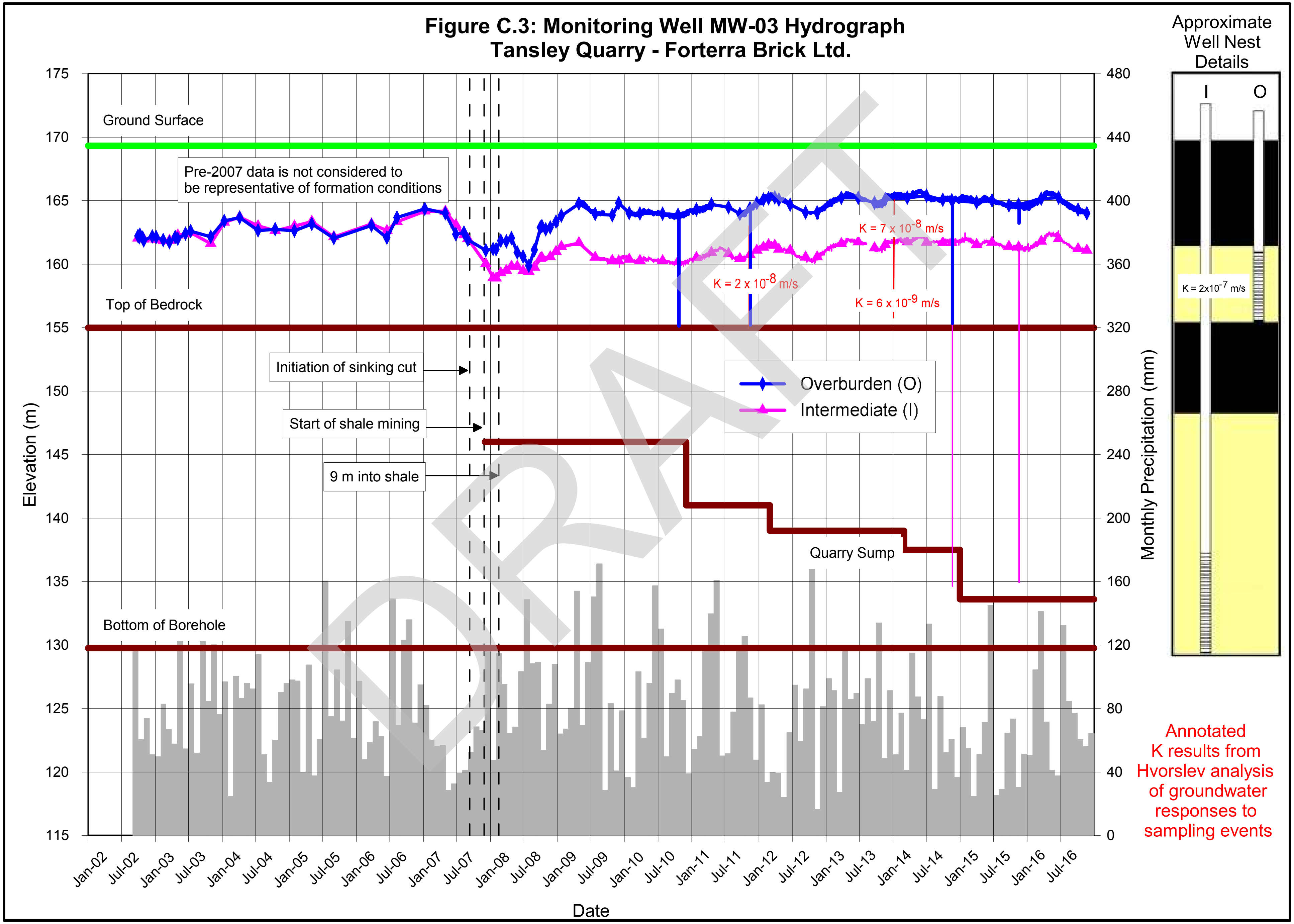
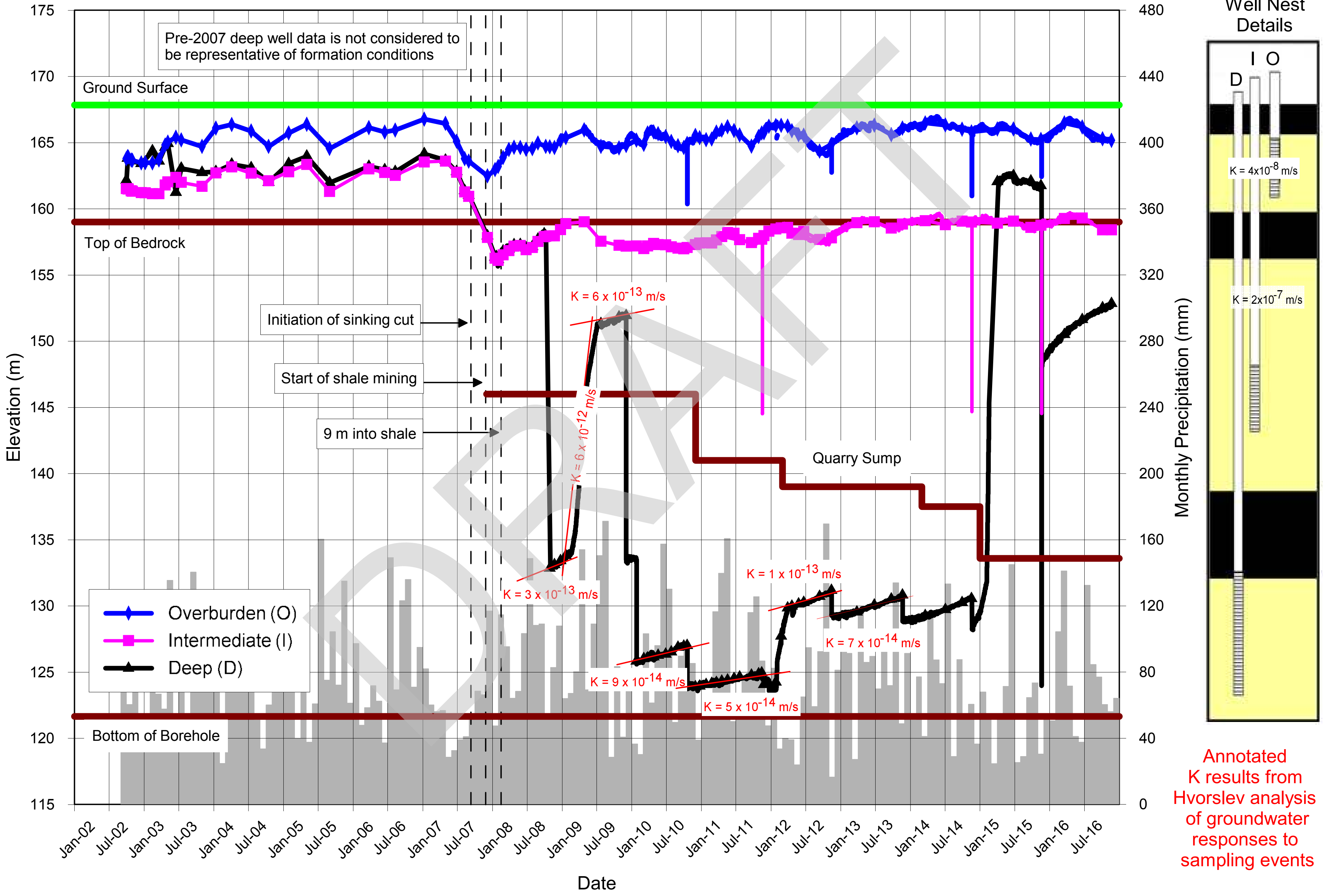


Figure C.3: Monitoring Well MW-03 Hydrograph
Tansley Quarry - Forterra Brick Ltd.

Figure C.4: Monitoring Well MW-04 Hydrograph
Tansley Quarry - Forterra Brick Ltd.



Annotated K results from Hvorslev analysis of groundwater responses to sampling events

Figure C.5: Monitoring Well MW-05 Hydrograph
Tansley Quarry - Forterra Brick Ltd.

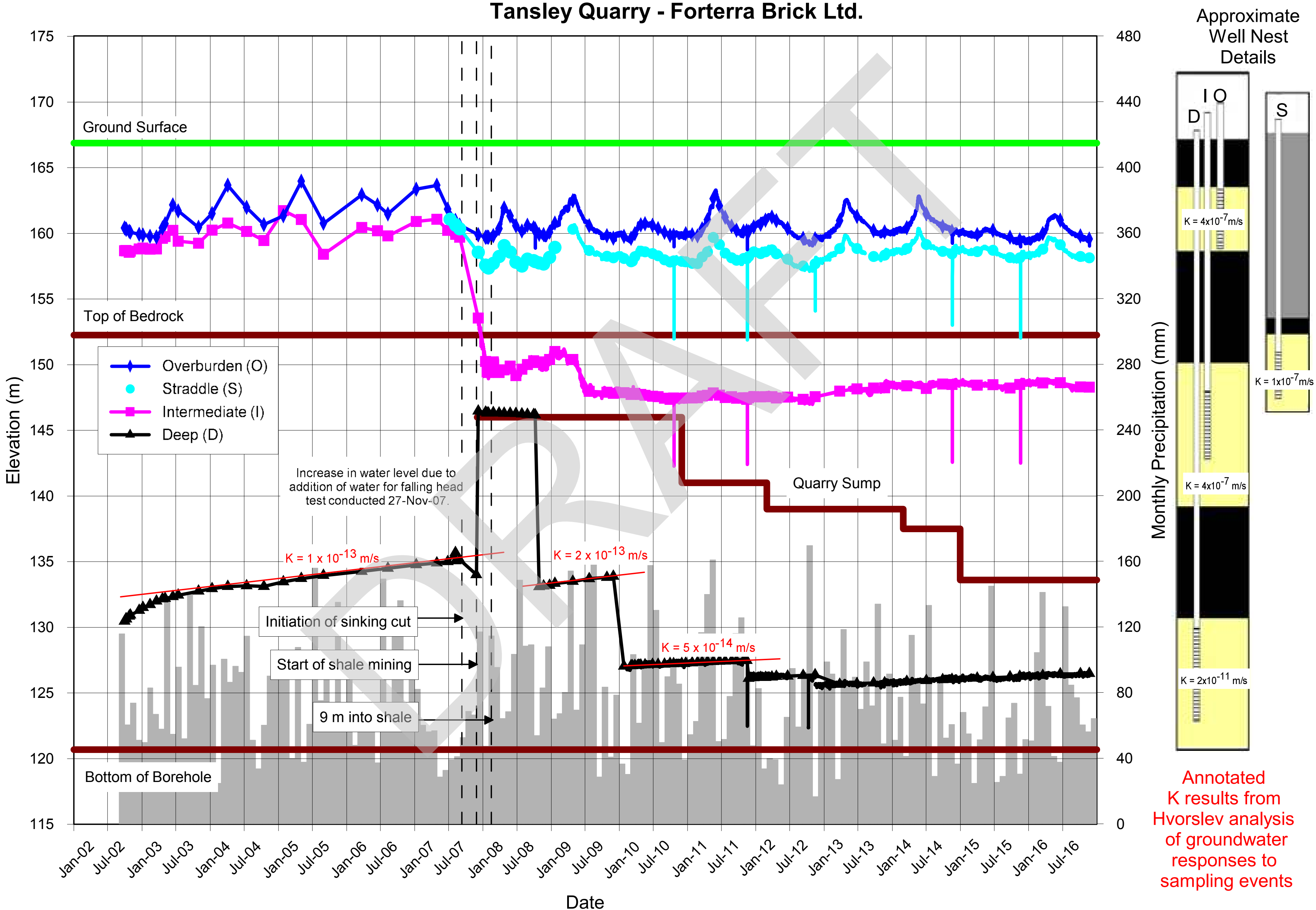
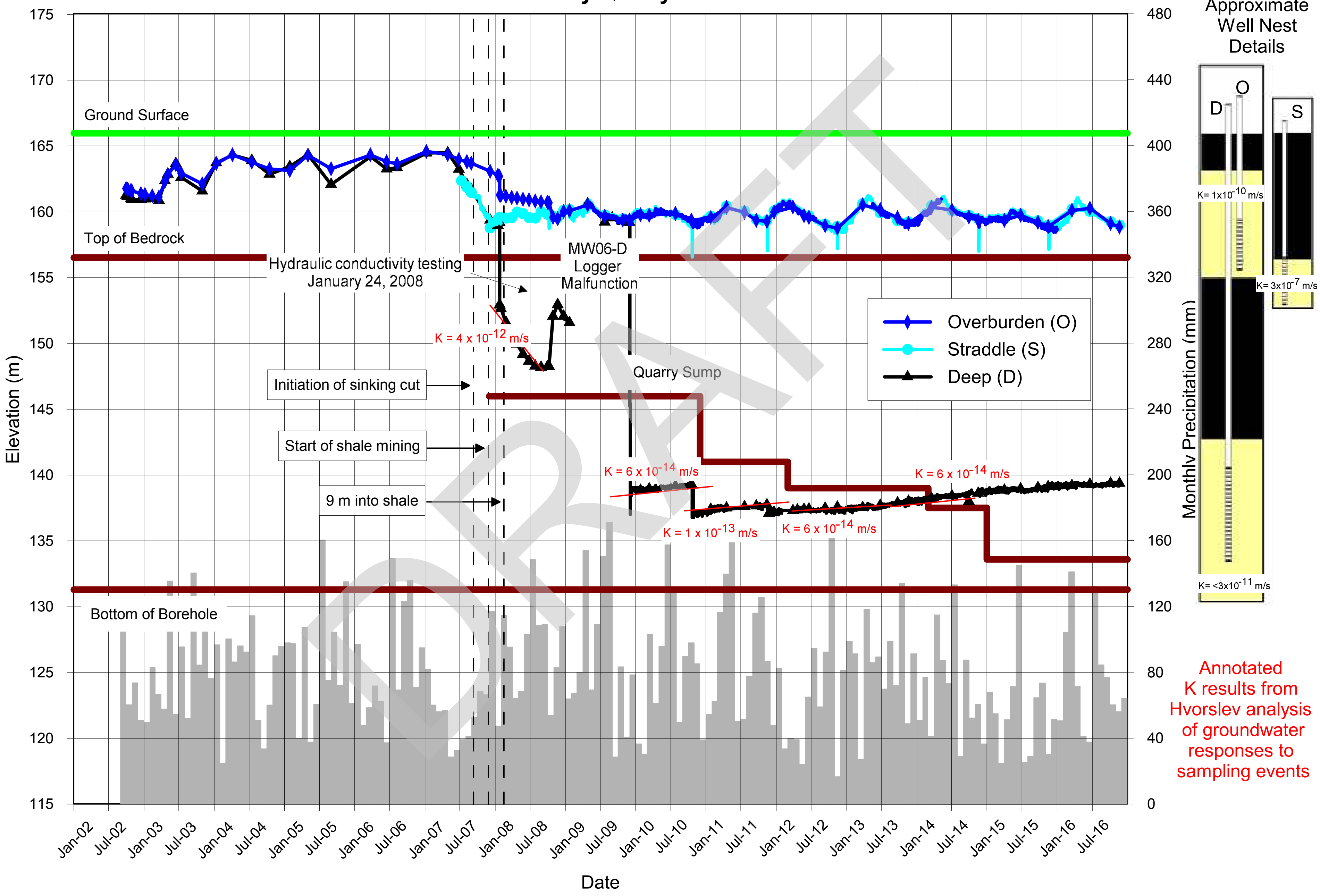
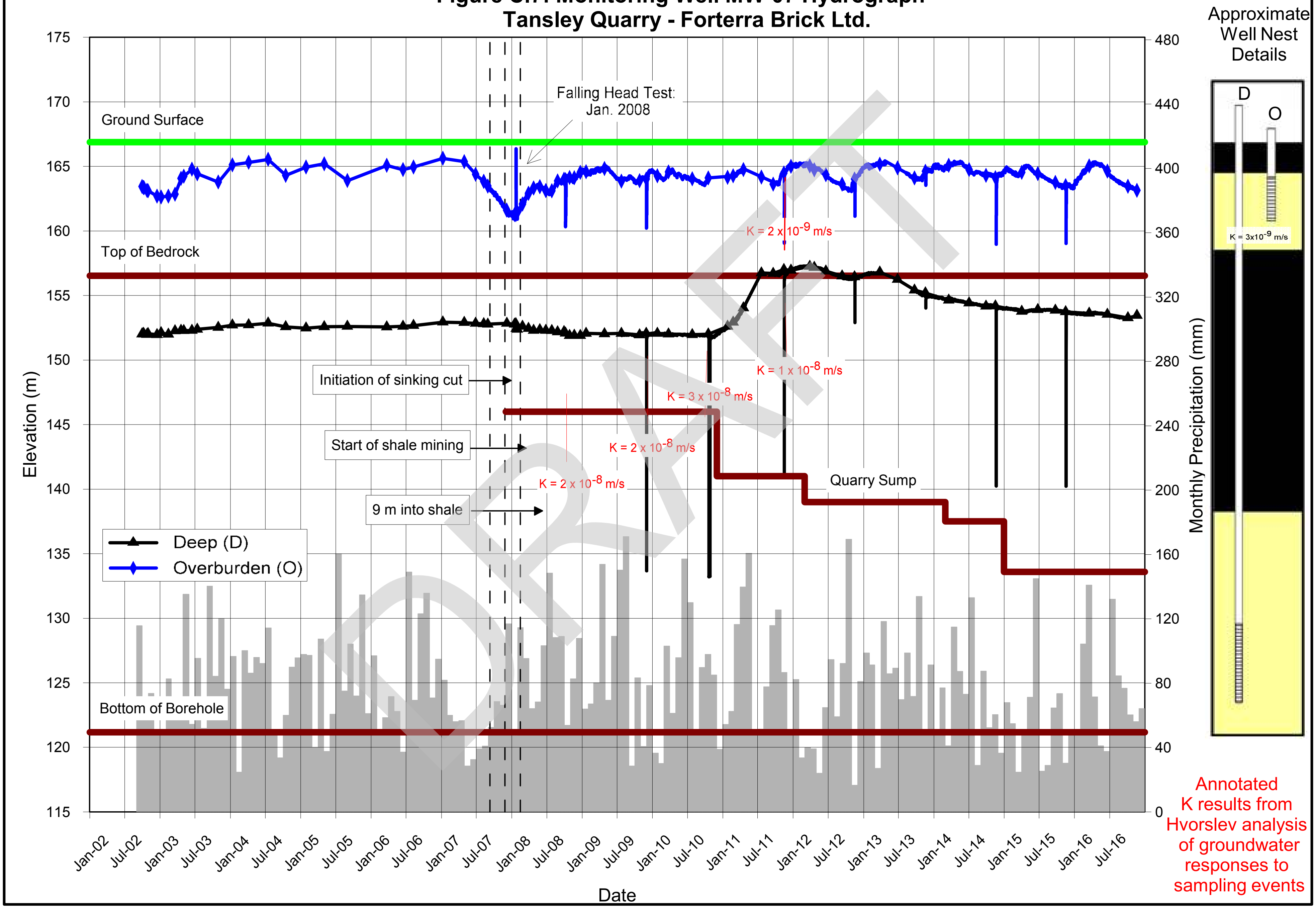


Figure C.6: Monitoring Well MW-06 Hydrograph
Tansley Quarry - Forterra Brick Ltd.



Annotated K results from Hvorslev analysis of groundwater responses to sampling events

Figure C.7: Monitoring Well MW-07 Hydrograph
Tansley Quarry - Forterra Brick Ltd.



Golder Associates

Figure C.8: Monitoring Well MW-08 Hydrograph
Tansley Quarry - Forterra Brick Ltd.

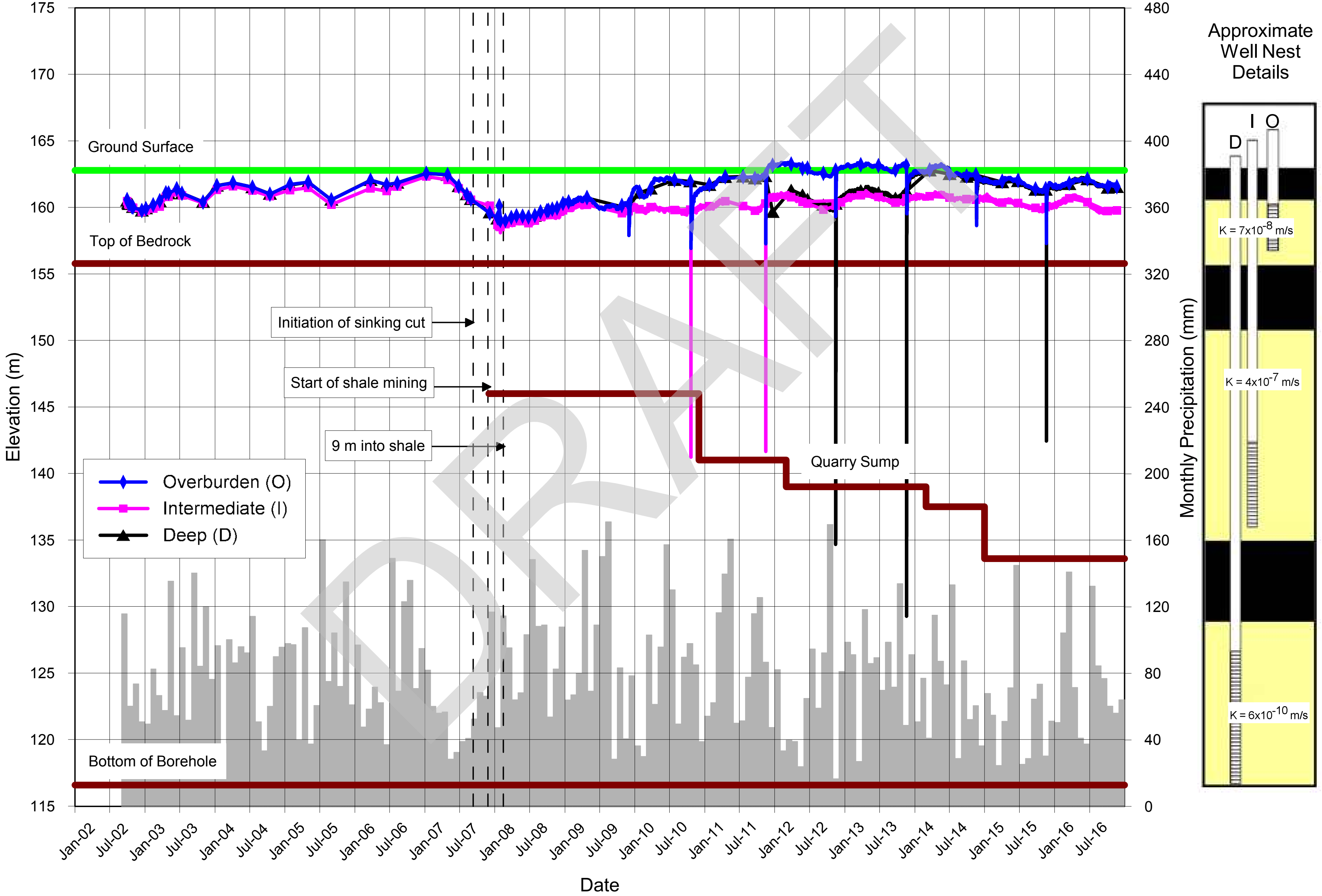
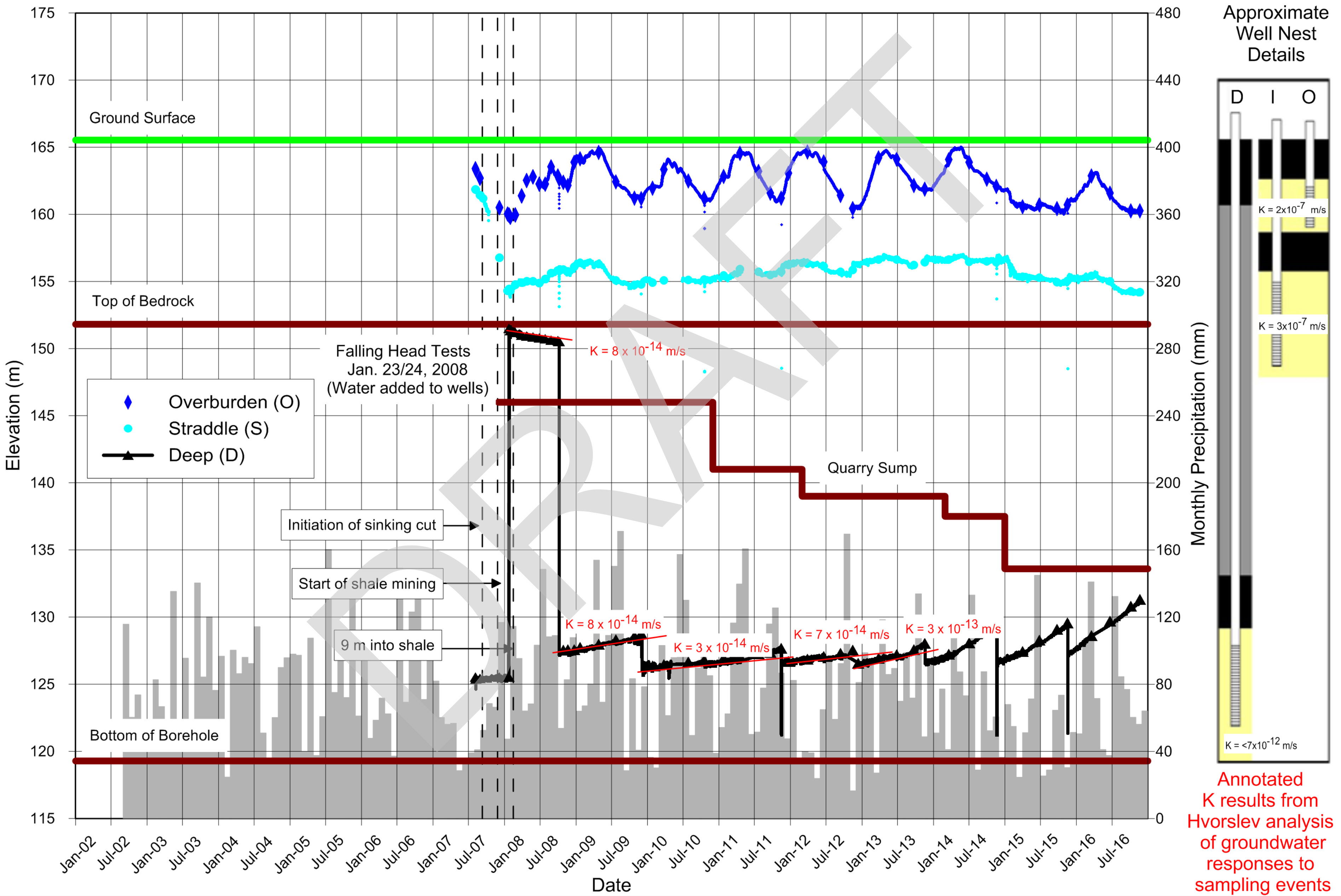


Figure C.9: Monitoring Well MW-09 Hydrograph
Tansley Quarry - Forterra Brick Ltd.



Annotated K results from Hvorslev analysis of groundwater responses to sampling events

Figure C.10: Monitoring Well MW-10 Hydrograph
Tansley Quarry - Forterra Brick Ltd.

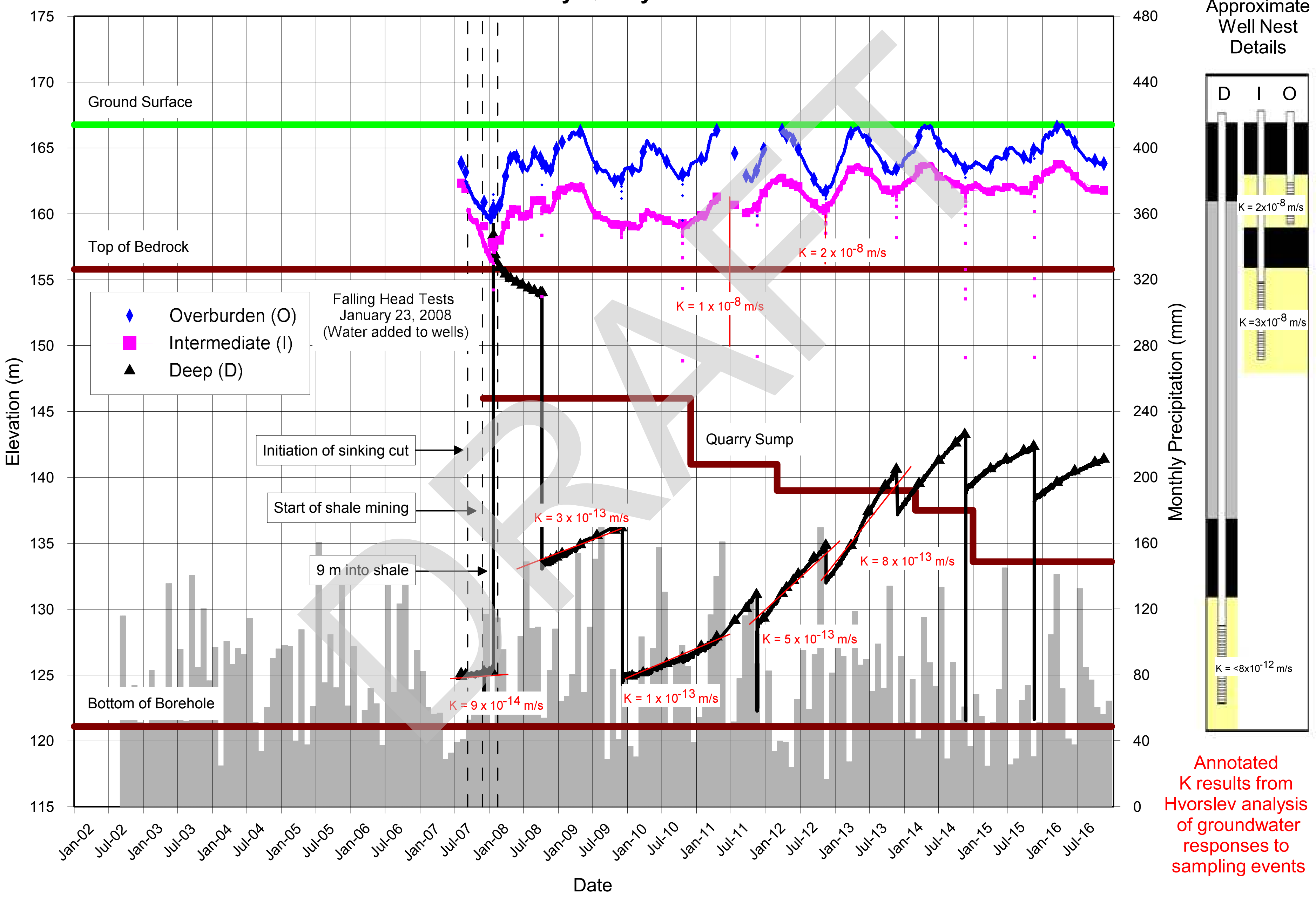


Figure C.11: Monitoring Well MW-11 Hydrograph
Tansley Quarry - Forterra Brick Ltd.

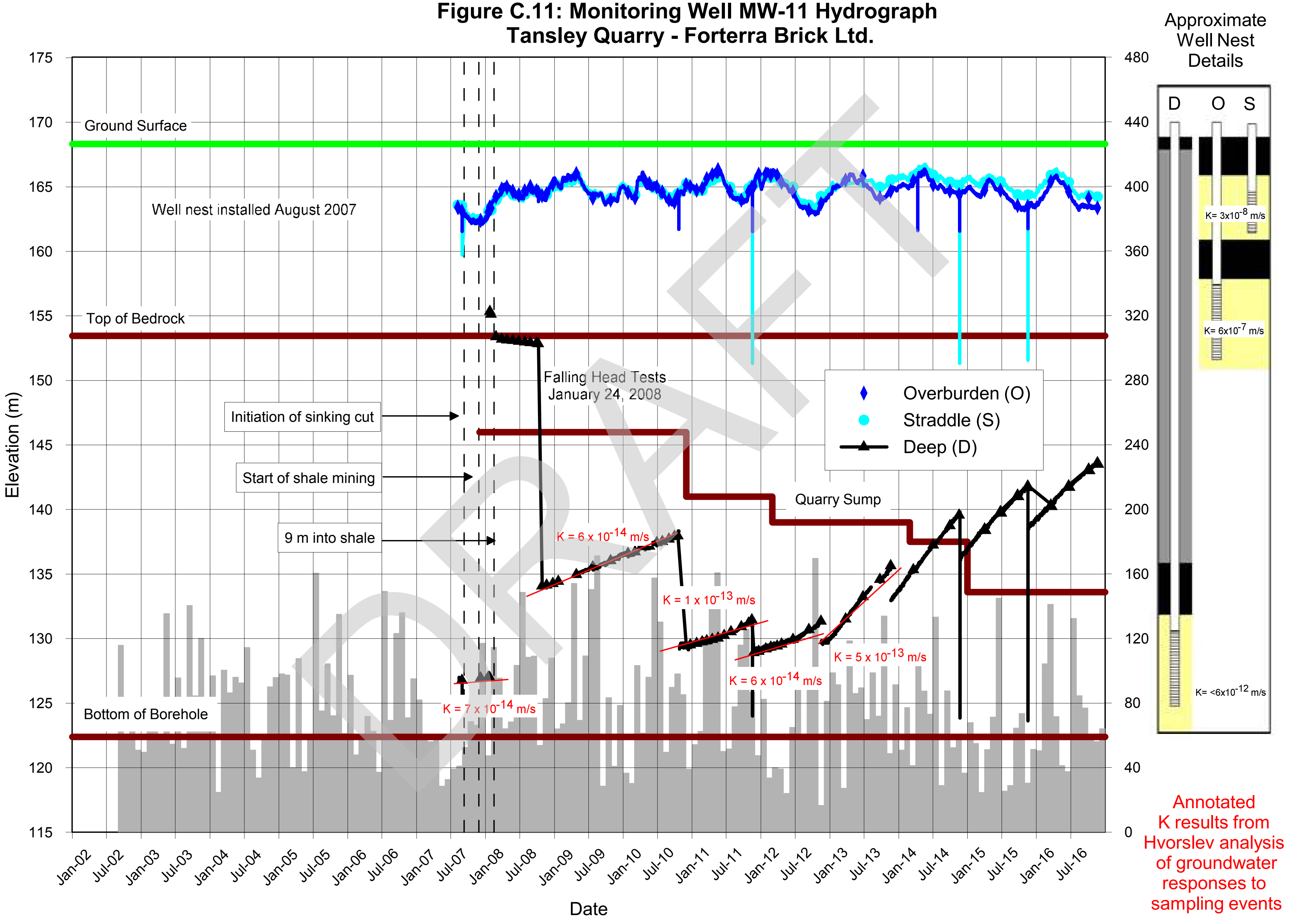


Figure C.12: Monitoring Well TW-1 Hydrograph
Tansley Quarry - Forterra Brick Ltd.

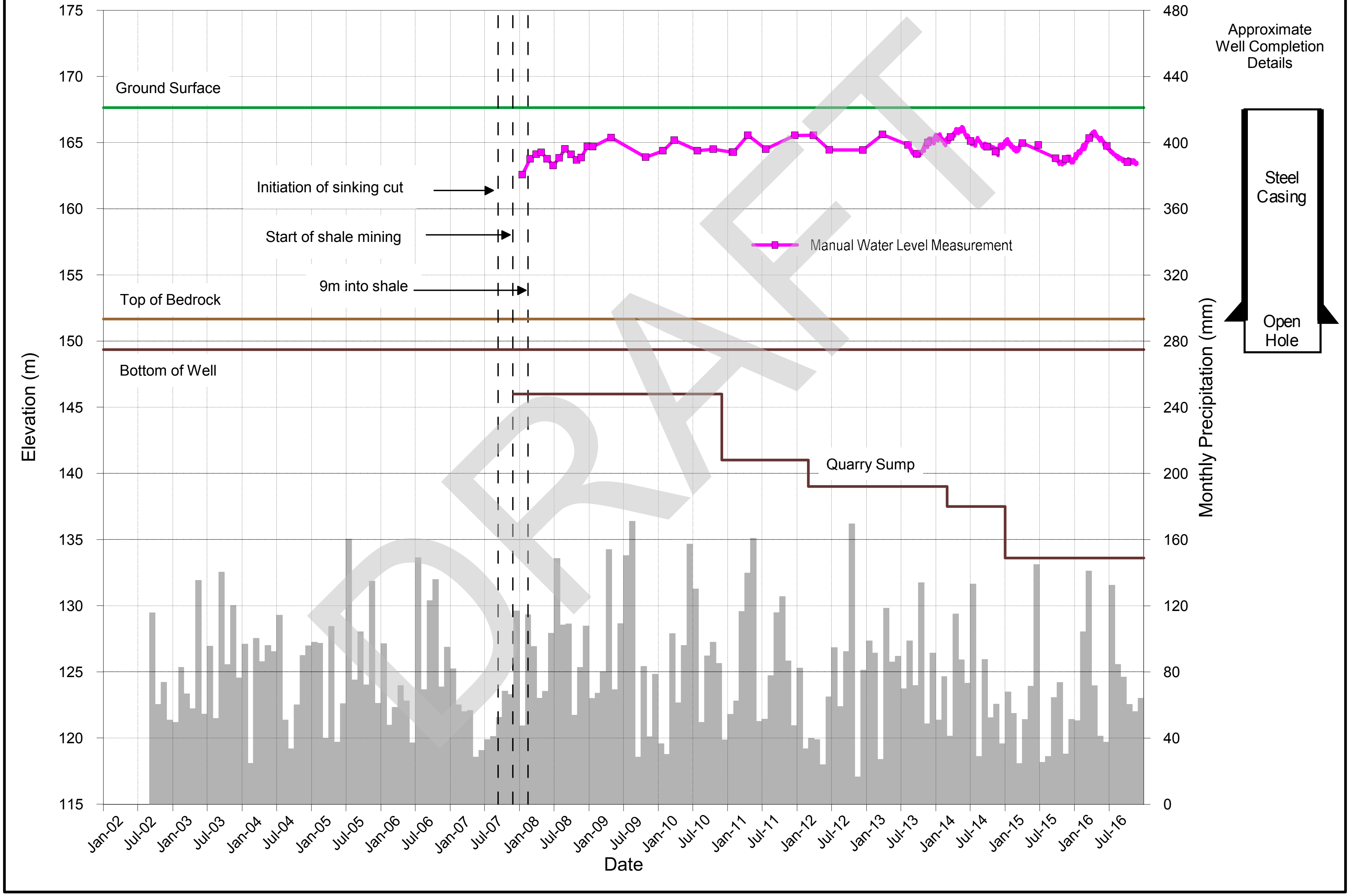


Figure C.13: Monitoring Well TW-2 Hydrograph
Tansley Quarry - Forterra Brick Ltd.

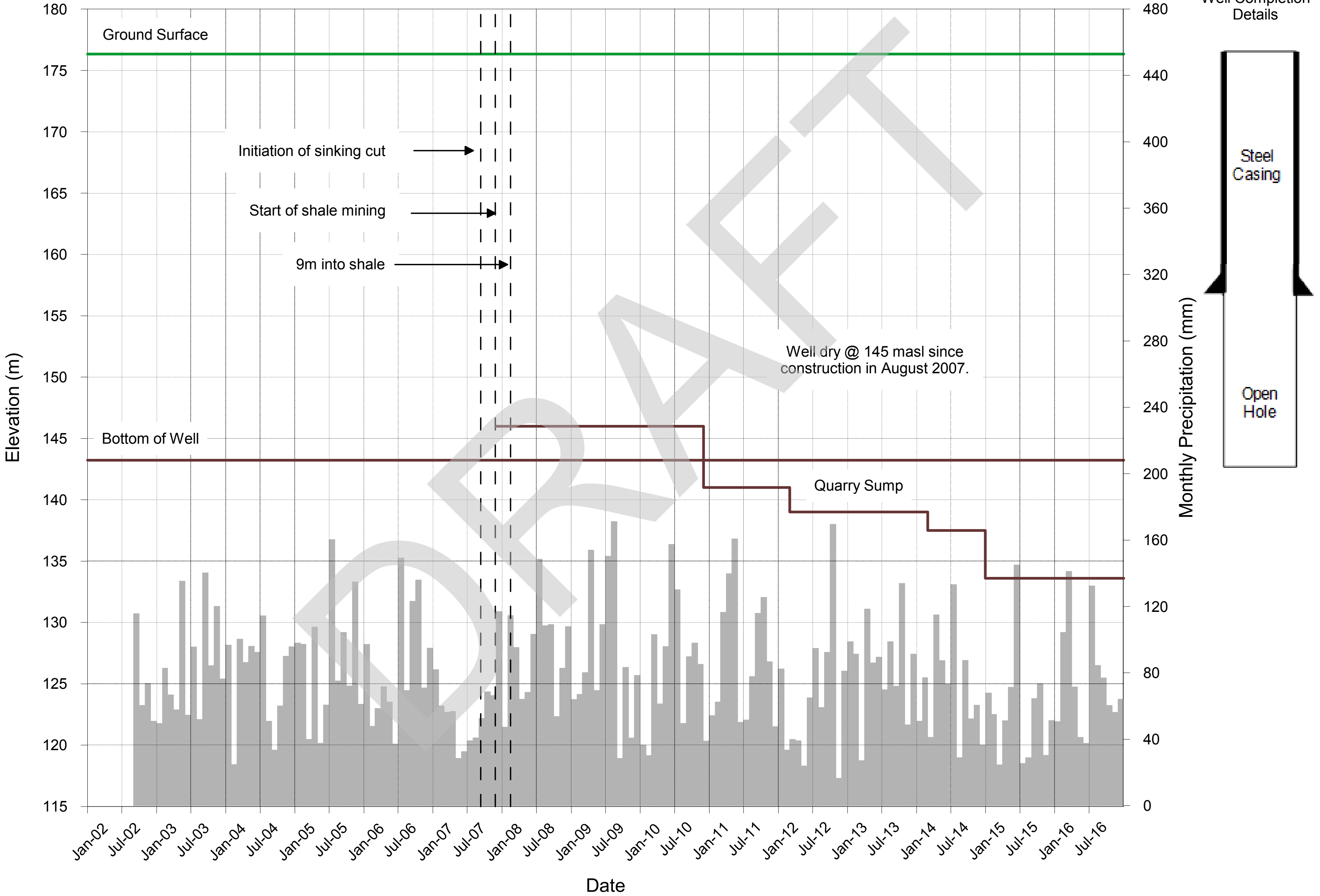


Figure C.14: Monitoring Well TW-3 Hydrograph
Tansley Quarry - Forterra Brick Ltd.

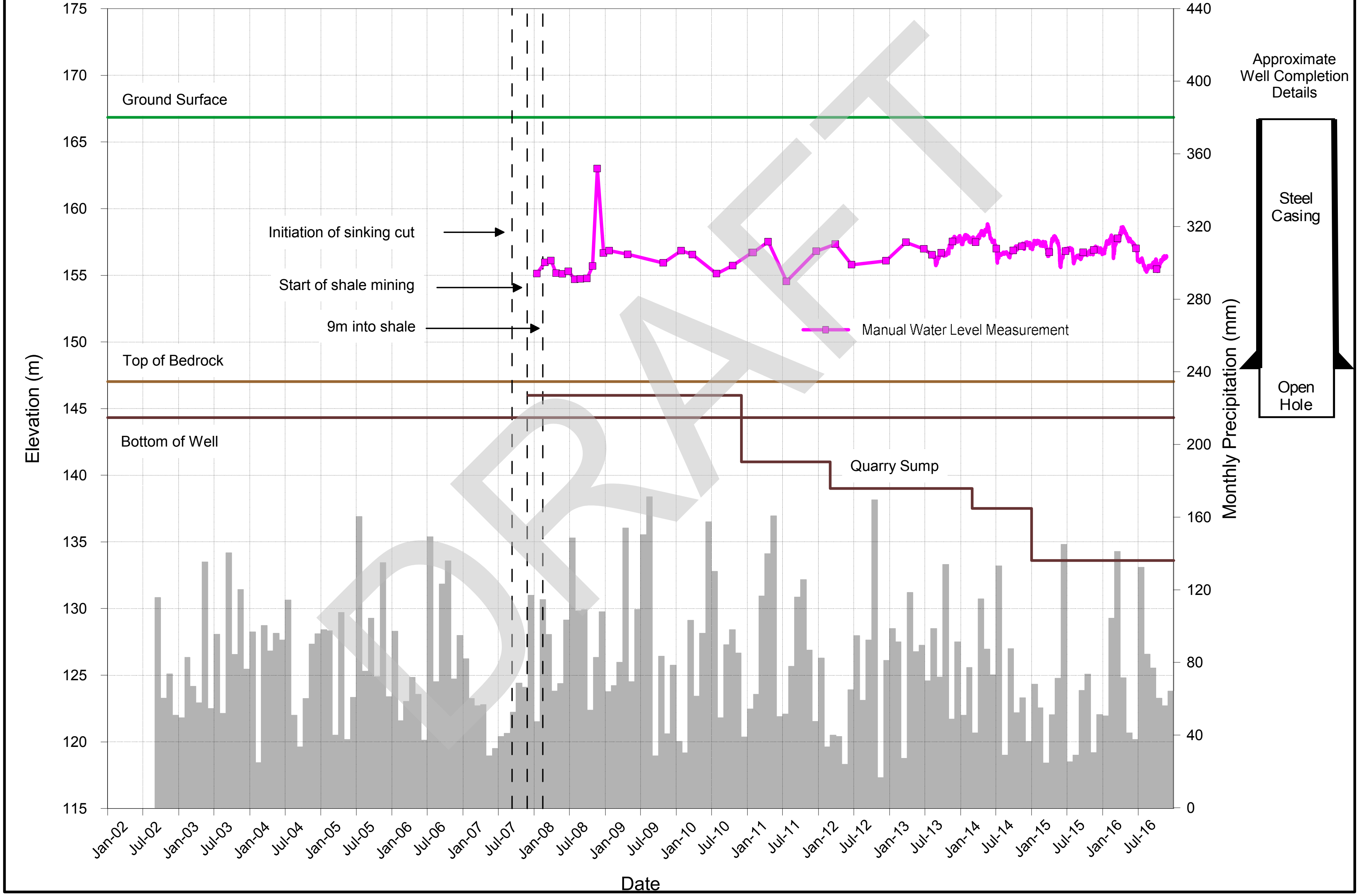


Figure C.15: Featherstone Well
Tansley Quarry - Forterra Brick Ltd.

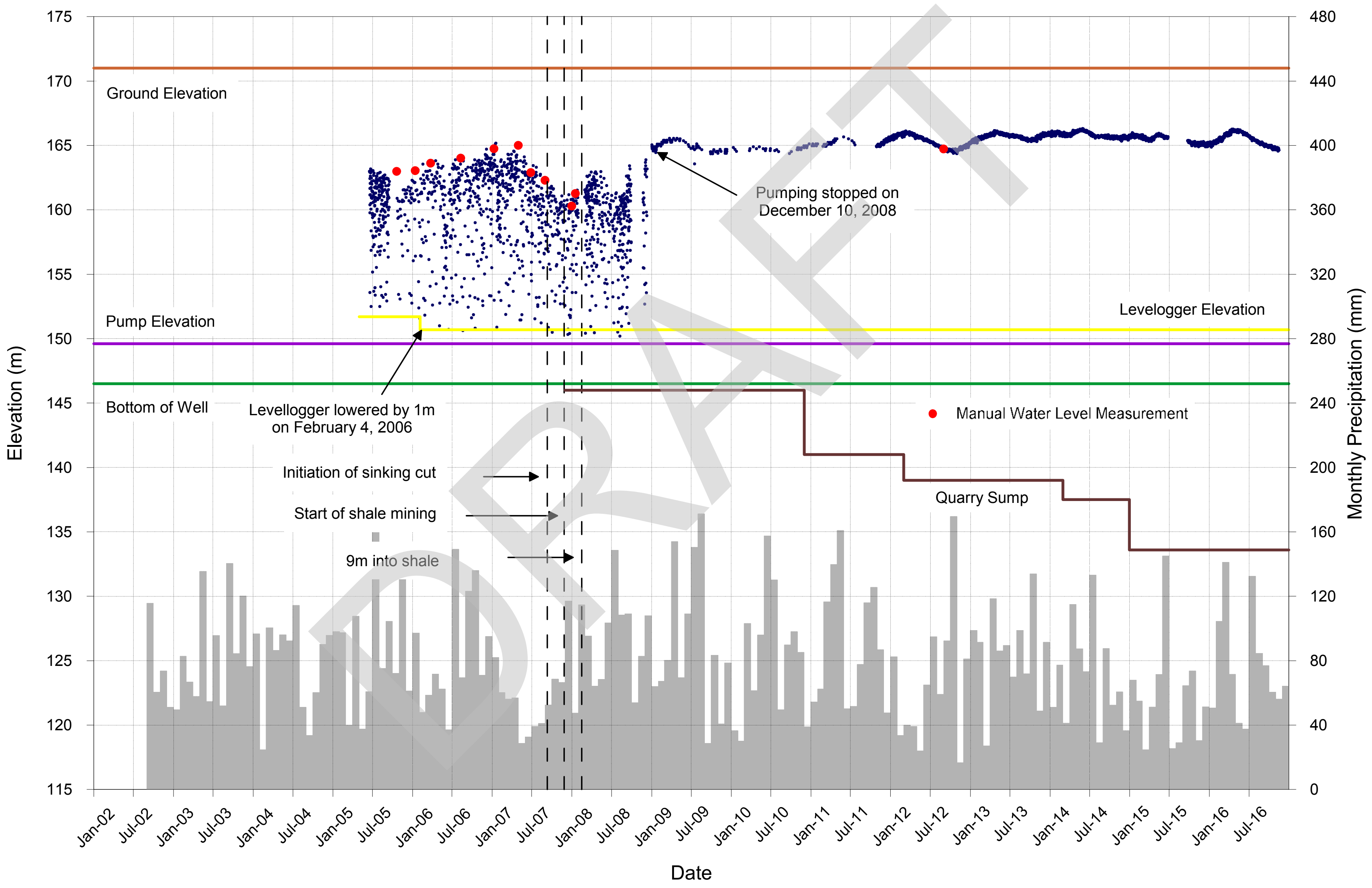


Figure C.16: Finucci Well
Tansley Quarry - Forterra Brick Ltd.

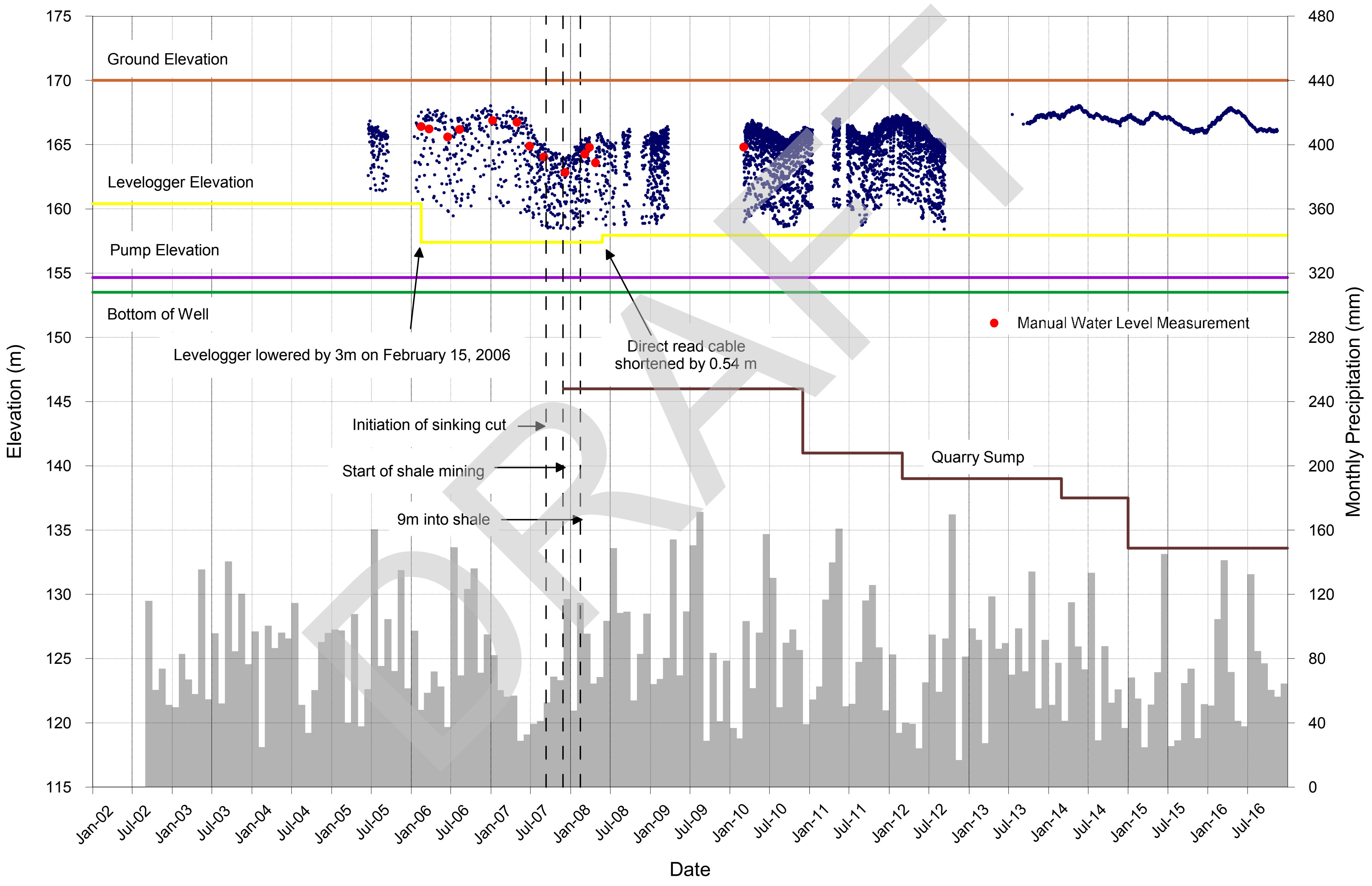
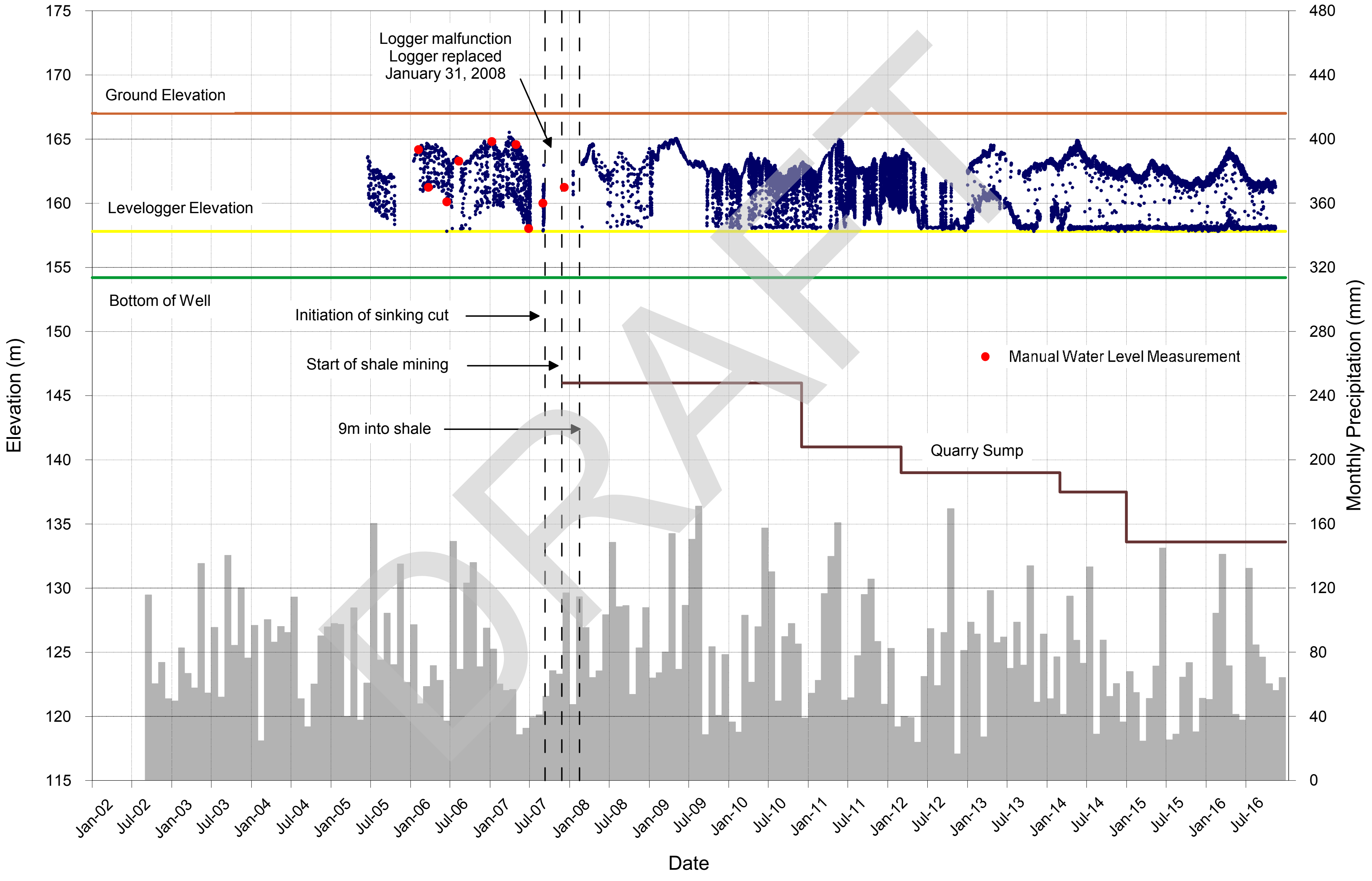


Figure C.17: Hendervale Main Barn Well
Tansley Quarry - Forterra Brick Ltd.



Golder Associates

Figure C.18: Hendervale Cottage Well
Tansley Quarry - Forterra Brick Ltd.

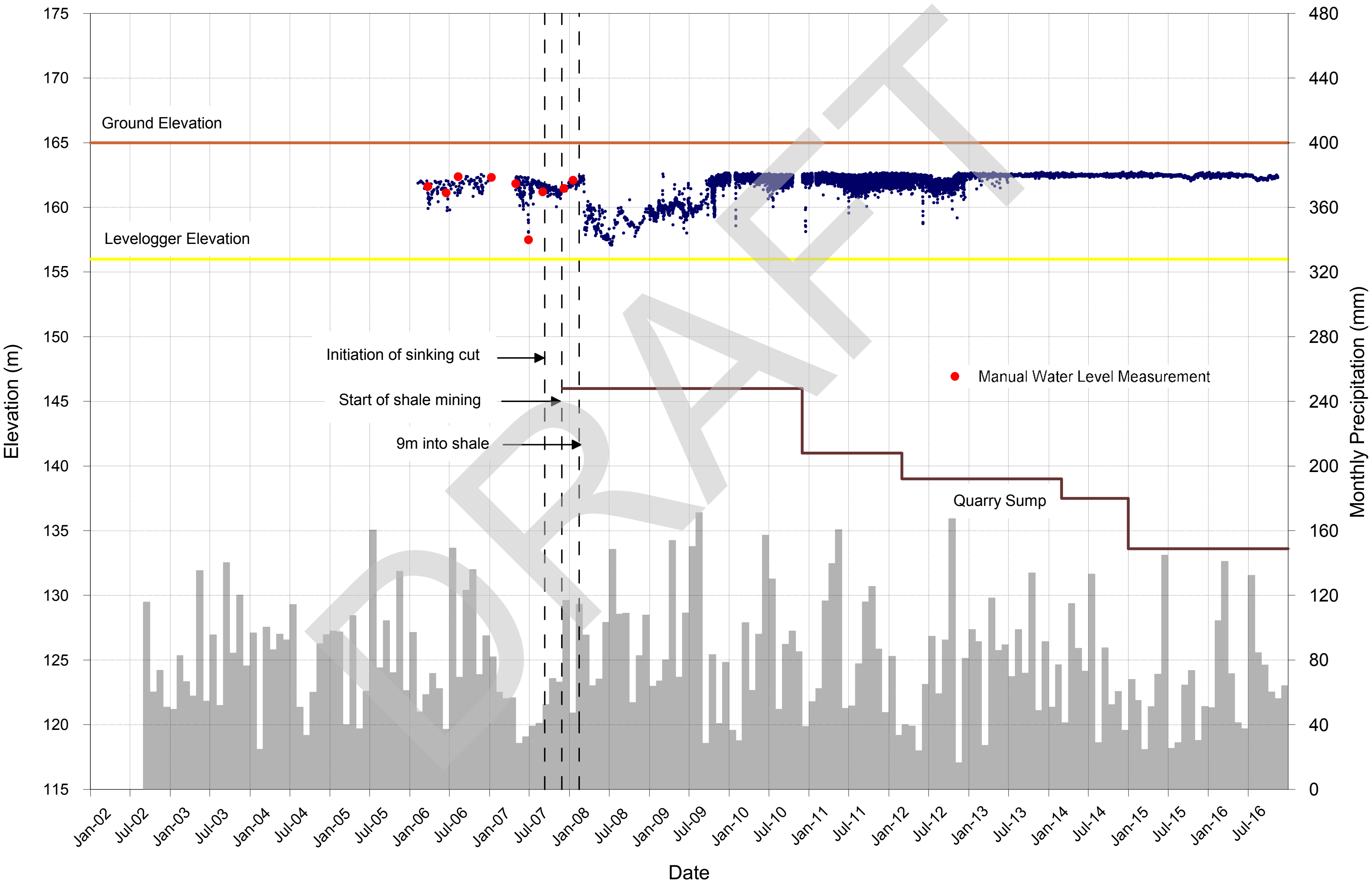


Figure C.19: Hendervale ABC Barn Well
Tansley Quarry - Forterra Brick Ltd.

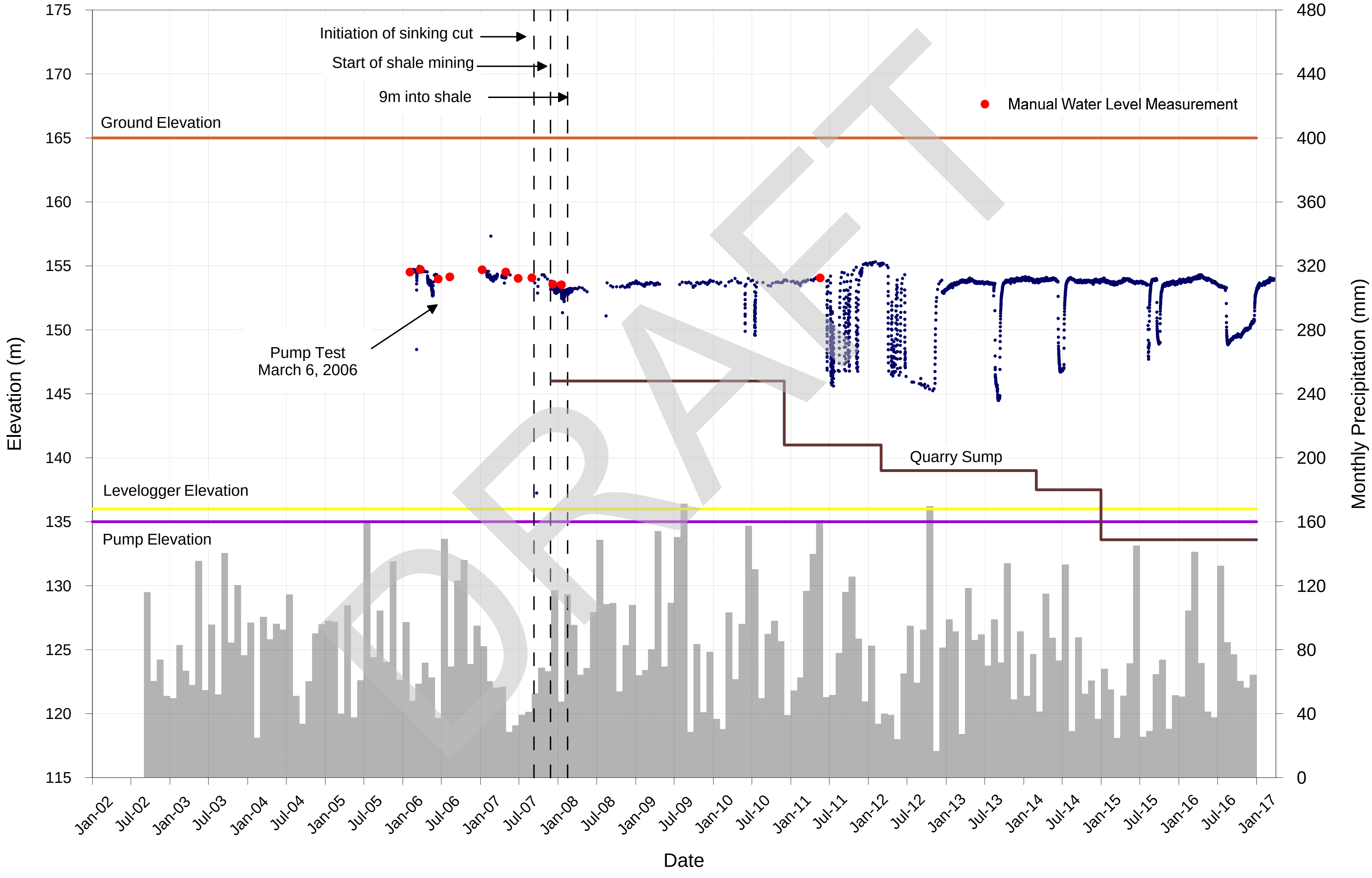


Figure C.20: Hendervale XYZ Barn Well
Tansley Quarry - Forterra Brick Ltd.

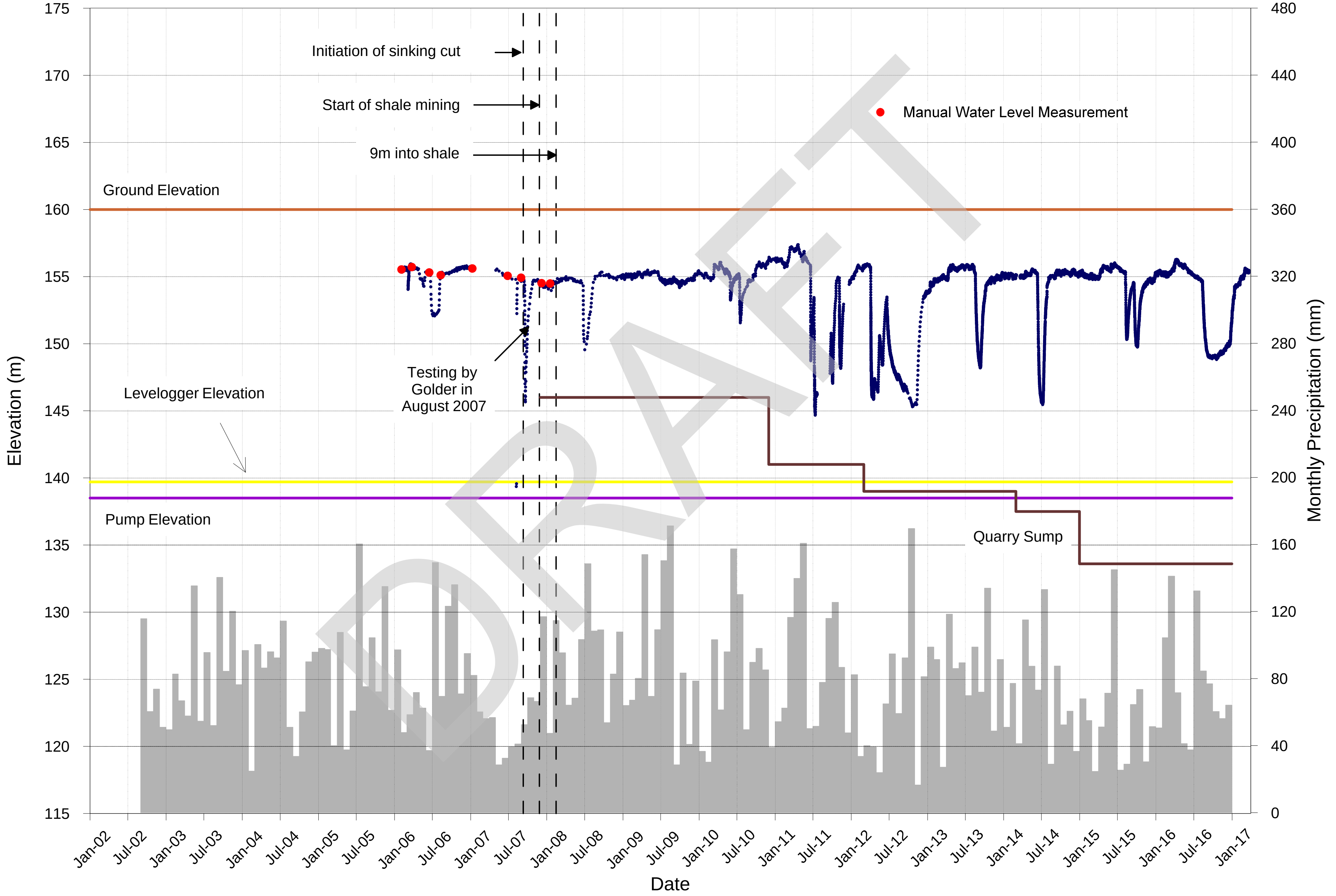


Figure C.21: Hendervale House Well
Tansley Quarry - Forterra Brick Ltd.

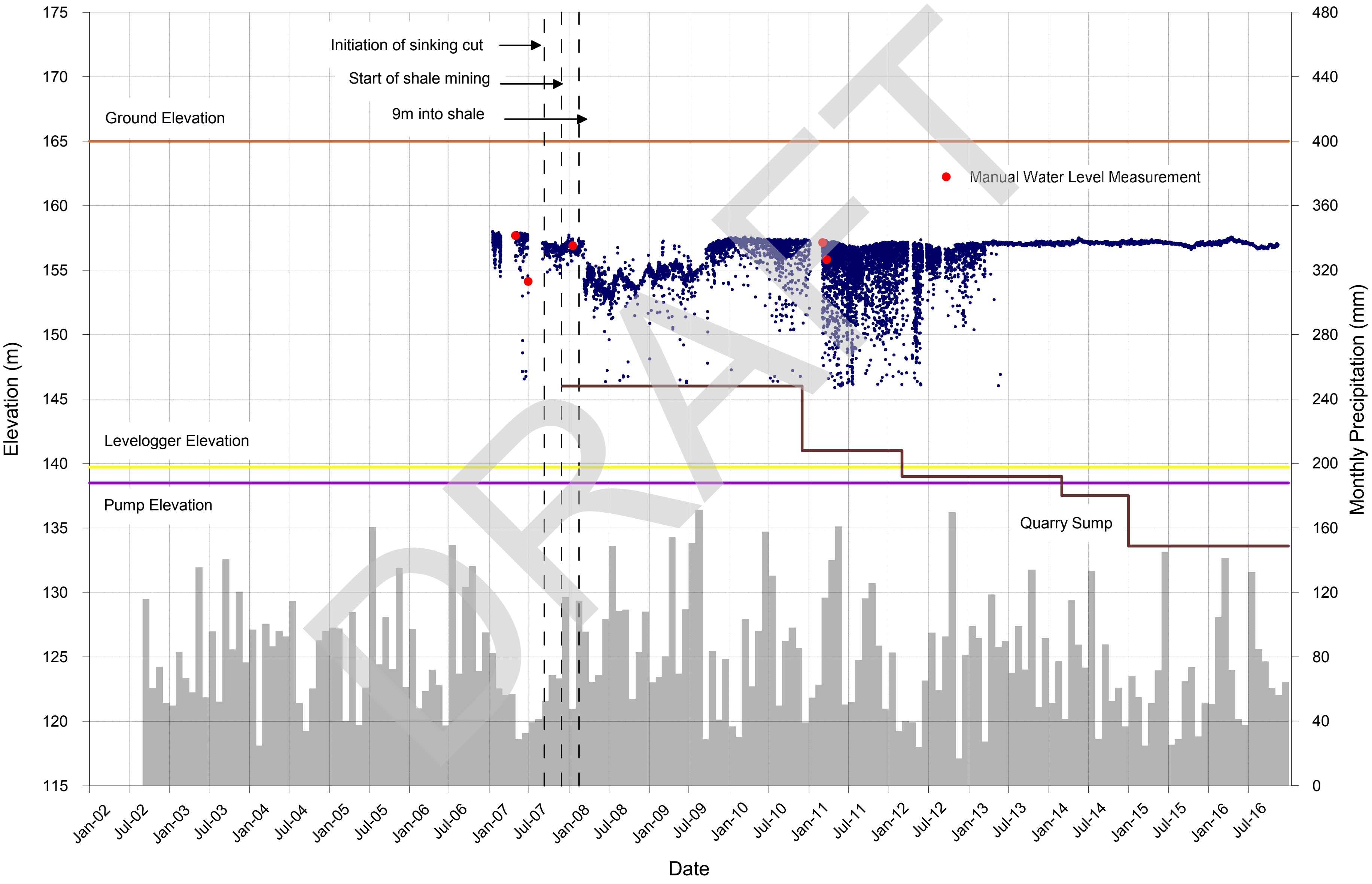


Figure C.22: Simms Well
Tansley Quarry - Forterra Brick Ltd.

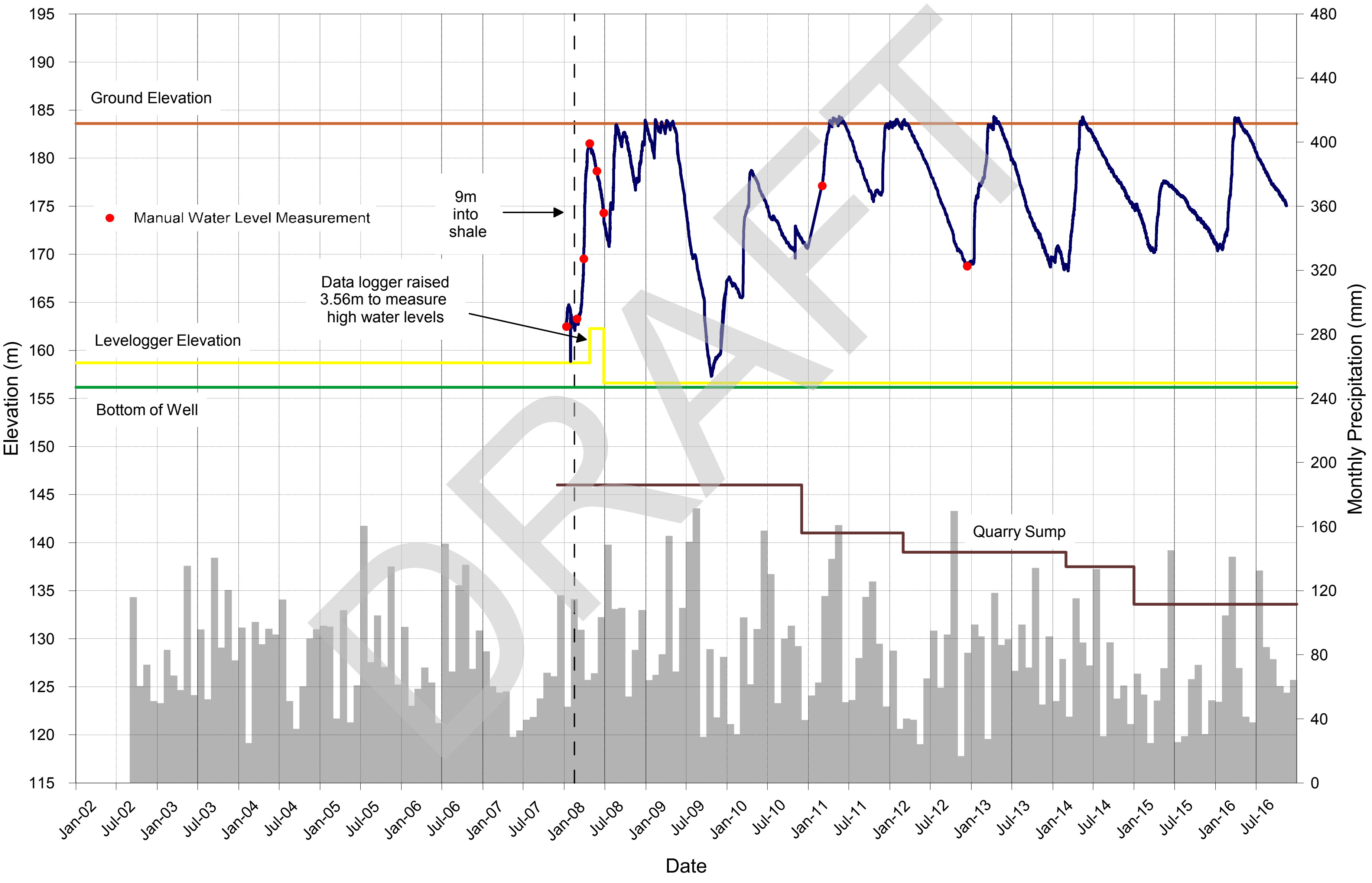


Figure C.23: Wettlaufer Well
Tansley Quarry - Forterra Brick Ltd.

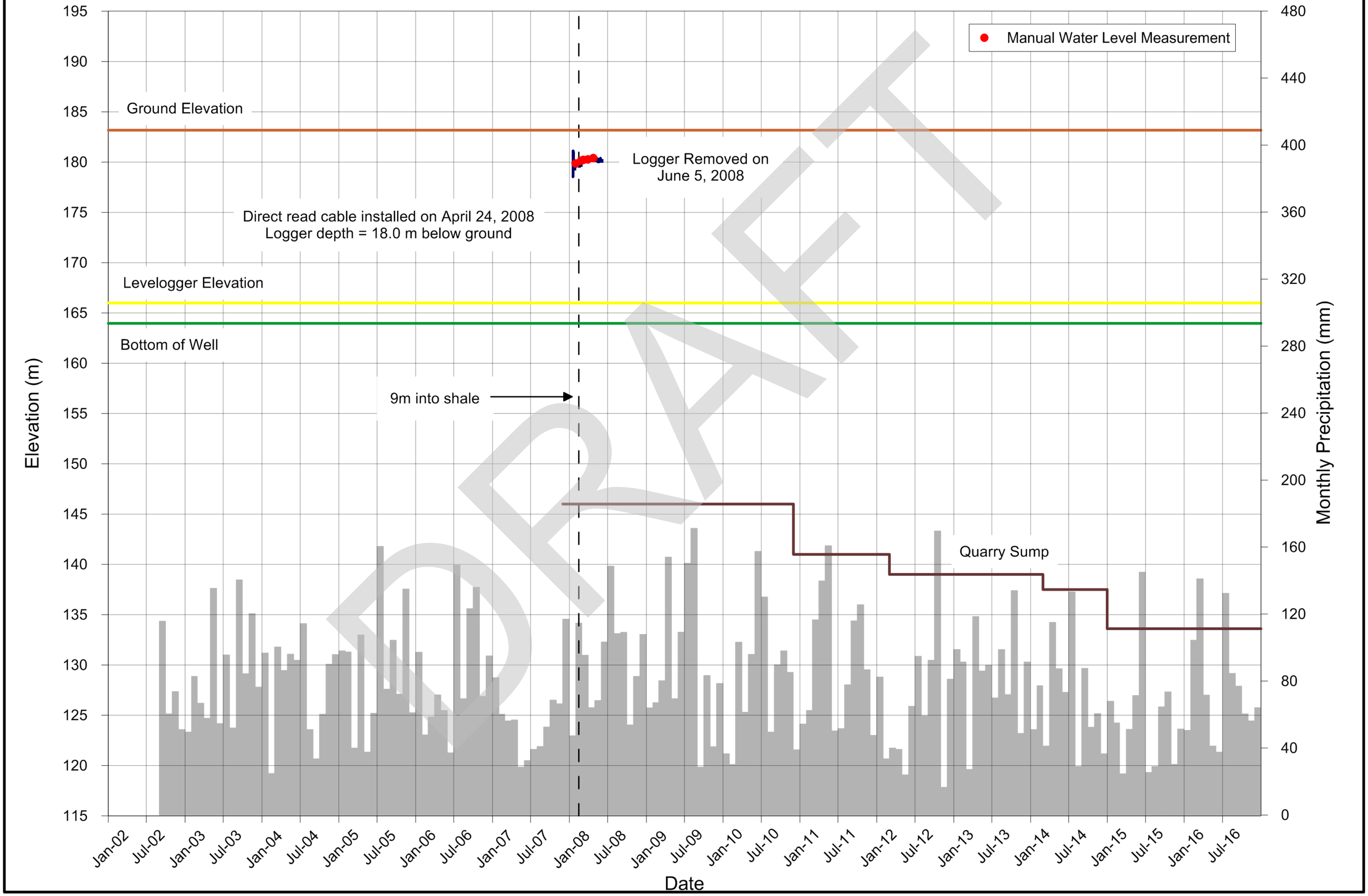


Figure C.24: Wiggins Well
Tansley Quarry - Forterra Brick Ltd.

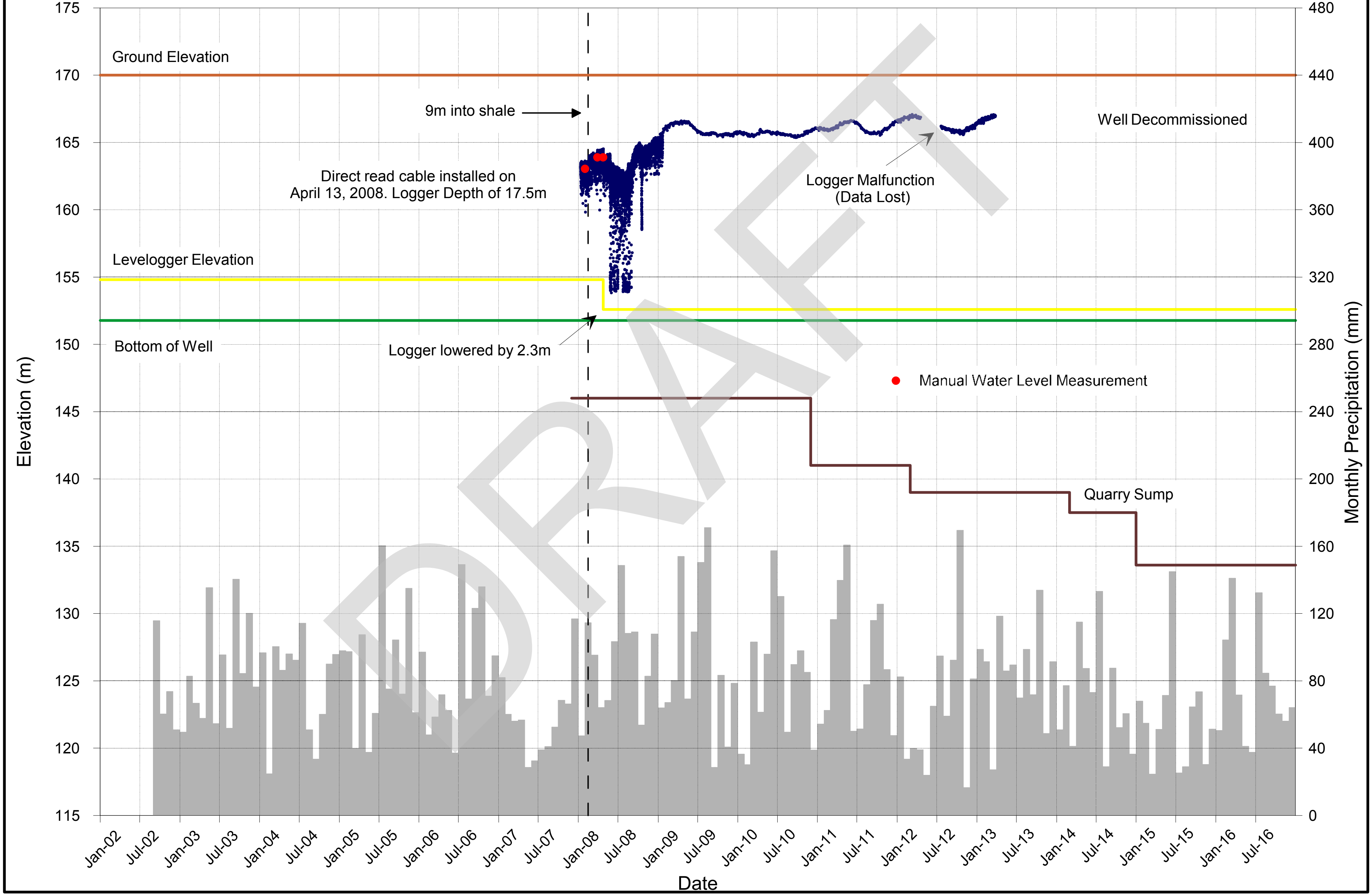


Figure C.25: Bekkers Well
Tansley Quarry - Forterra Brick Ltd.

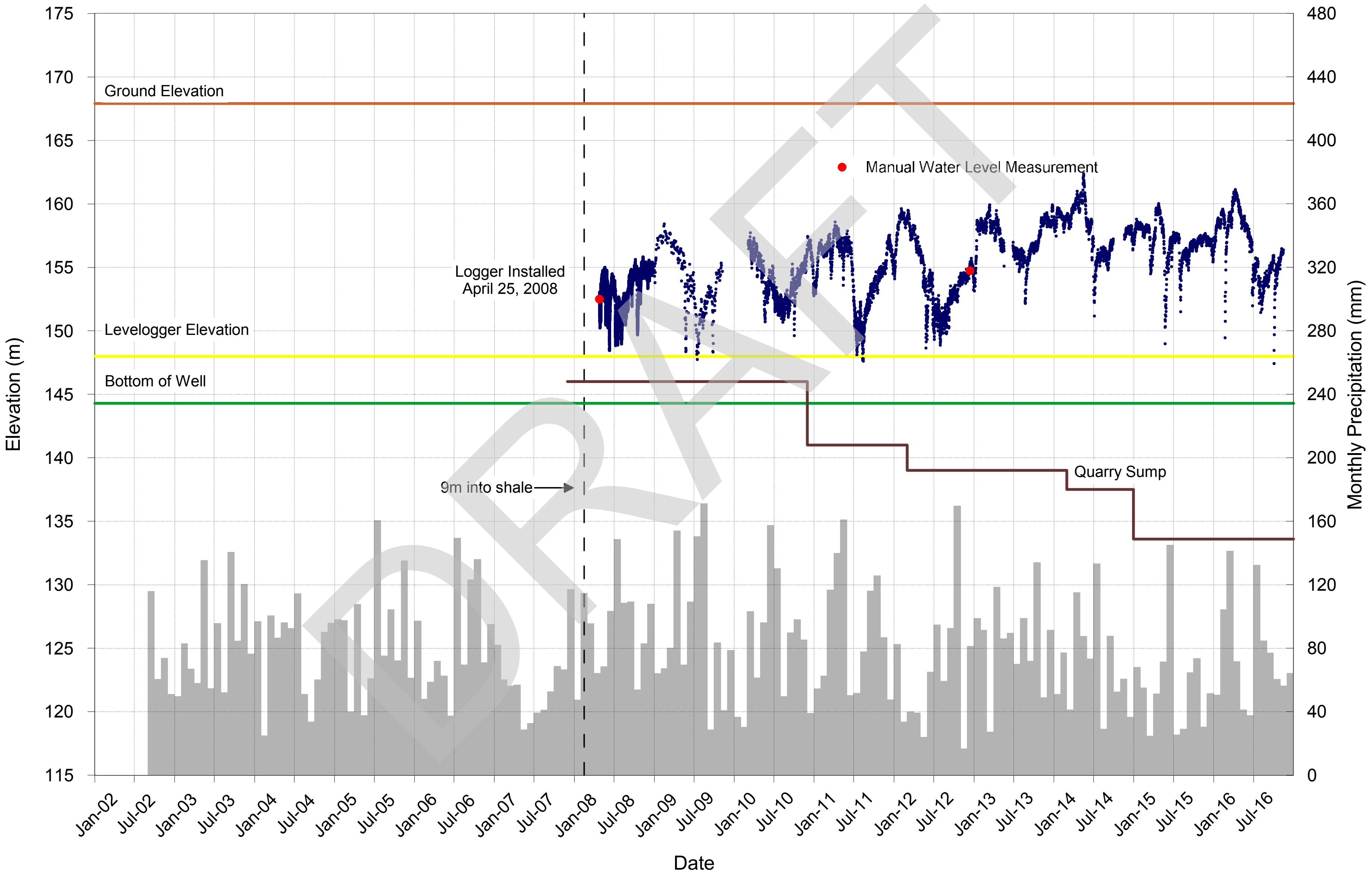
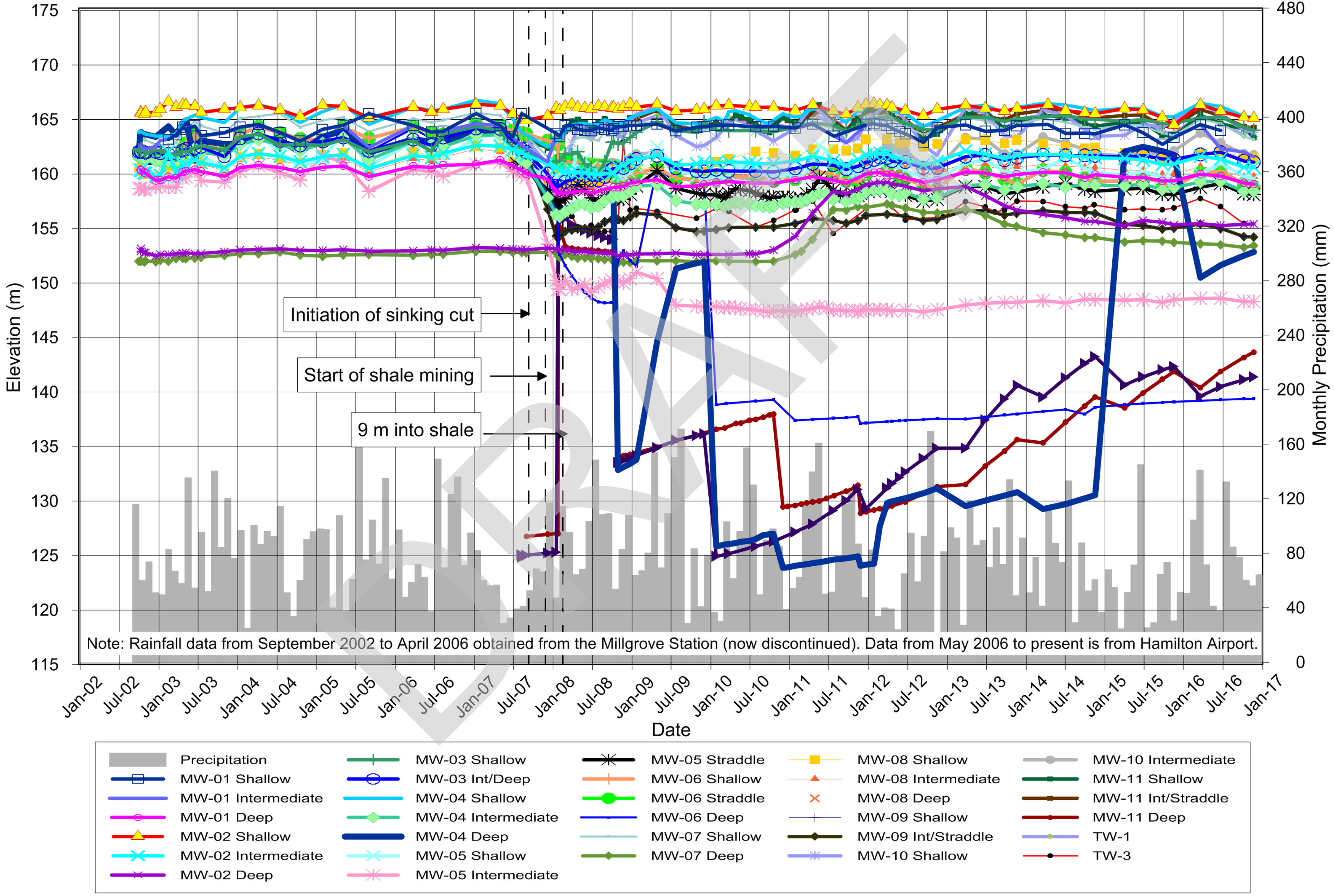


Figure C.26: Combined Static Water Levels and Precipitation with Time
Tansley Quarry - Forterra Brick Ltd.



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

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 deep												
				Nov-02	May-03	Jan-07	Oct-08	Dec-09	Oct-10	Oct- 10 DUP 2	Nov-11	Nov-12	Nov-13	Nov-14	Nov-15	Nov-16
aluminum	mg/L	0.1	[0.075] a	< 0.05	< 0.05	< 0.3	< 0.5	< 0.1	**0.1**	< 0.1	< 0.05	<0.05	<0.05	<0.025	<0.050	<0.050
alkalinity	mg CaCO$_3$/L	30-500	-	125	49	34	33	36	34	33	35	99	40	27	16	12
ammonia as N	mg/L	-	-	7.5	14.2	23	21	22	20	20	18	21	18	16	16	16
antimony	mg/L	-	[0.02]	< 0.005	< 0.005	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01	< 0.005	<0.005	<0.005	<0.0025	0.0054	<0.0050
arsenic	mg/L	0.025	[0.005]	< 0.02	< 0.02	< 0.05	< 0.1	< 0.02	**0.031**	**0.027**	< 0.02	<0.02	<0.02	<0.0050	<0.010	<0.010
barium	mg/L	1	-	0.066	< 0.05	< 0.3	< 0.5	< 0.1	< 0.1	< 0.1	0.022	0.023	0.024	0.025	0.035	0.025
beryllium	mg/L	-	1.1	< 0.01	< 0.01	< 0.03	< 0.05	< 0.01	< 0.01	< 0.01	< 0.005	<0.005	<0.005	<0.0025	<0.0050	<0.0050
bismuth	mg/L	-	-	< 0.01	< 0.01	< 0.05	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	<0.01	<0.01	<0.0050	<0.010	<0.010
boron	mg/L	5	0.2	**3.26**	**5.16**	**4.2**	**6.8**	**5.7**	**6.1**	**5.8**	**5.5**	**5.6**	**6.3**	**6.1**	**5.8**	**6.1**
bromide	mg/L	-	-	47	124	202	214	192	160	169	138	140	150	100	140	120
cadmium	mg/L	0.005	0.0005	< 0.001	< 0.001	< 0.005	< 0.01	< 0.002	< 0.002	< 0.002	< 0.001	<0.001	<0.001	**0.0032**	**0.0045**	<0.0010
calcium	mg/L	-	-	789	1720	2400	2600	2400	2500	2700	2000	1700	1900	1900	1800	1800
chloride	mg/L	250	-	4690	11600	19400	19800	16700	16300	17200	13000	13000	13000	12000	12000	11000
chromium	mg/L	0.05	-	< 0.05	< 0.05	< 0.3	< 0.5	< 0.1	< 0.1	< 0.1	< 0.05	<0.05	<0.05	<0.025	<0.050	0.089
cobalt	mg/L	-	0.0009	**0.0018**	< 0.001	< 0.03	< 0.05	< 0.01	< 0.01	< 0.01	< 0.005	<0.005	<0.005	<0.0050	**0.019**	<0.0050
copper	mg/L	1	[0.005] b	< 0.005	< 0.005	< 0.05	< 0.1	< 0.02	< 0.02	< 0.02	< 0.05	<0.01	<0.01	<0.020 (1)	<0.020	<0.010
fluoride	mg/L	1.5 - 2.4	-	0.4	0.3	0.2	0.3	0.3	0.2	< 1 (1)	0.3	0.35	0.32	0.32	0.37	0.33
free cyanide	mg/L	0.2	0.005	< 0.001	< 0.001	< 0.002	< 0.002	< 0.002	< 0.002	0.002	< 0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.0010
hardness	mg CaCO$_3$/L	80-100	-	2650	6124	8400	9300	8400	8800	9600	7200	6100	6700	6600	6200	6200
iron	mg/L	0.3	0.3	**0.59**	**6.94**	**9.6**	< 10	**8**	**6.5**	**8.6**	**4.1**	<1	**5**	**5.2**	**5**	**11**
lead	mg/L	0.01	[0.005] c	< 0.005	< 0.005	< 0.03	< 0.05	< 0.01	< 0.01	< 0.01	< 0.005	<0.005	<0.005	<0.0025	<0.0050	<0.0050
magnesium	mg/L	-	-	165	442	550	670	580	610	660	530	420	460	440	430	430
manganese	mg/L	0.05	-	0.516	1.16	1.3	1.6	1	1	2	1.1	1.0	1.1	1.1	1.2	1.1
mercury	mg/L	0.001	0.0002	< 0.00005	0.00006	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001
molybdenum	mg/L	-	0.04	0.036	0.021	< 0.05	< 0.1	**0.05**	< 0.02	< 0.02	0.006	<0.005	0.012	0.0056	0.012	0.0088
nickel	mg/L	-	0.025	< 0.01	< 0.01	< 0.05	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	<0.01	**0.079**	**0.2**	**1.1**	**0.32**
nitrate as N	mg/L	10	-	< 0.2	< 0.2	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	<0.10	<0.10	<0.10	<0.10	<0.10
nitrite as N	mg/L	1	-	< 20	< 20	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.05	<0.10	<0.010	<0.010	<0.010	<0.010
pH	pH Units	6.5-8.5	6.5-8.5	8	7.27	7.0	7.4	6.9	6.97	7.02	7.12	6.88	6.97	6.51	**6.36**	**6.49**
phenol	mg/L	-	0.005	< 0.001	< 0.001	**0.020**	< 0.001	0.001	< 0.001	0.002	**0.008**	**0.062**	**0.019**	**0.01**	0.0029	<0.0010
phosphate	mg/L	-	-	< 1	< 1	< 0.01	< 0.01	< 0.01	< 0.01	0.01	< 0.01	0.096	<0.010	<0.010	<0.010	<0.010
phosphorous	mg/L	-	-	-	-	< 3	< 10	< 2	< 2.00	< 2.00	< 1	<1	<1	<0.50		<1.0
total phosphorous	mg/L	-	0.01	**0.607**	**0.418**	**0.27**	**0.27**	**0.34**	< 0.1	< 5	< 3	**0.31**	**2.4**	**0.04**	**0.088**	<1.0
potassium	mg/L	-	-	63.6	108	130	150	140	150	150	130	120	130	130	130	130
selenium	mg/L	0.01	0.1	0.023	0.036	< 0.1	< 0.2	< 0.04	0.093	0.058	< 0.04	<0.04	<0.04	<0.010	<0.020	<0.020
silicon	mg/L	-	-	2.18	3.18	< 3	< 5	3	3	3	2.9	2.9	3.2	3.2	2.5	2.9
silver	mg/L	-	0.0001	< 0.001	< 0.001	< 0.005	< 0.01	< 0.002	< 0.002	< 0.002	< 0.001	<0.001	<0.001	**0.00092**	<0.0010	<0.0010
sodium	mg/L	200 d	-	2320	5530	6100	8000	6600	7200	7500	5800	5600	5800	5900	5600	5600
strontium	mg/L	-	-	16.2	35.8	47	55	51	54	59	43	38	40	37	37	38
sulphide	mg/L	0.05	-	0.01	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	4	0.048	0.16	<0.020	<0.020
sulphate	mg/L	500	-	1080	1780	1730	2130	1890	1820	1830	1910	-	1900	1900	1900	1700
thallium	mg/L	-	0.0003	< 0.0005	< 0.0005	< 0.003	< 0.005	< 0.001	< 0.001	< 0.001	< 0.0005	<0.0005	<0.0005	**0.00031**	<0.00050	<0.00050
tin	mg/L	-	-	< 0.01	< 0.01	< 0.05	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	<0.01	<0.01	<0.0050	<0.010	<0.010
titanium	mg/L	-	-	< 0.05	< 0.05	< 0.3	< 0.5	< 0.1	< 0.1	< 0.1	< 0.05	<0.05	<0.05	<0.025	<0.050	<0.050
TSS	mg/L	-	-	1010	375	810	770	610	600	660	560	120	1800	23	24000	34
turbidity	NTU	5	-	16.8	12.5	350	360	280	300	400	170	130	140	12	9.7	27
uranium	mg/L	0.02	[0.005]	**0.0152**	**0.0053**	< 0.005	< 0.01	< 0.002	< 0.002	< 0.002	< 0.001	<0.001	<0.001	<0.00050	<0.0010	<0.0010
vanadium	mg/L	-	[0.006]	< 0.005	< 0.05	**0.057**	< 0.1	< 0.02	**0.076**	**0.066**	< 0.01	<0.01	<0.01	<0.010 (1)	<0.010	<0.010
zinc	mg/L	5	[0.02]	< 0.05	< 0.05	< 0.3	< 0.5	< 0.1	< 0.1	< 0.1	< 0.05	<0.05	<0.05	<0.025 (1)	<0.050	<0.050

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-01 intermediate												
				Nov-02	May-03	Jan-07	Oct-08	Dec-09	Oct-10	Nov-11	Nov-12	Nov-13	Nov-14	Nov-15	Nov-16	Nov-16 DUP 2
aluminum	mg/L	0.1	[0.075] a	0.039	0.075	**0.11**		0.063	0.074	**0.14**	0.053	<0.005	**0.22**	**0.17**	0.053	**0.68**
alkalinity	mg $CaCO_3$/L	30-500	-	376	487	508		459	452	443	410	440	450	470	500	500
ammonia as N	mg/L	-	-	0.36	0.14	0.23		0.16	0.05	0.13	0.24	<0.050	0.054	0.052	<0.050	<0.050
antimony	mg/L	-	[0.02]	< 0.0005	0.0011	< 0.001		0.0005	< 0.0005	< 0.0005	<0.0005	<0.0005	<0.00050	<0.00050	<0.00050	0.00055
arsenic	mg/L	0.025	[0.005]	0.003	0.003	< 0.001		0.001	< 0.001	< 0.001	<0.001	<0.001	<0.0010	<0.0010	<0.0010	<0.0010
barium	mg/L	1	-	0.026	0.020	0.017		0.014	0.015	0.016	0.026	0.016	0.016	0.015	0.019	0.021
beryllium	mg/L	-	1.1	< 0.001	< 0.001	< 0.0005		< 0.0005	< 0.0005	< 0.0005	<0.0005	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050
bismuth	mg/L	-	-	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	<0.001	<0.001	<0.0010	<0.0010	<0.0010	<0.0010
boron	mg/L	5	0.2	**0.223**	0.127	0.15		0.16	0.14	0.11	0.06	0.14	0.11	0.1	0.16	0.17
bromide	mg/L	-	-	< 0.5	< 0.5	< 1.0		< 1	< 1	< 1	<1.0	<1.0	<2.0	<1.0	<5.0	<5.0
cadmium	mg/L	0.005	0.0005	< 0.0001	< 0.0001	< 0.0001		< 0.0001	< 0.0001	< 0.0001	<0.0001	<0.0001	<0.00010	<0.00010	<0.00010	<0.00010
calcium	mg/L	-	-	137	110	110		120	110	98	71	74	89	93	110	110
chloride	mg/L	250	-	35	61.1	111		157	214	183	120	95	100	95	77	79
chromium	mg/L	0.05	-	< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	<0.005	<0.005	<0.0050	<0.0050	<0.0050	<0.0050
cobalt	mg/L	-	0.0009	0.0009	0.0007	**0.018**		**0.013**	**0.0046**	**0.0043**	<0.0005	<0.0005	**0.0017**	**0.003**	0.00055	**0.0013**
copper	mg/L	1	[0.005] b	< 0.0005	0.0005	< 0.001		< 0.001	< 0.001	0.002	<0.001	0.0014	0.0013	0.0012	<0.0010	<0.0010
fluoride	mg/L	1.5 - 2.4	-	0.3	0.2	0.2	**NOT SAMPLED**	0.3	0.2	0.3	0.46	0.38	0.36	0.36	0.28	0.29
free cyanide	mg/L	0.2	0.005	< 0.001	< 0.001	< 0.002		< 0.002	< 0.002	< 0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.0010	<0.0010
hardness	mg $CaCO_3$/L	80-100	-	786	1128	1000		1100	1100	1000	780	770	890	910	1100	1100
iron	mg/L	0.3	0.3	**0.56**	**1.29**	0.068		0.2	0.13	0.25	<0.1	<0.1	0.15	0.14	<0.10	**0.47**
lead	mg/L	0.01	[0.005] c	< 0.0005	< 0.0005	< 0.0005		< 0.0005	< 0.0005	< 0.0005	<0.0005	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050
magnesium	mg/L	-	-	107	206	190		200	200	180	150	140	160	160	200	200
manganese	mg/L	0.05	-	0.63	0.123	0.09		0.058	0.031	0.031	0.0068	0.008	0.021	0.032	0.044	0.047
mercury	mg/L	0.001	0.0002	< 0.00005	< 0.00005	< 0.0001		0.0002	< 0.0001	< 0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001	<0.0001
molybdenum	mg/L	-	0.04	**0.044**	0.004	0.002		0.002	0.002	0.0018	0.0018	0.002	0.0017	0.0015	0.0016	0.0016
nickel	mg/L	-	0.025	0.003	< 0.001	0.003		0.004	0.002	0.002	0.0018	0.0018	0.0017	0.0019	0.0018	0.0023
nitrate as N	mg/L	10	-	< 0.2	< 0.2	0.1		0.6	0.7	0.6	0.82	0.52	0.29	0.12	<0.10	<0.10
nitrite as N	mg/L	1	-	< 0.2	< 0.2	0.07		< 0.01	0.01	< 0.01	<0.010	0.020	0.036	<0.010	<0.010	<0.010
pH	pH Units	6.5-8.5	6.5-8.5	7.93	7.86	7.90		7.6	7.88	7.61	7.91	7.87	7.75	7.72	7.87	7.94
phenol	mg/L	-	0.005	< 0.001	< 0.002	< 0.001		< 0.001	< 0.001	< 0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
phosphate	mg/L	-	-	< 1	< 1	< 0.01		< 0.01	0.01	0.01	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
phosphorous	mg/L	-	-	-	-	< 0.05		< 0.1	< 0.1	< 0.1	<0.1	<0.1	<0.10	-	<0.10	<0.10
total phosphorous	mg/L	-	0.01	**8.33**	**11.9**	**5.7**		**14.0**	**3.2**	**5.3**	**0.50**	**1.7**	**3.1**	**3.3**	**1.4**	**0.91**
potassium	mg/L	-	-	8.9	5.5	6.1		6.1	5.5	4.9	2.8	3.3	4.2	4.3	5.7	6.1
selenium	mg/L	0.01	0.1	< 0.002	< 0.002	< 0.002		0.002	0.003	0.003	0.0067	0.0062	0.004	0.0028	<0.0020	<0.0020
silicon	mg/L	-	-	5.87	6.53	8.4		8.0	7.4	7.4	7.2	6.9	7.7	7.2	6.8	8.3
silver	mg/L	-	0.0001	< 0.0001	< 0.0001	< 0.0001		< 0.0001	< 0.0001	< 0.0001	<0.0001	<0.0001	<0.00010	<0.00010	<0.00010	<0.00010
sodium	mg/L	200 d	-	76	51.9	54		56	52	52	46	42	46	44	50	51
strontium	mg/L	-	-	2.45	2.17	2		2.3	2.1	1.9	1.2	1.4	1.5	1.7	2.6	2.6
sulphide	mg/L	0.05	-	0.07	0.02	0.02		0.03	< 0.02	< 0.02	<0.020	<0.020	<0.020	0.021	<0.020	<0.020
sulphate	mg/L	500	-	501	702	389		496	445	385	-	340	380	440	620	620
thallium	mg/L	-	0.0003	< 0.00005	< 0.00005	< 0.00005		< 0.00005	< 0.00005	< 0.00005	<0.00005	<0.00005	<0.00005	<0.000050	<0.000050	<0.000050
tin	mg/L	-	-	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	<0.001	<0.001	<0.0010	<0.0010	<0.0010	<0.0010
titanium	mg/L	-	-	< 0.005	0.008	0.007		< 0.005	< 0.005	0.005	<0.005	<0.005	0.01	0.0097	<0.0050	0.024
TSS	mg/L	-	-	6970	20400	15000	**Note:**	20000	4500	2900	1600	1900	3300	1540	2900	710
turbidity	NTU	5	-	17.3	7.2	11900	Insufficient	16000	2900	77	720	210	1500	1400	1500	1000
uranium	mg/L	0.02	[0.005]	**0.0202**	**0.0138**	**0.011**	water	**0.012**	**0.011**	**0.0098**	**0.011**	**0.011**	**0.011**	**0.011**	**0.014**	**0.013**
vanadium	mg/L	-	[0.006]	0.0038	0.002	< 0.001		< 0.001	0.002	0.0038	0.00091	0.00085	0.0006	0.00051	<0.00050	0.0013
zinc	mg/L	5	[0.02]	< 0.005	< 0.005	0.007		< 0.005	< 0.005	< 0.005	<0.005	<0.005	<0.0050	0.0051	<0.0050	**0.032**

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-01 overburden							
				Oct-10	Nov-11	Nov-12	Nov-13	Nov-13	Nov-14	Nov-15	Nov-16
aluminum	mg/L	0.1	[0.075] a	**NOT SAMPLED**	0.068	**NOT SAMPLED**	**NOT SAMPLED**	**NOT SAMPLED**	**NOT SAMPLED**	**NOT SAMPLED**	**NOT SAMPLED**
alkalinity	mg $CaCO_3$/L	30-500	-		366						
ammonia as N	mg/L	-	-		< 0.05						
antimony	mg/L	-	[0.02]		< 0.0005						
arsenic	mg/L	0.025	[0.005]		< 0.001						
barium	mg/L	1	-		0.038						
beryllium	mg/L	-	1.1		< 0.0005						
bismuth	mg/L	-	-		< 0.001						
boron	mg/L	5	0.2		0.057						
bromide	mg/L	-	-		< 1						
cadmium	mg/L	0.005	0.0005		< 0.0001						
calcium	mg/L	-	-		64						
chloride	mg/L	250	-		183						
chromium	mg/L	0.05	-		< 0.005						
cobalt	mg/L	-	0.0009		**0.005**						
copper	mg/L	1	[0.005] b		0.001						
fluoride	mg/L	1.5 - 2.4	-		0.6						
free cyanide	mg/L	0.2	0.005		< 0.002						
hardness	mg $CaCO_3$/L	80-100	-		740						
iron	mg/L	0.3	0.3		< 0.1						
lead	mg/L	0.01	[0.005] c		< 0.0005						
magnesium	mg/L	-	-		140						
manganese	mg/L	0.05	-		0.01						
mercury	mg/L	0.001	0.0002		< 0.0001						
molybdenum	mg/L	-	0.04		0.0016						
nickel	mg/L	-	0.025		< 0.001						
nitrate as N	mg/L	10	-		1.1						
nitrite as N	mg/L	1	-		< 0.01						
pH	pH Units	6.5-8.5	6.5-8.5		7.84						
phenol	mg/L	-	0.005		< 0.001						
phosphate	mg/L	-	-		< 0.01						
phosphorous	mg/L	-	-		< 0.1						
total phosphorous	mg/L	-	0.01		**0.4**						
potassium	mg/L	-	-		1.8						
selenium	mg/L	0.01	0.1		0.005						
silicon	mg/L	-	-		6.8						
silver	mg/L	-	0.0001		< 0.0001						
sodium	mg/L	200 d	-		42						
strontium	mg/L	-	-		1.1						
sulphide	mg/L	0.05	-		< 0.01						
sulphate	mg/L	500	-		157						
thallium	mg/L	-	0.0003		< 0.00005						
tin	mg/L	-	-		< 0.001						
titanium	mg/L	-	-		< 0.005						
TSS	mg/L	-	-	**Note:** Insufficient water	620	**Note:** Insufficient water	**Note:** Insufficient water	**Note:** Insufficient water	**Note:** Insufficient water	**Note:** Insufficient water	**Note:** Insufficient water
turbidity	NTU	5	-		250						
uranium	mg/L	0.02	[0.005]		**0.0083**						
vanadium	mg/L	-	[0.006]		0.0025						
zinc	mg/L	5	[0.02]		0.005						

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-02 deep										
				Nov-02	May-03	Jan-07	Oct-08	Dec-09	Nov-11	Nov-12	Nov-13	Nov-14	Nov-15	Nov-16
aluminum	mg/L	0.1	[0.075] a	0.056	< 0.05	< 0.3	< 0.3	< 0.5	< 0.3	**0.3**	<0.1	<0.050	<0.050	**0.11**
alkalinity	mg CaCO$_3$/L	30-500	-	111	36	36	32	51	35	47	52	49	44	42
ammonia as N	mg/L	-	-	7.28	13	16	17	18	16	16	16	18	15	16
antimony	mg/L	-	[0.02]	< 0.01	< 0.01	< 0.05	< 0.03	< 0.05	< 0.03	<0.005	<0.01	<0.0050	<0.0050	<0.0050
arsenic	mg/L	0.025	[0.005]	< 0.02	< 0.02	< 0.05	< 0.05	< 0.1	< 0.05	<0.02	<0.02	<0.010	<0.010	<0.010
barium	mg/L	1	-	< 0.05	< 0.05	< 0.3	< 0.3	< 0.5	< 0.1	0.025	<0.04	<0.020	0.021	0.029
beryllium	mg/L	-	1.1	< 0.01	< 0.01	< 0.03	< 0.03	< 0.05	< 0.03	<0.005	<0.01	<0.0050	<0.0050	<0.0050
bismuth	mg/L	-	-	< 0.01	< 0.01	< 0.05	< 0.05	< 0.1	< 0.05	<0.01	<0.02	<0.010	<0.010	<0.010
boron	mg/L	5	0.2	**3.34**	**5.23**	**5.6**	**7.1**	**6**	**5.5**	**5.6**	**6.7**	**6.3**	**6.7**	**6.2**
bromide	mg/L	-	-	56	124	134	153	148	154	200	170	110	110	150
cadmium	mg/L	0.005	0.0005	< 0.001	< 0.001	< 0.005	< 0.005	< 0.01	< 0.005	<0.001	<0.002	<0.0010	<0.0010	<0.0010
calcium	mg/L	-	-	824	1620	2000	2000	2000	1900	1800	1900	1800	2000	2000
chloride	mg/L	250	-	4920	11200	13000	12900	12400	12500	14000	13000	12000	13000	13000
chromium	mg/L	0.05	-	< 0.05	< 0.05	< 0.3	< 0.3	< 0.5	< 0.3	<0.05	<0.1	<0.050	<0.050	<0.050
cobalt	mg/L	-	0.0009	< 0.001	< 0.001	< 0.03	< 0.03	< 0.05	< 0.03	<0.005	<0.01	<0.0050	<0.0050	<0.0050
copper	mg/L	1	[0.005] b	< 0.005	< 0.005	< 0.05	< 0.05	< 0.1	< 0.05	<0.01	<0.02	<0.050	<0.010	<0.010
fluoride	mg/L	1.5 - 2.4	-	0.4	0.4	0.3	0.3	0.3	< 1	0.34	0.31	0.32	0.4	0.29
free cyanide	mg/L	0.2	0.005	< 0.001	< 0.001	< 0.002	< 0.002	< 0.002	< 0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.0010
hardness	mg CaCO$_3$/L	80-100	-	2780	5831	6700	7200	7100	6500	6400	6500	6400	6800	7000
iron	mg/L	0.3	0.3	**2.16**	**6.59**	**6.9**	**6.8**	< 10	< 5	**4.1**	**3.7**	**3.8**	**2.4**	**4.9**
lead	mg/L	0.01	[0.005] c	< 0.005	< 0.005	< 0.03	< 0.03	< 0.05	< 0.03	<0.005	<0.01	<0.0050	<0.0050	<0.0050
magnesium	mg/L	-	-	176	427	430	510	520	450	440	460	450	430	480
manganese	mg/L	0.05	-	0.575	1.03	1	1.2	1.2	0.98	0.98	1	0.89	0.99	1.1
mercury	mg/L	0.001	0.0002	< 0.00005	0.00008	< 0.0001	< 0.0001	< 0.0001	< 0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001
molybdenum	mg/L	-	0.04	0.024	0.015	< 0.05	< 0.05	< 0.1	< 0.03	0.0057	<0.01	0.0076	<0.0050	0.0068
nickel	mg/L	-	0.025	< 0.01	< 0.01	< 0.05	< 0.05	< 0.1	< 0.05	0.016	<0.02	**0.076**	**0.033**	<0.010
nitrate as N	mg/L	10	-	< 0.2	< 0.2	< 0.1	< 0.1	< 0.1	< 0.1	<0.10	<0.10	<0.10	<0.10	<0.10
nitrite as N	mg/L	1	-	< 20	< 20	0.02	< 0.01	< 0.01	< 0.1	<0.10	0.012	0.019	0.043	<0.010
pH	pH Units	6.5-8.5	6.5-8.5	7.77	7.23	7.2	7.4	7.2	7.16	6.66	6.93	7.15	6.95	7.05
phenol	mg/L	-	0.005	< 0.001	< 0.001	**0.011**	< 0.001	0.005	0.001	<0.0010	**0.017**	**0.0062**	0.0021	0.0027
phosphate	mg/L	-	-	< 1	< 1	< 0.01	< 0.01	< 0.01	< 0.01	<0.010	<0.010	0.044	<0.010	<0.010
phosphorous	mg/L	-	-	-	-	< 3	< 5	< 10	< 5	<1	<2	<1.0	-	<1.0
total phosphorous	mg/L	-	0.01	**0.142**	**0.089**	**0.077**	**0.15**	**0.82**	< 2	**1.30**	**0.44 (1)**	**0.26**	**0.079**	**<0.50**
potassium	mg/L	-	-	60.4	101	120	130	120	110	110	120	120	120	130
selenium	mg/L	0.01	0.1	0.024	0.032	< 0.1	< 0.1	< 0.2	< 0.1	<0.04	<0.04	<0.020	<0.020	<0.020
silicon	mg/L	-	-	2.18	3.19	< 3	3	< 5	< 3	3.4	2.7	3.1	3.6	3.5
silver	mg/L	-	0.0001	< 0.001	< 0.001	< 0.005	< 0.005	< 0.01	< 0.005	<0.001	<0.002	<0.0010	<0.0010	<0.0010
sodium	mg/L	200 d	-	2380	5590	5800	6700	6200	5800	5700	6100	6000	5800	6300
strontium	mg/L	-	-	16.8	33.800	36	42	41	39	39	39	36	37	41
sulphide	mg/L	0.05	-	0.01	< 0.01	< 0.02	< 0.02	0.25	< 0.02	<0.020	1.6	1.1	0.09	<0.020
sulphate	mg/L	500	-	1230	1920	1950	1890	2010	2030	2100	2000	2000	2000	1900
thallium	mg/L	-	0.0003	< 0.0005	< 0.0005	< 0.003	< 0.003	< 0.005	< 0.003	<0.00005	<0.001	<0.00050	<0.00050	<0.00050
tin	mg/L	-	-	< 0.01	< 0.01	< 0.05	< 0.05	< 0.1	< 0.05	<0.01	<0.02	<0.010	<0.010	<0.010
titanium	mg/L	-	-	< 0.05	< 0.05	< 0.3	< 0.3	0.5	< 0.3	<0.05	<0.1	<0.050	<0.050	<0.050
TSS	mg/L	-	-	214	203	240	81	800	540	2900	270	15	22800	610
turbidity	NTU	5	-	4.0	6.8	179	71	720	290	630	110	21	41	280
uranium	mg/L	0.02	[0.005]	**0.0099**	0.0024	< 0.005	< 0.005	< 0.01	< 0.005	<0.001	<0.002	<0.0010	<0.0010	<0.0010
vanadium	mg/L	-	[0.006]	< 0.005	< 0.05	**0.064**	< 0.05	< 0.1	< 0.03	<0.01	**0.028**	<0.010 (1)	<0.010	<0.010
zinc	mg/L	5	[0.02]	< 0.05	< 0.05	< 0.3	< 0.3	< 0.5	< 0.3	<0.05	<0.1	<0.050	<0.050	<0.050

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-02 intermediate											
				Nov-02	May-03	Jan-07	Oct-08	Dec-09	Oct-10	Nov-11	Nov-12	Nov-13	Nov-14	Nov-15	Nov-16
aluminum	mg/L	0.1	[0.075] a	**0.1**	0.026	**0.28**	**0.19**	**0.27**	**0.15**	0.006	0.053	0.021	**0.23**	**0.16**	0.071
alkalinity	mg $CaCO_3$/L	30-500	-	225	118	133	139	141	129	140	160	150	140	130	130
ammonia as N	mg/L	-	-	1.86	2.82	2.09	1.5	1.6	1.5	1.5	1.7	1.7	1.8	1.7	1.8
antimony	mg/L	-	[0.02]	0.0008	< 0.0005	< 0.001	< 0.0005	< 0.0005	0.0009	< 0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.00075
arsenic	mg/L	0.025	[0.005]	< 0.002	< 0.002	0.003	0.003	0.003	0.003	0.001	0.0031	0.003	0.0028	0.0029	0.0025
barium	mg/L	1	-	0.042	0.021	0.009	0.008	0.009	0.007	0.007	0.0072	0.0071	0.0082	0.0081	0.0072
beryllium	mg/L	-	1.1	< 0.001	< 0.001	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	<0.0005	<0.0005	<0.00050	<0.00050	<0.00050
bismuth	mg/L	-	-	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	<0.001	<0.001	<0.0010	<0.0010	<0.0010
boron	mg/L	5	0.2	**2.04**	**2.9**	**1.9**	**1.8**	**1.8**	**2**	**1.8**	**2**	**2.1**	**2.2**	**2.3**	**2.2**
bromide	mg/L	-	-	2.2	4.9	3	< 1	1	2	< 10	<10	<5.0	<5.0	<5.0	<5.0
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	<0.00010	<0.00010	<0.00010
calcium	mg/L	-	-	110	272	230	190	200	180	190	200	200	210	210	210
chloride	mg/L	250	-	244	438	182	113	87	147	106	130	140	180	180	160
chromium	mg/L	0.05	-	0.001	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	<0.005	<0.005	<0.0050	<0.0050	<0.0050
cobalt	mg/L	-	0.0009	**0.0029**	< 0.0001	**0.0093**	**0.022**	**0.01**	< 0.0005	< 0.0005	<0.0005	<0.0005	0.00053	0.00086	0.0024
copper	mg/L	1	[0.005] b	**0.0065**	< 0.005	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	<0.001	<0.02	<0.0010	<0.0010	<0.0010
fluoride	mg/L	1.5 - 2.4	-	0.4	0.5	0.3	0.2	0.2	0.2	0.3	0.27	0.24	0.25	0.29	0.22
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	<0.0020	<0.0020	<0.0010
hardness	mg $CaCO_3$/L	80-100	-	424	1122	1100	990	1000	940	980	1000	990	1000	990	1000
iron	mg/L	0.3	0.3	0.15	**1.68**	**0.85**	**0.8**	**1.1**	**0.8**	< 0.1	**1.2**	**0.78**	**0.89**	**0.85**	**0.79**
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	<0.00050	<0.00050	<0.00050
magnesium	mg/L	-	-	36	106	130	130	130	120	120	130	120	120	110	120
manganese	mg/L	0.05	-	0.228	0.199	0.18	0.17	0.16	0.13	0.13	0.14	0.13	0.13	0.13	0.13
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	<0.00010	<0.00010	<0.0001
molybdenum	mg/L	-	0.04	**0.048**	0.021	0.012	0.009	0.009	0.009	0.0085	0.0095	0.0089	0.0083	0.0085	0.0084
nickel	mg/L	-	0.025	0.003	< 0.001	0.003	0.002	0.004	< 0.001	< 0.001	<0.001	<0.001	<0.0010	<0.0010	<0.0010
nitrate as N	mg/L	10	-	< 0.2	< 0.2	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	<0.10	<0.10	<0.10	<0.10	<0.10
nitrite as N	mg/L	1	-	< 2	< 0.2	< 0.01	< 0.01	0.03	< 0.01	0.03	<0.010	0.010	0.013	<0.010	<0.010
pH	pH Units	6.5-8.5	6.5-8.5	8.14	7.93	8	8.1	7.9	7.74	7.73	7.43	7.61	7.73	7.72	7.7
phenol	mg/L	-	0.005	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
phosphate	mg/L	-	-	< 1	< 1	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	<0.010	<0.010	<0.010	<0.010	<0.010
phosphorous	mg/L	-	-	-	-	< 0.05	< 0.1	< 0.1	< 0.1	< 0.1	<0.1	<0.1	<0.10	-	<0.10
total phosphorous	mg/L	-	0.01	**2.95**	**2.04**	**2.7**	**1.5**	**5.7**	**0.1**	**0.36**	**0.47**	**0.47**	**0.35**	**0.4**	**0.11**
potassium	mg/L	-	-	17.3	26.2	21	19	18	17	17	19	19	19	19	20
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	<0.0020	<0.0020	<0.0020
silicon	mg/L	-	-	3.51	4.3	5.6	5.5	6.0	5.1	4.7	5.4	5.1	5.4	5.2	5
silver	mg/L	-	0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	<0.0001	<0.0001	<0.00010	<0.00010	<0.00010
sodium	mg/L	200 d	-	318	546	270	200	180	200	210	240	200	210	210	200
strontium	mg/L	-	-	2.52	7.22	10	12	11	11	11	11	12	11	11	12
sulphide	mg/L	0.05	-	0.18	0.01	0.05	< 0.02	< 0.02	< 0.02	< 0.02	<0.020	<0.020	<0.020	<0.020	<0.020
sulphate	mg/L	500	-	542	1330	1200	1090	1080	1120	1140	1100	1100	1100	1100	1000
thallium	mg/L	-	0.0003	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	00 0.00005	<0.00005	<0.00005	<0.00005	<0.000050	<0.000050
tin	mg/L	-	-	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	<0.001	<0.001	<0.0010	<0.0010	<0.0010
titanium	mg/L	-	-	< 0.005	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	<0.005	<0.005	0.0075	0.008	<0.0050
TSS	mg/L	-	-	5300	3570	32000	2200	6500	360	920	650	730	470	1980	190
turbidity	NTU	5	-	19.1	2.5	17800	2200	7800	320	480	290	450	200	200	180
uranium	mg/L	0.02	[0.005]	**0.0153**	0.0028	0.0005	0.0002	0.0004	0.0002	0.0003	0.00052	0.0003	0.00026	0.00029	0.00032
vanadium	mg/L	-	[0.006]	0.0024	< 0.0005	< 0.001	< 0.001	0.003	< 0.001	< 0.0005	<0.0005	0.00052	<0.00050	<0.00050	<0.00050
zinc	mg/L	5	[0.02]	< 0.05	**0.023**	0.005	< 0.005	< 0.005	< 0.01	< 0.025	<0.01	<0.01	<0.010	<0.010	<0.010

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.

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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 overburden											
				Nov-02	May-03	Jan-07	Oct-08	Dec-09	Oct-10	Nov-11	Nov-12	Nov-13	Nov-14	Nov-15	Nov-16
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**	**0.08**	**0.079**
alkalinity	mg $CaCO_3$/L	30-500	-	387	630	738	666	695	700	707	730	730	710	690	730
ammonia as N	mg/L	-	-	0.38	0.15	0.38	0.38	0.27	< 0.05	0.13	0.5	0.53	0.14	0.12	0.69
antimony	mg/L	-	[0.02]	0.0008	0.0007	< 0.001	0.0008	< 0.0005	< 0.0005	< 0.0005	<0.0005	<0.0005	0.00059	<0.00050	<0.00050
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	0.0029	0.0018	0.0016
barium	mg/L	1	-	0.043	0.034	0.027	0.02	0.018	0.016	0.015	0.016	0.019	0.016	0.015	0.018
beryllium	mg/L	-	1.1	< 0.001	< 0.001	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	<0.0005	<0.0005	<0.00050	<0.00050	<0.00050
bismuth	mg/L	-	-	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	<0.001	<0.001	<0.0010	<0.0010	<0.0010
boron	mg/L	5	0.2	**0.302**	**0.269**	**0.3**	**0.3**	**0.32**	**0.3**	**0.34**	**0.33**	**0.34**	**0.3**	**0.31**	**0.3**
bromide	mg/L	-	-	< 0.5	< 0.5	< 1	< 1	< 1	< 1	< 1	<10	<5.0	<5.0	<5.0	<5.0
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	<0.00010	<0.00010	<0.00010
calcium	mg/L	-	-	136	154	210	200	220	210	210	170	200	210	190	200
chloride	mg/L	250	-	39.4	23.9	25	11	10	11	11	18	14	14	22	12
chromium	mg/L	0.05	-	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	<0.005	<0.005	<0.0050	<0.0050	<0.0050
cobalt	mg/L	-	0.0009	0.0008	**0.0010**	**0.015**	**0.023**	**0.0072**	**0.0016**	**0.0068**	0.0007	<0.0005	**0.0023**	**0.0011**	0.00083
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	<0.0010	<0.0010	<0.0010
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	0.25	0.28	0.24
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	<0.0020	<0.0020	<0.0010
hardness	mg $CaCO_3$/L	80-100	-	654	1287	1900	1900	2200	1900	2100	1900	1900	1900	1800	1900
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**	**1.9**	**1.7**	**2.2**
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	<0.00050	<0.00050	<0.00050
magnesium	mg/L	-	-	75.9	219	330	340	400	340	370	350	340	340	320	340
manganese	mg/L	0.05	-	0.838	0.658	0.4	0.34	0.26	0.22	0.46	0.76	0.57	0.28	0.33	0.36
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	<0.00010	<0.00010	<0.0001
molybdenum	mg/L	-	0.04	**0.059**	0.022	0.008	0.005	0.003	0.003	0.0037	0.0044	0.0034	0.0024	0.0029	0.0022
nickel	mg/L	-	0.025	0.004	0.001	0.003	0.004	0.008	0.005	0.002	0.0021	0.001	0.0021	0.002	0.0038
nitrate as N	mg/L	10	-	< 0.2	< 0.2	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	<0.10	<0.10	<0.10	<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	<0.010	<0.010	<0.010
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	7.49	7.57	7.58
phenol	mg/L	-	0.005	< 0.001	< 0.002	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0.0013	0.0025	<0.0010	<0.0010	<0.0020
phosphate	mg/L	-	-	< 1	< 1	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	<0.010	<0.010	<0.010	<0.010	0.01
phosphorous	mg/L	-	-	< 0.05	-	< 0.05	< 0.1	< 0.1	< 0.1	< 0.1	<0.1	<0.1	<0.10	-	<0.10
total phosphorous	mg/L	-	0.01	**0.217**	**0.124**	**11**	**2.3**	**10.0**	**1.1**	**4.4**	**2.4**	**1.2**	**1.6**	**4**	**1.5**
potassium	mg/L	-	-	9.1	7.6	10	10	10	9.3	9.5	7.3	9	8.9	8.7	9.2
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	<0.0020	<0.0020	<0.0020
silicon	mg/L	-	-	7.12	8.53	11	10	11	9.1	10	10	10	9.8	9.4	9.8
silver	mg/L	-	0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	<0.0001	<0.0001	<0.00010	<0.00010	<0.00010
sodium	mg/L	200 d	-	115	117	75	76	85	68	75	74	71	69	66	68
strontium	mg/L	-	-	2.89	3.37	4.2	4.4	4.1	4.4	4.8	3.4	4.1	4	3.8	3.9
sulphide	mg/L	0.05	-	0.43	0.07	0.14	< 0.02	< 0.02	< 0.02	< 0.02	0.33	0.18	0.021	<0.020	0.61
sulphate	mg/L	500	-	530	797	1070	1160	1410	1410	1320	1300	1300	1300	1300	1200
thallium	mg/L	-	0.0003	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	00 0.00005	<0.00005	<0.00005	<0.00005	<0.000050	<0.000050
tin	mg/L	-	-	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	<0.001	<0.001	<0.0010	<0.0010	<0.0010
titanium	mg/L	-	-	< 0.005	0.008	0.012	< 0.005	< 0.005	0.018	< 0.005	<0.005	<0.005	0.011	0.0051	<0.0050
TSS	mg/L	-	-	100000	49900	24000	47000	14000	1700	7600	2600	1200	1900	2590	6300
turbidity	NTU	5	-	44	5.2	20100	18000	31000	3600	460	640	550	1500	1700	3800
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**	**0.017**	**0.017**	**0.014**
vanadium	mg/L	-	[0.006]	0.0024	0.0018	< 0.001	0.001	0.004	0.002	< 0.0005	<0.0005	0.00088	<0.00050	<0.00050	<0.00050
zinc	mg/L	5	[0.02]	0.006	0.008	0.008	0.009	< 0.03	< 0.005	< 0.01	<0.01	<0.01	<0.010	<0.010	<0.010

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 intermediate													
				Nov-02	May-03	Jan-07	Oct-08	Dec-09	Oct-10	Nov-11	Nov-11 DUP 3	Nov-12	Nov-13	Nov-14	Nov-15	Nov-16	Nov-16 DUP 3
aluminum	mg/L	0.1	[0.075] a	**0.128**	< 0.050	< 0.05	< 0.3	0.074	**0.11**	< 0.05	< 0.05	0.057	<0.05	0.0059	<0.025	**0.18**	**0.17**
alkalinity	mg $CaCO_3$/L	30-500	-	40	29	56	74	88	72	56	53	62	51	50	84	58	51
ammonia as N	mg/L	-	-	9.2	11.3	13.5	4.7	5.7	7.9	9.6	9.9	10	9.9	13	7.3	11	11
antimony	mg/L	-	[0.02]	< 0.005	< 0.005	< 0.01	< 0.03	< 0.0005	< 0.005	< 0.005	< 0.005	<0.005	<0.005	0.0018	<0.0025	<0.0025	<0.0025
arsenic	mg/L	0.025	[0.005]	< 0.02	< 0.02	< 0.01	< 0.05	< 0.005	< 0.01	< 0.01	0.011	<0.01	<0.01	0.0013	<0.0050	<0.0050	<0.0050
barium	mg/L	1	-	< 0.05	< 0.05	< 0.05	< 0.3	0.017	< 0.05	0.025	0.025	0.023	0.021	0.021	0.022	0.022	0.024
beryllium	mg/L	-	1.1	< 0.01	< 0.01	< 0.005	< 0.03	< 0.0005	< 0.005	< 0.005	< 0.005	<0.005	<0.005	<0.00050	<0.0025	<0.0025	<0.0025
bismuth	mg/L	-	-	< 0.01	< 0.01	< 0.01	< 0.05	< 0.001	< 0.01	< 0.01	< 0.01	<0.01	<0.01	<0.0010	<0.0050	<0.0050	<0.0050
boron	mg/L	5	0.2	**5.17**	**5.68**	**3.8**	**3.6**	**4.7**	**4.6**	**4.6**	**5.1**	**4.3**	**5.5**	**4.3**	**4.3**	**5.2**	**5.2**
bromide	mg/L	-	-	70	94	142	37	31	62	< 500	< 500	120	98	160	<50	84	83
cadmium	mg/L	0.005	0.0005	< 0.001	< 0.001	< 0.001	< 0.005	< 0.0001	< 0.001	< 0.001	< 0.001	<0.001	<0.001	**0.0097**	**0.012**	<0.00050	<0.00050
calcium	mg/L	-	-	1220	1590	1400	540	470	870	1300	1300	1400	1300	1000	1000	1600	1600
chloride	mg/L	250	-	6720	9780	11500	3220	2440	4980	6480	6470	8200	7600	18000	6200	7600	7700
chromium	mg/L	0.05	-	< 0.05	< 0.05	< 0.05	< 0.3	< 0.005	< 0.05	< 0.05	< 0.05	<0.05	<0.05	<0.0050	<0.025	<0.025	<0.025
cobalt	mg/L	-	0.0009	< 0.001	< 0.001	**0.005**	< 0.03	**0.0037**	< 0.005	< 0.005	< 0.005	<0.005	<0.005	<0.0025	<0.0025	<0.0050	<0.0050
copper	mg/L	1	[0.005] b	< 0.005	< 0.005	< 0.01	< 0.05	< 0.001	< 0.01	< 0.02	< 0.01	<0.01	<0.01	<0.0050	<0.010	<0.0050	<0.0050
fluoride	mg/L	1.5 - 2.4	-	0.4	0.4	0.2	0.3	0.4	0.3	0.3	0.3	0.25	0.26	0.21	0.38	0.27	0.28
free cyanide	mg/L	0.2	0.005	< 0.001	< 0.001	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.0010	<0.0010
hardness	mg $CaCO_3$/L	80-100	-	4370	5871	5200	2200	1800	3300	4900	5100	5500	5000	3900	4000	6000	6000
iron	mg/L	0.3	0.3	**3.65**	**4.46**	**4.7**	< 5	**1.2**	**2.8**	**2.3**	**2.5**	**4.5**	**3.4**	0.14	<0.50	**3.9**	**3.9**
lead	mg/L	0.01	[0.005] c	< 0.005	< 0.005	< 0.005	< 0.03	< 0.0005	< 0.005	< 0.005	< 0.005	<0.005	<0.005	<0.00050	<0.0025	<0.0025	<0.0025
magnesium	mg/L	-	-	317	460	380	200	160	280	410	430	470	420	340	340	480	490
manganese	mg/L	0.05	-	0.575	0.735	0.62	0.27	0.2	0.39	0.52	0.54	0.6	0.58	0.45	0.44	0.64	0.65
mercury	mg/L	0.001	0.0002	< 0.00005	< 0.00005	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001	<0.0001
molybdenum	mg/L	-	0.04	0.013	0.012	< 0.01	< 0.05	0.006	< 0.01	0.006	0.006	<0.005	0.007	0.022	0.025	0.0072	0.0073
nickel	mg/L	-	0.025	< 0.01	< 0.01	< 0.01	< 0.05	< 0.005	< 0.01	< 0.01	< 0.01	<0.01	<0.01	0.015	0.021	<0.010	<0.010
nitrate as N	mg/L	10	-	< 0.2	< 0.2	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	<0.10	<0.10	<1.0	<0.10	<0.10	<0.10
nitrite as N	mg/L	1	-	< 20	< 20	0.02	< 0.01	0.01	< 0.01	< 0.01	< 0.01	<0.010	<0.010	<0.10	0.011	0.014	<0.010
pH	pH Units	6.5-8.5	6.5-8.5	7.44	7.28	7.30	7.80	7.7	7.45	7.37	7.38	6.96	7.15	7.16	7.36	7.31	7.39
phenol	mg/L	-	0.005	< 0.001	< 0.001	**0.023**	< 0.001	< 0.001	< 0.001	0.001	0.001	<0.0010	0.0020	**0.0074**	<0.0010	0.0028	0.0031
phosphate	mg/L	-	-	< 1	< 1	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
phosphorous	mg/L	-	-	-	-	< 0.5	< 5	< 0.1	< 1	< 1	< 1	<1	<1	<0.10	-	<0.50	<0.50
total phosphorous	mg/L	-	0.01	**0.278**	**0.076**	**0.21**	**0.12**	**0.04**	**0.10**	< 1	< 0.40	**0.13**	**0.13**	**0.16**	**0.029**	<0.50	<0.50
potassium	mg/L	-	-	78.1	94.4	80	46	40	61	86	91	85	82	69	66	100	100
selenium	mg/L	0.01	0.1	0.033	0.03	< 0.02	< 0.1	0.01	< 0.02	< 0.02	< 0.02	<0.04	<0.02	<0.0020	<0.010	<0.010	<0.010
silicon	mg/L	-	-	3.19	3.27	2.3	3.5	3.7	4	3.5	3.6	4	3.3	4.8	4.9	4.1	4.3
silver	mg/L	-	0.0001	< 0.001	< 0.001	< 0.001	< 0.005	< 0.0001	< 0.001	< 0.001	< 0.001	<0.001	<0.001	<0.00010	<0.00050	<0.00050	<0.00050
sodium	mg/L	200 d	-	2920	4330	3400	1700	1300	2400	3200	3400	3400	3300	2600	2600	3800	3900
strontium	mg/L	-	-	25.6	32.7	29	13	12	20	30	31	35	31	24	25	34	35
sulphide	mg/L	0.05	-	< 0.01	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
sulphate	mg/L	500	-	1360	1610	1540	1230	1260	1450	1650	1560	1500	1600	1600	1900	1400	1500
thallium	mg/L	-	0.0003	< 0.0005	< 0.0005	< 0.0005	< 0.003	< 0.00005	< 0.0005	< 0.0005	< 0.0005	<0.0005	<0.0005	<0.00005	<0.00025	<0.00025	<0.00025
tin	mg/L	-	-	< 0.01	< 0.01	< 0.01	< 0.05	< 0.001	< 0.01	< 0.01	< 0.01	<0.01	<0.01	<0.0010	<0.0050	<0.0050	<0.0050
titanium	mg/L	-	-	< 0.05	< 0.05	< 0.05	< 0.3	< 0.005	< 0.05	< 0.05	< 0.05	<0.05	<0.05	<0.0050	<0.025	<0.025	<0.025
TSS	mg/L	-	-	456	118	140	36	100	190	370	490	450	120	950	10900	390	340
turbidity	NTU	5	-	11.1	5.2	105	27	66	100	140	140	250	72	190	19	310	260
uranium	mg/L	0.02	[0.005]	0.0021	< 0.0010	< 0.001	< 0.005	< 0.0001	< 0.001	< 0.001	< 0.001	<0.001	<0.001	**0.013**	**0.015**	<0.00050	<0.00050
vanadium	mg/L	-	[0.006]	< 0.05	< 0.05	< 0.01	< 0.05	< 0.005	< 0.01	0.006	0.007	<0.01	<0.01	<0.0025	<0.0050	<0.010	<0.010
zinc	mg/L	5	[0.02]	< 0.05	< 0.05	**0.23**	< 0.3	**0.034**	< 0.05	**0.085**	< 0.05	<0.05	<0.05	**0.075**	**0.073**	<0.025	<0.025

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 overburden											
				Nov-02	May-03	Jan-07	Oct-08	Dec-09	Oct-10	Nov-11	Nov-12	Nov-13	Nov-14	Nov-15	Nov-16
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	0.042	**0.28**	**0.36**
alkalinity	mg $CaCO_3$/L	30-500	-	133	104	140	114	110	109	175	170	160	150	140	130
ammonia as N	mg/L	-	-	0.61	0.55	1.36	1.20	1.8	1.2	0.89	1.1	1.2	0.85	1	1.2
antimony	mg/L	-	[0.02]	< 0.0005	< 0.0005	< 0.001	0.0026	< 0.0005	0.0006	< 0.0005	0.00068	<0.0005	<0.00050	0.0006	0.00083
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	0.0041	0.0027	0.003
barium	mg/L	1	-	0.038	0.031	0.012	0.011	0.010	0.014	0.008	0.009	0.0095	0.008	0.013	0.011
beryllium	mg/L	-	1.1	< 0.001	< 0.001	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	<0.0005	<0.0005	<0.00050	<0.00050	<0.00050
bismuth	mg/L	-	-	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	<0.001	<0.001	<0.0010	<0.0010	<0.0010
boron	mg/L	5	0.2	**0.778**	**0.911**	**1.2**	**1.2**	**1.2**	**1.3**	**0.98**	**1.1**	**1.2**	**1.2**	**1.2**	**1.1**
bromide	mg/L	-	-	< 0.5	< 0.5	6	3	6	7	< 1	1.2	<5.0	2.4	<5.0	<5.0
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	<0.00010	<0.00010	<0.00010
calcium	mg/L	-	-	125	142	210	180	190	220	140	150	160	150	170	150
chloride	mg/L	250	-	30.5	30.8	492	281	518	574	78	70	82	120	120	240
chromium	mg/L	0.05	-	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	<0.005	<0.005	<0.0050	<0.0050	<0.0050
cobalt	mg/L	-	0.0009	0.0004	0.0002	**0.015**	**0.021**	**0.011**	**0.0051**	< 0.0005	**0.0023**	<0.0005	<0.00050	0.0043	0.00058
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	<0.0010	<0.0010	<0.0010
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	0.19	0.21	0.2
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	<0.0020	<0.0020	<0.0010
hardness	mg $CaCO_3$/L	80-100	-	577	760.5	1100	950	1000	1000	870	880	920	880	910	870
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**	**0.63**	**1.1**	**0.96**
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	<0.00050	<0.00050	<0.00050
magnesium	mg/L	-	-	63.8	98.2	150	120	130	120	120	130	130	120	120	120
manganese	mg/L	0.05	-	0.189	0.156	0.15	0.13	0.14	0.14	0.1	0.12	0.11	0.13	0.13	0.1
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	<0.00010	<0.00010	<0.0001
molybdenum	mg/L	-	0.04	**0.048**	0.02	0.008	0.013	0.007	0.012	0.006	0.0063	0.0069	0.0064	0.0077	0.0075
nickel	mg/L	-	0.025	0.002	< 0.001	0.003	0.002	0.003	< 0.001	< 0.001	<0.001	<0.001	<0.0010	<0.0010	<0.0010
nitrate as N	mg/L	10	-	< 0.2	< 0.2	< 0.1	< 0.1	0.3	< 0.1	0.6	<0.10	0.37	<0.10	<0.10	0.13
nitrite as N	mg/L	1	-	< 0.2	< 0.2	< 0.01	0.01	0.14	0.02	0.22	0.02	0.38	0.062	0.101	0.136
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	7.91	7.87	7.87
phenol	mg/L	-	0.005	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
phosphate	mg/L	-	-	< 1	< 1	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	<0.010	<0.010	<0.010	<0.010	<0.010
phosphorous	mg/L	-	-	< 0.05	-	< 0.05	< 0.1	< 0.1	< 0.1	< 0.1	<0.1	<0.1	<0.10	-	<0.10
total phosphorous	mg/L	-	0.01	**0.176**	**10.2**	**8.4**	**6.4**	**30.0**	**5.0**	**0.35**	**2.80**	**16**	**1.5**	**4.2**	**2.2**
potassium	mg/L	-	-	15.5	12.9	14	13	12	16	9.4	9	9.9	9.2	12	10
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	<0.0020	<0.0020	<0.0020
silicon	mg/L	-	-	5.40	5.99	6.4	6	6.9	6.5	5.5	5.9	6.4	5.4	7.1	7.1
silver	mg/L	-	0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	<0.0001	<0.0001	<0.00010	<0.00010	<0.00010
sodium	mg/L	200 d	-	98.4	111	280	210	170	320	130	120	130	110	160	130
strontium	mg/L	-	-	6.86	8.98	11	12	11	13	10	11	11	11	11	11
sulphide	mg/L	0.05	-	0.37	0.31	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	<0.020	0.028	<0.020	0.02	<0.020
sulphate	mg/L	500	-	651	836	884	813	953	933	900	900	890	900	920	850
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	<0.000050	<0.000050
tin	mg/L	-	-	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	<0.001	<0.001	<0.0010	<0.0010	<0.0010
titanium	mg/L	-	-	< 0.005	0.016	0.007	< 0.005	< 0.005	< 0.005	< 0.005	<0.005	<0.005	<0.0050	0.014	0.016
TSS	mg/L	-	-	58400	28300	24000	6500	12000	21000	5800	1100	24000	2600	1650	3500
turbidity	NTU	5	-	1.3	5.0	10700	3600	14000	19000	600	590	890	7.4	1200	1900
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	0.00032	0.00035	0.00032
vanadium	mg/L	-	[0.006]	0.0014	0.0015	< 0.001	**0.007**	0.003	0.003	0.0006	<0.0005	<0.0005	<0.00050	<0.00050	0.00052
zinc	mg/L	5	[0.02]	< 0.05	< 0.005	0.018	< 0.005	< 0.005	< 0.005	< 0.025	0.013	<0.01	<0.0050	<0.010	<0.010

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 deep										
				May-03	Jan-07	Oct-08	Dec-09	Oct-10	Nov-11	Nov-12	Nov-13	Nov-14	Nov-15	Nov-16
aluminum	mg/L	0.1	[0.075] a	< 0.05	< 0.05	< 0.5	**0.5**	NOT SAMPLED	< 0.3	<0.05	<0.25	<0.10	<0.025	<0.025
alkalinity	mg $CaCO_3$/L	30-500	-	172	126	34	66		102	150	160	180	74	97
ammonia as N	mg/L	-	-	8.7	23.4	25	34		37	19	31	32	3.3	2.2
antimony	mg/L	-	[0.02]	< 0.005	< 0.01	< 0.05	< 0.03		< 0.03	<0.0050	<0.025	<0.010	<0.0025	<0.0025
arsenic	mg/L	0.025	[0.005]	< 0.02	< 0.01	< 0.1	< 0.3		**0.059**	<0.02	<0.05	<0.040	<0.010	<0.0050
barium	mg/L	1	-	0.087	0.075	< 0.5	< 0.3		< 0.1	0.05	<0.1	0.073	0.027	0.012
beryllium	mg/L	-	1.1	< 0.01	< 0.005	< 0.05	< 0.03		< 0.03	<0.0050	<0.025	<0.010	<0.0025	<0.0025
bismuth	mg/L	-	-	< 0.01	< 0.01	< 0.1	< 0.05		< 0.05	<0.01	<0.05	<0.020	<0.0050	<0.0050
boron	mg/L	5	0.2	**2.38**	**3.3**	**6.2**	**5.4**		**6.3**	**5.7**	**7.9**	**6.2**	**7**	**6.9**
bromide	mg/L	-	-	103	183	398	401		572	200	400	<500	<10	<10
cadmium	mg/L	0.005	0.0005	**0.0017**	< 0.001	< 0.01	< 0.005		**0.006**	<0.0010	<0.005	<0.0020	**0.0034**	**0.0013**
calcium	mg/L	-	-	1440	3700	6600	5300		7700	2400	4800	4800	990	280
chloride	mg/L	250	-	9180	16800	34700	32700		45000	16000	33000	29000	540	500
chromium	mg/L	0.05	-	< 0.05	< 0.05	< 0.5	< 0.3		< 0.3	<0.05	<0.25	<0.10	<0.025	<0.025
cobalt	mg/L	-	0.0009	< 0.001	< 0.005	< 0.05	< 0.03		< 0.03	<0.0050	<0.025	<0.010	<0.0025	<0.0025
copper	mg/L	1	[0.005] b	**0.0124**	< 0.01	< 0.1	< 0.05		< 0.1	<0.01	<0.05	<0.020	<0.0050	<0.0050
fluoride	mg/L	1.5 - 2.4	-	0.3	0.2	0.1	0.1		< 0.1	0.18	<0.10	<0.10	0.65	0.57
free cyanide	mg/L	0.2	0.005	< 0.001	< 0.002	< 0.002	< 0.002		< 0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.0010
hardness	mg $CaCO_3$/L	80-100	-	4915	13000	23000	18000		27000	8400	16000	17000	3600	1100
iron	mg/L	0.3	0.3	< 0.3	**17**	**29**	**24**		< 5	<1	**7.7**	**3.3**	<0.50	<0.50
lead	mg/L	0.01	[0.005] c	< 0.005	< 0.005	< 0.05	< 0.03		< 0.03	<0.0050	<0.025	<0.010	<0.0025	<0.0025
magnesium	mg/L	-	-	316	820	1500	1200		1800	560	1100	1100	260	91
manganese	mg/L	0.05	-	1.13	2.4	3.7	2.8		5.1	1.6	3	3.3	0.62	0.19
mercury	mg/L	0.001	0.0002	< 0.00005	0.0001	< 0.0001	< 0.0001		< 0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001
molybdenum	mg/L	-	0.04	0.03	0.012	< 0.1	< 0.05		< 0.03	0.014	<0.025	<0.010	0.0099	0.014
nickel	mg/L	-	0.025	< 0.01	< 0.01	< 0.1	< 0.05		**0.19**	<0.01	<0.05	<0.020	0.0072	**0.04**
nitrate as N	mg/L	10	-	0.6	1.4	< 0.1	< 0.1		< 0.1	<0.10	<0.10	<0.10	0.15	0.38
nitrite as N	mg/L	1	-	< 20	0.02	< 0.01	0.02		< 0.1	0.029	<0.010	<0.010	0.081	0.058
pH	pH Units	6.5-8.5	6.5-8.5	7.42	7.4	7.2	6.8		6.8	7.05	6.82	7.06	7.5	7.59
phenol	mg/L	-	0.005	< 0.001	**0.025**	0.002	0.003		**0.07**	**0.022**	**0.057**	**0.079**	<0.0010	<0.0010
phosphate	mg/L	-	-	< 1	< 0.01	< 0.01	< 0.01		< 0.01	0.019	<0.010	0.027	<0.010	<0.010
phosphorous	mg/L	-	-	< 0.5	< 0.5	< 10	< 5		< 5	<1	<5	<2.0	-	<0.50
total phosphorous	mg/L	-	0.01	**0.089**	**0.34**	**0.37**	**2.7**		< 5	<1	**1.1**	**0.96**	**0.13**	<0.50
potassium	mg/L	-	-	76.2	160	260	210		300	130	210	220	63	34
selenium	mg/L	0.01	0.1	< 0.02	< 0.02	< 0.2	**0.2**		< 0.2	0.042	<0.1	<0.20	<0.020	<0.010
silicon	mg/L	-	-	3.41	2.3	< 5	4		3.4	4.1	7.1	2.5	4.2	5.3
silver	mg/L	-	0.0001	< 0.001	< 0.001	< 0.01	< 0.005		< 0.005	<0.0010	<0.005	<0.0020	<0.00050	<0.00050
sodium	mg/L	200 d	-	3600	8000	15000	12000		17000	6100	11000	12000	2100	440
strontium	mg/L	-	-	29.9	77	130	110		170	53	98	100	25	11
sulphide	mg/L	0.05	-	< 0.01	< 0.02	< 0.02	< 0.02		< 0.02	<0.020	1.4	0.53	<0.020	<0.020
sulphate	mg/L	500	-	762	1070	1250	1340		1540	1700	1400	2000	1300	1200
thallium	mg/L	-	0.0003	< 0.0005	< 0.0005	< 0.005	< 0.003		< 0.003	<0.0005	<0.00005	<0.0010	<0.00025	<0.00025
tin	mg/L	-	-	< 0.01	< 0.01	< 0.1	< 0.05		< 0.05	<0.01	<0.05	<0.020	<0.0050	<0.0050
titanium	mg/L	-	-	< 0.05	< 0.05	< 0.5	< 0.3		< 0.3	<0.05	<0.25	<0.10	<0.025	<0.025
TSS	mg/L	-	-	501	1000	540	3600		1600	290	1200	1500	2890	33
turbidity	NTU	5	-	188	518	380	4600		340	66	300	140	8	5.1
uranium	mg/L	0.02	[0.005]	**0.0075**	0.001	< 0.01	< 0.005		**0.023**	**0.029**	**0.025**	**0.029**	0.005	**0.0064**
vanadium	mg/L	-	[0.006]	< 0.05	< 0.01	< 0.1	< 0.3		< 0.05	<0.02	**0.026**	<0.050	<0.0050	<0.0025
zinc	mg/L	5	[0.02]	< 0.05	**0.073**	< 0.5	< 0.3		< 0.3	<0.05	<0.25	<0.10	0.027	<0.025

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 intermediate											
				Nov-02	**May-03**	**Jan-07**	**Oct-08**	**Dec-09**	**Oct-10**	**Nov-11**	**Nov-12**	**Nov-13**	**Nov-14**	**Nov-15**	**Nov-16**
aluminum	mg/L	0.1	[0.075] a	0.006	**0.289**	**0.1**	**0.14**	**0.14**	0.031	0.064	**0.091**	<0.025	0.051	0.12	0.1
alkalinity	mg CaCO$_3$/L	30-500	-	55	56	56	51	50	50	55	65	53	52	50	55
ammonia as N	mg/L	-	-	4.86	4.97	8.2	5.9	6.3	6	5.7	6.2	6.1	6	5.9	5.5
antimony	mg/L	-	[0.02]	< 0.0005	0.0005	< 0.005	< 0.005	< 0.0005	< 0.0005	< 0.0005	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025
arsenic	mg/L	0.025	[0.005]	< 0.002	< 0.002	< 0.005	< 0.01	< 0.005	< 0.005 (1)	< 0.005	<0.0050	<0.005	<0.0050	<0.0050	<0.0050
barium	mg/L	1	-	0.013	0.010	< 0.03	< 0.05	0.007	0.007	0.008	<0.01	<0.01	<0.010	<0.010	<0.010
beryllium	mg/L	-	1.1	< 0.001	< 0.001	< 0.003	< 0.005	< 0.0005	< 0.0005	< 0.0005	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025
bismuth	mg/L	-	-	< 0.001	< 0.001	< 0.005	< 0.01	< 0.001	0.002	< 0.001	<0.0050	<0.005	<0.0050	<0.0050	<0.0050
boron	mg/L	5	0.2	**6.46**	**6.99**	**6**	**6.9**	**6.5**	**6.4**	**5.9**	**6.1**	**5.6**	**5.6**	**6.8**	**7.1**
bromide	mg/L	-	-	11.3	10.3	14	17	21	16	21	21	25	<20	<20	11
cadmium	mg/L	0.005	0.0005	< 0.0001	**0.0006**	< 0.0005	< 0.001	< 0.0001	< 0.0001	< 0.0001	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050
calcium	mg/L	-	-	433	380	450	530	510	460	480	550	540	530	540	420
chloride	mg/L	250	-	1120	984	1320	1540	1800	1500	1650	2100	2000	2000	1800	1100
chromium	mg/L	0.05	-	< 0.005	< 0.005	< 0.03	< 0.05	< 0.005	< 0.005	< 0.005	<0.025	<0.025	<0.025	<0.025	<0.025
cobalt	mg/L	-	0.0009	0.0008	0.0002	**0.019**	**0.021**	**0.0086**	< 0.0005	< 0.003	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025
copper	mg/L	1	[0.005] b	< 0.005	< 0.005	< 0.005	< 0.01	< 0.005	< 0.005 (1)	< 0.001	<0.0050	<0.005	<0.0050	<0.0050	<0.0050
fluoride	mg/L	1.5 - 2.4	-	0.6	0.7	0.5	0.6	0.5	0.5	0.6	0.55	0.54	0.49	0.58	0.53
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	<0.0020	<0.0020	<0.0010
hardness	mg CaCO$_3$/L	80-100	-	1600	1405	1600	1900	1900	1700	1700	2000	2000	1900	1900	1500
iron	mg/L	0.3	0.3	0.23	**0.56**	**0.71**	< 1	**0.9**	**0.75**	**0.92**	**0.84**	**0.91**	**0.73**	**0.94**	**0.75**
lead	mg/L	0.01	[0.005] c	< 0.0005	< 0.0005	< 0.003	< 0.005	< 0.0005	< 0.0005	< 0.0005	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025
magnesium	mg/L	-	-	125	110	130	150	140	130	130	160	150	130	140	120
manganese	mg/L	0.05	-	0.205	0.17	0.21	0.26	0.22	0.19	0.21	0.23	0.23	0.23	0.23	0.16
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	<0.00010	<0.00010	<0.0001
molybdenum	mg/L	-	0.04	0.011	0.008	0.007	< 0.01	0.008	0.009	0.0087	0.0083	0.0077	0.0083	0.0079	0.007
nickel	mg/L	-	0.025	0.007	< 0.001	< 0.005	< 0.01	< 0.005	< 0.005 (1)	< 0.005	<0.0050	<0.005	<0.0050	<0.0050	<0.0050
nitrate as N	mg/L	10	-	< 0.2	< 0.2	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	<0.10	<0.10	<0.10	<0.10	<0.10
nitrite as N	mg/L	1	-	< 2.0	< 0.2	< 0.01	< 0.01	< 0.01	< 0.01	0.03	<0.010	<0.010	0.012	<0.010	<0.010
pH	pH Units	6.5-8.5	6.5-8.5	7.67	7.64	7.7	7.8	7.6	7.5	7.48	7.11	7.41	7.46	7.37	7.46
phenol	mg/L	-	0.005	< 0.001	< 0.001	0.001	< 0.001	< 0.001	< 0.001	0.001	**0.01**	0.0044	<0.0020	<0.0010	<0.0010
phosphate	mg/L	-	-	< 1	< 1	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	<0.010	<0.010	<0.010	<0.010	<0.010
phosphorous	mg/L	-	-	< 0.05	< 0.05	< 0.3	< 1	< 0.1	< 0.1	< 0.1	<0.5	<0.5	<0.50	-	<0.50
total phosphorous	mg/L	-	0.01	**5.45**	**0.96**	**1.4**	**0.47**	< 0.1	**0.05**	**0.14**	<0.5	**0.19**	**0.23**	**0.28**	<0.50
potassium	mg/L	-	-	39.7	38.5	42	48	43	43	43	47	48	46	48	42
selenium	mg/L	0.01	0.1	0.009	< 0.002	< 0.01	< 0.02	0.012	< 0.01 (1)	< 0.01	<0.01	<0.01	<0.010	<0.010	<0.010
silicon	mg/L	-	-	3.27	3.64	3	3.7	3.4	3.2	3.4	3.4	3.5	2.9	3.7	3.8
silver	mg/L	-	0.0001	< 0.0001	< 0.0001	< 0.0005	< 0.001	< 0.0001	**0.0002**	< 0.0001	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050
sodium	mg/L	200 d	-	682	609	780	1100	1000	960	1100	1200	1200	1100	1200	760
strontium	mg/L	-	-	14.2	11.8	11	13	13	12	13	14	13	12	13	11
sulphide	mg/L	0.05	-	0.05	0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	0.55	0.94	0.031	<0.020	0.021
sulphate	mg/L	500	-	1630	1600	1730	1670	1870	1750	1800	1800	1800	1800	1800	1500
thallium	mg/L	-	0.0003	< 0.00005	< 0.00005	< 0.0003	< 0.0005	< 0.00005	< 0.00005	< 0.00005	<0.00025	<0.00025	<0.00025	<0.00025	<0.00025
tin	mg/L	-	-	< 0.001	< 0.001	< 0.005	< 0.01	< 0.001	< 0.001	< 0.001	<0.0050	<0.005	<0.0050	<0.0050	<0.0050
titanium	mg/L	-	-	< 0.005	-	< 0.03	< 0.05	< 0.005	0.008	< 0.005	<0.025	<0.025	<0.025	<0.025	<0.025
TSS	mg/L	-	-	8680	1740	5400	1100	1100	91	380	530	280	210	5650	230
turbidity	NTU	5	-	11.2	24	2440	1100	1100	57	110	120	81	85	300	170
uranium	mg/L	0.02	[0.005]	0.0011	0.0002	< 0.0005	< 0.001	< 0.0001	< 0.0001	0.0004	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050
vanadium	mg/L	-	[0.006]	< 0.0050	< 0.0050	< 0.005	< 0.01	< 0.005	< 0.005 (1)	< 0.003	**0.0063**	<0.0025	0.0056	<0.0025	<0.0025
zinc	mg/L	5	[0.02]	< 0.050	0.007	< 0.03	< 0.05	< 0.03	< 0.005	< 0.005	<0.025	<0.025	<0.025	<0.025	<0.025

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 overburden											
				Nov-02	May-03	Jan-07	Oct-08	Dec-09	Oct-10	Nov-11	Nov-12	Nov-13	Nov-14	Nov-15	Nov-16
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	0.029	0.025	0.052
alkalinity	mg $CaCO_3$/L	30-500	-	385	419	391	413	390	387	384	390	380	390	400	420
ammonia as N	mg/L	-	-	0.32	0.25	0.16	< 0.05	0.53	< 0.05	< 0.05	0.13	0.12	<0.050	<0.050	<0.050
antimony	mg/L	-	[0.02]	< 0.0005	< 0.0005	< 0.001	0.0007	< 0.0005	< 0.0005	< 0.0005	<0.00050	<0.0005	<0.00050	0.00073	<0.00050
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	<0.0010	<0.0010	<0.0010
barium	mg/L	1	-	0.083	0.082	0.06	0.065	0.058	0.056	0.096	0.049	0.051	0.047	0.051	0.055
beryllium	mg/L	-	1.1	< 0.001	< 0.001	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050
bismuth	mg/L	-	-	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0.002	< 0.001	<0.0010	<0.001	<0.0010	<0.0010	<0.0010
boron	mg/L	5	0.2	**0.353**	**0.286**	0.071	0.12	0.11	0.078	0.06	0.11	0.054	0.065	0.094	0.14
bromide	mg/L	-	-	< 0.5	< 0.5	< 1.0	< 1.0	< 1	< 1	< 1	<1.0	<1.0	<1.0	<1.0	<1.0
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	<0.00010	<0.00010	<0.00010
calcium	mg/L	-	-	65.2	64.1	88	84	78	77	130	78	86	81	79	76
chloride	mg/L	250	-	12.2	5.8	8.0	4.0	4	5	4	4.2	3.6	3.9	4.9	4.2
chromium	mg/L	0.05	-	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	<0.0050	<0.005	<0.0050	<0.0050	<0.0050
cobalt	mg/L	-	0.0009	**0.0011**	0.0009	**0.019**	**0.022**	**0.015**	**0.001**	**0.0076**	**0.00092**	0.00062	**0.001**	**0.0022**	**0.0015**
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	<0.0010	<0.0010	<0.0010
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	0.2	0.21	0.21
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	<0.0020	<0.0020	<0.0010
hardness	mg $CaCO_3$/L	80-100	-	353	407.7	490	500	460	450	560	460	470	470	450	470
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	<0.10	<0.10	<0.10
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	<0.00050	<0.00050	<0.00050
magnesium	mg/L	-	-	46.1	60.1	66	71	65	62	61	65	63	64	61	67
manganese	mg/L	0.05	-	1.01	0.769	0.28	0.38	0.310	0.180	0.55	0.23	0.18	0.18	0.21	0.21
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	<0.00010	<0.00010	<0.0001
molybdenum	mg/L	-	0.04	0.024	0.012	0.005	0.007	0.005	0.006	0.0021	0.0039	0.0024	0.0032	0.0031	0.0035
nickel	mg/L	-	0.025	0.004	0.001	0.003	0.003	0.004	0.001	0.005	0.0011	<0.001	<0.0010	0.0013	0.0011
nitrate as N	mg/L	10	-	< 0.2	< 0.2	11	0.3	2.5	4.2	4.3	0.98	1.0	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	0.018	<0.010	<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	7.83	7.95	7.81
phenol	mg/L	-	0.005	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
phosphate	mg/L	-	-	< 1	< 1	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	<0.010	<0.010	<0.010	0.011	<0.010
phosphorous	mg/L	-	-	< 0.05	< 0.05	< 0.05	< 0.1	< 0.1	< 0.1	0.41	<0.1	0.15	<0.10	-	<0.10
total phosphorous	mg/L	-	0.01	**0.092**	**12**	**1.6**	**1.7**	**17.0**	**0.9**	**0.85**	**0.15**	**0.12**	**0.1**	**0.08**	**0.15**
potassium	mg/L	-	-	6.6	6.2	5	5.7	5.1	4.9	4.5	4.8	4.3	4	4.3	5.1
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	<0.0020	<0.0020	<0.0020
silicon	mg/L	-	-	6.69	7.66	7.5	6.9	6.7	5.8	7.3	6.6	6.7	5.7	6.4	7.5
silver	mg/L	-	0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	<0.00010	<0.0001	<0.00010	<0.00010	<0.00010
sodium	mg/L	200 d	-	49.5	35.9	24	34	28	28	25	24	23	20	20	22
strontium	mg/L	-	-	3.25	3.23	1.4	2	1.8	1.5	1.4	1.5	1.3	1.3	1.5	1.7
sulphide	mg/L	0.05	-	0.27	0.03	< 0.02	< 0.02	0.06	< 0.02	< 0.02	<0.020	0.069	0.069	0.026	0.023
sulphate	mg/L	500	-	106	70.2	80	122	116	103	116	110	130	130	82	86
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	<0.000050
tin	mg/L	-	-	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	<0.0010	<0.001	<0.0010	<0.0010	<0.0010
titanium	mg/L	-	-	< 0.005	< 0.005	0.012	0.009	0.008	< 0.005	0.009	0.0088	<0.005	<0.0050	<0.0050	<0.0050
TSS	mg/L	-	-	74300	30500	2500	2800	21000	750	2500	1300	110	140	496	350
turbidity	NTU	5	-	13	50	1710	2600	31000	4300	780	210	160	90	120	220
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**	**0.0067**	**0.0056**	**0.0046**
vanadium	mg/L	-	[0.006]	0.002	0.0014	0.002	0.003	0.001	< 0.001	0.004	<0.00050	<0.0005	0.0012	<0.00050	<0.00050
zinc	mg/L	5	[0.02]	< 0.005	< 0.005	0.008	< 0.005	0.005	< 0.005	0.016	<0.0050	<0.005	<0.0050	<0.0050	<0.0050

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								
				Oct-08	Dec-09	Oct-10	Nov-11	Nov-12	Nov-13	Nov-14	Nov-15	Nov-16
aluminum	mg/L	0.1	[0.075] a	NOT SAMPLED	< 0.5	NOT SAMPLED	< 0.5	<0.25	NOT SAMPLED	NOT SAMPLED	NOT SAMPLED	<0.050
alkalinity	mg $CaCO_3$/L	30-500	-		32		36	51				49
ammonia as N	mg/L	-	-		43		39	38				39
antimony	mg/L	-	[0.02]		**0.07**		< 0.05	**0.039**				<0.0050
arsenic	mg/L	0.025	[0.005]		< 0.1		< 0.1	<0.1				<0.010
barium	mg/L	1	-		< 0.5		< 0.2	0.14				0.16
beryllium	mg/L	-	1.1		< 0.05		< 0.05	<0.025				<0.0050
bismuth	mg/L	-	-		< 0.1		< 0.1	0.057				<0.010
boron	mg/L	5	0.2		**5**		**6**	**5.3**				**5.2**
bromide	mg/L	-	-		587		747	850				670
cadmium	mg/L	0.005	0.0005		**0.01**		< 0.01	<0.0050				**0.0025**
calcium	mg/L	-	-		8800		10000	9900				11000
chloride	mg/L	250	-		50200		54800	59000				56000
chromium	mg/L	0.05	-		< 0.5		< 0.5	<0.25				<0.050
cobalt	mg/L	-	0.0009		< 0.05		< 0.05	<0.025				<0.025
copper	mg/L	1	[0.005] b		< 0.1		< 0.1	<0.05				<0.050
fluoride	mg/L	1.5 - 2.4	-		< 0.1		< 0.1	<0.10				<0.10
free cyanide	mg/L	0.2	0.005		< 0.002		< 0.002	<0.0020				<0.0010
hardness	mg $CaCO_3$/L	80-100	-		31000		35000	34000				37000
iron	mg/L	0.3	0.3		**29**		**37**	**14**				**11**
lead	mg/L	0.01	[0.005] c		< 0.05		< 0.05	<0.025				<0.0050
magnesium	mg/L	-	-		2100		2300	2400				2400
manganese	mg/L	0.05	-		4.7		5.1	5.3				5.8
mercury	mg/L	0.001	0.0002		< 0.0001		< 0.0001	<0.00010				<0.0001
molybdenum	mg/L	-	0.04		< 0.1		< 0.05	<0.025				<0.0050
nickel	mg/L	-	0.025		< 0.1		< 0.1	<0.05				<0.050
nitrate as N	mg/L	10	-		< 0.1		< 0.1	<0.10				<1.0
nitrite as N	mg/L	1	-		< 0.01		< 0.1	<0.10				<0.10
pH	pH Units	6.5-8.5	6.5-8.5		6.5		**6.43**	**6.11**				6.5
phenol	mg/L	-	0.005		**0.006**		**0.11**	**0.0094**				**0.016**
phosphate	mg/L	-	-		< 0.01		< 0.01	<0.010				<0.050
phosphorous	mg/L	-	-		< 10		< 10	<5				<1.0
total phosphorous	mg/L	-	0.01		**1.1**		< 5	**0.42**				<1.0
potassium	mg/L	-	-		290		300	300				340
selenium	mg/L	0.01	0.1		< 0.2		< 0.2	<0.2				<0.020
silicon	mg/L	-	-		< 5		< 5	2.9				2.4
silver	mg/L	-	0.0001		< 0.01		< 0.01	**0.0095**				**0.0011**
sodium	mg/L	200 d	-		18000		19000	20000				18000
strontium	mg/L	-	-		180		210	210				240
sulphide	mg/L	0.05	-		0.06		0.04	<0.020				<0.020
sulphate	mg/L	500	-		1260		1370	1200				1000
thallium	mg/L	-	0.0003		< 0.005		< 0.005	<0.0025				<0.00050
tin	mg/L	-	-		< 0.1		< 0.1	<0.05				<0.010
titanium	mg/L	-	-		< 0.5		< 0.5	<0.25				<0.050
TSS	mg/L	-	-	**Note:**	1500	**Note:**	3800	1400	**Note:**	**Note:**	**Note:**	630
turbidity	NTU	5	-	Insufficient	530	Insufficient	520	470	Insufficient	Insufficient	Insufficient	160
uranium	mg/L	0.02	[0.005]	water	< 0.01	water	< 0.01	**0.0089**	water	water	water	0.0048
vanadium	mg/L	-	[0.006]		< 0.1		**0.092**	<0.25				<0.025
zinc	mg/L	5	[0.02]		< 0.5		< 0.5	<0.25				<0.050

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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 intermediate											
				Nov-02	May-03	Jan-07	Oct-08	Dec-09	Oct-10	Nov-11	Nov-12	Nov-13	Nov-14	Nov-15	Nov-16
aluminum	mg/L	0.1	[0.075] a	0.029	**0.194**	NOT SAMPLED	**0.1**	**0.130**	0.016	0.051	0.032	<0.005	0.043	0.022	**0.1**
alkalinity	mg $CaCO_3$/L	30-500	-	179	180		178	264	252	285	290	270	260	250	250
ammonia as N	mg/L	-	-	1.99	1.87		1.7	1.8	2.1	1.6	1.6	1.7	1.9	1.8	2.1
antimony	mg/L	-	[0.02]	< 0.0005	< 0.0005		0.0005	< 0.0005	< 0.0005	< 0.0005	0.0015	<0.0005	<0.00050	0.0006	<0.00050
arsenic	mg/L	0.025	[0.005]	0.002	< 0.002		0.002	0.002	0.002	< 0.001	0.0011	0.0013	0.0016	0.0013	0.0015
barium	mg/L	1	-	0.016	0.022		0.016	0.021	0.019	0.021	0.02	0.019	0.017	0.021	0.022
beryllium	mg/L	-	1.1	< 0.001	< 0.001		< 0.0005	< 0.0005	< 0.0005	< 0.0005	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050
bismuth	mg/L	-	-	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	0.0010	<0.001	<0.0010	<0.0010	<0.0010
boron	mg/L	5	0.2	**3.58**	**3.38**		**4.1**	**3.1**	**2.7**	**2**	**2.1**	**2.3**	**2.3**	**2.7**	**2.4**
bromide	mg/L	-	-	1.3	4.4		1	< 1	2	< 1	<1.0	1.2	1.1	2.2	1.8
cadmium	mg/L	0.005	0.0005	< 0.0001	< 0.0001		< 0.0001	< 0.0001	< 0.0001	< 0.0001	0.00012	<0.0001	<0.00010	<0.00010	<0.00010
calcium	mg/L	-	-	88.7	181		67	67	99	80	79	79	81	100	97
chloride	mg/L	250	-	150	406		105	74	176	74	67	110	140	150	160
chromium	mg/L	0.05	-	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	<0.0050	<0.005	<0.0050	<0.0050	<0.0050
cobalt	mg/L	-	0.0009	< 0.0001	0.0003		**0.021**	**0.0054**	< 0.0005	**0.0018**	**0.0024**	<0.0005	<0.00050	0.0018	<0.00050
copper	mg/L	1	[0.005] b	0.0006	0.0005		< 0.001	< 0.001	< 0.001	< 0.001	<0.0010	<0.001	<0.0010	<0.0010	<0.0010
fluoride	mg/L	1.5 - 2.4	-	0.7	0.7		0.7	0.5	0.4	0.4	0.42	0.43	0.39	0.42	0.39
free cyanide	mg/L	0.2	0.005	< 0.001	< 0.001		< 0.002	< 0.002	< 0.002	< 0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.0010
hardness	mg $CaCO_3$/L	80-100	-	332	692.2		260	270	390	320	320	320	320	400	380
iron	mg/L	0.3	0.3	0.13	**0.47**		0.26	0.2	0.27	0.14	<0.1	<0.1	0.23	0.36	**0.41**
lead	mg/L	0.01	[0.005] c	< 0.0005	< 0.0005		< 0.0005	< 0.0005	< 0.0005	< 0.0005	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050
magnesium	mg/L	-	-	26.7	57.6		23	25	35	30	30	30	29	36	34
manganese	mg/L	0.05	-	0.044	0.072		0.06	0.033	0.036	0.033	0.033	0.031	0.036	0.04	0.038
mercury	mg/L	0.001	0.0002	< 0.00005	< 0.00005		< 0.0001	< 0.0001	< 0.0001	< 0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001
molybdenum	mg/L	-	0.04	0.013	0.011		0.009	0.005	0.004	0.0037	0.0039	0.004	0.0041	0.0038	0.0038
nickel	mg/L	-	0.025	< 0.001	< 0.001		0.002	0.001	< 0.001	< 0.001	<0.0010	<0.001	<0.0010	<0.0010	<0.0010
nitrate as N	mg/L	10	-	< 0.2	< 0.2		< 0.1	0.2	< 0.1	0.6	0.26	0.20	<0.10	<0.10	<0.10
nitrite as N	mg/L	1	-	< 1.0	< 0.2		< 0.01	0.22	< 0.01	0.55	0.13	0.27	0.045	0.033	0.12
pH	pH Units	6.5-8.5	6.5-8.5	7.85	7.71		8.1	7.9	7.77	7.81	7.73	7.89	7.77	7.9	7.74
phenol	mg/L	-	0.005	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
phosphate	mg/L	-	-	< 1	< 1		< 0.01	< 0.01	< 0.01	< 0.01	<0.010	<0.010	<0.010	<0.010	<0.010
phosphorous	mg/L	-	-	< 0.05	< 0.05		< 0.1	< 0.1	< 0.1	< 0.1	<0.1	<0.1	<0.10		<0.10
total phosphorous	mg/L	-	0.01	**1.02**	**1.58**		**0.18**	**0.1**	**0.02**	< 0.1	**0.47**	**0.14**	**0.063**	**0.032**	**0.12**
potassium	mg/L	-	-	16.0	19.9		18	17	20	16	17	17	17	19	19
selenium	mg/L	0.01	0.1	< 0.002	< 0.002		< 0.002	< 0.002	< 0.002	< 0.002	<0.0020	<0.002	<0.0020	<0.0020	<0.0020
silicon	mg/L	-	-	4.03	4.21		5.4	6.0	5.6	5.6	6	5.5	4.9	5.6	5.5
silver	mg/L	-	0.0001	< 0.0001	< 0.0001		< 0.0001	< 0.0001	< 0.0001	< 0.0001	<0.00010	<0.0001	<0.00010	<0.00010	<0.00010
sodium	mg/L	200 d	-	171	362		180	110	110	71	74	81	86	97	96
strontium	mg/L	-	-	7.02	9.57		6.8	7.8	14	13	13	12	13	15	15
sulphide	mg/L	0.05	-	0.01	< 0.01		< 0.02	< 0.02	< 0.02	< 0.02	<0.020	<0.020	<0.020	<0.020	<0.020
sulphate	mg/L	500	-	270	276		244	136	179	130	120	140	160	150	160
thallium	mg/L	-	0.0003	< 0.00005	< 0.00005		< 0.00005	< 0.00005	< 0.00005	< 0.00005	<0.000050	<0.00005	<0.00005	<0.000050	<0.000050
tin	mg/L	-	-	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	<0.0010	<0.001	<0.0010	<0.0010	<0.0010
titanium	mg/L	-	-	< 0.005	0.006		< 0.005	< 0.005	< 0.005	0.006	<0.0050	<0.005	<0.0050	<0.0050	<0.0050
TSS	mg/L	-	-	1230	1750		350	86	< 10	200	600	240	73	736	250
turbidity	NTU	5	-	2.4	19.7		130	96	15	210	640	170	43	52	160
uranium	mg/L	0.02	[0.005]	0.0010	0.0005		0.0002	0.0002	0.0001	0.0004	0.00047	0.0004	0.0004	0.00041	0.00035
vanadium	mg/L	-	[0.006]	0.0008	< 0.005		0.002	< 0.001	< 0.001	< 0.0005	<0.00050	<0.0005	0.00072	<0.00050	<0.00050
zinc	mg/L	5	[0.02]	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	<0.0050	<0.005	<0.0050	<0.0050	0.011

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 overburden											
				Nov-02	May-03	Jan-07	Oct-08	Dec-09	Oct-10	Nov-11	Nov-12	Nov-13	Nov-14	Nov-15	Nov-16
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	0.03	0.013	0.029
alkalinity	mg $CaCO_3$/L	30-500	-	310	344		326	275	302	300	300	280	330	310	340
ammonia as N	mg/L	-	-	0.21	0.05		0.1	0.05	< 0.05	0.12	0.096	<0.050	<0.050	0.098	<0.050
antimony	mg/L	-	[0.02]	< 0.0005	< 0.0005		0.001	< 0.0005	< 0.0005	< 0.0005	<0.00050	<0.0005	<0.00050	0.00054	<0.00050
arsenic	mg/L	0.025	[0.005]	< 0.002	< 0.002		< 0.001	< 0.001	< 0.001	< 0.001	<0.0010	<0.001	<0.0010	<0.0010	<0.0010
barium	mg/L	1	-	0.07	0.081		0.078	0.061	0.06	0.058	0.061	0.058	0.055	0.064	0.055
beryllium	mg/L	-	1.1	< 0.001	< 0.001		< 0.001	< 0.0005	< 0.0005	< 0.0005	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050
bismuth	mg/L	-	-	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	<0.0010	<0.001	<0.0010	<0.0010	<0.0010
boron	mg/L	5	0.2	0.134	0.014		0.025	< 0.01	0.02	0.011	0.013	<0.01	0.018	<0.010	0.013
bromide	mg/L	-	-	< 0.5	0.5		< 1.000	< 1	< 1	< 1	<1.0	<1.0	<1.0	<1.0	<1.0
cadmium	mg/L	0.005	0.0005	< 0.0001	< 0.0001		< 0.0001	< 0.0001	< 0.0001	< 0.0001	<0.00010	<0.0001	<0.00010	<0.00010	0.00029
calcium	mg/L	-	-	98.7	114		120	120	120	120	120	120	120	130	130
chloride	mg/L	250	-	14.6	5.7		13	20	26	31	30	33	41	42	44
chromium	mg/L	0.05	-	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	<0.0050	<0.005	<0.0050	<0.0050	<0.0050
cobalt	mg/L	-	0.0009	0.0006	< 0.0001		**0.022**	**0.013**	**0.001**	**0.001**	**0.002**	<0.0005	<0.00050	0.0015	0.00064
copper	mg/L	1	[0.005] b	0.0015	0.0009		< 0.001	< 0.001	< 0.001	< 0.001	0.0016	<0.001	<0.0010	<0.0010	0.0016
fluoride	mg/L	1.5 - 2.4	-	0.2	0.1		0.1	0.1	0.1	0.1	0.11	0.10	0.11	0.12	0.1
free cyanide	mg/L	0.2	0.005	< 0.001	< 0.001		< 0.002	< 0.002	< 0.002	< 0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.0010
hardness	mg $CaCO_3$/L	80-100	-	352	406.4		430	430	430	440	430	440	440	480	480
iron	mg/L	0.3	0.3	< 0.03	0.06		< 0.1	0.1	< 0.1	< 0.1	0.12	<0.1	<0.10	<0.10	<0.10
lead	mg/L	0.01	[0.005] c	< 0.0005	0.0010		< 0.001	< 0.0005	< 0.0005	< 0.0005	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050
magnesium	mg/L	-	-	25.6	29.1		32	31	31	32	33	34	36	37	38
manganese	mg/L	0.05	-	1.29	0.051		0.038	0.032	0.004	0.003	0.0093	0.0044	0.018	0.024	0.0033
mercury	mg/L	0.001	0.0002	< 0.00005	< 0.00005		< 0.0015 (1)	< 0.0001	< 0.0001	< 0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001
molybdenum	mg/L	-	0.04	0.016	< 0.001		< 0.001	< 0.001	< 0.001	< 0.0005	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050
nickel	mg/L	-	0.025	0.002	< 0.001		0.002	0.003	< 0.001	< 0.001	<0.0010	<0.001	<0.0010	<0.0010	<0.0010
nitrate as N	mg/L	10	-	< 0.2	< 0.2		0.1	< 0.1	< 0.1	< 0.1	<0.10	<0.10	<0.10	<0.10	<0.10
nitrite as N	mg/L	1	-	< 0.2	< 0.2		< 0.01	0.02	< 0.01	< 0.01	<0.010	<0.010	0.019	<0.010	<0.010
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	7.72	7.89	7.74
phenol	mg/L	-	0.005	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
phosphate	mg/L	-	-	< 1	< 1		< 0.01	< 0.01	< 0.01	< 0.01	<0.010	<0.010	<0.010	<0.010	<0.010
phosphorous	mg/L	-	-	< 0.05	< 0.05		< 0.1	< 0.1	< 0.1	< 0.1	<0.1	<0.1	<0.10	-	<0.10
total phosphorous	mg/L	-	0.01	**0.09**	**6.05**		**6**	**5**	**3**	**14**	**3.7**	**0.58**	**0.67**	**2**	**1.1**
potassium	mg/L	-	-	5.4	0.7		0.69	0.7	0.7	0.72	0.73	0.72	0.61	0.78	0.88
selenium	mg/L	0.01	0.1	< 0.002	< 0.002		< 0.002	< 0.002	0.002	< 0.002	<0.0020	<0.002	<0.0020	<0.0020	<0.0020
silicon	mg/L	-	-	5.37	5.29		5.7	5.6	5.1	5.1	5.3	5.2	4.7	5.3	5.6
silver	mg/L	-	0.0001	< 0.0001	< 0.0001		< 0.0001	< 0.0001	< 0.0001	< 0.0001	<0.00010	<0.0001	<0.00010	<0.00010	<0.00010
sodium	mg/L	200 d	-	18.2	5.9		6.1	6.3	6.2	6.2	6.4	6.7	7	7.6	8.3
strontium	mg/L	-	-	1.6	0.244		0.21	0.19	0.19	0.2	0.19	0.21	0.19	0.22	0.21
sulphide	mg/L	0.05	-	0.25	0.04		< 0.02	< 0.02	< 0.02	< 0.02	<0.020	<0.020	<0.020	0.084	<0.020
sulphate	mg/L	500	-	103	69.6		80	90	96	111	95	100	100	110	94
thallium	mg/L	-	0.0003	< 0.00005	< 0.00005		< 0.0001	< 0.00005	< 0.00005	< 0.00005	<0.00005	<0.00005	<0.00005	<0.000050	<0.000050
tin	mg/L	-	-	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	<0.0010	<0.001	<0.0010	<0.0010	0.0015
titanium	mg/L	-	-	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	<0.0050	<0.005	<0.0050	<0.0050	<0.0050
TSS	mg/L	-	-	91100	20800		1900	3300	4000	22000	5700	2300	930	558	850
turbidity	NTU	5	-	6.8	48		340	3900	24	2700	1600	520	160	11	440
uranium	mg/L	0.02	[0.005]	0.0049	0.0019		0.002	0.0019	0.0019	0.0019	0.0018	0.002	0.0019	0.0022	0.002
vanadium	mg/L	-	[0.006]	0.0013	0.001		0.001	< 0.001	< 0.001	< 0.0005	0.00065	<0.0005	0.0012	<0.00050	<0.00050
zinc	mg/L	5	[0.02]	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	<0.0050	<0.005	<0.0050	0.0085	<0.0050

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 straddle									
				Oct-08	Dec-09	Oct-10	Nov-11	Nov-12	Nov-13	Nov-14	Nov-15	Nov-16	Nov-16 DUP 1
aluminum	mg/L	0.1	[0.075] a	**0.34**	**0.32**	0.04	**0.14**	**0.17**	<0.005	**0.66**	**0.13**	0.036	0.026
alkalinity	mg CaCO$_3$/L	30-500	-	271	296	294	285	290	290	280	270	250	250
ammonia as N	mg/L	-	-	0.51	0.65	0.54	0.75	0.76	0.58	0.7	0.71	0.68	0.68
antimony	mg/L	-	[0.02]	0.001	< 0.0005	0.0011	< 0.0005	<0.00050	<0.0005	<0.00050	0.00059	0.00052	<0.00050
arsenic	mg/L	0.025	[0.005]	**0.012**	**0.013**	**0.006**	**0.01**	**0.01**	**0.01**	**0.0064**	**0.009**	**0.006**	**0.0064**
barium	mg/L	1	-	0.068	0.077	0.066	0.067	0.061	0.059	0.061	0.06	0.045	0.045
beryllium	mg/L	-	1.1	< 0.001	< 0.0005	< 0.0005	< 0.0005	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050
bismuth	mg/L	-	-	< 0.001	< 0.001	< 0.001	< 0.001	<0.0010	<0.001	<0.0010	<0.0010	<0.0010	<0.0010
boron	mg/L	5	0.2	**1.1**	**1.0**	**1.0**	**1.2**	**1.2**	**1**	**1.5**	**1.2**	**2**	**1.8**
bromide	mg/L	-	-	< 1	< 1	< 1	< 1	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
cadmium	mg/L	0.005	0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0001	<0.00010	<0.0001	<0.00010	<0.00010	**0.00081**	**0.00096**
calcium	mg/L	-	-	63	70	67	58	61	56	56	59	49	50
chloride	mg/L	250	-	8	5	8	9	6.7	7.7	9.7	9.7	9.3	7.9
chromium	mg/L	0.05	-	< 0.005	< 0.005	< 0.005	< 0.005	<0.0050	<0.005	<0.0050	<0.0050	<0.0050	<0.0050
cobalt	mg/L	-	0.0009	**0.023**	**0.013**	**0.004**	**0.0058**	**0.0027**	<0.0005	0.00089	0.0054	0.00099	<0.00050
copper	mg/L	1	[0.005] b	< 0.001	0.001	< 0.001	0.001	0.0019	<0.001	<0.0010	<0.0010	0.0014	<0.0010
fluoride	mg/L	1.5 - 2.4	-	0.3	0.3	0.2	0.3	0.28	0.27	0.33	0.31	0.42	0.37
free cyanide	mg/L	0.2	0.005	< 0.002	< 0.002	< 0.002	< 0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.0010	<0.0010
hardness	mg CaCO$_3$/L	80-100	-	300	320	300	270	280	270	270	280	230	240
iron	mg/L	0.3	0.3	0.25	**0.60**	< 0.10	**0.49**	**0.50**	0.13	**0.51**	0.22	<0.10	<0.10
lead	mg/L	0.01	[0.005] c	< 0.001	< 0.0005	< 0.0005	< 0.0005	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050
magnesium	mg/L	-	-	34	34	33	29	32	32	31	31	27	27
manganese	mg/L	0.05	-	0.063	0.078	0.033	0.045	0.038	0.025	0.031	0.039	0.024	0.025
mercury	mg/L	0.001	0.0002	< 0.0015 (1)	< 0.0001	< 0.0001	< 0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001	<0.0001
molybdenum	mg/L	-	0.04	0.005	0.004	0.004	0.0047	0.0047	0.005	0.0059	0.005	0.008	0.0079
nickel	mg/L	-	0.025	0.003	0.003	< 0.001	< 0.001	<0.0010	<0.001	<0.0010	0.0015	0.001	0.002
nitrate as N	mg/L	10	-	0.1	0.3	< 0.1	0.5	0.27	0.51	0.24	0.44	0.22	0.22
nitrite as N	mg/L	1	-	0.03	0.16	0.03	0.04	0.022	0.038	0.044	0.016	0.023	0.015
pH	pH Units	6.5-8.5	6.5-8.5	8.3	7.9	7.93	7.9	7.90	7.94	7.9	8.09	7.87	7.91
phenol	mg/L	-	0.005	< 0.001	< 0.001	< 0.001	< 0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
phosphate	mg/L	-	-	< 0.01	< 0.01	< 0.01	< 0.01	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
phosphorous	mg/L	-	-	< 0.1	0.1	< 0.1	< 0.1	<0.1	<0.1	<0.10	-	<0.10	<0.10
total phosphorous	mg/L	-	0.01	**5.2**	**24.0**	**4.0**	**9.6**	**10**	**13**	**7.5**	**14**	**0.23**	**0.19**
potassium	mg/L	-	-	5.9	5.8	5.7	6.3	6.7	6.4	7.7	6.9	9	8.3
selenium	mg/L	0.01	0.1	< 0.002	< 0.002	< 0.002	< 0.002	<0.0020	<0.002	<0.0020	<0.0020	<0.0020	<0.0020
silicon	mg/L	-	-	11	11	9.7	8.6	10	9.5	10	9.5	7	6.7
silver	mg/L	-	0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	<0.00010	<0.0001	<0.00010	<0.00010	<0.00010	<0.00010
sodium	mg/L	200 d	-	24	22	22	25	27	27	30	27	36	35
strontium	mg/L	-	-	6	5.5	6	6.6	6.6	6.8	7.2	7.1	7.8	7.6
sulphide	mg/L	0.05	-	< 0.02	< 0.02	< 0.02	< 0.02	<0.020	0.049	<0.020	<0.020	<0.020	<0.020
sulphate	mg/L	500	-	38	46	52	52	41	47	58	51	67	49
thallium	mg/L	-	0.0003	< 0.0001	< 0.00005	< 0.00005	< 0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.000050
tin	mg/L	-	-	< 0.001	< 0.001	< 0.001	< 0.001	<0.0010	<0.001	<0.0010	<0.0010	<0.0010	<0.0010
titanium	mg/L	-	-	0.011	0.006	< 0.005	< 0.005	0.0089	<0.005	0.021	<0.0050	<0.0050	<0.0050
TSS	mg/L	-	-	15000	28000	3600	14000	12000	25000	8500	372	360	270
turbidity	NTU	5	-	7000	13000	3400	2700	3500	610	780	4200	100	150
uranium	mg/L	0.02	[0.005]	0.0004	0.0003	0.0003	0.0002	0.00021	0.00021	0.0002	0.00021	<0.00010	0.00018
vanadium	mg/L	-	[0.006]	0.002	0.001	0.002	0.0008	0.00064	<0.0005	0.0014	<0.00050	<0.00050	<0.00050
zinc	mg/L	5	[0.02]	< 0.005	0.006	< 0.005	0.006	<0.0050	<0.005	<0.0050	<0.0050	0.0063	0.006

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-06 overburden								
				Oct-08	Dec-09	Oct-10	Nov-11	Nov-12	Nov-13	Nov-14	Nov-15	Nov-16
aluminum	mg/L	0.1	[0.075] a	NOT SAMPLED	NOT SAMPLED	NOT SAMPLED	< 0.005	NOT SAMPLED	NOT SAMPLED	NOT SAMPLED	NOT SAMPLED	NOT SAMPLED
alkalinity	mg CaCO$_3$/L	30-500	-				309					
ammonia as N	mg/L	-	-				1.1					
antimony	mg/L	-	[0.02]				0.0009					
arsenic	mg/L	0.025	[0.005]				0.002					
barium	mg/L	1	-				0.12					
beryllium	mg/L	-	1.1				< 0.0005					
bismuth	mg/L	-	-				< 0.001					
boron	mg/L	5	0.2				0.17					
bromide	mg/L	-	-				< 1					
cadmium	mg/L	0.005	0.0005				< 0.0001					
calcium	mg/L	-	-				72					
chloride	mg/L	250	-				10					
chromium	mg/L	0.05	-				< 0.005					
cobalt	mg/L	-	0.0009				< 0.0005					
copper	mg/L	1	[0.005] b				< 0.001					
fluoride	mg/L	1.5 - 2.4	-				0.3					
free cyanide	mg/L	0.2	0.005				< 0.002					
hardness	mg CaCO$_3$/L	80-100	-				▨ 320					
iron	mg/L	0.3	0.3				< 0.1					
lead	mg/L	0.01	[0.005] c				< 0.0005					
magnesium	mg/L	-	-				35					
manganese	mg/L	0.05	-				▨ 0.15					
mercury	mg/L	0.001	0.0002				< 0.0001					
molybdenum	mg/L	-	0.04				0.019					
nickel	mg/L	-	0.025				< 0.001					
nitrate as N	mg/L	10	-				< 0.1					
nitrite as N	mg/L	1	-				0.12					
pH	pH Units	6.5-8.5	6.5-8.5				7.94					
phenol	mg/L	-	0.005				< 0.001					
phosphate	mg/L	-	-				< 0.01					
phosphorous	mg/L	-	-				< 0.1					
total phosphorous	mg/L	-	0.01				**180**					
potassium	mg/L	-	-				10					
selenium	mg/L	0.01	0.1				< 0.002					
silicon	mg/L	-	-				5.2					
silver	mg/L	-	0.0001				< 0.0001					
sodium	mg/L	200 d	-				11					
strontium	mg/L	-	-				5.1					
sulphide	mg/L	0.05	-				▨ 0.31					
sulphate	mg/L	500	-				94					
thallium	mg/L	-	0.0003				< 0.00005					
tin	mg/L	-	-				< 0.001					
titanium	mg/L	-	-				< 0.005					
TSS	mg/L	-	-	**Note:** Insufficient water	**Note:** Insufficient water	**Note:** Insufficient water	290000	**Note:** Insufficient water	**Note:** Insufficient water	**Note:** Insufficient water	**Note:** Insufficient water	**Note:** Insufficient water
turbidity	NTU	5	-				▨ 32000					
uranium	mg/L	0.02	[0.005]				**0.0081**					
vanadium	mg/L	-	[0.006]				< 0.0005					
zinc	mg/L	5	[0.02]				< 0.005					

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-06 straddle								
				Oct-08	Dec-09	Oct-10	Nov-11	Nov-12	Nov-13	Nov-14	Nov-15	Nov-16
aluminum	mg/L	0.1	[0.075] a	**0.16**	**0.71**	**0.46**	0.068	0.035	0.0057	**0.15**	**0.11**	**0.17**
alkalinity	mg $CaCO_3$/L	30-500	-	324	312	315	320	330	320	300	290	310
ammonia as N	mg/L	-	-	0.47	0.66	0.48	0.17	0.32	0.21	0.24	0.29	0.39
antimony	mg/L	-	[0.02]	0.0007	< 0.0005	0.0006	< 0.0005	<0.0005	<0.0005	<0.00050	0.00054	<0.00050
arsenic	mg/L	0.025	[0.005]	0.005	0.003	0.005	**0.007**	**0.006**	**0.0079**	**0.0066**	**0.0055**	0.0041
barium	mg/L	1	-	0.05	0.054	0.062	0.051	0.054	0.044	0.042	0.041	0.035
beryllium	mg/L	-	1.1	< 0.0005	< 0.0005	< 0.0005	< 0.0005	<0.0005	<0.0005	<0.00050	<0.00050	<0.00050
bismuth	mg/L	-	-	< 0.001	< 0.001	< 0.001	< 0.001	<0.001	<0.001	<0.0010	<0.0010	<0.0010
boron	mg/L	5	0.2	**0.28**	**0.23**	0.18	0.088	0.11	0.068	0.077	0.08	0.11
bromide	mg/L	-	-	< 1	< 1	< 1	< 1	<1.0	<1.0	<1.0	<1.0	<1.0
cadmium	mg/L	0.005	0.0005	< 0.0001	0.0001	< 0.0001	< 0.0001	<0.0001	0.0001	<0.00010	<0.00010	<0.00010
calcium	mg/L	-	-	71	73	76	90	82	92	85	96	98
chloride	mg/L	250	-	4	6	9	8	9	11	12	12	11
chromium	mg/L	0.05	-	< 0.005	< 0.005	< 0.005	< 0.005	<0.005	<0.005	<0.0050	<0.0050	<0.0050
cobalt	mg/L	-	0.0009	**0.019**	**0.015**	**0.005**	**0.0013**	**0.00096**	<0.0005	<0.00050	<0.00050	**0.00096**
copper	mg/L	1	[0.005] b	< 0.001	< 0.001	0.001	< 0.001	<0.001	0.0016	<0.0010	<0.0010	<0.0010
fluoride	mg/L	1.5 - 2.4	-	0.2	0.2	0.2	0.1	0.14	0.12	0.14	0.14	0.12
free cyanide	mg/L	0.2	0.005	< 0.002	< 0.002	< 0.002	< 0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.0010
hardness	mg $CaCO_3$/L	80-100	-	330	350	340	400	370	400	370	410	440
iron	mg/L	0.3	0.3	**0.39**	**0.6**	**0.7**	**0.8**	**0.54**	**0.69**	**0.57**	**0.39**	**0.48**
lead	mg/L	0.01	[0.005] c	< 0.0005	< 0.0005	0.0006	< 0.0005	<0.0005	<0.0005	<0.00050	<0.00050	<0.00050
magnesium	mg/L	-	-	37	39	38	43	41	42	39	41	47
manganese	mg/L	0.05	-	0.075	0.067	0.056	0.038	0.036	0.037	0.04	0.044	0.043
mercury	mg/L	0.001	0.0002	< 0.0015 (1)	< 0.0001	< 0.0001	< 0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001
molybdenum	mg/L	-	0.04	0.008	0.004	0.003	0.0014	0.0018	0.0012	0.0013	0.0014	0.0015
nickel	mg/L	-	0.025	0.002	0.003	0.002	< 0.001	<0.001	<0.001	<0.0010	<0.0010	<0.0010
nitrate as N	mg/L	10	-	< 0.1	0.4	0.3	< 0.1	<0.10	<0.10	<0.10	0.11	0.19
nitrite as N	mg/L	1	-	< 0.01	0.07	0.03	0.02	0.014	<0.010	0.023	<0.010	<0.010
pH	pH Units	6.5-8.5	6.5-8.5	8.3	7.8	7.95	7.82	7.87	7.80	7.99	7.93	7.81
phenol	mg/L	-	0.005	< 0.001	< 0.001	< 0.001	< 0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
phosphate	mg/L	-	-	< 0.01	< 0.01	0.01	< 0.01	<0.010	<0.010	<0.010	<0.010	<0.010
phosphorous	mg/L	-	-	< 0.1	< 0.1	< 0.1	< 0.1	<0.1	<0.1	<0.10	-	<0.10
total phosphorous	mg/L	-	0.01	**8.2**	**16**	**7.7**	**0.89**	**0.89**	**0.30**	**1.4**	**4**	**10**
potassium	mg/L	-	-	7.2	7.1	5.8	3.9	3.9	2.9	3.5	3.5	5
selenium	mg/L	0.01	0.1	< 0.002	< 0.002	< 0.002	< 0.002	<0.002	<0.002	<0.0020	<0.0020	<0.0020
silicon	mg/L	-	-	8.5	10	9.4	10	9.3	9.5	8.3	9.2	10
silver	mg/L	-	0.0001	< 0.0001	< 0.0001	< 0.0001	**0.0002**	<0.0001	<0.0001	<0.00010	<0.00010	<0.00010
sodium	mg/L	200 d	-	21	18	16	13	19	14	11	14	15
strontium	mg/L	-	-	5.5	5.1	4.3	2.4	2.8	1.6	2.4	2.5	4
sulphide	mg/L	0.05	-	< 0.02	0.05	0.08	< 0.02	<0.020	<0.020	<0.020	0.027	0.022
sulphate	mg/L	500	-	49	54	60	63	73	88	110	130	130
thallium	mg/L	-	0.0003	< 0.00005	< 0.00005	0.00007	< 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	<0.0010	<0.0010	<0.0010
titanium	mg/L	-	-	< 0.005	0.018	0.006	< 0.005	0.0084	<0.005	0.0054	<0.0050	0.0068
TSS	mg/L	-	-	19000	24000	17000	1500	1100	97	2900	498	22000
turbidity	NTU	5	-	11000	23000	18000	670	1100	49	710	2400	9400
uranium	mg/L	0.02	[0.005]	0.0022	0.0016	0.0011	0.0009	0.00099	0.001	0.00094	0.0011	0.0011
vanadium	mg/L	-	[0.006]	0.001	0.003	0.002	0.0006	<0.0005	<0.0005	<0.00050	<0.00050	<0.00050
zinc	mg/L	5	[0.02]	< 0.005	0.006	0.005	0.007	<0.005	0.014	<0.0050	<0.0050	<0.0050

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-06 deep								
				Oct-08	Dec-09	Oct-10	Nov-11	Nov-12	Nov-13	Nov-14	Nov-15	Nov-16
aluminum	mg/L	0.1	[0.075] a	NOT SAMPLED Note: Insufficient water	NOT SAMPLED Note: Insufficient water	NOT SAMPLED Note: Insufficient water	NOT SAMPLED Note: Insufficient water	NOT SAMPLED Note: Insufficient water	NOT SAMPLED Note: Insufficient water	NOT SAMPLED Note: Insufficient water	NOT SAMPLED Note: Insufficient water	<0.050
alkalinity	mg CaCO$_3$/L	30-500	-									170
ammonia as N	mg/L	-	-									21
antimony	mg/L	-	[0.02]									<0.0050
arsenic	mg/L	0.025	[0.005]									<0.010
barium	mg/L	1	-									0.072
beryllium	mg/L	-	1.1									<0.0050
bismuth	mg/L	-	-									<0.010
boron	mg/L	5	0.2									**9**
bromide	mg/L	-	-									250
cadmium	mg/L	0.005	0.0005									<0.0010
calcium	mg/L	-	-									4900
chloride	mg/L	250	-									24000
chromium	mg/L	0.05	-									<0.050
cobalt	mg/L	-	0.0009									**0.016**
copper	mg/L	1	[0.005] b									<0.010
fluoride	mg/L	1.5 - 2.4	-									<0.10
free cyanide	mg/L	0.2	0.005									<0.0010
hardness	mg CaCO$_3$/L	80-100	-									18000
iron	mg/L	0.3	0.3									**12**
lead	mg/L	0.01	[0.005] c									<0.0050
magnesium	mg/L	-	-									1300
manganese	mg/L	0.05	-									2.7
mercury	mg/L	0.001	0.0002									<0.0001
molybdenum	mg/L	-	0.04									0.0095
nickel	mg/L	-	0.025									**0.68**
nitrate as N	mg/L	10	-									80.2
nitrite as N	mg/L	1	-									0.301
pH	pH Units	6.5-8.5	6.5-8.5									6.92
phenol	mg/L	-	0.005									**0.0086**
phosphate	mg/L	-	-									<0.010
phosphorous	mg/L	-	-									<1.0
total phosphorous	mg/L	-	0.01									**0.8**
potassium	mg/L	-	-									200
selenium	mg/L	0.01	0.1									<0.020
silicon	mg/L	-	-									4
silver	mg/L	-	0.0001									**0.0018**
sodium	mg/L	200 d	-									9600
strontium	mg/L	-	-									89
sulphide	mg/L	0.05	-									0.071
sulphate	mg/L	500	-									1300
thallium	mg/L	-	0.0003									<0.00050
tin	mg/L	-	-									<0.010
titanium	mg/L	-	-									<0.050
TSS	mg/L	-	-									520
turbidity	NTU	5	-									230
uranium	mg/L	0.02	[0.005]									**0.035**
vanadium	mg/L	-	[0.006]									<0.025
zinc	mg/L	5	[0.02]									<0.050

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-07 deep								
				Oct-08	Dec-09	Oct-10	Nov-11	Nov-12	Nov-13	Nov-14	Nov-15	Nov-16
aluminum	mg/L	0.1	[0.075] a	< 0.3	< 0.1	< 0.1	< 0.3	**0.13**	<0.1	0.0058	<0.050	<0.050
alkalinity	mg $CaCO_3$/L	30-500	-	33	35	32	33	45	41	74	61	47
ammonia as N	mg/L	-	-	19	18	19	19	22	19	8.9	15	6.4
antimony	mg/L	-	[0.02]	< 0.03	< 0.01	< 0.01	< 0.03	<0.01	<0.01	0.001	<0.0050	0.0061
arsenic	mg/L	0.025	[0.005]	< 0.05	< 0.02	< 0.02	< 0.05	<0.04	**0.025**	0.0016	<0.020	<0.010
barium	mg/L	1	-	< 0.3	< 0.1	< 0.1	< 0.1	0.055	0.04	0.023	0.042	0.041
beryllium	mg/L	-	1.1	< 0.03	< 0.01	< 0.01	< 0.03	<0.01	<0.01	<0.00050	<0.0050	<0.0050
bismuth	mg/L	-	-	< 0.05	< 0.02	< 0.02	< 0.05	<0.02	<0.02	<0.0010	<0.010	<0.010
boron	mg/L	5	0.2	**7.6**	**6.6**	**6.3**	**6.1**	**6.6**	**8.5**	**6.7**	**6.7**	**6.8**
bromide	mg/L	-	-	205	203	182	224	320	210	130	110	140
cadmium	mg/L	0.005	0.0005	< 0.005	< 0.002	< 0.002	< 0.005	<0.0020	<0.002	**0.00096**	**0.02**	**0.019**
calcium	mg/L	-	-	3200	3000	2900	2900	3700	3000	600	2300	2300
chloride	mg/L	250	-	17500	17800	16000	18100	24000	18000	13000	13000	11000
chromium	mg/L	0.05	-	< 0.3	< 0.1	< 0.1	< 0.3	<0.1	<0.1	0.009	<0.050	<0.050
cobalt	mg/L	-	0.0009	< 0.03	< 0.01	< 0.01	< 0.03	<0.01	<0.01	<0.0025	**0.011**	**0.0066**
copper	mg/L	1	[0.005] b	< 0.05	< 0.02	< 0.02	< 0.05	<0.02	<0.02	<0.0050	<0.010	<0.010
fluoride	mg/L	1.5 - 2.4	-	0.2	0.3	0.2	0.2	0.19	0.24	0.28	0.32	0.28
free cyanide	mg/L	0.2	0.005	< 0.002	< 0.002	< 0.002	< 0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.0010
hardness	mg $CaCO_3$/L	80-100	-	11000	10000	10000	10000	13000	11000	2500	8300	8100
iron	mg/L	0.3	0.3	**6.5**	**6**	**5.1**	< 5	**5.1**	<2	<0.10	<1.0	<1.0
lead	mg/L	0.01	[0.005] c	< 0.03	< 0.01	< 0.01	< 0.03	<0.01	**0.019**	<0.00050	<0.0050	<0.0050
magnesium	mg/L	-	-	830	750	750	750	940	770	240	610	580
manganese	mg/L	0.05	-	1.6	1.5	1.4	1.4	1.7	1.5	0.23	1.1	1.0
mercury	mg/L	0.001	0.0002	< 0.0001	< 0.0001	< 0.0001	< 0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001
molybdenum	mg/L	-	0.04	< 0.05	< 0.02	< 0.02	< 0.03	0.018	0.015	0.014	0.018	0.014
nickel	mg/L	-	0.025	< 0.05	< 0.02	< 0.02	< 0.05	**0.027**	<0.02	**0.031**	**0.2**	**0.12**
nitrate as N	mg/L	10	-	< 0.1	< 0.1	< 0.1	< 0.1	<0.10	<0.10	<0.10	<0.10	0.59
nitrite as N	mg/L	1	-	< 0.01	< 0.01	< 0.01	< 0.1	<0.10	0.017	0.283	3.85	2.40
pH	pH Units	6.5-8.5	6.5-8.5	7.4	7.0	7.0	7.0	6.58	6.90	7.38	7.15	6.93
phenol	mg/L	-	0.005	< 0.001	< 0.001	< 0.001	**0.03**	0.0025	**0.035**	**0.018**	<0.0010	0.0031
phosphate	mg/L	-	-	< 0.01	< 0.01	< 0.01	< 0.01	<0.010	<0.010	<0.010	<0.010	0.011
phosphorous	mg/L	-	-	< 5	< 2	< 2	< 5	<2	<2	<0.10	-	<1.0
total phosphorous	mg/L	-	0.01	**0.28**	**0.14**	< 0.2 (1)	< 2	<5	**0.32**	**0.032**	**0.06**	**0.140**
potassium	mg/L	-	-	160	140	140	140	170	150	39	130	130
selenium	mg/L	0.01	0.1	< 0.1	< 0.04	< 0.04	< 0.1	<0.08	<0.08	<0.0020	<0.040	<0.020
silicon	mg/L	-	-	4.6	5	5.5	< 3	4.6	4.3	7.7	4.9	5.2
silver	mg/L	-	0.0001	< 0.005	< 0.002	< 0.002	< 0.005	<0.0020	<0.002	0.00015	<0.0010	<0.0010
sodium	mg/L	200 d	-	8000	6700	6600	6800	8500	6900	1600	5600	5000
strontium	mg/L	-	-	63	63	60	64	80	64	15	50	47
sulphide	mg/L	0.05	-	< 0.02	0.02	< 0.02	< 0.02	<0.020	0.023	<0.020	<0.020	<0.020
sulphate	mg/L	500	-	1470	1550	1620	1560	1500	1500	1500	1500	1500
thallium	mg/L	-	0.0003	< 0.003	< 0.001	< 0.001	< 0.003	<0.0010	<0.001	0.00005	<0.00050	<0.00005
tin	mg/L	-	-	< 0.05	< 0.02	< 0.02	< 0.05	<0.02	<0.02	<0.0010	<0.010	<0.010
titanium	mg/L	-	-	< 0.3	< 0.1	< 0.1	< 0.3	<0.1	<0.1	<0.0050	<0.050	<0.050
TSS	mg/L	-	-	400	460	150	310	2100	210	67	22700	65
turbidity	NTU	5	-	310	210	91	330	210	170	10	13	23
uranium	mg/L	0.02	[0.005]	< 0.005	< 0.002	< 0.002	< 0.005	0.0049	**0.0068**	**0.0053**	**0.012**	**0.007**
vanadium	mg/L	-	[0.006]	< 0.05	< 0.02	< 0.02	< 0.03	<0.02	**0.027**	<0.0025	<0.010	<0.010
zinc	mg/L	5	[0.02]	< 0.3	< 0.1	< 0.1	< 0.3	<0.1	<0.1	<0.0050	<0.050	**0.091**

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-07 overburden								
				Oct-08	Nov-09	Oct-10	Nov-11	Nov-12	Nov-13	Nov-14	Nov-15	Nov-16
aluminum	mg/L	0.1	[0.075] a	**0.1**	**0.38**	**0.94**	0.049	**0.12**	<0.005	**0.33**	**0.45**	**0.23**
alkalinity	mg $CaCO_3$/L	30-500	-	502	559	569	569	570	550	530	510	490
ammonia as N	mg/L	-	-	0.65	0.56	0.47	0.32	0.28	0.20	0.19	0.21	0.2
antimony	mg/L	-	[0.02]	0.0009	< 0.0005	0.0008	0.0005	<0.00050	<0.0005	<0.00050	0.00089	<0.00050
arsenic	mg/L	0.025	[0.005]	0.005	0.003	0.003	< 0.001	<0.0010	0.0034	0.0024	0.0017	0.0022
barium	mg/L	1	-	0.059	0.055	0.066	0.044	0.034	0.034	0.031	0.037	0.043
beryllium	mg/L	-	1.1	< 0.0005	< 0.0005	< 0.0005	< 0.0005	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050
bismuth	mg/L	-	-	< 0.001	< 0.001	< 0.001	< 0.001	<0.0010	<0.001	<0.0010	<0.0010	<0.0010
boron	mg/L	5	0.2	**3.3**	**4.3**	**4.5**	**4.5**	**5.8**	**7.9**	**6.1**	**5.6**	**4.5**
bromide	mg/L	-	-	< 1	< 1	< 1	< 1	<1.0	<1.0	<1.0	<1.0	<1.0
cadmium	mg/L	0.005	0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0001	<0.00010	<0.0001	<0.00010	<0.00010	0.0001
calcium	mg/L	-	-	70	66	72	65	66	54	54	54	53
chloride	mg/L	250	-	20	23	22	18	23	34	40	37	42
chromium	mg/L	0.05	-	< 0.005	< 0.005	< 0.005	< 0.005	<0.0050	<0.005	<0.0050	<0.0050	<0.0050
cobalt	mg/L	-	0.0009	**0.026**	**0.013**	**0.005**	**0.0085**	**0.0037**	0.00078	**0.0021**	**0.0043**	0.00075
copper	mg/L	1	[0.005] b	< 0.001	0.001	0.002	< 0.001	<0.0010	<0.001	<0.0010	<0.0010	<0.0010
fluoride	mg/L	1.5 - 2.4	-	0.4	0.5	0.3	0.3	0.33	0.34	0.36	0.38	0.36
free cyanide	mg/L	0.2	0.005	< 0.002	< 0.002	< 0.002	< 0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.0010
hardness	mg $CaCO_3$/L	80-100	-	690	630	590	630	610	500	490	470	460
iron	mg/L	0.3	0.3	**1**	**0.8**	**1.6**	0.12	0.11	0.3	**0.51**	**0.5**	0.24
lead	mg/L	0.01	[0.005] c	< 0.0005	0.0006	0.0014	< 0.0005	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050
magnesium	mg/L	-	-	120	110	99	110	110	88	85	82	80
manganese	mg/L	0.05	-	0.22	0.18	0.3	0.16	0.092	0.1	0.086	0.09	0.075
mercury	mg/L	0.001	0.0002	**0.0017 (1)**	**0.0022**	< 0.0015 (1)	< 0.0001		<0.00010	<0.00010	<0.00010	<0.0001
molybdenum	mg/L	-	0.04	0.011	0.007	0.007	0.0066	0.0062	0.0092	0.0081	0.0086	0.0095
nickel	mg/L	-	0.025	0.004	0.003	0.003	0.001	0.0016	<0.001	0.0012	0.0018	0.0018
nitrate as N	mg/L	10	-	< 0.1	< 0.1	< 0.1	< 0.1	<0.10	<0.10	<0.10	<0.10	<0.10
nitrite as N	mg/L	1	-	< 0.01	0.06	0.09	0.01	<0.010	0.023	0.029	0.011	0.014
pH	pH Units	6.5-8.5	6.5-8.5	**8.6**	7.6	7.79	7.7	7.92	7.74	8	8.02	7.89
phenol	mg/L	-	0.005	< 0.001	< 0.001	< 0.001	< 0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
phosphate	mg/L	-	-	< 0.01	0.01	0.01	0.01	<0.010	<0.010	<0.010	<0.010	0.011
phosphorous	mg/L	-	-	< 0.1	< 0.1	0.12	< 0.1	<0.1	<0.1	<0.10		<0.10
total phosphorous	mg/L	-	0.01	**22**	**32**	**25**	**9.9**	**1.8**	**4.2**	**2.3**	**3.6**	**0.46**
potassium	mg/L	-	-	8.1	7.4	7	6.5	6.5	6.2	5.9	6.2	6.6
selenium	mg/L	0.01	0.1	< 0.002	< 0.002	< 0.002	< 0.002	<0.0020	<0.002	<0.0020	<0.0020	<0.0020
silicon	mg/L	-	-	9.5	9.5	10	8.7	9.3	8.5	8.3	9.2	8.8
silver	mg/L	-	0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	<0.00010	<0.0001	<0.00010	<0.00010	<0.00010
sodium	mg/L	200 d	-	83	70	95	83	90	110	100	94	93
strontium	mg/L	-	-	3.8	3.5	3.6	2.9	2.6	2.7	2.2	2.3	3.1
sulphide	mg/L	0.05	-	< 0.02	0.08	0.1	0.02	0.027	0.036	<0.020	0.02	<0.020
sulphate	mg/L	500	-	202	193	181	182	170	160	140	140	140
thallium	mg/L	-	0.0003	< 0.00005	< 0.00005	0.00005	< 0.00005	<0.000050	<0.00005	<0.00005	<0.000050	<0.00005
tin	mg/L	-	-	< 0.001	< 0.001	< 0.001	< 0.001	<0.0010	<0.001	<0.0010	<0.0010	<0.0010
titanium	mg/L	-	-	< 0.005	0.010	0.024	< 0.005	0.013	<0.005	0.018	0.027	0.0086
TSS	mg/L	-	-	46000	84000	91000	10000	2200	5800	2600	748	1300
turbidity	NTU	5	-	36000	100000	63000	14000	770	250	2300	4800	900
uranium	mg/L	0.02	[0.005]	**0.0079**	**0.0059**	**0.01**	**0.0065**	**0.0063**	**0.007**	**0.0068**	**0.0069**	**0.0064**
vanadium	mg/L	-	[0.006]	0.001	0.002	0.004	< 0.0005	0.00059	0.001	0.00055	0.00099	**0.00091**
zinc	mg/L	5	[0.02]	< 0.005	< 0.005	0.005	< 0.005	<0.0050	<0.005	<0.0050	<0.0050	<0.0050

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-08 deep								
				Oct-08	Dec-09	Oct-10	Nov-11	Nov-12	Nov-13	Nov-14	Nov-15	Nov-16
aluminum	mg/L	0.1	[0.075] a	0.005	< 0.005	< 0.3	**0.47**	<0.0050	<0.005	0.0054	0.0072	<0.0050
alkalinity	mg CaCO$_3$/L	30-500	-	414	412	59	67	440	420	540	540	510
ammonia as N	mg/L	-	-	1.9	2.3	39	35	0.10	2.3	0.63	0.59	0.06
antimony	mg/L	-	[0.02]	< 0.0005	< 0.0005	< 0.03	< 0.03	<0.00050	<0.0005	0.00059	0.00057	0.00054
arsenic	mg/L	0.025	[0.005]	**0.006**	< 0.005	< 0.05	< 0.05	<0.0010	0.0012	<0.0010	0.0018	0.0010
barium	mg/L	1	-	0.012	0.013	< 0.3	0.12	0.015	0.014	0.019	0.012	0.013
beryllium	mg/L	-	1.1	< 0.0005	< 0.0005	< 0.03	< 0.03	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050
bismuth	mg/L	-	-	< 0.001	< 0.001	< 0.05	< 0.05	<0.0010	<0.001	<0.0010	<0.0010	<0.0010
boron	mg/L	5	0.2	**3.7**	**4.5**	**4.7**	**5.3**	**3.4**	**3.5**	**2.5**	**1.3**	**1.8**
bromide	mg/L	-	-	< 1	3	< 500	523	<5.0	3.1	<5.0	<2.0	<5.0
cadmium	mg/L	0.005	0.0005	< 0.0001	< 0.0001	< 0.005	< 0.005	**0.0021**	**0.00067**	**0.0012**	0.0001	**0.00220**
calcium	mg/L	-	-	110	290	5300	7900	110	100	120	67	81
chloride	mg/L	250	-	49	213	48500	41500	220	240	29	22	91
chromium	mg/L	0.05	-	< 0.005	< 0.005	< 0.3	< 0.3	<0.0050	<0.005	<0.0050	<0.0050	<0.0050
cobalt	mg/L	-	0.0009	**0.0057**	**0.0016**	< 0.03	< 0.03	**0.0017**	<0.0005	<0.00050	0.0011	<0.00050
copper	mg/L	1	[0.005] b	< 0.001	< 0.001	< 0.05	< 0.1	0.0014	<0.001	0.0018	<0.0010	0.0019
fluoride	mg/L	1.5 - 2.4	-	0.3	0.3	< 0.1	< 0.1	0.28	0.27	0.2	0.22	0.19
free cyanide	mg/L	0.2	0.005	< 0.002	< 0.002	< 0.002	< 0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.0010
hardness	mg CaCO$_3$/L	80-100	-	620	1300	18000	27000	660	600	880	700	710
iron	mg/L	0.3	0.3	**0.74**	**0.7**	**8**	**18**	<0.1	<0.1	<0.10	<0.10	0.22
lead	mg/L	0.01	[0.005] c	< 0.0005	< 0.0005	< 0.03	< 0.03	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050
magnesium	mg/L	-	-	86	130	1200	1800	96	85	140	130	120
manganese	mg/L	0.05	-	0.1	0.15	2.6	4.2	0.063	0.01	0.014	0.055	0.089
mercury	mg/L	0.001	0.0002	< 0.0001	< 0.0001	< 0.0015 (1)	< 0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001
molybdenum	mg/L	-	0.04	0.004	0.006	< 0.05	< 0.03	0.0048	0.0046	0.0043	0.0032	0.0031
nickel	mg/L	-	0.025	0.003	< 0.001	< 0.05	< 0.05	0.0099	0.0032	0.0033	0.0036	0.0029
nitrate as N	mg/L	10	-	< 0.1	< 0.1	< 0.1	< 0.1	1.6	1.7	<0.10	<0.10	0.34
nitrite as N	mg/L	1	-	< 0.01	0.01	0.05	< 0.1	0.066	0.035	0.043	0.075	0.028
pH	pH Units	6.5-8.5	6.5-8.5	8.1	7.9	6.76	6.75	7.89	8.01	7.64	7.7	7.79
phenol	mg/L	-	0.005	< 0.001	< 0.001	< 0.001	**0.26**	<0.0010	0.0025	<0.0010	<0.0010	<0.0010
phosphate	mg/L	-	-	< 0.01	< 0.01	< 0.01	< 0.01	<0.010	<0.010	<0.010	<0.010	<0.010
phosphorous	mg/L	-	-	< 0.1	< 0.1	< 5	< 5	<0.1	<0.1	<0.10	-	<0.10
total phosphorous	mg/L	-	0.01	**0.062**	**0.04**	**8**	< 5	**0.035**	**0.099**	**0.049**	**0.037**	<0.10
potassium	mg/L	-	-	24	31	190	270	28	25	25	20	21
selenium	mg/L	0.01	0.1	< 0.002	< 0.01	**0.14**	< 0.2	<0.0020	<0.002	<0.0020	<0.0020	<0.0020
silicon	mg/L	-	-	6.1	5.6	< 3	3.6	6	5.7	7	5.2	5.8
silver	mg/L	-	0.0001	< 0.0001	< 0.0001	< 0.005	< 0.005	<0.00010	<0.0001	<0.00010	<0.00010	<0.00010
sodium	mg/L	200 d	-	120	620	10000	16000	220	200	210	220	190
strontium	mg/L	-	-	16	12	110	170	16	16	12	7.6	9.9
sulphide	mg/L	0.05	-	< 0.02	< 0.02	0.13	< 0.02	<0.020	<0.020	<0.020	<0.020	<0.020
sulphate	mg/L	500	-	413	522	1180	1130	430	430	630	630	510
thallium	mg/L	-	0.0003	< 0.00005	< 0.00005	< 0.003	< 0.003	<0.000050	<0.00005	<0.00005	<0.00005	<0.00005
tin	mg/L	-	-	< 0.001	< 0.001	< 0.05	< 0.05	<0.0010	<0.001	<0.0010	<0.0010	<0.0010
titanium	mg/L	-	-	< 0.005	< 0.005	< 0.3	< 0.3	<0.0050	<0.005	<0.0050	<0.0050	<0.0050
TSS	mg/L	-	-	32	22	44000	9100	27	69	25	1450	130
turbidity	NTU	5	-	12	25	96000	1900	29	12	21	26	310
uranium	mg/L	0.02	[0.005]	0.0025	0.0034	< 0.005	< 0.005	0.00076	0.00096	0.0029	**0.0064**	0.0039
vanadium	mg/L	-	[0.006]	< 0.001	< 0.005	**0.14**	< 0.1	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050
zinc	mg/L	5	[0.02]	0.006	< 0.005	< 0.3	< 0.3	0.02	0.017	**0.083**	<0.0050	0.01

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 intermediate										
				Oct-08	Nov-09	Oct-10	Oct-10 DUP 1	Nov-11	Nov-11 DUP 1	Nov-12	Nov-13	Nov-14	Nov-15	Nov-16
aluminum	mg/L	0.1	[0.075] a	< 0.05	0.013	0.065	< 0.05	**0.08**	**0.12**	0.057	<0.025	**0.16**	0.027	0.031
alkalinity	mg $CaCO_3$/L	30-500	-	102	146	139	145	163	168	150	140	140	130	130
ammonia as N	mg/L	-	-	4.5	5.5	5.6	5	6.1	5.8	5.8	5.2	5.6	5.7	6.5
antimony	mg/L	-	[0.02]	< 0.005	< 0.0005	< 0.005	< 0.005	< 0.005	< 0.005	<0.0025	<0.0025	<0.0025	<0.0025	<0.00050
arsenic	mg/L	0.025	[0.005]	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	<0.01	**0.0064**	<0.0050	<0.0050	0.0017
barium	mg/L	1	-	< 0.05	0.011	< 0.05	< 0.05	< 0.02	< 0.02	0.023	0.014	0.014	0.016	0.015
beryllium	mg/L	-	1.1	< 0.005	< 0.0005	< 0.005	< 0.005	< 0.005	< 0.005	<0.0025	<0.0025	<0.0025	<0.0025	<0.00050
bismuth	mg/L	-	-	< 0.01	< 0.001	< 0.01	< 0.01	< 0.01	< 0.01	<0.0050	<0.005	<0.0050	<0.0050	<0.0010
boron	mg/L	5	0.2	**6.8**	**6.1**	**6.1**	**6.3**	**6.1**	**6**	**6.3**	**6.3**	**6.4**	**6.2**	**6.2**
bromide	mg/L	-	-	23	23	23	29	23	21	60	32	<20	26	39
cadmium	mg/L	0.005	0.0005	< 0.001	< 0.0001	< 0.001	< 0.001	< 0.001	< 0.001	<0.00050	<0.0005	<0.00050	<0.00050	0.00032
calcium	mg/L	-	-	460	450	530	530	450	440	1100	560	550	640	860
chloride	mg/L	250	-	2110	2100	2240	2150	1710	1730	4100	2400	2400	3000	3400
chromium	mg/L	0.05	-	< 0.05	< 0.005	< 0.05	< 0.05	< 0.05	< 0.05	<0.025	<0.025	<0.025	<0.025	<0.0050
cobalt	mg/L	-	0.0009	**0.015**	**0.0077**	< 0.005	< 0.005	< 0.005	< 0.005	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025
copper	mg/L	1	[0.005] b	< 0.01	< 0.001	< 0.01	< 0.01	< 0.01	< 0.01	**0.0062**	<0.005	<0.0050	<0.0050	<0.0010
fluoride	mg/L	1.5 - 2.4	-	0.5	0.4	0.4	0.4	0.4	0.5	0.42	0.45	0.43	0.48	0.4
free cyanide	mg/L	0.2	0.005	< 0.002	< 0.002	< 0.002	<0.002	< 0.002	< 0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.0010
hardness	mg $CaCO_3$/L	80-100	-	1700	1700	2000	2000	1700	1700	4100	2100	2000	2300	3000
iron	mg/L	0.3	0.3	< 1	**1**	< 1	< 1	< 1	**1.1**	**2.7**	**1.3**	**1.2**	**1.4**	**1.7**
lead	mg/L	0.01	[0.005] c	< 0.005	< 0.0005	< 0.005	< 0.005	< 0.005	< 0.005	<0.0025	<0.0025	<0.0025	<0.0025	<0.00050
magnesium	mg/L	-	-	140	140	160	160	140	140	320	160	160	170	220
manganese	mg/L	0.05	-	0.2	0.19	0.21	0.22	0.19	0.19	0.56	0.24	0.22	0.25	0.33
mercury	mg/L	0.001	0.0002	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001
molybdenum	mg/L	-	0.04	< 0.01	0.007	< 0.01	< 0.01	0.006	0.006	0.0056	0.0064	0.0063	0.0062	0.0065
nickel	mg/L	-	0.025	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	<0.0050	<0.005	<0.0050	<0.0050	<0.0050
nitrate as N	mg/L	10	-	< 0.1	< 0.1	< 0.1	0.1	< 0.1	< 0.1	<0.10	<0.10	<0.10	<0.10	<0.10
nitrite as N	mg/L	1	-	< 0.01	< 0.01	< 0.01	0.01	0.03	0.04	0.038	<0.010	0.013	0.077	<0.010
pH	pH Units	6.5-8.5	6.5-8.5	7.9	7.8	7.55	7.59	7.64	7.58	7.59	7.59	7.65	7.61	7.45
phenol	mg/L	-	0.005	< 0.001	< 0.001	< 0.001	< 0.001	0.005	0.004	<0.0010	0.0030	<0.0010	<0.0010	<0.0010
phosphate	mg/L	-	-	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.01	<0.010	<0.010	<0.010	<0.010	<0.010
phosphorous	mg/L	-	-	< 1	< 0.1	< 1	< 1	< 1	< 1	<0.5	<0.5	<0.50	-	<0.10
total phosphorous	mg/L	-	0.01	**0.051**	**0.04**	**0.03**	< 0.02	< 0.5	< 0.02	**0.6**	**0.069**	**0.034**	**0.039**	<0.50
potassium	mg/L	-	-	45	44	46	47	42	41	62	47	46	53	54
selenium	mg/L	0.01	0.1	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	<0.02	0.016	<0.010	<0.010	<0.0020
silicon	mg/L	-	-	4.2	3.8	3.9	4	4	4.9	5	4.2	4.1	4.3	4.2
silver	mg/L	-	0.0001	< 0.001	< 0.0001	< 0.001	< 0.001	< 0.001	< 0.001	<0.00050	<0.0005	<0.00050	<0.00050	<0.00010
sodium	mg/L	200 d	-	1200	1200	1300	1400	1100	1100	2500	1300	1300	1300	1700
strontium	mg/L	-	-	12	12	13	13	12	12	26	15	13	17	19
sulphide	mg/L	0.05	-	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	<0.020	<0.020	<0.020	<0.020	<0.020
sulphate	mg/L	500	-	1040	1040	1010	1010	965	976	1000	1000	1000	1100	1000
thallium	mg/L	-	0.0003	< 0.0005	< 0.00005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	<0.00005	<0.00025	<0.00025	<0.00025	<0.000050
tin	mg/L	-	-	< 0.01	< 0.001	< 0.01	< 0.01	< 0.01	< 0.01	<0.0050	<0.005	<0.0050	<0.0050	<0.0010
titanium	mg/L	-	-	< 0.05	< 0.005	< 0.05	< 0.05	< 0.05	< 0.05	<0.025	<0.025	<0.025	<0.025	<0.0050
TSS	mg/L	-	-	92	60	27	26	32	29	4000	170	72	7110	330
turbidity	NTU	5	-	64	48	14	22	30	21	1000	73	34	15	220
uranium	mg/L	0.02	[0.005]	< 0.001	0.0001	< 0.001	< 0.001	< 0.001	< 0.001	0.0011	<0.0005	<0.00050	<0.00050	0.00029
vanadium	mg/L	-	[0.006]	< 0.01	< 0.005	< 0.01	< 0.01	< 0.005	< 0.005	<0.0050	**0.0096**	<0.0025	<0.0025	<0.0025
zinc	mg/L	5	[0.02]	< 0.05	0.006	< 0.05	< 0.05	< 0.05	< 0.05	<0.025	<0.025	<0.025	<0.025	<0.010

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-08 overburden								
				Oct-08	Nov-09	Oct-10	Nov-11	Nov-12	Nov-13	Nov-14	Nov-15	Nov-16
aluminum	mg/L	0.1	[0.075] a	**0.31**	**0.24**	0.042	0.028	**0.15**	<0.005	**0.56**	**0.13**	**0.076**
alkalinity	mg $CaCO_3$/L	30-500	-	525	549	545	553	580	570	570	550	550
ammonia as N	mg/L	-	-	0.87	0.55	0.38	0.09	1.3	0.46	0.3	0.18	0.25
antimony	mg/L	-	[0.02]	0.0015	0.0005	0.0007	0.0005	<0.00050	<0.0005	<0.00050	0.00072	<0.00050
arsenic	mg/L	0.025	[0.005]	0.004	0.002	0.002	0.001	0.0019	0.0013	0.0028	0.0012	0.0039
barium	mg/L	1	-	0.025	0.019	0.019	0.024	0.051	0.028	0.025	0.025	0.023
beryllium	mg/L	-	1.1	< 0.0005	< 0.0005	< 0.0005	< 0.0005	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050
bismuth	mg/L	-	-	< 0.001	< 0.001	< 0.001	< 0.001	<0.0010	<0.001	<0.0010	<0.0010	<0.0010
boron	mg/L	5	0.2	**2.4**	**1.5**	**1.7**	**1.2**	**1.4**	**1.5**	**1.3**	**1.4**	**1.8**
bromide	mg/L	-	-	< 1	< 1	< 1	< 1	<5.0	<1.0	<2.0	<5.0	<1.0
cadmium	mg/L	0.005	0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0001	<0.00010	<0.0001	0.0001	<0.00010	<0.00010
calcium	mg/L	-	-	150	110	120	93	110	100	100	100	110
chloride	mg/L	250	-	13	13	13	10	16	11	12	18	17
chromium	mg/L	0.05	-	< 0.005	< 0.005	< 0.005	< 0.005	<0.0050	0.0052	<0.0050	<0.0050	<0.0050
cobalt	mg/L	-	0.0009	**0.048**	**0.016**	**0.0087**	**0.0069**	**0.0021**	**0.0015**	**0.0023**	**0.004**	**0.00071**
copper	mg/L	1	[0.005] b	< 0.001	< 0.001	< 0.001	< 0.001	<0.0010	<0.001	0.0016	<0.0010	<0.0010
fluoride	mg/L	1.5 - 2.4	-	0.2	0.3	0.2	0.3	0.24	0.23	0.23	0.25	0.23
free cyanide	mg/L	0.2	0.005	< 0.002	< 0.002	< 0.002	< 0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.0010
hardness	mg $CaCO_3$/L	80-100	-	1100	940	990	880	980	910	940	900	900
iron	mg/L	0.3	0.3	**0.87**	**0.4**	**0.54**	0.21	**1.3**	**0.34**	**1.5**	**0.53**	**0.99**
lead	mg/L	0.01	[0.005] c	< 0.0005	< 0.0005	< 0.0005	< 0.0005	<0.00050	<0.0005	0.00074	<0.00050	<0.00050
magnesium	mg/L	-	-	190	160	170	160	170	160	170	160	150
manganese	mg/L	0.05	-	0.29	0.16	0.17	0.11	0.22	0.21	0.12	0.08	0.096
mercury	mg/L	0.001	0.0002	**0.0036**	**0.002**	0.0001	< 0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001
molybdenum	mg/L	-	0.04	0.005	0.005	0.005	0.0044	0.0038	0.0036	0.0026	0.003	0.0049
nickel	mg/L	-	0.025	0.006	0.004	0.002	0.002	0.0021	<0.001	0.0016	0.002	0.0013
nitrate as N	mg/L	10	-	< 0.1	< 0.1	< 0.1	0.3	<0.10	<0.10	<0.10	<0.10	<0.10
nitrite as N	mg/L	1	-	0.01	< 0.01	0.02	< 0.01	<0.010	0.065	0.055	0.016	<0.010
pH	pH Units	6.5-8.5	6.5-8.5	8.3	7.7	7.69	7.65	7.81	7.71	7.75	7.79	7.73
phenol	mg/L	-	0.005	< 0.001	< 0.001	< 0.001	< 0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
phosphate	mg/L	-	-	< 0.01	< 0.01	< 0.01	< 0.01	<0.010	<0.010	<0.010	<0.010	<0.010
phosphorous	mg/L	-	-	< 0.1	< 0.1	< 0.1	< 0.1	<0.1	<0.1	<0.10		<0.10
total phosphorous	mg/L	-	0.01	**76**	**110**	**6.7**	**3.9**	**7.7**	**7.8**	**5.7**	**5**	**0.23**
potassium	mg/L	-	-	20	16	16	13	15	14	13	14	16
selenium	mg/L	0.01	0.1	< 0.002	< 0.002	< 0.002	0.003	<0.0020	<0.002	<0.0020	<0.0020	<0.0020
silicon	mg/L	-	-	9.7	8.0	7.7	7.0	7.7	7.5	8.1	7.7	8.3
silver	mg/L	-	0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	<0.00010	<0.0001	<0.00010	<0.00010	<0.00010
sodium	mg/L	200 d	-	95	92	90	78	84	78	76	76	79
strontium	mg/L	-	-	15	10	12	8.1	9.4	9.4	7.6	8.1	11
sulphide	mg/L	0.05	-	0.12	0.31	< 0.02	< 0.02	0.48	0.28	0.075	0.03	<0.020
sulphate	mg/L	500	-	706	631	576	423	560	550	510	520	460
thallium	mg/L	-	0.0003	< 0.00005	< 0.00005	< 0.00005	< 0.00005	<0.000050	<0.00005	0.000053	<0.00005	<0.00005
tin	mg/L	-	-	< 0.001	< 0.001	< 0.001	< 0.001	<0.0010	<0.001	<0.0010	<0.0010	<0.0010
titanium	mg/L	-	-	0.011	0.008	< 0.005	< 0.005	0.0065	<0.005	0.015	0.01	<0.0050
TSS	mg/L	-	-	130000	130000	9000	5700	5200	12000	6800	1300	890
turbidity	NTU	5	-	75000	140000	14000	710	2500	1100	2700	6400	1900
uranium	mg/L	0.02	[0.005]	**0.0056**	**0.01**	**0.008**	**0.011**	**0.0095**	**0.0093**	**0.0086**	**0.0084**	**0.0063**
vanadium	mg/L	-	[0.006]	0.002	< 0.001	< 0.001	0.0007	0.00059	0.0013	0.0013	<0.00050	0.00053
zinc	mg/L	5	[0.02]	< 0.03	< 0.005	< 0.005	< 0.005	<0.0050	0.0094	<0.0050	<0.0050	<0.0050

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-09 deep								
				Oct-08	Nov-09	Oct-10	Nov-11	Nov-12	Nov-13	Nov-14	Nov-15	Nov-16
aluminum	mg/L	0.1	[0.075] a				< 0.3	<0.25	<0.25	<0.25	**0.44**	**0.11**
alkalinity	mg $CaCO_3$/L	30-500	-				52	52	41	42	43	27
ammonia as N	mg/L	-	-				40	36	39	38	34	38
antimony	mg/L	-	[0.02]				< 0.03	<0.025	<0.025	<0.025	<0.025	<0.005
arsenic	mg/L	0.025	[0.005]				< 0.05	<0.05	<0.1	<0.050	<0.050	<0.01
barium	mg/L	1	-				0.13	0.14	0.12	0.14	0.12	0.19
beryllium	mg/L	-	1.1				< 0.03	<0.025	<0.025	<0.025	<0.025	<0.005
bismuth	mg/L	-	-				< 0.05	<0.05	<0.05	<0.050	<0.050	<0.01
boron	mg/L	5	0.2				**5.9**	**4.9**	**4.9**	**4.9**	**4.6**	**4.2**
bromide	mg/L	-	-				696	590	690	590	600	590
cadmium	mg/L	0.005	0.0005				< 0.005	<0.005	<0.005	<0.0050	<0.0050	<0.001
calcium	mg/L	-	-				8100	8600	8700	9600	7400	9700
chloride	mg/L	250	-				46900	52000	53000	53000	49000	50000
chromium	mg/L	0.05	-				< 0.3	<0.25	<0.25	<0.25	<0.25	<0.05
cobalt	mg/L	-	0.0009				< 0.03	<0.025	<0.025	<0.025	<0.025	<0.025
copper	mg/L	1	[0.005] b				< 0.1	<0.05	<0.05	<0.10	<0.050	<0.05
fluoride	mg/L	1.5 - 2.4	-	**NOT SAMPLED**	**NOT SAMPLED**	**NOT SAMPLED**	< 0.1	<0.10	<0.10	<0.10	0.11	<0.10
free cyanide	mg/L	0.2	0.005				< 0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.0010
hardness	mg $CaCO_3$/L	80-100	-				28000	29000	31000	33000	27000	33000
iron	mg/L	0.3	0.3				**33**	**24**	**15**	**39**	<5.0	**20**
lead	mg/L	0.01	[0.005] c				< 0.03	<0.025	<0.025	<0.025	<0.025	<0.005
magnesium	mg/L	-	-				1900	1900	2100	2200	2000	2200
manganese	mg/L	0.05	-				4.6	4.5	4.7	5.3	2.6	5.1
mercury	mg/L	0.001	0.0002				< 0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001
molybdenum	mg/L	-	0.04				< 0.03	0.038	0.029	0.029	0.13	0.03
nickel	mg/L	-	0.025				< 0.05	<0.05	**0.067**	**0.2**	<0.050	<0.05
nitrate as N	mg/L	10	-				< 0.1	<0.10	<0.10	<5.0	<1.0	<1.0
nitrite as N	mg/L	1	-				< 0.1	<0.10	<0.010	<0.50	<0.10	<0.10
pH	pH Units	6.5-8.5	6.5-8.5				6.84	**6.19**	**6.31**	**6.36**	6.77	6.54
phenol	mg/L	-	0.005				**0.08**	**0.070**	**0.025**	**0.056**	**0.0066**	**0.022**
phosphate	mg/L	-	-				< 0.01	<0.010	<0.010	<0.010	<0.010	<0.010
phosphorous	mg/L	-	-				< 5	<5	<5	<5.0		<1
total phosphorous	mg/L	-	0.01				< 0.1	**0.42**	**0.65 (1)**	**0.4**	**0.21**	<0.4
potassium	mg/L	-	-				280	290	300	310	290	340
selenium	mg/L	0.01	0.1				< 0.2	<0.2	<0.2	<0.10	<0.20	<0.02
silicon	mg/L	-	-				< 3	2.5	<2.5	<2.5	<2.5	1.4
silver	mg/L	-	0.0001				< 0.005	<0.005	<0.005	<0.0050	<0.0050	<0.001
sodium	mg/L	200 d	-				17000	18000	19000	19000	19000	18000
strontium	mg/L	-	-				160	180	180	190	160	210
sulphide	mg/L	0.05	-				< 0.02	<0.020	<0.020	<0.020	<0.020	<0.020
sulphate	mg/L	500	-				1470	1300	1200	930	1400	1200
thallium	mg/L	-	0.0003				< 0.003	<0.0025	<0.0025	<0.0025	<0.0025	<0.0005
tin	mg/L	-	-				< 0.05	<0.05	<0.05	<0.050	<0.050	<0.01
titanium	mg/L	-	-				< 0.3	<0.25	<0.25	<0.25	<0.25	<0.05
TSS	mg/L	-	-	**Note:**	**Note:**	**Note:**	390	260	1000	510	85700	440
turbidity	NTU	5	-	Insufficient	Insufficient	Insufficient	150	38	320	93	68	122
uranium	mg/L	0.02	[0.005]	water	water	water	< 0.005	**0.011**	**0.019**	**0.011**	**0.011**	**0.004**
vanadium	mg/L	-	[0.006]				< 0.05	<0.05	<0.05	<0.050	<0.050	<0.025
zinc	mg/L	5	[0.02]				< 0.3	<0.25	**0.43**	<0.25	<0.25	<0.05

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-09 straddle								
				Oct-08	Nov-09	Oct-10	Nov-11	Nov-12	Nov-13	Nov-14	Nov-15	Nov-16
aluminum	mg/L	0.1	[0.075] a	0.066	**0.61**	0.056	0.072	**0.12**	<0.005	**0.3**	**0.48**	**0.54**
alkalinity	mg $CaCO_3$/L	30-500	-	175	305	261	239	220	240	150	250	180
ammonia as N	mg/L	-	-	2	2.5	2.2	1.7	2.6	3.3	3	2.4	3.3
antimony	mg/L	-	[0.02]	< 0.0005	< 0.0005	< 0.0005	< 0.0005	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050
arsenic	mg/L	0.025	[0.005]	0.002	0.004	0.003	0.002	0.0030	0.0026	0.0025	0.0017	0.0016
barium	mg/L	1	-	0.058	0.067	0.04	0.065	0.041	0.05	0.051	0.071	0.023
beryllium	mg/L	-	1.1	< 0.0005	< 0.0005	< 0.0005	< 0.0005	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050
bismuth	mg/L	-	-	< 0.001	< 0.001	< 0.001	< 0.001	<0.0010	<0.001	<0.0010	<0.0010	<0.0010
boron	mg/L	5	0.2	**2.8**	**2.5**	**3.4**	**4.8**	**5.1**	**4.4**	**4.7**	**4.6**	**5.2**
bromide	mg/L	-	-	2	1	2	3	<10	2.5	<5.0	<2.0	<5.0
cadmium	mg/L	0.005	0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0001	<0.00010	<0.0001	<0.00010	<0.00010	<0.00010
calcium	mg/L	-	-	110	85	140	190	140	120	140	120	190
chloride	mg/L	250	-	142	115	196	252	290	210	510	220	340
chromium	mg/L	0.05	-	< 0.005	< 0.005	< 0.005	< 0.005	<0.0050	<0.005	<0.0050	<0.0050	<0.0050
cobalt	mg/L	-	0.0009	**0.022**	**0.014**	**0.0049**	**0.0028**	**0.0024**	<0.0005	0.0006	**0.00094**	**0.0015**
copper	mg/L	1	[0.005] b	< 0.001	< 0.001	< 0.001	< 0.001	<0.0010	<0.001	<0.0010	<0.0010	<0.0010
fluoride	mg/L	1.5 - 2.4	-	0.4	0.5	0.3	0.4	0.44	0.38	0.45	0.42	0.47
free cyanide	mg/L	0.2	0.005	< 0.002	< 0.002	< 0.002	< 0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.0010
hardness	mg $CaCO_3$/L	80-100	-	450	390	600	760	600	480	560	470	750
iron	mg/L	0.3	0.3	**0.38**	**1**	**0.58**	**0.64**	**0.77**	0.2	**0.68**	**0.44**	**0.79**
lead	mg/L	0.01	[0.005] c	< 0.0005	< 0.0005	< 0.0005	< 0.0005	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050
magnesium	mg/L	-	-	45	42	57	69	58	47	53	44	64
manganese	mg/L	0.05	-	0.088	0.07	0.067	0.079	0.066	0.047	0.053	0.047	0.078
mercury	mg/L	0.001	0.0002	< 0.0015 (1)	< 0.0001	< 0.0001	< 0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001
molybdenum	mg/L	-	0.04	0.008	0.005	0.007	0.0096	0.0097	0.009	0.0084	0.0088	0.0094
nickel	mg/L	-	0.025	0.003	0.004	< 0.001	< 0.001	<0.0010	<0.001	0.0015	0.0013	0.0016
nitrate as N	mg/L	10	-	< 0.1	< 0.1	< 0.1	1.8	0.14	0.18	<0.10	0.98	<0.10
nitrite as N	mg/L	1	-	< 0.01	< 0.01	0.02	0.44	0.053	0.070	0.032	0.132	<0.010
pH	pH Units	6.5-8.5	6.5-8.5	8.2	7.8	7.81	7.77	7.84	7.86	7.73	7.92	7.8
phenol	mg/L	-	0.005	< 0.001	< 0.001	< 0.001	< 0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
phosphate	mg/L	-	-	< 0.01	< 0.01	< 0.01	< 0.01	<0.010	<0.010	<0.010	<0.010	<0.010
phosphorous	mg/L	-	-	< 0.1	< 0.1	< 0.1	< 0.1	<0.1	<0.1	<0.10		<0.10
total phosphorous	mg/L	-	0.01	**5.3**	**9**	**1.7**	**1.1**	**2.6**	**3.8**	**2.3**	**3.3**	**11**
potassium	mg/L	-	-	23	19	23	26	23	21	24	22	28
selenium	mg/L	0.01	0.1	< 0.002	< 0.002	< 0.002	< 0.002	<0.0020	<0.002	<0.0020	<0.0020	<0.0020
silicon	mg/L	-	-	6.4	7.4	5.3	5.1	5.3	5.1	6	6.5	5.6
silver	mg/L	-	0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	<0.00010	<0.0001	<0.00010	<0.00010	<0.00010
sodium	mg/L	200 d	-	150	110	210	290	240	180	200	160	270
strontium	mg/L	-	-	14	14	17	19	18	17	17	17	18
sulphide	mg/L	0.05	-	< 0.02	0.06	< 0.02	< 0.02	<0.020	<0.020	0.022	0.031	0.042
sulphate	mg/L	500	-	299	254	385	468	560	400	810	370	600
thallium	mg/L	-	0.0003	< 0.00005	< 0.00005	< 0.00005	< 0.00005	<0.000050	<0.00005	<0.00005	<0.00005	<0.00005
tin	mg/L	-	-	< 0.001	< 0.001	< 0.001	< 0.001	<0.0010	<0.001	<0.0010	<0.0010	<0.0010
titanium	mg/L	-	-	< 0.005	0.012	< 0.005	< 0.005	<0.0050	<0.005	0.0095	0.016	0.017
TSS	mg/L	-	-	8900	16000	3300	3100	2700	5500	9200	1400	13000
turbidity	NTU	5	-	11000	20000	3400	920	470	690	820	2300	6100
uranium	mg/L	0.02	[0.005]	0.0008	0.0003	0.0004	0.0008	0.00078	0.001	0.00059	0.00089	0.00041
vanadium	mg/L	-	[0.006]	0.002	0.001	< 0.001	< 0.0005	0.0010	0.00054	0.00053	0.001	0.00087
zinc	mg/L	5	[0.02]	< 0.005	< 0.005	< 0.005	< 0.005	0.0057	<0.005	<0.0050	<0.0050	<0.0050

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-09 overburden								
				Oct-08	Nov-09	Oct-10	Nov-11	Nov-12	Nov-13	Nov-14	Nov-15	Nov-16
aluminum	mg/L	0.1	[0.075] a	**0.16**	0.070	0.020	0.029	0.064	<0.005	**0.39**	**0.46**	**0.73**
alkalinity	mg $CaCO_3$/L	30-500	-	401	438	412	398	390	420	410	390	370
ammonia as N	mg/L	-	-	0.38	0.10	0.17	0.36	0.39	0.20	0.33	0.21	0.51
antimony	mg/L	-	[0.02]	0.0006	< 0.0005	0.0012	< 0.0005	<0.00050	<0.0005	<0.00050	<0.00050	0.00051
arsenic	mg/L	0.025	[0.005]	0.004	0.001	0.002	0.001	0.0017	0.0017	0.0022	0.0027	0.0037
barium	mg/L	1	-	0.058	0.061	0.061	0.06	0.067	0.064	0.06	0.079	0.070
beryllium	mg/L	-	1.1	< 0.0005	< 0.0005	< 0.0005	< 0.0005	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050
bismuth	mg/L	-	-	< 0.001	< 0.001	< 0.001	< 0.001	<0.0010	<0.001	<0.0010	<0.0010	<0.0010
boron	mg/L	5	0.2	**0.46**	**0.48**	**0.54**	**2.6**	**1.3**	**0.53**	**0.4**	**0.47**	**0.59**
bromide	mg/L	-	-	< 1	< 1	< 1	< 1	<1.0	<1.0	<1.0	<1.0	<1.0
cadmium	mg/L	0.005	0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0001	<0.00010	<0.0001	<0.00010	<0.00010	<0.00010
calcium	mg/L	-	-	56	60	59	51	51	55	53	60	43
chloride	mg/L	250	-	6	10	10	12	10	6.5	6	6.4	4.5
chromium	mg/L	0.05	-	< 0.005	< 0.005	< 0.005	< 0.005	<0.0050	<0.005	<0.0050	<0.0050	<0.0050
cobalt	mg/L	-	0.0009	**0.011**	**0.0098**	**0.0014**	**0.0048**	**0.0013**	<0.0005	**0.0013**	**0.001**	**0.0007**
copper	mg/L	1	[0.005] b	< 0.001	< 0.001	< 0.001	< 0.001	<0.0010	<0.001	<0.0010	<0.0010	<0.0010
fluoride	mg/L	1.5 - 2.4	-	0.3	0.2	0.2	0.2	0.27	0.22	0.2	0.22	0.23
free cyanide	mg/L	0.2	0.005	< 0.002	< 0.002	< 0.002	< 0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.0010
hardness	mg $CaCO_3$/L	80-100	-	400	420	410	380	380	390	380	420	330
iron	mg/L	0.3	0.3	0.12	< 0.1	< 0.1	0.22	<0.1	<0.1	0.18	0.27	**0.42**
lead	mg/L	0.01	[0.005] c	< 0.0005	< 0.0005	< 0.0005	< 0.0005	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050
magnesium	mg/L	-	-	62	67	63	62	61	62	61	66	54
manganese	mg/L	0.05	-	0.066	0.042	0.035	0.051	0.038	0.039	0.041	0.021	0.039
mercury	mg/L	0.001	0.0002	< 0.0015 (1)	< 0.0001	< 0.0001	< 0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001
molybdenum	mg/L	-	0.04	0.013	0.006	0.007	0.0091	0.0067	0.0054	0.0042	0.0049	0.0053
nickel	mg/L	-	0.025	0.002	0.002	< 0.001	0.001	<0.0010	<0.001	<0.0010	<0.0010	0.0011
nitrate as N	mg/L	10	-	0.2	2.1	0.4	0.2	0.13	0.31	0.17	0.24	0.18
nitrite as N	mg/L	1	-	0.05	< 0.01	0.04	0.03	0.012	0.018	0.042	<0.010	<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	7.92	7.92	7.92
phenol	mg/L	-	0.005	< 0.001	< 0.001	< 0.001	< 0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
phosphate	mg/L	-	-	< 0.01	< 0.01	0.01	< 0.01	<0.010	<0.010	<0.010	0.011	0.012
phosphorous	mg/L	-	-	< 0.1	< 0.1	< 0.1	< 0.1	<0.1	<0.1	<0.10		<0.10
total phosphorous	mg/L	-	0.01	**1.2**	**1.3**	**0.2**	**1.1**	**3.3**	**2.9**	**3**	**1.7**	**5.1**
potassium	mg/L	-	-	18	13	12	9.9	11	9.8	8.7	10	10
selenium	mg/L	0.01	0.1	< 0.002	< 0.002	< 0.002	< 0.002	<0.0020	<0.002	<0.0020	<0.0020	<0.0020
silicon	mg/L	-	-	8.9	8.6	8.4	8.4	9.1	7.8	7.9	10	11
silver	mg/L	-	0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	<0.00010	<0.0001	<0.00010	<0.00010	<0.00010
sodium	mg/L	200 d	-	35	36	35	39	35	33	29	29	31
strontium	mg/L	-	-	7.3	5.2	6.4	5.9	7	6.5	6	7.6	8.1
sulphide	mg/L	0.05	-	< 0.02	< 0.02	< 0.02	< 0.02	<0.020	<0.020	<0.020	<0.020	0.038
sulphate	mg/L	500	-	70	70	68	59	50	67	76	97	51
thallium	mg/L	-	0.0003	< 0.00005	< 0.00005	< 0.00005	< 0.00005	<0.000050	<0.00005	<0.00005	<0.00005	<0.00005
tin	mg/L	-	-	< 0.001	< 0.001	< 0.001	< 0.001	<0.0010	<0.001	<0.0010	<0.0010	<0.0010
titanium	mg/L	-	-	0.006	< 0.005	< 0.005	< 0.005	0.0089	<0.005	0.013	0.016	0.024
TSS	mg/L	-	-	1200	560	180	4900	4500	4800	2700	512	14000
turbidity	NTU	5	-	3100	2400	330	3200	2000	430	900	2500	6300
uranium	mg/L	0.02	[0.005]	**0.0052**	0.0035	0.0032	0.0023	0.0021	0.0026	0.0018	0.0016	0.0009
vanadium	mg/L	-	[0.006]	0.001	0.001	< 0.001	< 0.0005	0.0011	0.00096	0.0015	0.0016	0.0018
zinc	mg/L	5	[0.02]	0.006	0.006	< 0.005	< 0.005	<0.0050	<0.005	<0.0050	<0.0050	<0.0050

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-10 deep								
				Oct-08	Dec-09	Oct-10	Nov-11	Nov-12	Nov-13	Nov-14	Nov-15	Nov-16
aluminum	mg/L	0.1	[0.075] a	NOT SAMPLED Note: Insufficient water	NOT SAMPLED Note: Insufficient water	NOT SAMPLED Note: Insufficient water	< 0.3	<0.25	**0.46**	<0.25	<0.10	<0.25
alkalinity	mg CaCO$_3$/L	30-500	-				40	66	39	52	49	43
ammonia as N	mg/L	-	-				34	28	34	32	30	36
antimony	mg/L	-	[0.02]				< 0.03	<0.025	<0.025	<0.025	<0.010	<0.025
arsenic	mg/L	0.025	[0.005]				< 0.05	<0.05	<0.05	<0.050	<0.020	<0.1
barium	mg/L	1	-				0.12	<0.1	0.11	<0.10	0.11	0.12
beryllium	mg/L	-	1.1				< 0.03	<0.025	<0.025	<0.025	<0.010	<0.025
bismuth	mg/L	-	-				< 0.05	<0.05	<0.05	<0.050	<0.020	<0.05
boron	mg/L	5	0.2				**5.5**	**7.5**	**6.6**	**10**	**14**	**9**
bromide	mg/L	-	-				0.538	390	540	550	<500	530
cadmium	mg/L	0.005	0.0005				< 0.005	<0.005	<0.005	**0.012**	**0.0049**	**0.0062**
calcium	mg/L	-	-				7100	4900	7500	7100	6100	9300
chloride	mg/L	250	-				41700	36000	44000	40000	37000	46000
chromium	mg/L	0.05	-				< 0.3	<0.25	<0.25	<0.25	<0.10	<0.25
cobalt	mg/L	-	0.0009				< 0.03	<0.025	<0.025	<0.025	<0.010	<0.025
copper	mg/L	1	[0.005] b				< 0.1	<0.05	<0.05	<0.10	<0.040	<0.05
fluoride	mg/L	1.5 - 2.4	-				< 0.1	0.14	<0.10	0.11	0.14	<0.10
free cyanide	mg/L	0.2	0.005				< 0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.0010
hardness	mg CaCO$_3$/L	80-100	-				25000	17000	26000	25000	21000	33000
iron	mg/L	0.3	0.3				**28**	<5	**22**	**16**	**2.3**	**15**
lead	mg/L	0.01	[0.005] c				< 0.03	<0.025	<0.025	<0.025	<0.010	<0.025
magnesium	mg/L	-	-				1700	1300	1800	1700	1500	2400
manganese	mg/L	0.05	-				3.8	1.9	4.1	3.7	2.9	5.4
mercury	mg/L	0.001	0.0002				< 0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001
molybdenum	mg/L	-	0.04				0.037	**0.24**	**0.078**	**0.13**	**0.18**	**0.06**
nickel	mg/L	-	0.025				< 0.05	**0.12**	**0.063**	**0.4**	**0.54**	**0.38**
nitrate as N	mg/L	10	-				0.1	<0.10	<0.10	<5.0	<0.50	<1.0
nitrite as N	mg/L	1	-				< 0.1	<0.10	<0.010	<0.50	<0.050	<0.10
pH	pH Units	6.5-8.5	6.5-8.5				6.6	8.22	6.65	7.05	6.94	6.59
phenol	mg/L	-	0.005				**0.05**	0.0022	<0.0010	**0.033**	**0.0053**	**0.014**
phosphate	mg/L	-	-				< 0.01	<0.010	<0.010	<0.010	<0.010	<0.010
phosphorous	mg/L	-	-				< 5	<5	<5	<5.0		<5
total phosphorous	mg/L	-	0.01				< 0.1	<0.10	**1.4**	**0.12**	<0.10 (1)	0.49
potassium	mg/L	-	-				250	210	260	260	250	330
selenium	mg/L	0.01	0.1				< 0.2	<0.1	<0.2	<0.10	<0.040	<0.2
silicon	mg/L	-	-				< 3	<2.5	5.6	<2.5	2.3	2.8
silver	mg/L	-	0.0001				< 0.005	<0.005	<0.005	<0.0050	<0.0020	<0.005
sodium	mg/L	200 d	-				17000	13000	17000	17000	15000	22000
strontium	mg/L	-	-				150	110	160	140	130	200
sulphide	mg/L	0.05	-				< 0.02	<0.020	<0.020	<0.020	<0.020	<0.020
sulphate	mg/L	500	-				1360	1700	1400	1300	1500	1200
thallium	mg/L	-	0.0003				< 0.003	<0.0025	<0.0025	<0.0025	<0.0010	<0.0025
tin	mg/L	-	-				< 0.05	<0.05	<0.05	<0.050	<0.020	<0.05
titanium	mg/L	-	-				< 0.3	<0.25	<0.25	<0.25	<0.10	<0.25
TSS	mg/L	-	-				770	150	4300	150	69200	860
turbidity	NTU	5	-				280	41	260	37	45	290
uranium	mg/L	0.02	[0.005]				< 0.005	<0.005	**0.017**	**0.027**	**0.036**	**0.016**
vanadium	mg/L	-	[0.006]				< 0.05	**0.036**	<0.05	<0.050	<0.020	<0.05
zinc	mg/L	5	[0.02]				< 0.3	<0.25	**0.61**	<0.25	0.18	<0.25

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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.
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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 intermediate								
				Oct-08	Nov-09	Oct-10	Nov-11	Nov-12	Nov-13	Nov-14	Nov-15	Nov-16
aluminum	mg/L	0.1	[0.075] a	**4.8**	**0.41**	0.027	0.008	**0.36**	**0.36**	**0.69**	**0.69**	0.008
alkalinity	mg CaCO$_3$/L	30-500	-	381	394	400	416	410	410	430	430	430
ammonia as N	mg/L	-	-	1.9	1.6	0.92	0.82	0.99	0.99	1	0.98	0.69
antimony	mg/L	-	[0.02]	0.001	< 0.0005	< 0.0005	< 0.0005	<0.0005	<0.0005	<0.00050	<0.00050	<0.00050
arsenic	mg/L	0.025	[0.005]	0.005	0.004	0.004	0.004	0.005	0.005	0.0034	0.0029	0.0034
barium	mg/L	1	-	0.073	0.063	0.078	0.068	0.077	0.077	0.069	0.082	0.073
beryllium	mg/L	-	1.1	< 0.0005	< 0.0005	< 0.0005	< 0.0005	<0.0005	<0.0005	<0.00050	<0.00050	<0.00050
bismuth	mg/L	-	-	< 0.001	< 0.001	< 0.001	< 0.001	<0.001	<0.001	<0.0010	<0.0010	<0.0010
boron	mg/L	5	0.2	**3.1**	**1.8**	**1.3**	**0.71**	**0.75**	**0.75**	**0.87**	**0.89**	**0.7**
bromide	mg/L	-	-	< 1	< 1	< 1	< 1	<1.0	<1.0	<1.0	<1.0	<1.0
cadmium	mg/L	0.005	0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0001	<0.0001	<0.0001	<0.00010	<0.00010	**0.0012**
calcium	mg/L	-	-	58	53	58	41	57	57	53	56	56
chloride	mg/L	250	-	6	7	7	3	3	3	4.9	4	5.6
chromium	mg/L	0.05	-	< 0.005	< 0.005	< 0.005	< 0.005	<0.005	<0.005	<0.0050	<0.0050	<0.0050
cobalt	mg/L	-	0.0009	**0.0065**	**0.011**	**0.0033**	< 0.005	0.00074	0.00074	0.00077	0.0015	0.00078
copper	mg/L	1	[0.005] b	0.001	< 0.001	< 0.001	< 0.001	<0.001	<0.001	<0.0010	<0.0010	0.0015
fluoride	mg/L	1.5 - 2.4	-	0.3	0.3	0.2	0.2	0.2	0.2	0.19	0.22	0.18
free cyanide	mg/L	0.2	0.005	< 0.002	< 0.002	< 0.002	< 0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.0010
hardness	mg CaCO$_3$/L	80-100	-	330	310	370	340	380	380	360	360	390
iron	mg/L	0.3	0.3	**3.2**	**0.6**	0.3	< 0.1	**0.51**	**0.51**	**0.53**	**0.48**	<0.10
lead	mg/L	0.01	[0.005] c	0.0011	< 0.0005	< 0.0005	< 0.0005	<0.0005	<0.0005	<0.00050	<0.00050	<0.00050
magnesium	mg/L	-	-	46	43	56	56	58	58	55	54	61
manganese	mg/L	0.05	-	0.071	0.058	0.033	0.002	0.022	0.022	0.03	0.028	0.013
mercury	mg/L	0.001	0.0002	< 0.0015 (1)	< 0.0001	< 0.0001	< 0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001
molybdenum	mg/L	-	0.04	0.006	0.004	0.003	0.0029	0.0026	0.0026	0.0029	0.0026	0.0028
nickel	mg/L	-	0.025	0.003	0.002	< 0.001	< 0.001	<0.001	<0.001	<0.0010	<0.0010	<0.0010
nitrate as N	mg/L	10	-	< 0.1	< 0.1	< 0.1	0.7	0.36	0.36	<0.10	0.83	0.2
nitrite as N	mg/L	1	-	< 0.01	0.06	0.08	0.1	0.14	0.14	0.079	0.094	0.012
pH	pH Units	6.5-8.5	6.5-8.5	8.5	7.7	7.8	7.83	7.96	7.96	7.85	7.89	7.85
phenol	mg/L	-	0.005	< 0.001	< 0.001	< 0.001	< 0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
phosphate	mg/L	-	-	< 0.01	< 0.01	< 0.01	< 0.01	<0.010	<0.010	<0.010	<0.010	<0.010
phosphorous	mg/L	-	-	< 0.1	< 0.1	< 0.1	< 0.1	<0.1	<0.1	<0.10	-	<0.10
total phosphorous	mg/L	-	0.01	**13**	**10**	**0.4**	**2.4**	**1.8**	**1.8**	**1.2**	**2.7**	<0.10
potassium	mg/L	-	-	19	15	14	11	12	12	13	13	11
selenium	mg/L	0.01	0.1	< 0.002	< 0.002	< 0.002	< 0.002	<0.002	<0.002	<0.0020	<0.0020	<0.0020
silicon	mg/L	-	-	17	7.2	7.4	8.4	9.5	9.5	9.4	10	9
silver	mg/L	-	0.0001	0.0001	< 0.0001	< 0.0001	< 0.0001	<0.0001	<0.0001	<0.00010	<0.00010	<0.00010
sodium	mg/L	200 d	-	69	49	41	28	30	30	33	29	27
strontium	mg/L	-	-	12	11	12	9.7	11	11	12	12	10
sulphide	mg/L	0.05	-	< 0.02	0.03	< 0.02	< 0.02	<0.020	<0.020	<0.020	<0.020	<0.020
sulphate	mg/L	500	-	50	60	57	39	41	41	43	42	35
thallium	mg/L	-	0.0003	< 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	< 0.001	<0.001	<0.001	<0.0010	<0.0010	0.0036
titanium	mg/L	-	-	0.22	0.010	< 0.005	< 0.005	0.018	0.018	0.024	0.02	<0.0050
TSS	mg/L	-	-	25000	6500	440	2700	1900	1900	1200	492	44
turbidity	NTU	5	-	9000	7500	340	540	500	500	170	2400	16
uranium	mg/L	0.02	[0.005]	0.0022	0.0011	0.0008	0.0004	0.00031	0.00031	0.00041	0.00048	0.00021
vanadium	mg/L	-	[0.006]	**0.009**	0.001	< 0.001	0.0007	<0.0005	<0.0005	0.0017	0.0013	<0.00050
zinc	mg/L	5	[0.02]	0.006	< 0.005	< 0.005	< 0.005	<0.005	<0.005	<0.0050	<0.0050	0.0081

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 overburden								
				Oct-08	Nov-09	Oct-10	Nov-11	Nov-12	Nov-13	Nov-14	Nov-15	Nov-16
aluminum	mg/L	0.1	[0.075] a	**1.2**	**0.66**	**0.17**	0.031	0.045	<0.005	0.073	**0.81**	0.066
alkalinity	mg $CaCO_3$/L	30-500	-	396	475	472	485	490	490	490	480	480
ammonia as N	mg/L	-	-	1.4	0.47	0.43	0.13	0.42	0.13	0.12	0.099	<0.050
antimony	mg/L	-	[0.02]	0.0014	0.0007	0.0009	< 0.0005	<0.00050	<0.0005	0.0007	0.0011	<0.00050
arsenic	mg/L	0.025	[0.005]	0.004	0.003	0.004	0.003	0.0020	0.0023	0.003	0.0029	0.0017
barium	mg/L	1	-	0.088	0.093	0.09	0.044	0.065	0.054	0.05	0.098	0.05
beryllium	mg/L	-	1.1	< 0.0005	< 0.0005	< 0.0005	< 0.0005	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050
bismuth	mg/L	-	-	< 0.001	< 0.001	< 0.001	< 0.001	<0.0010	<0.001	<0.0010	<0.0010	<0.0010
boron	mg/L	5	0.2	**0.39**	0.17	0.17	0.11	0.13	0.097	0.13	0.11	0.1
bromide	mg/L	-	-	< 1	< 1	< 1	< 1	<1.0	<1.0	<1.0	<1.0	<1.0
cadmium	mg/L	0.005	0.0005	< 0.0001	< 0.0001	0.0001	< 0.0001	<0.00010	<0.0001	<0.00010	<0.00010	0.00025
calcium	mg/L	-	-	67	74	67	63	59	61	57	61	61
chloride	mg/L	250	-	3	3	4	16	2.5	2.1	3.9	3.6	3
chromium	mg/L	0.05	-	< 0.005	< 0.005	< 0.005	< 0.005	<0.0050	<0.005	<0.0050	<0.0050	<0.0050
cobalt	mg/L	-	0.0009	**0.025**	**0.027**	**0.0022**	**0.0046**	0.00085	<0.0005	**0.0011**	**0.0045**	0.00065
copper	mg/L	1	[0.005] b	0.001	0.002	0.001	< 0.001	<0.0010	<0.001	<0.0010	<0.0010	<0.0010
fluoride	mg/L	1.5 - 2.4	-	0.3	0.3	0.2	0.2	0.20	0.16	0.16	0.23	0.13
free cyanide	mg/L	0.2	0.005	< 0.002	< 0.002	< 0.002	< 0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.0010
hardness	mg $CaCO_3$/L	80-100	-	450	510	480	500	480	480	460	460	470
iron	mg/L	0.3	0.3	**0.97**	**1**	**0.73**	< 0.1	**0.64**	**0.36**	0.17	1.3	<0.10
lead	mg/L	0.01	[0.005] c	< 0.0005	0.0008	< 0.0005	< 0.0005	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050
magnesium	mg/L	-	-	68	79	77	84	82	80	78	74	77
manganese	mg/L	0.05	-	0.15	0.23	0.14	0.073	0.064	0.068	0.067	0.075	0.04
mercury	mg/L	0.001	0.0002	< 0.0015 (1)	< 0.0015	< 0.0001	< 0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001
molybdenum	mg/L	-	0.04	0.014	0.004	0.004	0.0025	0.0030	0.0022	0.0021	0.0025	0.0019
nickel	mg/L	-	0.025	0.004	0.006	0.001	< 0.001	<0.0010	<0.001	<0.0010	0.0016	0.0016
nitrate as N	mg/L	10	-	0.5	0.4	< 0.1	< 0.1	0.11	<0.10	<0.10	0.18	0.1
nitrite as N	mg/L	1	-	0.02	0.03	0.05	< 0.01	<0.010	<0.010	0.018	0.043	<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	7.84	7.97	7.84
phenol	mg/L	-	0.005	< 0.001	< 0.001	< 0.001	< 0.001	<0.0010	<0.0010	0.0025	<0.0010	<0.0010
phosphate	mg/L	-	-	< 0.01	< 0.01	< 0.01	< 0.01	<0.010	<0.010	<0.010	<0.010	<0.010
phosphorous	mg/L	-	-	< 0.1	0.2	< 0.1	< 0.1	<0.1	<0.1	<0.10	-	<0.10
total phosphorous	mg/L	-	0.01	**64**	**98**	**29**	**11**	**57**	**3.3**	**1.7**	**-**	<0.10
potassium	mg/L	-	-	18	8.6	9.9	6.8	7.1	6.4	5.9	8.2	5.8
selenium	mg/L	0.01	0.1	< 0.002	< 0.002	< 0.002	< 0.002	<0.0020	<0.002	<0.0020	<0.0020	<0.0020
silicon	mg/L	-	-	13	10	9.1	9.3	9.5	8.8	8.4	11	9.1
silver	mg/L	-	0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	<0.00010	<0.0001	<0.00010	<0.00010	<0.00010
sodium	mg/L	200 d	-	65	26	27	23	23	22	21	20	21
strontium	mg/L	-	-	5.1	2.6	3.1	1.5	1.8	1.5	1.4	2	1.2
sulphide	mg/L	0.05	-	0.11	0.19	0.23	< 0.02	0.047	0.025	0.035	0.35	<0.020
sulphate	mg/L	500	-	83	58	58	58	52	52	50	52	50
thallium	mg/L	-	0.0003	< 0.00005	< 0.00005	0.00005	< 0.00005	<0.000050	<0.00005	<0.00005	<0.00005	<0.00005
tin	mg/L	-	-	< 0.001	< 0.001	< 0.001	< 0.001	<0.0010	<0.001	<0.0010	<0.0010	<0.0010
titanium	mg/L	-	-	0.041	0.011	< 0.005	< 0.005	<0.0050	<0.005	<0.0050	0.038	<0.0050
TSS	mg/L	-	-	150000	94000	91000	10000	27000	5800	5700	530	450
turbidity	NTU	5	-	50000	87000	94000	1500	1200	1900	1300	8800	440
uranium	mg/L	0.02	[0.005]	**0.011**	0.0044	0.0037	0.0018	0.0018	0.0016	0.0014	0.0014	0.0015
vanadium	mg/L	-	[0.006]	0.003	0.002	0.005	< 0.0005	<0.00050	<0.0005	0.001	0.0014	0.00088
zinc	mg/L	5	[0.02]	< 0.005	0.007	< 0.005	0.005	<0.0050	<0.005	<0.0050	<0.0050	<0.0050

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 deep								
				Oct-08	Dec-09	Oct-10	Nov-11	Nov-12	Nov-13	Nov-14	Nov-15	Nov-16
aluminum	mg/L	0.1	[0.075] a	NOT SAMPLED	NOT SAMPLED	< 0.3	< 0.3	<0.25	<0.25	<0.25	<0.25	<0.25
alkalinity	mg $CaCO_3$/L	30-500	-			44	50	55	63	64	62	42
ammonia as N	mg/L	-	-			31	34	35	31	29	30	35
antimony	mg/L	-	[0.02]			< 0.03	< 0.03	<0.025	<0.025	<0.025	<0.025	<0.025
arsenic	mg/L	0.025	[0.005]			< 0.05	**0.054**	<0.05	<0.05	<0.050	<0.050	<0.050
barium	mg/L	1	-			< 0.300	0.14	0.17	0.13	0.1	<0.10	0.13
beryllium	mg/L	-	1.1			< 0.03	< 0.03	<0.025	<0.025	<0.025	<0.025	<0.025
bismuth	mg/L	-	-			< 0.05	< 0.05	<0.05	<0.05	<0.050	<0.050	<0.050
boron	mg/L	5	0.2			**4.8**	**4.7**	**5.6**	**5.5**	**4.3**	**4.4**	**4.8**
bromide	mg/L	-	-			500	500	580	460	780	<500	<1000
cadmium	mg/L	0.005	0.0005			**0.019**	< 0.005	**0.011**	**0.0067**	<0.0050	0.0073	<0.0050
calcium	mg/L	-	-			6300	7500	7800	6800	5600	5400	8300
chloride	mg/L	250	-			35800	40700	47000	38000	37000	41000	37000
chromium	mg/L	0.05	-			< 0.3	< 0.3	<0.25	<0.25	<0.25	<0.25	<0.25
cobalt	mg/L	-	0.0009			< 0.03	< 0.03	<0.025	<0.025	<0.025	<0.025	<0.025
copper	mg/L	1	[0.005] b			< 0.05	< 0.1	<0.05	<0.05	<0.10	<0.050	<0.050
fluoride	mg/L	1.5 - 2.4	-			0.1	0.1	0.12	0.15	0.12	0.16	0.11
free cyanide	mg/L	0.2	0.005			< 0.002	< 0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.0010
hardness	mg $CaCO_3$/L	80-100	-			21000	26000	27000	24000	21000	19000	29000
iron	mg/L	0.3	0.3			**21**	**21**	**12**	**7.1**	**6.1**	**5.1**	**25**
lead	mg/L	0.01	[0.005] c			< 0.03	< 0.03	<0.025	<0.025	<0.025	<0.025	<0.025
magnesium	mg/L	-	-			1400	1800	1900	1800	1600	1500	2000
manganese	mg/L	0.05	-			3.1	4	4	3.4	2.5	2.7	4.6
mercury	mg/L	0.001	0.0002			< 0.0001	< 0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001
molybdenum	mg/L	-	0.04			< 0.05	< 0.03	**0.057**	**0.063**	**0.15**	**0.14**	0.031
nickel	mg/L	-	0.025			< 0.05	< 0.05	**0.2**	**0.25**	**0.33**	**0.47**	**0.27**
nitrate as N	mg/L	10	-			< 0.1	< 0.1	<0.10	<0.10	<5.0	<1.0	<0.10
nitrite as N	mg/L	1	-			< 0.01	< 0.01	<0.10	<0.010	<0.50	<0.10	<0.010
pH	pH Units	6.5-8.5	6.5-8.5			6.62	6.69	**6.14**	7.21	6.73	6.74	6.65
phenol	mg/L	-	0.005			< 0.001	**0.017**	**0.0091**	**0.0070**	**0.035**	0.0047	<0.010
phosphate	mg/L	-	-			< 0.01	< 0.01	<0.010	<0.010	<0.010	<0.010	<0.010
phosphorous	mg/L	-	-			< 5	< 5	<5	<5	<5.0		<5.0
total phosphorous	mg/L	-	0.01			< 1 (1)	< 5	<0.20	**0.17**	**0.11**	**0.15**	<1.0
potassium	mg/L	-	-			250	280	290	260	250	240	300
selenium	mg/L	0.01	0.1			**0.17**	< 0.2	<0.2	<0.1	<0.10	<0.10	<0.10
silicon	mg/L	-	-			< 3	3.1	<2.5	<2.5	2.9	2.5	<2.5
silver	mg/L	-	0.0001			< 0.005	< 0.005	<0.005	<0.005	<0.0050	<0.0050	<0.0050
sodium	mg/L	200 d	-			13000	16000	17000	16000	15000	14000	17000
strontium	mg/L	-	-			130	150	160	140	110	120	180
sulphide	mg/L	0.05	-			0.04	< 0.02	<0.020	<0.020	<0.020	<0.020	<0.020
sulphate	mg/L	500	-			1390	1410	1300	1600	1700	1600	1200
thallium	mg/L	-	0.0003			< 0.003	< 0.003	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025
tin	mg/L	-	-			< 0.05	< 0.05	<0.05	<0.05	<0.050	<0.050	<0.050
titanium	mg/L	-	-			< 0.3	< 0.300	<0.25	<0.25	<0.25	<0.25	<0.25
TSS	mg/L	-	-	**Note:** Insufficient water	**Note:** Insufficient water	680	1200	3000	170	58	68300	390
turbidity	NTU	5	-			760	140	320	15	29	69	220
uranium	mg/L	0.02	[0.005]			**0.024**	**0.009**	**0.019**	**0.017**	**0.031**	**0.03**	**0.0083**
vanadium	mg/L	-	[0.006]			**0.11**	< 0.05	<0.05	<0.05	<0.025	<0.050	<0.050
zinc	mg/L	5	[0.02]			< 0.3	< 0.3	<0.25	**0.36**	<0.25	<0.25	**0.28**

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 straddle								
				Oct-08	Dec-09	Oct-10	Nov-11	Nov-12	Nov-13	Nov-14	Nov-15	Nov-16
aluminum	mg/L	0.1	[0.075] a	**0.13**	**0.13**	**0.078**	0.059	**0.25**	<0.005	**0.33**	**0.093**	**0.140**
alkalinity	mg $CaCO_3$/L	30-500	-	458	431	453	450	400	410	420	380	380
ammonia as N	mg/L	-	-	1.4	1.3	1.3	1.5	1.8	1.7	1.7	1.7	1.7
antimony	mg/L	-	[0.02]	< 0.0005	< 0.0005	0.0006	< 0.0005	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050
arsenic	mg/L	0.025	[0.005]	**0.012**	**0.01**	**0.012**	**0.011**	**0.0087**	**0.0072**	**0.0058**	**0.0065**	**0.0061**
barium	mg/L	1	-	0.021	0.020	0.023	0.025	0.021	0.024	0.018	0.016	0.015
beryllium	mg/L	-	1.1	< 0.0005	< 0.0005	< 0.0005	< 0.0005	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050
bismuth	mg/L	-	-	< 0.001	< 0.001	< 0.001	< 0.001	<0.0010	<0.001	<0.0010	<0.0010	<0.0010
boron	mg/L	5	0.2	**1.3**	**1.7**	**1.2**	**1.5**	**1.6**	**2.6**	**2.3**	**3**	**2**
bromide	mg/L	-	-	< 1	< 1	< 1	< 1	<1.0	<1.0	<1.0	<1.0	<1.0
cadmium	mg/L	0.005	0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0001	<0.00010	<0.0001	<0.00010	<0.00010	<0.00010
calcium	mg/L	-	-	72	69	70	82	72	100	91	82	70
chloride	mg/L	250	-	9	11	9	10	15	26	27	23	13
chromium	mg/L	0.05	-	< 0.005	< 0.005	< 0.005	< 0.005	<0.0050	<0.005	<0.0050	<0.0050	<0.0050
cobalt	mg/L	-	0.0009	**0.017**	**0.0013**	**0.0039**	**0.001**	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050
copper	mg/L	1	[0.005] b	< 0.001	< 0.001	< 0.001	< 0.001	<0.0010	<0.001	<0.0010	<0.0010	<0.0010
fluoride	mg/L	1.5 - 2.4	-	0.2	0.3	0.3	0.3	0.29	0.27	0.3	0.34	0.31
free cyanide	mg/L	0.2	0.005	< 0.002	< 0.002	< 0.002	< 0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.0010
hardness	mg $CaCO_3$/L	80-100	-	470	430	450	490	430	600	530	450	380
iron	mg/L	0.3	0.3	**0.86**	**0.8**	**0.83**	**0.69**	**0.84**	**1.1**	**1.1**	**0.82**	**0.80**
lead	mg/L	0.01	[0.005] c	< 0.0005	< 0.0005	< 0.0005	< 0.0005	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050
magnesium	mg/L	-	-	71	62	66	70	61	84	73	59	51
manganese	mg/L	0.05	-	0.056	0.028	0.033	0.033	0.033	0.04	0.039	0.032	0.031
mercury	mg/L	0.001	0.0002	< 0.0015 (1)	< 0.0001	< 0.0001	< 0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001
molybdenum	mg/L	-	0.04	0.003	0.003	0.003	0.0035	0.0031	0.0032	0.003	0.003	0.0028
nickel	mg/L	-	0.025		< 0.001	< 0.001	< 0.001	<0.0010	<0.001	<0.0010	<0.0010	<0.0010
nitrate as N	mg/L	10	-	< 0.1	< 0.1	< 0.1	< 0.1	<0.10	<0.10	<0.10	<0.10	<0.10
nitrite as N	mg/L	1	-	< 0.01	< 0.01	< 0.01	< 0.01	<0.010	0.20	<0.010	<0.010	0.014
pH	pH Units	6.5-8.5	6.5-8.5	8.2	8.2	7.88	7.95	8.00	7.82	7.92	7.8	8.07
phenol	mg/L	-	0.005	< 0.001	< 0.001	< 0.001	< 0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
phosphate	mg/L	-	-	< 0.01	< 0.01	< 0.01	< 0.01	<0.010	<0.010	<0.010	<0.010	<0.010
phosphorous	mg/L	-	-	< 0.1	< 0.1	< 0.1	< 0.1	<0.1	<0.1	<0.10		<0.10
total phosphorous	mg/L	-	0.01	**3.3**	**0.6**	**0.22**	**1.6**	**10**	**1.6**	**2**	**0.82**	**7.20**
potassium	mg/L	-	-	17	17	16	21	18	21	20	20	18
selenium	mg/L	0.01	0.1	< 0.002	< 0.002	< 0.002	< 0.002	<0.0020	<0.002	<0.0020	<0.0020	<0.0020
silicon	mg/L	-	-	9.3	8.4	8.6	9.2	8.8	7.5	6.8	7.1	7.3
silver	mg/L	-	0.0001	< 0.0001	< 0.0001	< 0.0001	0.0001	<0.00010	<0.0001	<0.00010	<0.00010	<0.00010
sodium	mg/L	200 d	-	62	64	55	76	71	92	84	94	69
strontium	mg/L	-	-	11	10	11	11	10	14	12	11	10
sulphide	mg/L	0.05	-	< 0.02	< 0.02	< 0.02	< 0.02	0.021	<0.020	<0.020	<0.020	<0.020
sulphate	mg/L	500	-	141	148	140	147	160	360	330	270	130
thallium	mg/L	-	0.0003	< 0.00005	< 0.00005	< 0.00005	< 0.00005	<0.000050	<0.00005	<0.00005	<0.00005	<0.00005
tin	mg/L	-	-	< 0.001	< 0.001	< 0.001	< 0.001	<0.0010	<0.001	<0.0010	<0.0010	<0.0010
titanium	mg/L	-	-	< 0.005	< 0.005	< 0.005	< 0.005	<0.0050	<0.005	0.0072	<0.0050	0.0058
TSS	mg/L	-	-	990	780	240	1900	14000	5900	2600	804	7500
turbidity	NTU	5	-	510	520	210	410	900	800	460	610	2100
uranium	mg/L	0.02	[0.005]	0.0004	0.0003	0.0003	0.0004	0.00032	0.00034	0.00023	0.0002	0.00020
vanadium	mg/L	-	[0.006]	< 0.001	< 0.001	< 0.001	< 0.0005	0.00053	0.00052	0.00055	<0.00050	<0.00050
zinc	mg/L	5	[0.02]	< 0.005	< 0.005	< 0.005	< 0.005	<0.0050	<0.005	<0.0050	<0.0050	<0.0050

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 overburden								
				Oct-08	Dec-09	Oct-10	Nov-11	Nov-12	Nov-13	Nov-14	Nov-15	Nov-16
aluminum	mg/L	0.1	[0.075] a	**0.7**	**0.36**	**4.8**	0.049	0.068	<0.005	**0.22**	**0.13**	**0.093**
alkalinity	mg $CaCO_3$/L	30-500	-	308	321	322	341	340	350	350	350	350
ammonia as N	mg/L	-	-	0.29	0.18	0.21	0.18	0.26	0.082	0.24	<0.050	0.077
antimony	mg/L	-	[0.02]	< 0.0005	0.0006	0.0011	< 0.0005	0.00050	<0.0005	<0.00050	<0.00050	0.00064
arsenic	mg/L	0.025	[0.005]	0.002	0.005	0.005	0.003	0.0021	0.0045	0.0019	0.0031	**0.0069**
barium	mg/L	1	-	0.074	0.054	0.2	0.057	0.052	0.052	0.043	0.053	0.056
beryllium	mg/L	-	1.1	< 0.0005	< 0.0005	< 0.0005	< 0.0005	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050
bismuth	mg/L	-	-	< 0.001	< 0.001	< 0.001	< 0.001	<0.0010	<0.001	<0.0010	<0.0010	<0.0010
boron	mg/L	5	0.2	0.17	0.13	0.089	0.085	0.097	0.13	0.091	0.086	0.1
bromide	mg/L	-	-	< 1	< 1	1	< 1	<1.0	<1.0	<1.0	<1.0	<1.0
cadmium	mg/L	0.005	0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0001	<0.00010	<0.0001	<0.00010	<0.00010	<0.00010
calcium	mg/L	-	-	110	73	130	65	61	61	56	63	60
chloride	mg/L	250	-	7	14	3	2	2.6	2.5	4.1	3.7	1.4
chromium	mg/L	0.05	-	< 0.005	< 0.005	0.014	< 0.005	<0.0050	<0.005	<0.0050	<0.0050	<0.0050
cobalt	mg/L	-	0.0009	**0.023**	**0.015**	**0.013**	**0.0021**	**0.0028**	<0.0005	**0.0013**	**0.0014**	0.0021
copper	mg/L	1	[0.005] b	0.003	< 0.001	**0.013**	< 0.001	<0.0010	<0.001	<0.0010	<0.0010	<0.0010
fluoride	mg/L	1.5 - 2.4	-	0.3	0.3	0.2	0.1	0.14	0.14	0.15	0.15	0.13
free cyanide	mg/L	0.2	0.005	< 0.002	< 0.002	< 0.002	< 0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.0010
hardness	mg $CaCO_3$/L	80-100	-	500	450	550	390	410	390	360	390	400
iron	mg/L	0.3	0.3	**1.4**	**0.7**	**7.6**	**0.63**	**0.42**	**0.51**	0.19	**0.64**	**0.84**
lead	mg/L	0.01	[0.005] c	0.0011	< 0.0005	**0.0051**	< 0.0005	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050
magnesium	mg/L	-	-	57	65	58	54	62	57	53	56	61
manganese	mg/L	0.05	-	0.32	0.14	0.68	0.074	0.074	0.062	0.06	0.08	0.049
mercury	mg/L	0.001	0.0002	< 0.0015 (1)	**0.0003**	< 0.0001	< 0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001
molybdenum	mg/L	-	0.04	0.022	0.009	0.002	0.0045	0.0027	0.0031	0.0028	0.0027	0.0019
nickel	mg/L	-	0.025	0.005	0.005	0.009	< 0.001	0.0011	<0.001	<0.0010	<0.0010	0.0013
nitrate as N	mg/L	10	-	< 0.1	< 0.1	< 0.1	< 0.1	<0.10	<0.10	<0.10	<0.10	<0.10
nitrite as N	mg/L	1	-	< 0.01	0.03	0.02	0.02	<0.010	<0.010	0.021	0.016	0.016
pH	pH Units	6.5-8.5	6.5-8.5	8.2	7.8	7.88	7.95	8.01	7.96	8.03	8.02	8.14
phenol	mg/L	-	0.005	< 0.001	< 0.001	< 0.001	< 0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
phosphate	mg/L	-	-	< 0.01	< 0.01	< 0.01	< 0.01	<0.010	<0.010	<0.010	<0.010	<0.010
phosphorous	mg/L	-	-	0.12	< 0.1	0.45	< 0.1	<0.1	<0.1	<0.10		<0.10
total phosphorous	mg/L	-	0.01	**50**	**100**	**19**	**2.4**	**2.6**	**7.7**	**14**	**12**	**10**
potassium	mg/L	-	-	14	8.6	7.1	4.4	4.2	4	3.7	4.2	4.1
selenium	mg/L	0.01	0.1	< 0.002	< 0.002	< 0.002	< 0.002	<0.0020	<0.002	<0.0020	<0.0020	<0.0020
silicon	mg/L	-	-	8.3	11	17	7.9	9.4	8.6	7.8	8.6	10
silver	mg/L	-	0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	<0.00010	<0.0001	<0.00010	<0.00010	<0.00010
sodium	mg/L	200 d	-	53	26	13	21	13	15	16	14	10
strontium	mg/L	-	-	1.2	0.98	1.2	1.1	1.1	1.2	1.1	1.1	1.4
sulphide	mg/L	0.05	-	< 0.02	0.16	0.17	0.06	0.042	0.057	0.064	<0.020	0.089
sulphate	mg/L	500	-	184	92	77	79	71	73	66	67	46
thallium	mg/L	-	0.0003	< 0.00005	< 0.00005	0.00006	< 0.00005	<0.000050	<0.00005	<0.00005	<0.00005	<0.00005
tin	mg/L	-	-	< 0.001	< 0.001	< 0.001	< 0.001	<0.0010	<0.001	<0.0010	<0.0010	<0.0010
titanium	mg/L	-	-	0.006	0.010	0.160	< 0.005	<0.0050	<0.005	0.012	<0.0050	0.0059
TSS	mg/L	-	-	98000	190000	88000	2300	7100	11000	22000	458	13000
turbidity	NTU	5	-	44000	130000	62000	840	1900	4700	6300	6100	10000
uranium	mg/L	0.02	[0.005]	**0.011**	0.0046	0.0042	0.0033	0.0028	0.0024	0.0026	0.0029	0.0015
vanadium	mg/L	-	[0.006]	0.002	0.005	**0.01**	0.0008	<0.00050	0.00051	0.00074	<0.00050	<0.00050
zinc	mg/L	5	[0.02]	0.007	< 0.005	**0.021**	< 0.005	<0.0050	<0.005	<0.0050	<0.0050	<0.0050

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 overburden						
				Dec-10	Nov-11	Nov-12	Nov-13	Nov-14	Nov-15	Nov-16
aluminum	mg/L	0.1	[0.075] a	NOT SAMPLED	**7.2**	NOT SAMPLED	NOT SAMPLED	NOT SAMPLED	NOT SAMPLED	NOT SAMPLED
alkalinity	mg $CaCO_3$/L	30-500	-		366					
ammonia as N	mg/L	-	-		< 0.05					
antimony	mg/L	-	[0.02]		0.0006					
arsenic	mg/L	0.025	[0.005]		0.004					
barium	mg/L	1	-		0.12					
beryllium	mg/L	-	1.1		0.0006					
bismuth	mg/L	-	-		< 0.001					
boron	mg/L	5	0.2		0.059					
bromide	mg/L	-	-		< 1					
cadmium	mg/L	0.005	0.0005		0.0002					
calcium	mg/L	-	-		100					
chloride	mg/L	250	-		183					
chromium	mg/L	0.05	-		0.01					
cobalt	mg/L	-	0.0009		**0.0046**					
copper	mg/L	1	[0.005] b		**0.016**					
fluoride	mg/L	1.5 - 2.4	-		0.6					
free cyanide	mg/L	0.2	0.005		< 0.002					
hardness	mg $CaCO_3$/L	80-100	-		740					
iron	mg/L	0.3	0.3		**12**					
lead	mg/L	0.01	[0.005] c		**0.01**					
magnesium	mg/L	-	-		150					
manganese	mg/L	0.05	-		0.27					
mercury	mg/L	0.001	0.0002		< 0.0001					
molybdenum	mg/L	-	0.04		0.0021					
nickel	mg/L	-	0.025		0.011					
nitrate as N	mg/L	10	-		1.1					
nitrite as N	mg/L	1	-		< 0.01					
pH	pH Units	6.5-8.5	6.5-8.5		7.84					
phenol	mg/L	-	-		< 0.001					
phosphate	mg/L	-	-		< 0.01					
total phosphorous	mg/L	-	0.01		**0.4**					
potassium	mg/L	-	-		4.3					
selenium	mg/L	0.01	0.1		0.004					
silicon	mg/L	-	-		6.8					
silver	mg/L	-	0.0001		< 0.0001					
sodium	mg/L	200 d	-		41					
strontium	mg/L	-	-		1.3					
sulphide	mg/L	0.05	-		< 0.02					
sulphate	mg/L	500	-		157					
thallium	mg/L	-	0.0003		0.00012					
tin	mg/L	-	-	**Note:** Insufficient water.	< 0.001	**Note:** Insufficient water.	**Note:** Insufficient water.			**Note:** Insufficient water.
titanium	mg/L	-	-		0.18					
TSS	mg/L	-	-		620					
turbidity	NTU	1	-		250					
uranium	mg/L	0.02	0.005		**0.011**					
vanadium	mg/L	-	0.006		**0.012**					
zinc	mg/L	5	0.02		**0.051**					

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-01 intermediate										
				Jan-07	Oct-08	Dec-09	Oct-10	Nov-11	Nov-12	Nov-13	Nov-14	Nov-15	Nov-16	Nov-16 DUP 2
aluminum	mg/L	0.1	[0.075] a	**180**	**NOT SAMPLED**	**360**	**60**	**66**	**15**	**31**	**49**	**45**	**26**	**21**
alkalinity	mg $CaCO_3$/L	30-500	-	-		459	-	443	410	440	450	470	500	500
ammonia as N	mg/L	-	-	-		-	-	0.13	0.24	<0.050	0.054	0.052	<0.050	<0.050
antimony	mg/L	-	[0.02]	< 0.01		< 0.005	< 0.0005	< 0.003	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050
arsenic	mg/L	0.025	[0.005]	**0.093**		**0.140**	**0.028**	**0.034**	**0.0082**	0.017	**0.02**	**0.022**	**0.011**	**0.0087**
barium	mg/L	1	-	1.6		2.8	0.43	0.53	0.16	0.23	0.33	0.39	0.18	0.15
beryllium	mg/L	-	1.1	0.012		0.021	0.0031	0.003	0.0012	0.0021	0.0026	0.0027	0.0014	0.0011
bismuth	mg/L	-	-	< 0.01		< 0.01	< 0.001	< 0.005	<0.0010	<0.001	<0.0010	<0.0010	<0.0010	<0.0010
boron	mg/L	5	0.2	**0.37**		**0.6**	0.19	**0.22**	0.09	0.2	0.14	0.19	0.19	0.19
bromide	mg/L	-	-	-		< 1	-	< 1	<1.0	<1.0	<2.0	<1.0	<5.0	<5.0
cadmium	mg/L	0.005	0.0005	**0.002**		**0.004**	**0.0006**	**0.0011**	**0.00052**	0.00049	**0.00052**	**0.0011**	0.00028	0.00021
calcium	mg/L	-	-	1100		2700	520	770	160	290	450	540	280	220
chloride	mg/L	250	-	111		157	214	183	120	95	100	95	77	79
chromium	mg/L	0.05	-	0.36		0.6	0.11	0.12	0.027	0.055	0.076	0.11	0.043	0.032
cobalt	mg/L	-	0.0009	**0.16**		**0.29**	**0.052**	**0.073**	**0.014**	**0.031**	**0.038**	**0.054**	**0.024**	**0.018**
copper	mg/L	1	[0.005] b	**0.32**		**0.58**	**0.095**	**0.13**	**0.03**	**0.064**	**0.097**	**0.078**	**0.035**	**0.026**
fluoride	mg/L	1.5 - 2.4	-	-		-	-	0.3	0.46	0.38	0.36	0.36	0.28	0.29
free cyanide	mg/L	0.2	0.005	-		-	-	< 0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.0010	<0.0010
hardness	mg $CaCO_3$/L	80-100	-	-		-	-	1000	780	770	890	910	1100	1100
iron	mg/L	0.3	0.3	**360**		**660**	**120**	**130**	**29**	**58**	**87**	**91**	**46**	**34**
lead	mg/L	0.01	[0.005] c	**0.16**		**0.29**	**0.054**	**0.064**	**0.016**	**0.034**	**0.043**	**0.045**	**0.023**	**0.017**
magnesium	mg/L	-	-	310		620	270	270	160	180	210	230	230	210
manganese	mg/L	0.05	-	6.7		16	2.7	5	0.65	1.5	1.8	2.5	1.2	0.83
mercury	mg/L	0.001	0.0002	< 0.0001		0.0002	< 0.0001	< 0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001	<0.0001
molybdenum	mg/L	-	0.04	0.024		0.02	0.005	0.006	0.0034	0.0039	0.0037	0.0036	0.0022	0.002
nickel	mg/L	-	0.025	**0.37**		**0.7**	**0.11**	**0.13**	**0.027**	**0.052**	**0.078**	**0.088**	**0.043**	**0.033**
nitrate as N	mg/L	10	-	-		0.6	-	0.6	0.82	0.52	0.29	0.12	<0.10	<0.10
nitrite as N	mg/L	1	-	-		< 0.01	-	< 0.01	<0.010	0.020	0.036	<0.010	<0.010	<0.010
pH	pH Units	6.5-8.5	6.5-8.5	-		-	-	7.61	7.91	7.87	7.75	7.72	7.87	7.94
phenol	mg/L	-	-	-		-	-	< 0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
phosphate	mg/L	-	-	-		< 0.01	-	0.01	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
total phosphorous	mg/L	-	0.01	-		-	**3**	**5.3**	**0.82**	**1.7**	**2.3**	**3.3**	**1.4**	**0.91**
potassium	mg/L	-	-	66		100	18	19	7.7	11	15	14	11	11
selenium	mg/L	0.01	0.1	< 0.02		< 0.02	0.006	< 0.01	0.0068	0.0067	0.0059	0.0039	<0.0020	<0.0020
silicon	mg/L	-	-	23		450	77	73	28	45	66	60	46	38
silver	mg/L	-	0.0001	**0.001**		**0.002**	**0.0004**	< 0.0005	**0.00014**	**0.00025**	**0.00016**	**0.00027**	**0.00011**	<0.00010
sodium	mg/L	200 d	-	46		85	59	52	45	45	48	50	52	50
strontium	mg/L	-	-	4.2		9.0	3.4	3.9	1.6	2	2.4	2.9	2.9	2.7
sulphide	mg/L	0.05	-	-		-	-	< 0.02	<0.020	<0.020	<0.020	0.021	<0.020	<0.020
sulphate	mg/L	500	-	-		-	-	385	280	340	380	440	620	620
thallium	mg/L	-	0.0003	**0.0021**		**0.0041**	**0.00057**	**0.0006**	0.00022	**0.00043**	**0.00056**	**0.00045**	0.00026	0.00022
tin	mg/L	-	-	< 0.01	**Note:** Insufficient water.	< 0.01	< 0.001	< 0.005	<0.0010	<0.001	<0.0010	0.0032	0.0024	0.0028
titanium	mg/L	-	-	1.9		7.1	1.1	0.84	0.35	0.67	0.95	0.58	0.44	0.43
TSS	mg/L	-	-	-		-	-	2900	1600	1900	3300	1540	2900	710
turbidity	NTU	1	-	-		-	-	77	720	210	1500	1400	1500	1000
uranium	mg/L	0.02	0.005	**0.032**		**0.043**	**0.017**	0.017	**0.013**	0.016	**0.014**	**0.015**	**0.016**	**0.015**
vanadium	mg/L	-	0.006	**0.39**		**0.70**	**0.12**	0.13	**0.03**	0.061	**0.089**	**0.094**	**0.05**	**0.038**
zinc	mg/L	5	0.02	**1**		**2**	**0.31**	0.43	**0.089**	**0.17**	**0.23**	**0.25**	**0.11**	**0.086**

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 deep									
				Jan-07	Oct-08	Dec-09	Oct-10	Nov-11	Nov-12	Nov-13	Nov-14	Nov-15	Nov-16
aluminum	mg/L	0.1	[0.075] a	**5.9**	**5.9**	**6**	**6.2**	**3.4**	**0.29**	**57**	**0.27**	**0.29**	**0.23**
alkalinity	mg CaCO$_3$/L	30-500	-	-	-	36	-	35	99	40	27	16	12
ammonia as N	mg/L	-	-	-	-	-	-	18	21	18	16	16	16
antimony	mg/L	-	[0.02]	< 0.05	< 0.005	< 0.01	0.005	< 0.01	<0.0050	<0.005	<0.0050	<0.0050	<0.0050
arsenic	mg/L	0.025	[0.005]	< 0.05	**0.014**	< 0.03	< 0.05	< 0.03	<0.02	**0.045**	<0.010	<0.010	<0.010
barium	mg/L	1	-	< 0.3	0.081	< 0.1	0.095	0.053	0.028	1	0.031	0.032	0.032
beryllium	mg/L	-	1.1	< 0.03	< 0.005	< 0.01	< 0.005	< 0.01	<0.0050	<0.005	<0.0050	<0.0050	<0.0050
bismuth	mg/L	-	-	< 0.05	< 0.01	< 0.03	< 0.01	< 0.03	<0.01	<0.01	<0.010	<0.010	<0.010
boron	mg/L	5	0.2	**5.7**	**6.1**	**5.4**	**6.4**	**6.3**	**6.1**	**6.3**	**6.1**	**6.5**	**6**
bromide	mg/L	-	-	-	-	192	-	138	140	150	100	140	120
cadmium	mg/L	0.005	0.0005	< 0.005	**0.003**	< 0.003	< 0.001	< 0.003	**0.002**	**0.008**	**0.0026**	<0.0010	<0.0010
calcium	mg/L	-	-	3500	2600	2400	2800	2000	2000	2700	1900	1900	1800
chloride	mg/L	250	-	19400	19800	16700	16300	13000	13000	13000	12000	12000	11000
chromium	mg/L	0.05	-	< 0.3	< 0.05	< 0.1	< 0.5	< 0.1	0.073	0.83	0.059	0.18	0.16
cobalt	mg/L	-	0.0009	< 0.03	< 0.01	< 0.01	< 0.005	< 0.01	<0.0050	**0.069**	<0.0050	<0.0050	**0.0055**
copper	mg/L	1	[0.005] b	**0.066**	**0.044**	**0.050**	**0.048**	**0.03**	**0.017**	**0.24**	<0.020	<0.050	<0.010
fluoride	mg/L	1.5 - 2.4	-	-	-	-	-	0.3	0.35	0.32	0.32	0.37	0.33
free cyanide	mg/L	0.2	0.005	-	-	-	-	< 0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.0010
hardness	mg CaCO$_3$/L	80-100	-	-	-	-	-	7200	6100	6700	6600	6200	6200
iron	mg/L	0.3	0.3	**27**	**17**	**18**	**20**	**9.6**	**1.4**	**110**	**7.5**	**14**	**11**
lead	mg/L	0.01	[0.005] c	< 0.03	0.005	< 0.01	**0.009**	< 0.01	<0.0050	**0.13**	<0.0050	<0.0050	<0.0050
magnesium	mg/L	-	-	800	660	580	720	500	490	650	450	470	440
manganese	mg/L	0.05	-	2.2	1.7	1.6	1.8	1.3	1.1	4.4	1.1	1.3	1.2
mercury	mg/L	0.001	0.0002	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001
molybdenum	mg/L	-	0.04	< 0.05	0.011	< 0.03	0.011	< 0.01	<0.0050	0.027	<0.0050	0.0069	0.013
nickel	mg/L	-	0.025	< 0.05	< 0.01	< 0.03	< 0.05	< 0.03	**0.037**	**0.47**	**0.16**	**0.32**	**0.34**
nitrate as N	mg/L	10	-	-	-	< 0.1	-	< 0.1	<0.10	<0.10	<0.10	<0.10	<0.10
nitrite as N	mg/L	1	-	-	-	< 0.01	-	< 0.05	<0.10	<0.010	<0.010	<0.010	<0.010
pH	pH Units	6.5-8.5	6.5-8.5	-	-	-	-	7.12	6.88	6.97	6.51	**6.36**	**6.49**
phenol	mg/L	-	-	-	-	-	-	0.008	0.062	0.019	0.01	0.0029	<0.0010
phosphate	mg/L	-	-	-	-	< 0.01	-	< 0.01	0.096	<0.010	<0.010	<0.010	<0.010
total phosphorous	mg/L	-	0.01	-	-	-	**0.15**	< 3	<1	**2.4**	<1.0	0.088	<1.0
potassium	mg/L	-	-	170	150	140	160	130	140	150	130	130	120
selenium	mg/L	0.01	0.1	< 0.1	< 0.02	< 0.05	< 0.1	< 0.05	<0.04	<0.04	<0.020	<0.020	<0.020
silicon	mg/L	-	-	12	12	11	11	7.4	4	63	3.8	3.5	3.6
silver	mg/L	-	0.0001	< 0.005	< 0.001	< 0.003	< 0.001	< 0.003	<0.0010	<0.001	<0.0010	<0.0010	<0.0010
sodium	mg/L	200 d	-	8600	7500	6900	7200	6600	6500	8000	6100	6200	5700
strontium	mg/L	-	-	69	52	49	61	44	42	59	38	40	38
sulphide	mg/L	0.05	-	-	-	-	-	< 0.02	4	0.048	0.16	<0.020	<0.020
sulphate	mg/L	500	-	-	-	-	-	1910	1900	1900	1900	1900	1700
thallium	mg/L	-	0.0003	< 0.003	< 0.0005	< 0.001	< 0.0005	< 0.001	<0.00050	**0.00058**	<0.00050	<0.00050	<0.00050
tin	mg/L	-	-	< 0.05	< 0.01	< 0.03	< 0.01	< 0.03	<0.01	<0.01	<0.010	<0.010	<0.010
titanium	mg/L	-	-	< 0.3	0.089	0.1	0.1	< 0.1	<0.05	0.68	<0.050	<0.050	<0.050
TSS	mg/L	-	-	-	-	-	-	560	120	1800	23	24000	34
turbidity	NTU	1	-	-	-	-	-	170	130	140	12	9.7	27
uranium	mg/L	0.02	0.005	< 0.005	< 0.001	< 0.003	0.001	< 0.003	<0.0010	0.0049	<0.0010	<0.0010	<0.0010
vanadium	mg/L	-	0.006	< 0.05	**0.016**	< 0.03	< 0.05	**0.014**	<0.01	**0.095**	<0.010	<0.0050	<0.0050
zinc	mg/L	5	0.02	< 0.3	**0.068**	< 0.1	**0.076**	< 0.1	<0.05	**0.41**	<0.050	<0.050	<0.050

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 overburden										
				Jan-07	Oct-08	Dec-09	Oct-10	Oct-10 DUP 3	Nov-11	Nov-12	Nov-13	Nov-14	Nov-15	Nov-16
aluminum	mg/L	0.1	[0.075] a	**540**	**750**	**85**	**22**	**25**	**43**	**31**	**25**	**31**	**41**	**24**
alkalinity	mg $CaCO_3$/L	30-500	-	-	-	695	700	700	707	730	730	710	690	730
ammonia as N	mg/L	-	-	-	-	-	< 0.05	0.06	0.13	0.50	0.53	0.14	0.12	0.69
antimony	mg/L	-	[0.02]	< 0.01	**0.088**	< 0.005	< 0.0005	< 0.0005	< 0.0005	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050
arsenic	mg/L	0.025	[0.005]	**0.22**	**0.24**	**0.03**	**0.01**	**0.01**	**0.03**	**0.016**	**0.011**	**0.014**	**0.019**	**0.0076**
barium	mg/L	1	-	6	6.9	0.76	0.18	0.21	0.57	0.34	0.24	0.29	0.41	0.24
beryllium	mg/L	-	1.1	0.038	0.064	< 0.005	0.0013	0.0013	0.0023	0.0020	0.0016	0.0015	0.0024	0.0013
bismuth	mg/L	-	-	< 0.01	0.15	< 0.01	0.001	< 0.001	< 0.001	<0.0010	<0.001	<0.0010	<0.0010	<0.0010
boron	mg/L	5	0.2	**0.77**	**1.6**	**0.4**	**0.3**	**0.3**	**0.3**	**0.3**	**0.33**	**0.32**	**0.33**	**0.31**
bromide	mg/L	-	-	-	-	< 1	-	-	< 1	<10	<5.0	<5.0	<5.0	<5.0
cadmium	mg/L	0.005	0.0005	**0.007**	**0.011**	< 0.001	0.0002	0.0003	**0.0009**	**0.0018**	0.0004	**0.00053**	**0.00066**	**0.00032**
calcium	mg/L	-	-	4600	5800	880	340	370	830	460	360	430	600	380
chloride	mg/L	250	-	25	11	10	11		11	18	14	14	22	12
chromium	mg/L	0.05	-	1.2	1.3	0.2	0.04	0.04	0.08	0.06	0.047	0.048	0.077	0.041
cobalt	mg/L	-	0.0009	**0.59**	**0.69**	**0.08**	**0.02**	**0.02**	**0.04**	**0.03**	**0.021**	**0.022**	**0.04**	**0.019**
copper	mg/L	1	[0.005] b	**1.2**	**1.4**	**0.2**	**0.04**	**0.04**	**0.09**	**0.06**	**0.042**	**0.058**	**0.089**	**0.041**
fluoride	mg/L	1.5 - 2.4	-	-	-	-	0.2	0.2	0.3	0.33	0.26	0.25	0.28	0.24
free cyanide	mg/L	0.2	0.005	-	-	-	< 0.002	< 0.002	< 0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.0010
hardness	mg $CaCO_3$/L	80-100	-	-	-	-	1900	2000	2100	1900	1900	1900	1800	1900
iron	mg/L	0.3	0.3	**1300**	**1400**	**180**	**40**	**46**	**100**	**72**	**48**	**54**	**87**	**46**
lead	mg/L	0.01	[0.005] c	**0.43**	**0.55**	**0.07**	**0.02**	**0.02**	**0.04**	**0.03**	**0.018**	**0.022**	**0.033**	**0.015**
magnesium	mg/L	-	-	790	1300	440	360	360	370	350	330	390	370	340
manganese	mg/L	0.05	-	37	39	5	1	1	4.2	2.4	1.8	1.7	3	1.5
mercury	mg/L	0.001	0.0002	< 0.0001	< 0.0015 (1)	< 0.0001	< 0.0001	< 0.0001	< 0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001
molybdenum	mg/L	-	0.04	**0.049**	< 0.1	< 0.01	0.004	0.004	0.0067	0.0064	0.0055	0.0043	0.0047	0.0023
nickel	mg/L	-	0.025	**1.4**	**1.5**	**0.2**	**0.042**	**0.1**	**0.093**	**0.067**	**0.042**	**0.054**	**0.09**	**0.041**
nitrate as N	mg/L	10	-	-	-	< 0.1	< 0.1	< 0.1	< 0.1	<0.10	<0.10	<0.10	<0.10	<0.10
nitrite as N	mg/L	1	-	-	-	< 0.01	< 0.01	< 0.01	< 0.01	<0.010	0.013	<0.010	<0.010	<0.010
pH	pH Units	6.5-8.5	6.5-8.5	-	-	-	7.57	7.56	7.52	7.61	7.40	7.49	7.57	7.58
phenol	mg/L	-	-	-	-	-	< 0.001	< 0.001	< 0.001	0.0013	0.0025	<0.0010	<0.0010	<0.0020
phosphate	mg/L	-	-	-	-	< 0.01	< 0.01	< 0.01	< 0.01	<0.010	<0.010	<0.010	<0.010	0.01
total phosphorous	mg/L	-	0.01	-	-	-	**1.1**	**1.1**	**4.4**	**2.1**	**1.2**	**1.7**	**4**	**1.5**
potassium	mg/L	-	-	160	200	26	15	15	17	15	17	16	16	15
selenium	mg/L	0.01	0.1	0.022	< 0.2	< 0.02	< 0.002	< 0.002	0.004	<0.0020	<0.002	<0.0020	<0.0020	<0.0020
silicon	mg/L	-	-	39	97	100	40	43	53	48	46	47	50	45
silver	mg/L	-	0.0001	**0.003**	< 0.01	< 0.001	**0.0002**	**0.0002**	**0.0003**	**0.00024**	**0.00019**	**0.00018**	**0.00031**	**0.00015**
sodium	mg/L	200 d	-	82	130	72	68	69	65	66	66	73	67	63
strontium	mg/L	-	-	14	19	5.7	4.6	4.6	5.5	4.8	4.2	4.7	4.8	5
sulphide	mg/L	0.05	-	-	-	-	< 0.020	< 0.020	< 0.02	0.33	0.18	0.021	<0.020	0.61
sulphate	mg/L	500	-	-	-	-	-	-	1320	1300	1300	1300	1300	1200
thallium	mg/L	-	0.0003	**0.0066**	**0.014**	**0.0009**	0.0002	0.0003	**0.00057**	**0.00032**	**0.00037**	0.0003	0.00041	0.00022
tin	mg/L	-	-	< 0.01	< 0.1	< 0.01	0.001	< 0.001	< 0.001	<0.0010	0.0012	<0.0010	0.0034	0.003
titanium	mg/L	-	-	4	11	1.5	0.56	0.61	0.97	<0.5	0.59	0.68	0.53	0.47
TSS	mg/L	-	-	-	-	-	1700	1600	7600	2600	1200	1900	2590	6300
turbidity	NTU	1	-	-	-	-	3600	3700	460	640	550	1500	1700	3800
uranium	mg/L	0.02	0.005	**0.068**	**0.11**	**0.027**	**0.020**	**0.021**	**0.020**	**0.023**	**0.018**	**0.018**	**0.019**	**0.011**
vanadium	mg/L	-	0.006	**1.3**	**1.6**	**0.18**	**0.05**	**0.05**	**0.09**	**0.07**	**0.056**	**0.055**	**0.083**	**0.047**
zinc	mg/L	5	0.02	**3.7**	**4.1**	**0.49**	**0.12**	**0.13**	**0.27**	**0.19**	**0.12**	**0.15**	**0.26**	**0.13**

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 intermediate									
				Jan-07	Oct-08	Dec-09	Oct-10	Nov-11	Nov-12	Nov-13	Nov-14	Nov-15	Nov-16
aluminum	mg/L	0.1	[0.075] a	**240**	**30**	**57**	**3**	**5.6**	**5.3**	**10**	**3.6**	**8.2**	**3.9**
alkalinity	mg $CaCO_3$/L	30-500	-	-	-	141	129	140	160	150	140	130	130
ammonia as N	mg/L	-	-	-	-	-	1.5	1.5	1.7	1.7	1.8	1.7	1.8
antimony	mg/L	-	[0.02]	< 0.01	< 0.005	< 0.005	< 0.0005	< 0.0005	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050
arsenic	mg/L	0.025	[0.005]	**0.13**	**0.014**	**0.03**	0.004	**0.006**	**0.0058**	**0.0053**	0.0042	0.0057	0.0037
barium	mg/L	1	-	3.9	0.35	0.93	0.04	0.12	0.19	0.32	0.11	0.26	0.066
beryllium	mg/L	-	1.1	0.017	< 0.005	< 0.005	< 0.0005	< 0.0005	<0.00050	0.00063	<0.00050	0.00059	<0.00050
bismuth	mg/L	-	-	< 0.01	< 0.01	< 0.01	< 0.001	< 0.001	<0.0010	<0.001	<0.0010	<0.0010	<0.0010
boron	mg/L	5	0.2	**2**	**1.9**	**1.7**	**2.3**	**1.8**	**1.8**	**2.1**	**2.3**	**2.2**	**2.1**
bromide	mg/L	-	-	-	-	1	-	< 10	<10	<5.0	<5.0	<5.0	<5.0
cadmium	mg/L	0.005	0.0005	**0.003**	< 0.001	< 0.001	< 0.0001	0.0001	<0.00010	<0.0001	<0.00010	0.00016	<0.00010
calcium	mg/L	-	-	2200	380	610	230	240	240	250	240	260	220
chloride	mg/L	250	-	182	113	87	147	106	130	140	180	180	160
chromium	mg/L	0.05	-	0.54	0.054	0.110	0.006	0.012	0.013	0.018	0.0057	0.016	0.0067
cobalt	mg/L	-	0.0009	**0.26**	**0.0280**	**0.0610**	**0.0028**	**0.0059**	**0.0056**	**0.0071**	**0.0029**	**0.0079**	**0.0026**
copper	mg/L	1	[0.005] b	**0.55**	**0.059**	**0.110**	0.004	**0.012**	**0.012**	**0.013**	**0.0068**	**0.014**	0.0046
fluoride	mg/L	1.5 - 2.4	-	-	-	-	0.2	0.3	0.27	0.24	0.25	0.29	0.22
free cyanide	mg/L	0.2	0.005	-	-	-	< 0.002	< 0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.0010
hardness	mg $CaCO_3$/L	80-100	-	-	-	-	940	980	1000	990	1000	990	1000
iron	mg/L	0.3	0.3	**540**	**55**	**120**	**6**	**11**	**11**	**14**	**6.2**	**14**	**5.6**
lead	mg/L	0.01	[0.005] c	**0.2**	**0.024**	**0.050**	0.003	**0.0064**	**0.0054**	**0.0079**	**0.0038**	**0.0078**	0.0022
magnesium	mg/L	-	-	360	150	180	130	120	120	120	130	120	120
manganese	mg/L	0.05	-	18	2	4	0.34	0.51	0.53	0.54	0.33	0.59	0.26
mercury	mg/L	0.001	0.0002	< 0.0001	< 0.0015 (1)	< 0.0001	< 0.0001	< 0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001
molybdenum	mg/L	-	0.04	0.038	0.013	0.01	0.01	0.0096	0.011	0.0092	0.0098	0.0089	0.0088
nickel	mg/L	-	0.025	**0.6**	**0.058**	**0.130**	0.006	0.012	0.014	0.015	0.0064	0.018	0.0063
nitrate as N	mg/L	10	-	-	-	< 0.1	< 0.1	< 0.1	<0.10	<0.10	<0.10	<0.10	<0.10
nitrite as N	mg/L	1	-	-	-	0.03	< 0.01	0.03	<0.010	0.010	0.013	<0.010	<0.010
pH	pH Units	6.5-8.5	6.5-8.5	-	-	-	7.74	7.73	7.43	7.61	7.73	7.72	7.7
phenol	mg/L	-	-	-	-	-	< 0.001	< 0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
phosphate	mg/L	-	-	-	-	< 0.01	< 0.01	< 0.01	<0.010	<0.010	<0.010	<0.010	<0.010
total phosphorous	mg/L	-	0.01	-	-	-	**0.17**	**0.36**	**0.35**	**0.47**	**0.21**	**0.4**	**0.11**
potassium	mg/L	-	-	97	26	28	21	19	19	22	22	21	20
selenium	mg/L	0.01	0.1	< 0.02	< 0.02	< 0.02	< 0.002	< 0.002	<0.0020	<0.002	<0.0020	<0.0020	<0.0020
silicon	mg/L	-	-	28	48	79	9.7	13	13	23	11	17	12
silver	mg/L	-	0.0001	< 0.001	< 0.001	< 0.001	< 0.0001	0.0001	<0.00010	<0.0001	<0.00010	0.0001	<0.00010
sodium	mg/L	200 d	-	250	190	160	210	170	200	200	230	210	180
strontium	mg/L	-	-	15	11	12	13	12	12	12	14	12	13
sulphide	mg/L	0.05	-	-	-	-	< 0.020	< 0.02	<0.020	<0.020	<0.020	<0.020	<0.020
sulphate	mg/L	500	-	-	-	-	-	1140	1100	1100	1100	1100	1000
thallium	mg/L	-	0.0003	**0.003**	**0.001**	**0.0007**	< 0.0001	0.0001	<0.000050	0.00014	<0.00005	0.00011	<0.000050
tin	mg/L	-	-	< 0.01	< 0.01	< 0.01	< 0.001	< 0.001	<0.0010	0.0055	<0.0010	0.0012	<0.0010
titanium	mg/L	-	-	2.5	0.6	0.89	0.06	0.14	0.12	0.29	0.091	0.16	0.094
TSS	mg/L	-	-	-	-	-	360	920	650	730	470	1980	190
turbidity	NTU	1	-	-	-	-	320	480	290	450	200	200	180
uranium	mg/L	0.02	0.005	**0.031**	0.004	**0.007**	0.001	0.002	0.0013	0.0016	0.00097	0.0016	0.00052
vanadium	mg/L	-	0.006	**0.52**	**0.062**	**0.1**	0.006	**0.012**	**0.012**	**0.021**	**0.0066**	**0.016**	**0.0077**
zinc	mg/L	5	0.02	**1.8**	**0.17**	**0.37**	0.02	**0.04**	**0.03**	**0.038**	0.02	**0.044**	0.014

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-02 deep								
				Jan-07	Oct-08	Dec-09	Nov-11	Nov-12	Nov-13	Nov-14	Nov-15	Nov-16
aluminum	mg/L	0.1	[0.075] a	**2.8**	**0.92**	**12**	**3.3**	**22**	**2.9**	**0.15**	0.068	**5.1**
alkalinity	mg $CaCO_3$/L	30-500	-	-	-	51	35	47	52	49	44	42
ammonia as N	mg/L	-	-	-	-	-	16	16	16	18	15	16
antimony	mg/L	-	[0.02]	< 0.01	< 0.005	< 0.01	< 0.01	<0.0050	<0.01	<0.0050	<0.0025	<0.0025
arsenic	mg/L	0.025	[0.005]	< 0.05	< 0.05	< 0.02	< 0.02	**0.023**	<0.02	<0.010	<0.0050	**0.009**
barium	mg/L	1	-	0.052	< 0.05	0.3	0.088	0.35	0.056	0.022	0.023	0.091
beryllium	mg/L	-	1.1	< 0.005	< 0.005	< 0.01	< 0.01	<0.0050	<0.01	<0.0050	<0.0025	<0.0025
bismuth	mg/L	-	-	< 0.01	< 0.01	< 0.02	< 0.02	<0.01	<0.02	<0.010	<0.0050	<0.0050
boron	mg/L	5	0.2	**5.9**	**5.8**	**6.1**	**5.8**	**5.9**	**5.1**	**6.2**	**6.2**	**6.1**
bromide	mg/L	-	-	-	-	148	154	200	170	110	110	150
cadmium	mg/L	0.005	0.0005	**0.002**	< 0.001	< 0.002	< 0.002	<0.0010	<0.002	<0.0010	0.00084	<0.00050
calcium	mg/L	-	-	2100	1900	1900	2200	2000	1700	1900	1800	1900
chloride	mg/L	250	-	13000	12900	12400	12500	14000	13000	12000	13000	13000
chromium	mg/L	0.05	-	< 0.05	< 0.05	< 0.1	< 0.1	<0.05	<0.1	<0.050	0.029	<0.025
cobalt	mg/L	-	0.0009	< 0.01	< 0.01	**0.0100**	< 0.01	**0.0250**	<0.01	<0.0050	<0.0050	<0.0050
copper	mg/L	1	[0.005] b	**0.1**	**0.019**	**0.040**	**0.025**	**0.085**	<0.02	<0.020	<0.025	<0.020
fluoride	mg/L	1.5 - 2.4	-	-	-	-	< 1	0.34	0.31	0.32	0.4	0.29
free cyanide	mg/L	0.2	0.005	-	-	-	< 0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.0010
hardness	mg $CaCO_3$/L	80-100	-	-	-	-	6500	6400	6500	6400	6800	7000
iron	mg/L	0.3	0.3	**13**	**6.4**	**29.0**	**11**	**42**	**7**	**2**	**5.1**	**13**
lead	mg/L	0.01	[0.005] c	< 0.005	< 0.005	**0.010**	< 0.01	**0.018**	<0.01	<0.0050	<0.0025	0.0041
magnesium	mg/L	-	-	490	490	480	550	480	420	470	410	440
manganese	mg/L	0.05	-	1.3	1.1	1.8	1.4	2.0	1.1	1	0.96	1.2
mercury	mg/L	0.001	0.0002	< 0.0001	< 0.0001	< 0.0001	< 0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001
molybdenum	mg/L	-	0.04	0.014	< 0.01	< 0.02	< 0.01	0.012	<0.01	<0.0050	0.0045	0.0093
nickel	mg/L	-	0.025	< 0.01	< 0.01	**0.050**	< 0.02	**0.068**	<0.02	0.017	0.015	0.016
nitrate as N	mg/L	10	-	-	-	< 0.1	< 0.1	<0.10	<0.10	<0.10	<0.10	<0.10
nitrite as N	mg/L	1	-	-	-	< 0.01	< 0.1	<0.10	0.012	0.019	0.043	<0.010
pH	pH Units	6.5-8.5	6.5-8.5	-	-	-	7.16	6.66	6.93	7.15	6.95	7.05
phenol	mg/L	-	-	-	-	-	0.001	<0.0010	0.017	0.0062	0.0021	0.0027
phosphate	mg/L	-	-	-	-	< 0.01	< 0.01	<0.010	<0.010	0.044	<0.010	<0.010
total phosphorous	mg/L	-	0.01	-	-	-	< 2	**1.40**	**0.44 (1)**	<1.0	**0.079**	<0.50
potassium	mg/L	-	-	130	120	110	130	120	100	130	120	120
selenium	mg/L	0.01	0.1	< 0.1	< 0.1	0.060	< 0.04	<0.04	<0.04	<0.020	<0.010	<0.010
silicon	mg/L	-	-	8.1	4.9	18	6.9	30	6	3.6	3.5	10
silver	mg/L	-	0.0001	< 0.001	< 0.001	< 0.002	< 0.002	<0.0010	<0.002	<0.0010	<0.00050	<0.00050
sodium	mg/L	200 d	-	6600	6900	5600	7000	6200	5400	6500	5500	5700
strontium	mg/L	-	-	43	41	40	45	41	35	38	37	40
sulphide	mg/L	0.05	-	-	-	-	< 0.02	<0.020	1.6	1.1	0.09	<0.020
sulphate	mg/L	500	-	-	-	-	2030	2100	2000	2000	2000	1900
thallium	mg/L	-	0.0003	< 0.0005	< 0.0005	< 0.001	< 0.001	<0.00050	<0.001	<0.00050	<0.00025	<0.00025
tin	mg/L	-	-	< 0.01	< 0.01	< 0.02	< 0.02	<0.01	<0.02	<0.010	<0.0050	<0.0050
titanium	mg/L	-	-	< 0.05	< 0.05	0.2	< 0.1	0.42	<0.1	<0.050	<0.025	0.1
TSS	mg/L	-	-	-	-	-	540	2900	270	15	22800	610
turbidity	NTU	1	-	-	-	-	290	630	110	21	41	280
uranium	mg/L	0.02	0.005	< 0.001	< 0.001	< 0.002	< 0.002	0.0017	<0.002	<0.0010	<0.00050	0.00071
vanadium	mg/L	-	0.006	< 0.05	< 0.05	**0.050**	< 0.01	0.054	<0.01	<0.010	<0.0025	**0.014**
zinc	mg/L	5	0.02	**0.086**	< 0.05	**0.100**	< 0.1	0.210	<0.1	<0.050	<0.025	**0.038**

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 overburden									
				Jan-07	Oct-08	Dec-09	Oct-10	Nov-11	Nov-12	Nov-13	Nov-14	Nov-15	Nov-16
aluminum	mg/L	0.1	[0.075] a	**120**	**40**	**50**	**88**	**5.6**	**10**	**230**	**21**	**38**	**18**
alkalinity	mg $CaCO_3$/L	30-500	-	-	-	110	109	175	170	160	150	140	130
ammonia as N	mg/L	-	-	-	-	-	1.2	0.89	1.1	1.2	0.85	1	1.2
antimony	mg/L	-	[0.02]	< 0.01	< 0.005	0.003	< 0.005	< 0.0005	<0.00050	<0.005	<0.00050	<0.00050	<0.00050
arsenic	mg/L	0.025	[0.005]	**0.067**	**0.043**	**0.038**	**0.051**	0.005	**0.0092**	**0.19**	**0.024**	**0.032**	**0.016**
barium	mg/L	1	-	0.85	0.33	0.36	0.69	0.12	0.06	2.1	0.16	0.27	0.13
beryllium	mg/L	-	1.1	0.008	< 0.005	0.003	< 0.005	< 0.0005	<0.00050	0.012	0.0012	0.002	0.00086
bismuth	mg/L	-	-	< 0.01	< 0.01	0.005	< 0.01	< 0.001	<0.0010	<0.01	<0.0010	<0.0010	<0.0010
boron	mg/L	5	0.2	**1.2**	**1.3**	**1.2**	**1.6**	**1.8**	**1.3**	**1.8**	**1.2**	**1.2**	**1.2**
bromide	mg/L	-	-	-	-	6	-	< 1	1.2	<5.0	2.4	<5.0	<5.0
cadmium	mg/L	0.005	0.0005	**0.002**	< 0.001	**0.001**	**0.002**	< 0.0001	0.00025	**0.0079**	**0.00057**	**0.00065**	**0.00058**
calcium	mg/L	-	-	1800	790	1100	1400	240	250	4700	450	790	480
chloride	mg/L	250	-	492	281	518	574	78	70	82	120	120	240
chromium	mg/L	0.05	-	0.3	0.096	0.110	0.180	0.011	0.018	0.48	0.05	0.081	0.038
cobalt	mg/L	-	0.0009	**0.13**	**0.045**	**0.049**	**0.083**	**0.0057**	**0.0069**	**0.24**	**0.021**	**0.042**	**0.015**
copper	mg/L	1	[0.005] b	**0.34**	**0.12**	**0.14**	**0.23**	**0.01**	**0.02**	**0.66**	**0.056**	**0.11**	**0.046**
fluoride	mg/L	1.5 - 2.4	-	-	-	0.2	0.2	0.2	0.19	0.17	0.19	0.21	0.2
free cyanide	mg/L	0.2	0.005	-	-	-	< 0.002	< 0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.0010
hardness	mg $CaCO_3$/L	80-100	-	-	-	-	1000	870	880	920	880	910	870
iron	mg/L	0.3	0.3	**270**	**89**	**110**	**160**	**11**	**15**	**510**	**44**	**83**	**35**
lead	mg/L	0.01	[0.005] c	**0.12**	**0.047**	**0.054**	**0.087**	**0.0064**	**0.0063**	**0.27**	**0.021**	**0.038**	**0.016**
magnesium	mg/L	-	-	290	180	210	260	120	150	710	160	190	150
manganese	mg/L	0.05	-	14	5.4	7.8	9.5	0.51	0.79	35	2.4	4.7	2.6
mercury	mg/L	0.001	0.0002	< 0.0001	< 0.0015 (1)	0.0001	< 0.0001	< 0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001
molybdenum	mg/L	-	0.04	0.015	0.015	0.007	0.016	0.0095	0.0066	0.031	0.0086	0.009	0.0089
nickel	mg/L	-	0.025	**0.28**	**0.087**	**0.100**	**0.160**	0.011	0.015	**0.41**	**0.042**	**0.086**	**0.031**
nitrate as N	mg/L	10	-	-	-	0.3	< 0.1	0.6	<0.10	0.37	<0.10	<0.10	0.13
nitrite as N	mg/L	1	-	-	-	0.14	0.02	0.22	0.020	0.38	0.062	0.101	0.136
pH	pH Units	6.5-8.5	6.5-8.5	-	-	-	7.76	7.78	7.58	7.80	7.91	7.87	7.87
phenol	mg/L	-	-	-	-	-	< 0.001	< 0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
phosphate	mg/L	-	-	-	-	0.01	< 0.01	< 0.01	<0.010	<0.010	<0.010	<0.010	<0.010
total phosphorous	mg/L	-	0.01	-	-	-	**9.1**	**0.35**	**0.64**	**16**	**2.4**	**4.2**	**2.2**
potassium	mg/L	-	-	49	20	20	43	19	14	73	15	18	17
selenium	mg/L	0.01	0.1	< 0.02	< 0.02	0.01	< 0.02	< 0.002	<0.0020	<0.02	<0.0020	<0.0020	<0.0020
silicon	mg/L	-	-	20	55	62	120	13	25	310	38	49	36
silver	mg/L	-	0.0001	< 0.001	< 0.001	**0.0005**	< 0.001	< 0.0001	<0.00010	**0.0014**	**0.00011**	**0.0002**	<0.00010
sodium	mg/L	200 d	-	250	190	160	290	170	140	310	150	160	190
strontium	mg/L	-	-	13	12	13	15	12	12	23	13	12	12
sulphide	mg/L	0.05	-	-	-	-	< 0.020	< 0.02	<0.020	0.028	<0.020	0.02	<0.020
sulphate	mg/L	500	-	-	-	-	-	900	900	890	900	920	850
thallium	mg/L	-	0.0003	**0.0013**	< 0.0005	**0.0004**	**0.0011**	0.0001	<0.000050	**0.0029**	0.00022	**0.00035**	0.00016
tin	mg/L	-	-	< 0.01	< 0.01	0.005	< 0.01	< 0.001	<0.0010	<0.01	0.001	0.0016	0.0022
titanium	mg/L	-	-	1.8	0.9	0.86	2.6	0.14	0.33	7.1	0.57	0.73	0.52
TSS	mg/L	-	-	-	-	-	21000	5800	1100	24000	2600	1650	3500
turbidity	NTU	1	-	-	-	-	19000	600	590	890	7.4	1200	1900
uranium	mg/L	0.02	0.005	**0.012**	**0.007**	0.0040	**0.01**	0.0015	0.00087	**0.029**	0.0022	0.0035	0.0018
vanadium	mg/L	-	0.006	**0.27**	**0.1**	**0.1**	**0.2**	**0.012**	**0.019**	**0.5**	**0.044**	**0.08**	**0.037**
zinc	mg/L	5	0.02	**0.96**	**0.31**	**0.35**	**0.48**	**0.041**	**0.059**	**1.5**	**0.17**	**0.23**	**0.12**

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 intermediate											
				Jan-07	Oct-08	Dec-09	Oct-10	Nov-11	Nov-11 DUP 3	Nov-12	Nov-13	Nov-14	Nov-15	Nov-16	Nov-16 DUP-3
aluminum	mg/L	0.1	[0.075] a	**1.6**	**1.3**	**0.59**	**3.3**	**4.2**	**4.5**	**9.5**	**1.4**	**0.29**	**0.29**	**8.80**	**9.5**
alkalinity	mg $CaCO_3$/L	30-500	-	-	-	88	72	56	53	62	51	50	84	58	51
ammonia as N	mg/L	-	-	-	-	-	7.9	9.6	9.9	10	9.9	13	7.3	11	11
antimony	mg/L	-	[0.02]	< 0.01	< 0.005	< 0.005	< 0.0005	< 0.005	< 0.005	<0.0050	<0.005	<0.0050	<0.0025	<0.0025	<0.0025
arsenic	mg/L	0.025	[0.005]	< 0.05	< 0.01	< 0.01	**0.007**	< 0.01	< 0.01	<0.01	<0.01	<0.010	<0.0050	<0.0050	<0.0050
barium	mg/L	1	-	0.053	< 0.05	< 0.05	0.054	0.088	0.1	0.12	0.061	0.02	0.024	0.12	0.11
beryllium	mg/L	-	1.1	< 0.005	< 0.005	< 0.005	< 0.0005	< 0.005	< 0.005	<0.0050	<0.005	<0.0050	<0.0025	<0.0025	<0.0025
bismuth	mg/L	-	-	< 0.01	< 0.01	< 0.01	< 0.001	< 0.01	< 0.01	<0.01	<0.01	<0.010	<0.0050	<0.0050	<0.0050
boron	mg/L	5	0.2	**5.4**	**3.5**	**4.8**	**4.8**	**4.6**	**4.9**	**5.3**	**5.1**	**5**	**4.2**	**4.80**	**5**
bromide	mg/L	-	-	-	-	31	-	< 500	< 0.5	120	98	160	<50	84	83
cadmium	mg/L	0.005	0.0005	< 0.001	**0.002**	< 0.001	< 0.0001	< 0.001	< 0.001	**0.002**	<0.001	**0.0012**	**0.0041**	**0.0013**	**0.00096**
calcium	mg/L	-	-	2100	630	510	970	1200	1300	1700	1500	1100	940	1600	1600
chloride	mg/L	250	-	11500	3220	2440	4980	6480	6470	8200	7600	18000	6200	7600	7700
chromium	mg/L	0.05	-	< 0.05	< 0.05	< 0.05	0.006	< 0.05	< 0.05	<0.05	<0.05	<0.050	<0.025	<0.025	<0.025
cobalt	mg/L	-	0.0009	< 0.005	< 0.005	< 0.005	**0.0012**	< 0.005	< 0.005	<0.0050	<0.005	<0.0050	<0.0025	0.01	<0.0050
copper	mg/L	1	[0.005] b	**0.033**	< 0.01	< 0.01	0.002	**0.018**	**0.016**	**0.019**	<0.01	<0.010	<0.010	**0.01**	**0.0088**
fluoride	mg/L	1.5 - 2.4	-	-	-	0.4	0.3	0.3	0.3	0.25	0.26	0.21	0.38	0.27	0.28
free cyanide	mg/L	0.2	0.005	-	-	-	< 0.002	< 0.002	< 0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.0010	<0.0010
hardness	mg $CaCO_3$/L	80-100	-	-	-	-	3300	4900	5100	5500	5000	3900	4000	6000	6000
iron	mg/L	0.3	0.3	**9.8**	**3.3**	**2.0**	**5.4**	**9.2**	**9.6**	**15.0**	**4.8**	<1.0	**0.85**	**12**	**13**
lead	mg/L	0.01	[0.005] c	< 0.005	< 0.005	< 0.005	0.0016	0.005	0.005	<0.0050	<0.005	<0.0050	<0.0025	0.0041	0.0039
magnesium	mg/L	-	-	550	230	180	270	390	400	560	450	350	290	450	470
manganese	mg/L	0.05	-	1.1	0.38	0.26	0.51	0.77	0.87	0.93	0.77	0.52	0.43	1	1
mercury	mg/L	0.001	0.0002	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001	<0.0001
molybdenum	mg/L	-	0.04	< 0.01	0.012	< 0.01	0.007	0.006	0.006	0.0074	0.0076	0.02	0.023	0.01	0.0073
nickel	mg/L	-	0.025	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	0.012	<0.01	<0.010	0.014	0.02	0.015
nitrate as N	mg/L	10	-	-	-	< 0.1	< 0.1	< 0.1	< 0.1	<0.10	<0.10	<1.0	<0.10	<0.10	<0.10
nitrite as N	mg/L	1	-	-	-	0.01	< 0.01	< 0.01	< 0.01	<0.010	<0.010	<0.10	0.011	0.01	<0.010
pH	pH Units	6.5-8.5	6.5-8.5	-	-	-	7.45	7.37	7.38	6.96	7.15	7.16	7.36	7.31	7.39
phenol	mg/L	-	-	-	-	-	< 0.001	0.001	0.001	<0.0010	0.0020	0.0074	<0.0010	0.0028	0.0031
phosphate	mg/L	-	-	-	-	< 0.01	< 0.01	< 0.01	< 0.01	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
total phosphorous	mg/L	-	0.01	-	-	-	< 0.1	< 1	< 1	<1	**0.13**	<1.0	**0.029**	<0.50	<0.50
potassium	mg/L	-	-	110	48	45	65	81	83	100	88	72	59	92	96
selenium	mg/L	0.01	0.1	< 0.1	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	<0.04	<0.04	<0.020	<0.010	<0.010	<0.010
silicon	mg/L	-	-	6.4	6.9	4.9	10	10	3.6	22	5.8	5	5	20	23
silver	mg/L	-	0.0001	< 0.001	**0.001**	< 0.001	**0.0002**	< 0.001	< 0.001	<0.0010	<0.001	<0.0010	<0.00050	<0.00050	<0.00050
sodium	mg/L	200 d	-	5000	1700	1500	2500	3100	3100	4100	3400	2800	2200	3800	3800
strontium	mg/L	-	-	46	17	13	23	28	29	41	35	26	22	35	36
sulphide	mg/L	0.05	-	-	-	-	< 0.020	< 0.02	< 0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
sulphate	mg/L	500	-	-	-	-	-	1650	1560	1500	1600	1600	1900	1400	1500
thallium	mg/L	-	0.0003	< 0.0005	< 0.0005	< 0.0005	< 0.00005	< 0.0005	< 0.0005	<0.00050	<0.0005	<0.00050	<0.00025	<0.00025	<0.00025
tin	mg/L	-	-	< 0.01	< 0.01	< 0.01	< 0.001	< 0.01	< 0.01	<0.01	<0.01	<0.010	<0.0050	<0.0050	<0.0050
titanium	mg/L	-	-	< 0.05	< 0.05	< 0.05	0.15	0.071	0.16	0.067	<0.05	<0.050	<0.025	0.31	0.071
TSS	mg/L	-	-	-	-	-	190	370	490	450	120	950	10900	390	340
turbidity	NTU	1	-	-	-	-	100	140	140	250	72	190	19	310	260
uranium	mg/L	0.02	0.005	< 0.001	0.001	< 0.001	0.0002	< 0.001	< 0.001	<0.0010	<0.001	**0.0056**	**0.0089**	0.00062	0.00057
vanadium	mg/L	-	0.006	< 0.05	< 0.01	< 0.01	< 0.005	**0.013**	**0.015**	**0.01**	<0.01	<0.0050	<0.0025	**0.014**	**0.014**
zinc	mg/L	5	0.02	**0.99**	**0.23**	< 0.05	**0.083**	**0.12**	**0.15**	**0.2**	**0.09**	**0.084**	**0.086**	**0.12**	**0.11**

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 overburden									
				Jan-07	Oct-08	Dec-09	Oct-10	Nov-11	Nov-12	Nov-13	Nov-14	Nov-15	Nov-16
aluminum	mg/L	0.1	[0.075] a	**35**	**37**	**230**	**10**	**14**	**6.5**	**2.3**	**5.3**	**2.4**	**7.9**
alkalinity	mg $CaCO_3$/L	30-500	-	-	-	390	387	384	390	380	390	400	420
ammonia as N	mg/L	-	-	-	-	-	0.05	< 0.05	0.13	0.12	<0.050	<0.050	<0.050
antimony	mg/L	-	[0.02]	< 0.001	< 0.005	< 0.005	< 0.005	< 0.0005	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050
arsenic	mg/L	0.025	[0.005]	**0.021**	**0.02**	**0.120**	< 0.010	**0.008**	0.0023	0.002	0.0025	0.0017	0.0023
barium	mg/L	1	-	0.39	0.36	2.100	0.150	0.180	0.093	0.079	0.09	0.069	0.1
beryllium	mg/L	-	1.1	0.002	< 0.005	0.016	< 0.005	0.0009	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050
bismuth	mg/L	-	-	< 0.001	< 0.01	< 0.01	< 0.01	< 0.001	<0.0010	<0.001	<0.0010	<0.0010	<0.0010
boron	mg/L	5	0.2	0.098	0.16	**0.5**	0.1	0.1	0.092	0.079	0.083	0.12	0.16
bromide	mg/L	-	-	-	-	< 1	-	< 1	<1.0	<1.0	<1.0	<1.0	<1.0
cadmium	mg/L	0.005	0.0005	**0.0009**	< 0.001	**0.0040**	< 0.0010	0.0004	0.00010	0.00013	0.00015	<0.00010	<0.00010
calcium	mg/L	-	-	260	310	1600	120	170	91	94	110	95	94
chloride	mg/L	250	-	8.0	4.0	4	5	4	4.2	3.6	3.9	4.9	4.2
chromium	mg/L	0.05	-	0.077	0.065	0.400	< 0.050	0.022	0.0074	<0.005	0.0069	<0.0050	0.0099
cobalt	mg/L	-	0.0009	**0.042**	**0.037**	**0.240**	**0.011**	**0.016**	**0.005**	**0.0034**	**0.0045**	**0.0036**	**0.0046**
copper	mg/L	1	[0.005] b	**0.074**	**0.066**	**0.420**	**0.019**	**0.027**	**0.007**	**0.0076**	**0.01**	0.0041	0.0076
fluoride	mg/L	1.5 - 2.4	-	-	-	0.3	0.2	0.2	0.23	0.20	0.2	0.21	0.21
free cyanide	mg/L	0.2	0.005	-	-	-	< 0.002	< 0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.0010
hardness	mg $CaCO_3$/L	80-100	-	-	-	-	450	560	460	470	470	450	470
iron	mg/L	0.3	0.3	**83**	**70**	**470**	**17**	**26**	**7**	**4.6**	**8**	**3.9**	**8.1**
lead	mg/L	0.01	[0.005] c	**0.046**	**0.061**	**0.280**	**0.014**	**0.024**	0.0050	0.0043	**0.0058**	0.0029	**0.006**
magnesium	mg/L	-	-	84	100	290	69	75	71	59	68	68	70
manganese	mg/L	0.05	-	2.2	2.4	13.0	0.7	1.2	0.4	0.3	0.36	0.33	0.37
mercury	mg/L	0.001	0.0002	< 0.0001	< 0.0015 (1)	0.0001	< 0.0001	< 0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001
molybdenum	mg/L	-	0.04	0.007	< 0.01	0.02	< 0.01	0.0046	0.0044	0.0042	0.0038	0.0037	0.0039
nickel	mg/L	-	0.025	**0.082**	**0.077**	**0.480**	0.020	**0.027**	0.0073	0.0062	0.0088	0.0054	0.0094
nitrate as N	mg/L	10	-	-	-	2.5	4.2	4.3	0.98	1.0	0.1	<0.10	<0.10
nitrite as N	mg/L	1	-	-	-	0.25	0.11	0.02	0.040	0.021	0.018	<0.010	<0.010
pH	pH Units	6.5-8.5	6.5-8.5	-	-	8.0	7.8	7.8	7.91	7.87	7.83	7.95	7.81
phenol	mg/L	-	-	-	-	-	< 0.001	< 0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
phosphate	mg/L	-	-	-	-	< 0.01	< 0.01	< 0.01	<0.010	<0.010	<0.010	0.011	<0.010
total phosphorous	mg/L	-	0.01	-	-	-	< 1	**0.85**	**0.15**	**0.12**	**0.24**	**0.08**	**0.15**
potassium	mg/L	-	-	13	14	71	7.3	8.2	7	4.9	6.2	5.6	7.6
selenium	mg/L	0.01	0.1	0.002	< 0.02	< 0.02	< 0.02	< 0.002	<0.0020	<0.002	<0.0020	<0.0020	<0.0020
silicon	mg/L	-	-	53	56	350	20	24	18	9	15	14	24
silver	mg/L	-	0.0001	< 0.0003	< 0.001	**0.00100**	< 0.001	< 0.0001	<0.00010	<0.0001	<0.00010	<0.00010	<0.00010
sodium	mg/L	200 d	-	23	34	49	28	28	26	21	22	22	22
strontium	mg/L	-	-	2	2.5	6.0	1.7	1.6	1.5	1.4	1.5	1.7	1.9
sulphide	mg/L	0.05	-	-	-	-	< 0.020	< 0.02	<0.020	0.069	0.069	0.026	0.023
sulphate	mg/L	500	-	-	-	-	-	116.000	110	130	130	82	86
thallium	mg/L	-	0.0003	**0.00044**	< 0.0005	**0.0029**	< 0.0005	0.00017	0.00007	<0.00005	0.000059	<0.00005	0.00007
tin	mg/L	-	-	< 0.001	< 0.01	< 0.01	< 0.01	< 0.001	<0.0010	<0.001	<0.0010	<0.0010	<0.0010
titanium	mg/L	-	-	0.78	0.7	5.3	0.23	0.3	0.17	0.052	0.1	0.048	0.25
TSS	mg/L	-	-	-	-	-	750	2500	1300	110	140	496	350
turbidity	NTU	1	-	-	-	-	4300	780	210	160	90	120	220
uranium	mg/L	0.02	0.005	**0.009**	**0.012**	**0.032**	**0.010**	**0.009**	**0.008**	**0.0087**	**0.0065**	**0.0056**	**0.0053**
vanadium	mg/L	-	0.006	**0.091**	**0.089**	**0.480**	**0.019**	**0.026**	**0.010**	0.005	**0.0091**	0.0045	**0.014**
zinc	mg/L	5	0.02	**0.24**	**0.22**	**1.40**	**0.05**	**0.08**	0.018	0.018	**0.025**	0.013	**0.024**

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 intermediate									
				Jan-07	Oct-08	Dec-09	Oct-10	Nov-11	Nov-12	Nov-13	Nov-14	Nov-15	Nov-16
aluminum	mg/L	0.1	[0.075] a	**38**	**12**	**10**	**3**	**2.4**	**7.4**	**2**	**2.8**	**5.8**	**4.8**
alkalinity	mg $CaCO_3$/L	30-500	-	-	-	50	50	55	65	53	52	50	55
ammonia as N	mg/L	-	-	-	-	-	6	5.7	6.2	6.1	6	5.9	5.5
antimony	mg/L	-	[0.02]	< 0.01	< 0.005	< 0.005	< 0.0005	< 0.0005	<0.0025	<0.0025	<0.0025	<0.00050	<0.0025
arsenic	mg/L	0.025	[0.005]	**0.014**	< 0.01	< 0.01	0.002	0.004	0.0050	<0.005	<0.0050	0.006	<0.0050
barium	mg/L	1	-	0.52	0.22	0.23	0.03	0.06	0.11	0.063	0.058	0.21	0.055
beryllium	mg/L	-	1.1	< 0.005	< 0.005	< 0.005	< 0.0005	< 0.0005	<0.0025	<0.0025	<0.0025	0.00056	<0.0025
bismuth	mg/L	-	-	< 0.01	< 0.01	< 0.01	< 0.001	< 0.001	<0.0050	<0.005	<0.0050	<0.0010	<0.0050
boron	mg/L	5	0.2	**7.2**	**6.7**	**6.4**	**7.1**	**6.4**	**5.9**	**6.1**	**6.6**	**6.9**	**7.2**
bromide	mg/L	-	-	-	-	21	-	21	21	25	<20	<20	11
cadmium	mg/L	0.005	0.0005	**0.002**	< 0.001	< 0.001	0.0001	0.0002	<0.00050	<0.0005	<0.00050	0.00015	<0.00050
calcium	mg/L	-	-	760	590	630	500	540	560	570	560	580	440
chloride	mg/L	250	-	1320	1540	1800	1500	1650	2100	2000	2000	1800	1100
chromium	mg/L	0.05	-	0.09	< 0.05	< 0.05	< 0.005	0.006	<0.025	<0.025	<0.025	0.0096	<0.025
cobalt	mg/L	-	0.0009	**0.037**	**0.01**	**0.01**	< 0.0005	**0.002**	**0.0029**	<0.0025	<0.0025	0.0052	<0.0025
copper	mg/L	1	[0.005] b	**0.1**	**0.034**	**0.030**	< 0.001	< 0.005	**0.007**	**0.0055**	<0.0050	0.011	<0.0050
fluoride	mg/L	1.5 - 2.4	-	-	-	0.5	0.5	0.6	0.55	0.54	0.49	0.58	0.53
free cyanide	mg/L	0.2	0.005	-	-	-	0.002	< 0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.0010
hardness	mg $CaCO_3$/L	80-100	-	-	-	-	1700	1700	2000	2000	1900	1900	1500
iron	mg/L	0.3	0.3	**71**	**21**	**20**	**3**	**5**	**9**	**4.9**	**4.7**	**11**	**5.4**
lead	mg/L	0.01	[0.005] c	**0.03**	**0.012**	**0.014**	0.002	0.003	**0.006**	0.0034	0.0033	0.0081	0.0033
magnesium	mg/L	-	-	180	160	170	140	150	160	140	160	150	130
manganese	mg/L	0.05	-	2.5	1.1	1.0	0.3	0.4	0.5	0.39	0.35	0.54	0.29
mercury	mg/L	0.001	0.0002	< 0.0001	< 0.0015 (1)	< 0.0001	< 0.0001	< 0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001
molybdenum	mg/L	-	0.04	0.015	0.012	0.01	0.009	0.01	0.0097	0.0087	0.009	0.0095	0.0079
nickel	mg/L	-	0.025	**0.081**	0.021	0.02	< 0.001	0.006	0.0062	0.0063	<0.0050	0.011	0.014
nitrate as N	mg/L	10	-	-	-	< 0.1	0.1	< 0.1	<0.10	<0.10	<0.10	<0.10	<0.10
nitrite as N	mg/L	1	-	-	-	< 0.01	0.01	0.03	<0.010	<0.010	0.012	<0.010	<0.010
pH	pH Units	6.5-8.5	6.5-8.5	-	-	-	7.5	7.48	7.11	7.41	7.46	7.37	7.46
phenol	mg/L	-	-	-	-	-	0.001	0.001	0.011	0.0044	<0.0020	<0.0010	<0.0010
phosphate	mg/L	-	-	-	-	< 0.01	0.01	< 0.01	<0.010	<0.010	<0.010	<0.010	<0.010
total phosphorous	mg/L	-	0.01	-	-	-	< 0.1	**0.14**	<0.5	**0.19**	<0.50	**0.28**	<0.50
potassium	mg/L	-	-	57	49	49	47	49	51	47	50	51	44
selenium	mg/L	0.01	0.1	< 0.02	< 0.02	< 0.02	< 0.002	0.002	<0.01	<0.01	<0.010	<0.0020	<0.010
silicon	mg/L	-	-	57	23	19	9.9	7	19	6.5	8.1	28	14
silver	mg/L	-	0.0001	< 0.001	< 0.001	< 0.001	< 0.0001	< 0.0001	<0.00050	<0.0005	<0.00050	<0.00010	<0.00050
sodium	mg/L	200 d	-	930	1000	1100	1000	1000	1200	1100	1200	1200	820
strontium	mg/L	-	-	16	12	14	13	15	14	14	13	13	13
sulphide	mg/L	0.05	-	-	-	-	0.020	< 0.02	1	0.94	0.031	<0.020	0.021
sulphate	mg/L	500	-	-	-	-		1800	1800	1800	1800	1800	1500
thallium	mg/L	-	0.0003	< 0.0005	< 0.0005	< 0.0005	< 0.00005	< 0.00005	<0.00025	<0.00025	<0.00025	0.000077	<0.00025
tin	mg/L	-	-	< 0.01	< 0.01	< 0.01	< 0.001	< 0.001	<0.0050	<0.005	<0.0050	0.0012	<0.0050
titanium	mg/L	-	-	0.64	0.22	0.25	0.089	0.064	0.31	0.05	0.077	0.12	0.11
TSS	mg/L	-	-	-	-	-	91	380	530	280	210	5650	230
turbidity	NTU	1	-	-	-	-	57	110	120	81	85	300	170
uranium	mg/L	0.02	0.005	**0.006**	0.001	0.003	0.0007	0.0011	0.0016	0.00089	0.00079	0.0018	0.0012
vanadium	mg/L	-	0.006	**0.086**	**0.04**	**0.02**	< 0.005 (1)	0.01	**0.01**	0.0048	0.0053	0.011	**0.0084**
zinc	mg/L	5	0.02	**0.26**	**0.072**	**0.100**	< 0.005	< 0.03	<0.025	<0.025	<0.025	**0.033**	<0.025

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 deep									
				Jan-07	Oct-08	Dec-09	Oct-10	Nov-11	Nov-12	Nov-13	Nov-14	Nov-15	Nov-16
aluminum	mg/L	0.1	[0.075] a	**8**	**9**	**41**		**5.2**	**0.65**	**7.4**	**8.5**	**0.26**	**0.15**
alkalinity	mg $CaCO_3$/L	30-500	-	-	-	66		102	150	160	180	74	97
ammonia as N	mg/L	-	-	-	-	-		37	19	31	32	3.3	2.20
antimony	mg/L	-	[0.02]	< 0.05	< 0.005	< 0.05		< 0.03	<0.0050	<0.025	<0.025	0.00077	<0.0025
arsenic	mg/L	0.025	[0.005]	< 0.05	**0.015**	< 0.1		**0.07**	<0.02	<0.05	<0.050	<0.0010	<0.0050
barium	mg/L	1	-	< 0.3	0.16	0.6		0.18	0.059	0.18	0.17	0.022	0.02
beryllium	mg/L	-	1.1	< 0.03	< 0.005	< 0.05		< 0.03	<0.0050	<0.025	<0.025	<0.00050	<0.0025
bismuth	mg/L	-	-	< 0.05	< 0.01	< 0.1		< 0.05	<0.01	<0.05	<0.050	<0.0010	<0.0050
boron	mg/L	5	0.2	**5**	**5.9**	**6.0**		**6.6**	**6.7**	**7.7**	**7.5**	**7.7**	**7.80**
bromide	mg/L	-	-	-	-	401		572	200	400	<500	<10	<10
cadmium	mg/L	0.005	0.0005	< 0.005	**0.007**	< 0.01		**0.017**	**0.0044**	<0.005	**0.0052**	0.0043	**0.01**
calcium	mg/L	-	-	5900	3900	6800		7900	2500	4800	5200	310	310
chloride	mg/L	250	-	16800	34700	32700		45000	16000	33000	29000	540	500
chromium	mg/L	0.05	-	< 0.3	0.096	< 0.5		< 0.3	<0.05	<0.25	<0.25	0.021	0.03
cobalt	mg/L	-	0.0009	< 0.03	< 0.03	< 0.05		**0.031**	<0.0050	<0.025	<0.025	**0.0011**	<0.0025
copper	mg/L	1	[0.005] b	**0.24**	**0.13**	**0.80**		**0.18**	**0.03**	**0.17**	**0.17**	0.005	**0.01**
fluoride	mg/L	1.5 - 2.4	-	-	-	0.1	**N O T S A M P L E D**	< 0.1	0.18	<0.10	<0.10	0.65	0.57
free cyanide	mg/L	0.2	0.005	-	-	-		< 0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.0010
hardness	mg $CaCO_3$/L	80-100	-	-	-	-		27000	8400	16000	17000	3600	1100
iron	mg/L	0.3	0.3	**42**	**25**	**110**		**11**	**1**	**26**	**17**	**1.5**	**1.10**
lead	mg/L	0.01	[0.005] c	< 0.03	**0.013**	**0.060**		< 0.03	<0.0050	<0.025	<0.025	0.001	<0.0025
magnesium	mg/L	-	-	1200	920	1600		1800	620	990	1200	97	98
manganese	mg/L	0.05	-	4.2	2.30	6.50		5.5	1.6	3.5	3.6	0.26	0.23
mercury	mg/L	0.001	0.0002	0.0001	< 0.0001	< 0.0001		< 0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001
molybdenum	mg/L	-	0.04	< 0.05	0.026	< 0.1		< 0.03	0.019	<0.025	<0.025	0.0076	0.02
nickel	mg/L	-	0.025	< 0.05	< 0.1	< 0.1		**0.22**	<0.01	**0.099**	<0.050	0.024	**0.06**
nitrate as N	mg/L	10	-	-	-	< 0.1		< 0.1	<0.10	<0.10	<0.10	0.15	0.38
nitrite as N	mg/L	1	-	-	-	0.02		< 0.1	0.029	<0.010	<0.010	0.081	0.06
pH	pH Units	6.5-8.5	6.5-8.5	-	-	-		6.8	7.05	6.82	7.06	7.5	7.59
phenol	mg/L	-	-	-	-	-		0.07	0.022	0.057	0.079	<0.0010	<0.0010
phosphate	mg/L	-	-	-	-	< 0.01		< 0.01	0.019	<0.010	0.027	<0.010	<0.010
total phosphorous	mg/L	-	0.01	-	-	-		< 5	<1	**1.1**	<5.0	**0.13**	<0.50
potassium	mg/L	-	-	230	170	240		300	140	200	230	37	36
selenium	mg/L	0.01	0.1	< 0.1	< 0.02	< 0.2		< 0.2	<0.04	<0.1	<0.10	<0.0020	<0.010
silicon	mg/L	-	-	16	23	58		9	5	15	16	4.5	5.60
silver	mg/L	-	0.0001	< 0.005	< 0.001	< 0.01		< 0.005	<0.0010	<0.005	<0.0050	<0.00010	<0.00050
sodium	mg/L	200 d	-	13000	8900	14000		17000	7100	10000	12000	440	470
strontium	mg/L	-	-	120	84	130		170	54	100	100	13	13
sulphide	mg/L	0.05	-	-	-	-		< 0.02	<0.020	1.4	0.53	<0.020	<0.020
sulphate	mg/L	500	-	-	-	-		1540	1700	1400	2000	1300	1200
thallium	mg/L	-	0.0003	< 0.003	< 0.0005	< 0.005		< 0.003	<0.00050	<0.0025	<0.0025	<0.00005	<0.00025
tin	mg/L	-	-	< 0.05	< 0.01	< 0.1	**Note:** Insufficient water	< 0.05	<0.01	<0.05	<0.050	0.0017	<0.0050
titanium	mg/L	-	-	< 0.3	0.36	0.6		< 0.3	<0.05	<0.25	<0.25	0.0065	<0.025
TSS	mg/L	-	-	-	-	-		1600.000	290	1200	1500	2890	33
turbidity	NTU	1	-	-	-	-		340.000	66	300	140	8.00	5.10
uranium	mg/L	0.02	0.005	< 0.005	0.005	< 0.01		**0.024**	**0.032**	**0.028**	**0.028**	0.00095	**0.01**
vanadium	mg/L	-	0.006	< 0.05	< 0.05	< 0.1		< 0.05	<0.01	**0.029**	<0.025	0.00073	<0.0025
zinc	mg/L	5	0.02	< 0.3	**0.2**	**0.6**		< 0.3	<0.05	**0.71**	**0.26**	**0.034**	**0.04**

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-05 overburden									
				Jan-07	Oct-08	Dec-09	Oct-10	Nov-11	Nov-12	Nov-13	Nov-14	Nov-15	Nov-16
aluminum	mg/L	0.1	[0.075] a	NOT SAMPLED	**82**	**53**	**26**	**130**	**43**	**11**	**12**	**2**	**23**
alkalinity	mg $CaCO_3$/L	30-500	-		-	275	302	300	300	280	330	310	340
ammonia as N	mg/L	-	-		-	-	< 0.05	0.12	0.096	<0.050	<0.050	0.098	<0.050
antimony	mg/L	-	[0.02]		< 0.005	< 0.003	0.0005	< 0.005	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050
arsenic	mg/L	0.025	[0.005]		**0.049**	**0.032**	**0.021**	**0.098**	**0.027**	**0.0076**	**0.0071**	**0.001**	**0.01**
barium	mg/L	1	-		1.5	1.0	0.6	3.5	0.95	0.28	0.3	0.1	0.39
beryllium	mg/L	-	1.1		0.005	< 0.003	0.0016	0.006	0.0023	0.00069	0.00067	<0.00050	0.0012
bismuth	mg/L	-	-		< 0.01	< 0.005	< 0.001	< 0.01	<0.0010	<0.001	<0.0010	<0.0010	<0.0010
boron	mg/L	5	0.2		< 0.1	< 0.05	0.038	0.13	0.064	0.026	0.037	0.016	0.053
bromide	mg/L	-	-		-	< 1	-	< 1	<1.0	<1.0	<1.0	<1.0	<1.0
cadmium	mg/L	0.005	0.0005		**0.002**	**0.002**	**0.001**	**0.009**	**0.001**	0.00039	0.00018	0.00026	**0.0017**
calcium	mg/L	-	-		780	550	470	2100	600	250	250	150	270
chloride	mg/L	250	-		13	20	26	31	30	33	41	42	44
chromium	mg/L	0.05	-		0.2	0.1	0.1	0.33	0.10	0.024	0.025	<0.0050	0.047
cobalt	mg/L	-	0.0009		**0.1**	**0.1**	**0.036**	**0.23**	**0.052**	**0.015**	**0.012**	**0.0022**	**0.017**
copper	mg/L	1	[0.005] b		**0.47**	**0.35**	**0.17**	**1.10**	**0.23**	**0.069**	**0.059**	**0.012**	**0.089**
fluoride	mg/L	1.5 - 2.4	-		-	0.1	0.1	0.1	0.11	0.10	0.11	0.12	0.1
free cyanide	mg/L	0.2	0.005		-	-	< 0.002	< 0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.0010
hardness	mg $CaCO_3$/L	80-100	-		-	-	430	440	430	440	440	480	480
iron	mg/L	0.3	0.3		**170**	**110**	**62**	**320**	**93**	**24**	**24**	**3.5**	**38**
lead	mg/L	0.01	[0.005] c		**0.12**	**0.08**	**0.05**	**0.23**	**0.07**	**0.019**	**0.016**	0.0027	**0.025**
magnesium	mg/L	-	-		100	73	63	190	84	48	51	40	53
manganese	mg/L	0.05	-		14	16	7	64	10	2.8	1.6	0.24	1.9
mercury	mg/L	0.001	0.0002		< 0.0015 (1)	< 0.0001	< 0.0001	< 0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001
molybdenum	mg/L	-	0.04		0.012	0.006	0.004	0.022	0.0053	0.0019	0.0018	<0.00050	0.0015
nickel	mg/L	-	0.025		**0.19**	**0.15**	**0.063 (1)**	**0.49**	**0.09**	0.024	0.019	0.0041	**0.036**
nitrate as N	mg/L	10	-		-	< 0.1	< 0.1	< 0.1	<0.10	<0.10	<0.10	<0.10	<0.10
nitrite as N	mg/L	1	-		-	0.02	< 0.01	< 0.01	<0.010	<0.010	0.019	<0.010	<0.010
pH	pH Units	6.5-8.5	6.5-8.5		-	-	7.8	7.75	7.71	7.78	7.72	7.89	7.74
phenol	mg/L	-	-		-	-	< 0.001	< 0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
phosphate	mg/L	-	-		-	< 0.01	< 0.01	< 0.01	<0.010	<0.010	<0.010	<0.010	<0.010
total phosphorous	mg/L	-	0.01		-	-	**2.7**	**14**	**3.7**	**0.58**	**1**	**2**	**1.1**
potassium	mg/L	-	-		23	11	6.6	15	10	3.9	4.3	1.4	6.8
selenium	mg/L	0.01	0.1		< 0.02	< 0.01	< 0.002	< 0.02	<0.0020	<0.002	<0.0020	<0.0020	<0.0020
silicon	mg/L	-	-		39	64	40	87	60	20	23	9.8	42
silver	mg/L	-	0.0001		< 0.001	< 0.0005	**0.0002**	< **0.001**	**0.00035**	0.0001	<0.00010	<0.00010	**0.00015**
sodium	mg/L	200 d	-		6.8	6.8	6.7	11	8.5	6.9	8	8.1	8.9
strontium	mg/L	-	-		1.2	0.85	0.72	3.2	0.96	0.41	0.4	0.24	0.45
sulphide	mg/L	0.05	-		-	-	< 0.020	< 0.02	<0.020	<0.020	<0.020	0.084	<0.020
sulphate	mg/L	500	-		-	-	-	111	95	100	100	110	94
thallium	mg/L	-	0.0003		**0.0013**	**0.0006**	**0.0004**	**0.0018**	**0.0005**	0.00016	0.00014	<0.00005	0.00027
tin	mg/L	-	-		< 0.01	< 0.005	< 0.001	< 0.01	<0.0010	0.001	<0.0010	<0.0010	0.0041
titanium	mg/L	-	-		1.3	0.77	0.52	1.5	0.83	0.24	0.24	0.034	0.48
TSS	mg/L	-	-		-	-	4000	22000	5700	2300	930	558	850
turbidity	NTU	1	-		-	-	24	2700	1600	520	160	11	440
uranium	mg/L	0.02	0.005		**0.007**	0.0042	0.0038	**0.012**	0.0046	0.0029	0.0027	0.0023	0.0034
vanadium	mg/L	-	0.006		**0.17**	**0.10**	**0.06**	**0.25**	**0.08**	**0.024**	**0.023**	0.0041	**0.04**
zinc	mg/L	5	0.02		**0.66**	**0.40**	**0.19**	**1.20**	**0.25**	**0.077**	**0.063**	**0.011**	**0.11**

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 straddle									
				Oct-08	Dec-09	Oct-10	Nov-11	Nov-12	Nov-13	Nov-14	Nov-15	Nov-16	Nov-16 DUP-1
aluminum	mg/L	0.1	[0.075] a	**60**	**300**	**19**	**57**	**100**	**98**	**100**	**39**	**4.10**	**4.3**
alkalinity	mg $CaCO_3$/L	30-500	-	-	296	294	285	290	290	280	270	250	250
ammonia as N	mg/L	-	-	-	-	0.54	0.75	0.76	0.58	0.7	0.71	0.68	0.68
antimony	mg/L	-	[0.02]	< 0.005	< 0.005	< 0.0005	< 0.003	<0.0025	<0.005	<0.0050	<0.0025	0.00077	0.00098
arsenic	mg/L	0.025	[0.005]	**0.045**	**0.230**	**0.023**	**0.083**	**0.110**	**0.12**	**0.092**	**0.063**	**0.03**	**0.025**
barium	mg/L	1	-	0.7	3.5	0.3	0.6	0.7	0.82	0.7	0.37	0.08	0.081
beryllium	mg/L	-	1.1	< 0.005	0.017	0.0011	< 0.003	0.0046	0.0057	0.0059	<0.0025	<0.00050	<0.00050
bismuth	mg/L	-	-	< 0.01	< 0.01	< 0.001	< 0.005	<0.0050	<0.01	<0.010	<0.0050	<0.0010	<0.0010
boron	mg/L	5	0.2	**1.1**	**2.1**	**1.2**	**1.4**	**1.3**	**1.3**	**3**	**1.5**	**1.90**	**1.9**
bromide	mg/L	-	-	-	< 1	-	< 1	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
cadmium	mg/L	0.005	0.0005	**0.002**	**0.009**	0.0004	**0.0032**	**0.0027**	**0.0022**	**0.0012**	**0.00089**	**0.01**	**0.0069**
calcium	mg/L	-	-	920	4600	410	1400	2000	1600	1100	850	77	71
chloride	mg/L	250	-	8	5	8	9	6.7	7.7	9.7	9.7	9.3	7.9
chromium	mg/L	0.05	-	0.13	0.61	0.03	0.12	0.16	0.17	0.14	0.064	0.03	0.038
cobalt	mg/L	-	0.0009	**0.063**	**0.300**	**0.020**	**0.065**	**0.1**	**0.096**	**0.084**	**0.043**	**0.0027**	**0.0028**
copper	mg/L	1	[0.005] b	**0.16**	**0.87**	**0.05**	**0.19**	**1**	**0.29**	**0.25**	**0.11**	**0.01**	**0.012**
fluoride	mg/L	1.5 - 2.4	-	-	0.3	0.2	0.3	0.28	0.27	0.33	0.31	0.42	0.37
free cyanide	mg/L	0.2	0.005	-	-	< 0.002	< 0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.0010	<0.0010
hardness	mg $CaCO_3$/L	80-100	-	-	-	300	270	280	270	270	280	230	240
iron	mg/L	0.3	0.3	**120**	**590**	**40**	**140**	**230**	**200**	**170**	**81**	**6.1**	**6.2**
lead	mg/L	0.01	[0.005] c	**0.05**	**0.25**	**0.02**	**0.063**	**0.15**	**0.085**	**0.068**	**0.032**	0.0029	0.0031
magnesium	mg/L	-	-	110	470	66	140	210	210	150	77	31	30
manganese	mg/L	0.05	-	7	37	3	11	14	13	7.7	5.3	0.28	0.23
mercury	mg/L	0.001	0.0002	< 0.0015 (1)	< 0.0001	< 0.0001	< 0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001	<0.0001
molybdenum	mg/L	-	0.04	< 0.01	0.02	0.006	0.009	0.0049	0.0091	0.014	0.0055	0.01	0.0085
nickel	mg/L	-	0.025	**0.12**	**0.63**	**0.04**	**0.12**	**0.20**	**0.18**	**0.17**	**0.092**	0.018	0.022
nitrate as N	mg/L	10	-	-	0.3	< 0.1	0.5	0.27	0.51	0.24	0.44	0.22	0.22
nitrite as N	mg/L	1	-	-	0.16	0.03	0.04	0.022	0.038	0.044	0.016	0.02	0.015
pH	pH Units	6.5-8.5	6.5-8.5	-	-	7.93	7.9	7.90	7.94	7.9	8.09	7.87	7.91
phenol	mg/L	-	-	-	-	< 0.001	< 0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
phosphate	mg/L	-	-	-	< 0.01	< 0.01	< 0.01	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
total phosphorous	mg/L	-	0.01	-	-	**2.8**	**9.6**	**14**	**13**	**8**	**14**	**0.23**	**0.19**
potassium	mg/L	-	-	18	83	10	16	23	40	46	14	10	9.8
selenium	mg/L	0.01	0.1	< 0.02	< 0.02	< 0.002	< 0.01	<0.01	<0.02	<0.020	<0.010	<0.0020	<0.0020
silicon	mg/L	-	-	75	390	35	66	96	150	170	55	15	15
silver	mg/L	-	0.0001	**0.001**	**0.005**	**0.0002**	**0.0006**	**0.00065**	<0.001	<0.0010	<0.00050	<0.00010	**0.00011**
sodium	mg/L	200 d	-	25	45	24	28	30	32	58	32	37	36
strontium	mg/L	-	-	7.8	21	7.5	9.9	10	10	14	10	8.60	8.3
sulphide	mg/L	0.05	-	-	-	< 0.020	< 0.02	<0.020	0.049	<0.020	<0.020	<0.020	<0.020
sulphate	mg/L	500	-	-	-	-	52	41	47	58	51	67	49
thallium	mg/L	-	0.0003	< 0.0005	**0.0033**	0.0002	**0.0006**	**0.0006**	**0.0013**	**0.0011**	**0.00032**	<0.000050	<0.000050
tin	mg/L	-	-	< 0.01	< 0.01	< 0.001	< 0.005	<0.0050	<0.01	<0.010	<0.0050	0.0034	0.0037
titanium	mg/L	-	-	0.76	5.6	0.38	1	1.4	2.5	2	0.4	0.10	0.13
TSS	mg/L	-	-	-	-	3600	14000	12000	25000	8500	372	360	270
turbidity	NTU	1	-	-	-	3400	2700	3500	610	780	4200	100	150
uranium	mg/L	0.02	0.005	0.005	**0.020**	0.002	0.005	0.006	**0.0073**	**0.0051**	0.0026	0.00031	0.00033
vanadium	mg/L	-	0.006	**0.12**	**0.57**	**0.04**	**0.12**	**0.17**	**0.2**	**0.17**	**0.07**	**0.01**	**0.0077**
zinc	mg/L	5	0.02	**0.47**	**2.10**	**0.11**	**0.38**	**1.20**	**0.61**	**0.46**	**0.22**	**0.04**	**0.041**

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-05 intermediate									
				Jan-07	Oct-08	Dec-09	Oct-10	Nov-11	Nov-12	Nov-13	Nov-14	Nov-15	Nov-16
aluminum	mg/L	0.1	[0.075] a	NOT SAMPLED	**2.7**	**2**	**0.38**	**1.10**	**5.6**	**1.5**	**0.79**	**0.38**	**1.2**
alkalinity	mg $CaCO_3$/L	30-500	-		-	264	252	285	290	270	260	250	250
ammonia as N	mg/L	-	-		-	-	2.1	1.6	1.6	1.7	1.9	1.8	2.1
antimony	mg/L	-	[0.02]		< 0.001	< 0.0005	< 0.0005	< 0.0005	<0.00050	<0.0005	<0.00050	<0.00050	0.0016
arsenic	mg/L	0.025	[0.005]		0.005	**0.010**	0.004	**0.045**	**0.300**	**0.1**	**0.044**	**0.025**	**0.14**
barium	mg/L	1	-		0.051	0.10	0.02	0.07	0.19	0.061	0.042	0.03	0.062
beryllium	mg/L	-	1.1		< 0.001	< 0.0005	< 0.0005	< 0.0005	0.00064	<0.0005	<0.00050	<0.00050	<0.00050
bismuth	mg/L	-	-		< 0.001	< 0.001	< 0.001	< 0.001	<0.0010	<0.001	<0.0010	<0.0010	<0.0010
boron	mg/L	5	0.2		**4**	**3**	**3**	**2.2**	**2.4**	**2.4**	**2.6**	**2.6**	**2.5**
bromide	mg/L	-	-		-	< 1	-	< 1	<1.0	1.2	1.1	2.2	1.8
cadmium	mg/L	0.005	0.0005		< 0.0001	0.0001	< 0.0001	0.0004	**0.00066**	0.00028	<0.00010	<0.00010	**0.00054**
calcium	mg/L	-	-		80	75	100	91	110	90	100	92	110
chloride	mg/L	250	-		105	74	176	74	67	110	140	150	160
chromium	mg/L	0.05	-		0.005	< 0.005	< 0.005	< 0.005	0.013	<0.005	<0.0050	<0.0050	0.0089
cobalt	mg/L	-	0.0009		**0.0022**	**0.0014**	< 0.0005	**0.0012**	**0.0036**	**0.0013**	0.00071	<0.00050	**0.00097**
copper	mg/L	1	[0.005] b		**0.01**	**0.01**	0.001	**0.009**	**0.032**	**0.008**	0.0048	0.0028	**0.0073**
fluoride	mg/L	1.5 - 2.4	-		-	0.5	0.4	0.4	0.42	0.43	0.39	0.42	0.39
free cyanide	mg/L	0.2	0.005		-	-	< 0.002	< 0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.0010
hardness	mg $CaCO_3$/L	80-100	-		-	-	390	320	320	320	320	400	380
iron	mg/L	0.3	0.3		**4.3**	**5.8**	**1.1**	**21**	**100.0**	**30**	**15**	**6.8**	**37**
lead	mg/L	0.01	[0.005] c		0.003	0.0029	< 0.0005	0.0028	**0.0097**	0.0032	0.0013	0.001	0.0027
magnesium	mg/L	-	-		23	24	35	33	36	32	36	34	35
manganese	mg/L	0.05	-		0.18	0.13	0.04	0.1	0.3	0.11	0.087	0.054	0.11
mercury	mg/L	0.001	0.0002		< 0.0001	< 0.0001	< 0.0001	< 0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001
molybdenum	mg/L	-	0.04		0.009	0.005	0.004	0.0049	0.0063	0.0053	0.0047	0.0044	0.0049
nickel	mg/L	-	0.025		0.004	0.003	< 0.001	0.002	0.0093	0.0029	0.0019	0.0013	0.0043
nitrate as N	mg/L	10	-		-	0.2	< 0.1	0.6	0.26	0.20	<0.10	<0.10	<0.10
nitrite as N	mg/L	1	-		-	0.22	< 0.01	0.55	0.13	0.27	0.045	0.033	0.12
pH	pH Units	6.5-8.5	6.5-8.5		-	-	7.77	7.81	7.73	7.89	7.77	7.9	7.74
phenol	mg/L	-	-		-	-	< 0.001	< 0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
phosphate	mg/L	-	-		-	< 0.01	< 0.01	< 0.01	<0.010	<0.010	<0.010	<0.010	<0.010
total phosphorous	mg/L	-	0.01		-	-	< 0.1	< 0.1	**0.46**	**0.14**	**0.11**	**0.032**	**0.12**
potassium	mg/L	-	-		17	17	20	18	18	18	19	19	20
selenium	mg/L	0.01	0.1		< 0.002	< 0.002	< 0.002	< 0.002	<0.0020	<0.002	<0.0020	<0.0020	<0.0020
silicon	mg/L	-	-		8.8	8.3	6.9	9.3	25	11	8.4	7.3	11
silver	mg/L	-	0.0001		< 0.0001	< 0.0001	< 0.0001	< 0.0001	<0.00010	<0.0001	<0.00010	<0.00010	<0.00010
sodium	mg/L	200 d	-		170	110	110	78	75	86	98	94	95
strontium	mg/L	-	-		6.9	8.3	14	15	14	14	15	13	16
sulphide	mg/L	0.05	-		-	-	< 0.020	< 0.02	<0.020	<0.020	<0.020	<0.020	<0.020
sulphate	mg/L	500	-		-	-	-	130	120	140	160	150	160
thallium	mg/L	-	0.0003		< 0.00005	< 0.00005	< 0.00005	< 0.00005	<0.000050	<0.00005	<0.00005	<0.00005	<0.000050
tin	mg/L	-	-		< 0.001	< 0.001	< 0.001	< 0.001	0.0017	<0.001	<0.0010	<0.0010	0.0015
titanium	mg/L	-	-		0.056	0.039	0.015	0.028	0.17	0.04	0.018	0.01	0.035
TSS	mg/L	-	-		-	-	< 10	200	600	240	73	736	250
turbidity	NTU	1	-		-	-	15	210	640	170	43	52	160
uranium	mg/L	0.02	0.005		0.0008	0.0002	0.0001	0.0006	0.0017	0.00062	0.00041	0.00064	0.00056
vanadium	mg/L	-	0.006		0.006	0.004	< 0.001	0.0039	**0.01**	0.0047	0.0023	0.0015	0.0056
zinc	mg/L	5	0.02		**0.03**	0.013	< 0.005	**0.032**	**0.033**	0.017	0.0071	<0.0050	0.013

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.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 deep								
				Oct-08	Dec-09	Oct-10	Nov-11	Nov-12	Nov-13	Nov-14	Nov-15	Nov-16
aluminum	mg/L	0.1	[0.075] a	NOT SAMPLED	**14**	NOT SAMPLED	**190**	**8.1**	NOT SAMPLED	NOT SAMPLED	NOT SAMPLED	NOT SAMPLED
alkalinity	mg $CaCO_3$/L	30-500	-		32		36	51				
ammonia as N	mg/L	-	-		-		39	38				
antimony	mg/L	-	[0.02]		**0.05**		< 0.03	<0.025				
arsenic	mg/L	0.025	[0.005]		< 0.1		**0.14**	<0.1				
barium	mg/L	1	-		< 0.5		0.86	0.18				
beryllium	mg/L	-	1.1		< 0.05		< 0.03	<0.025				
bismuth	mg/L	-	-		< 0.1		< 0.05	<0.05				
boron	mg/L	5	0.2		**5**		**5.5**	**5.4**				
bromide	mg/L	-	-		587		747	850				
cadmium	mg/L	0.005	0.0005		**0.010**		**0.075**	**0.007**				
calcium	mg/L	-	-		8600		11000	11000				
chloride	mg/L	250	-		50200		54800	59000				
chromium	mg/L	0.05	-		< 0.5		0.68	<0.25				
cobalt	mg/L	-	0.0009		< 0.05		**0.081**	<0.025				
copper	mg/L	1	[0.005] b		**0.10**		**0.80**	**0.08**				
fluoride	mg/L	1.5 - 2.4	-		< 0.1		< 0.1	<0.10				
free cyanide	mg/L	0.2	0.005		-		< 0.002	<0.0020				
hardness	mg $CaCO_3$/L	80-100	-		-		35000	34000				
iron	mg/L	0.3	0.3		**49.0**		**170**	**40**				
lead	mg/L	0.01	[0.005] c		< 0.05		**0.17**	<0.025				
magnesium	mg/L	-	-		2000		2500	2600				
manganese	mg/L	0.05	-		5.00		8.50	5.20				
mercury	mg/L	0.001	0.0002		< 0.0001		< 0.0001	<0.00010				
molybdenum	mg/L	-	0.04		< 0.1		**0.049**	<0.025				
nickel	mg/L	-	0.025		< 0.1		**0.3**	**0.054**				
nitrate as N	mg/L	10	-		< 0.1		< 0.1	<0.10				
nitrite as N	mg/L	1	-		< 0.01		< 0.1	<0.10				
pH	pH Units	6.5-8.5	6.5-8.5		-		**6.43**	**6.11**				
phenol	mg/L	-	-		-		0.11	0.0094				
phosphate	mg/L	-	-		< 0.01		< 0.01	<0.010				
total phosphorous	mg/L	-	0.01		-		< 5	<5				
potassium	mg/L	-	-		280		340	330				
selenium	mg/L	0.01	0.1		< 0.2		< 0.2	<0.1				
silicon	mg/L	-	-		18		63	14				
silver	mg/L	-	0.0001		< 0.01		< 0.005	**0.0058**				
sodium	mg/L	200 d	-		17000		20000	21000				
strontium	mg/L	-	-		180		240	220				
sulphide	mg/L	0.05	-		-		0.040	<0.020				
sulphate	mg/L	500	-		-		1370	1200				
thallium	mg/L	-	0.0003		< 0.005		< 0.003	<0.0025				
tin	mg/L	-	-	**Note:** Insufficient water	< 0.1	**Note:** Insufficient water	< 0.05	<0.05	**Note:** Insufficient water	**Note:** Insufficient water	**Note:** Insufficient water	**Note:** Insufficient water
titanium	mg/L	-	-		< 0.5		0.96	0.91				
TSS	mg/L	-	-		-		3800	1400				
turbidity	NTU	1	-		-		520	470				
uranium	mg/L	0.02	0.005		< 0.01		**0.009**	<0.0050				
vanadium	mg/L	-	0.006		< 0.1		**0.19**	<0.05				
zinc	mg/L	5	0.02		< 0.5		**1.6**	<0.25				

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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-06 overburden								
				Oct-08	Dec-09	Oct-10	Nov-11	Nov-12	Nov-13	Nov-14	Nov-15	Nov-16
aluminum	mg/L	0.1	[0.075] a	NOT SAMPLED	NOT SAMPLED	NOT SAMPLED	**1800**	NOT SAMPLED	NOT SAMPLED	NOT SAMPLED	NOT SAMPLED	NOT SAMPLED
alkalinity	mg $CaCO_3$/L	30-500	-				309					
ammonia as N	mg/L	-	-				1.1					
antimony	mg/L	-	[0.02]				< 0.03					
arsenic	mg/L	0.025	[0.005]				**0.78**					
barium	mg/L	1	-				32					
beryllium	mg/L	-	1.1				0.11					
bismuth	mg/L	-	-				< 0.05					
boron	mg/L	5	0.2				**3**					
bromide	mg/L	-	-				< 0.001					
cadmium	mg/L	0.005	0.0005				**0.028**					
calcium	mg/L	-	-				20000					
chloride	mg/L	250	-				10					
chromium	mg/L	0.05	-				3.8					
cobalt	mg/L	-	0.0009				**2**					
copper	mg/L	1	[0.005] b				**4.7**					
fluoride	mg/L	1.5 - 2.4	-				0.3					
free cyanide	mg/L	0.2	0.005				< 0.002					
hardness	mg $CaCO_3$/L	80-100	-				320					
iron	mg/L	0.3	0.3				**3300**					
lead	mg/L	0.01	[0.005] c				**1.8**					
magnesium	mg/L	-	-				2400					
manganese	mg/L	0.05	-				190					
mercury	mg/L	0.001	0.0002				< 0.0001					
molybdenum	mg/L	-	0.04				**0.14**					
nickel	mg/L	-	0.025				**4.1**					
nitrate as N	mg/L	10	-				< 0.1					
nitrite as N	mg/L	1	-				0.12					
pH	pH Units	6.5-8.5	6.5-8.5				7.94					
phenol	mg/L	-	-				< 0.001					
phosphate	mg/L	-	-				< 0.01					
total phosphorous	mg/L	-	0.01				**180**					
potassium	mg/L	-	-				340					
selenium	mg/L	0.01	0.1				< 0.1					
silicon	mg/L	-	-				5.2					
silver	mg/L	-	0.0001				**0.007**					
sodium	mg/L	200 d	-				70					
strontium	mg/L	-	-				55					
sulphide	mg/L	0.05	-				0.31					
sulphate	mg/L	500	-				94					
thallium	mg/L	-	0.0003				**0.015**					
tin	mg/L	-	-	**Note:** Insufficient water	**Note:** Insufficient water	**Note:** Insufficient water	< 0.05	**Note:** Insufficient water	**Note:** Insufficient water	**Note:** Insufficient water	**Note:** Insufficient water	**Note:** Insufficient water
titanium	mg/L	-	-				9.1					
TSS	mg/L	-	-				290000					
turbidity	NTU	1	-				32000					
uranium	mg/L	0.02	0.005				**0.19**					
vanadium	mg/L	-	0.006				**2.7**					
zinc	mg/L	5	0.02				**11**					

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-06 straddle								
				Oct-08	Dec-09	Oct-10	Nov-11	Nov-12	Nov-13	Nov-14	Nov-15	Nov-16
aluminum	mg/L	0.1	[0.075] a	**230**	**330**	**210**	**12**	**19**	**1.4**	**21**	**71**	**220**
alkalinity	mg $CaCO_3$/L	30-500	-	-	312	-	320	330	320	300	290	310
ammonia as N	mg/L	-	-	-	0.66	-	0.17	0.32	0.21	0.24	0.29	0.39
antimony	mg/L	-	[0.02]	< 0.005	< 0.005	0.01	< 0.0005	<0.0005	0.00064	<0.00050	<0.0050	<0.0050
arsenic	mg/L	0.025	[0.005]	**0.069**	**0.110**	**0.051**	**0.02**	**0.02**	**0.0082**	**0.024**	**0.059**	**0.073**
barium	mg/L	1	-	3.2	5.5	2.3	0.27	0.31	0.055	0.36	0.96	2.7
beryllium	mg/L	-	1.1	0.014	0.020	0.007	0.001	0.001	<0.0005	0.0012	<0.0050	0.011
bismuth	mg/L	-	-	< 0.01	< 0.01	< 0.01	< 0.001	<0.001	0.0011	<0.0010	<0.010	<0.010
boron	mg/L	5	0.2	**0.52**	**0.90**	**0.49**	0.1	0.2	0.058	0.13	0.18	**0.67**
bromide	mg/L	-	-	-	< 1	-	< 1	<1.0	<1.0	<1.0	<1.0	<1.0
cadmium	mg/L	0.005	0.0005	**0.004**	**0.005**	**0.001**	0.000	**0.001**	**0.001**	0.00045	**0.0012**	**0.0014**
calcium	mg/L	-	-	1700	2400	740	170	200	92	250	460	1000
chloride	mg/L	250	-	4	6	9	8	9	11	12	12	11
chromium	mg/L	0.05	-	0.38	0.48	0.18	0.021	0.030	<0.005	0.03	0.097	0.28
cobalt	mg/L	-	0.0009	**0.23**	**0.32**	**0.13**	**0.015**	**0.015**	**0.0013**	**0.018**	**0.058**	**0.16**
copper	mg/L	1	[0.005] b	**0.4**	**0.5**	**0.15**	**0.026**	**0.037**	**0.0063**	**0.04**	**0.082**	**0.25**
fluoride	mg/L	1.5 - 2.4	-	-	0.2	-	0.1	0.14	0.12	0.14	0.14	0.12
free cyanide	mg/L	0.2	0.005	-	-	-	< 0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.0010
hardness	mg $CaCO_3$/L	80-100	-	-	-	-	400	370	400	370	410	440
iron	mg/L	0.3	0.3	**360**	**530**	**210**	**26**	**29**	**2.9**	**35**	**110**	**290**
lead	mg/L	0.01	[0.005] c	**0.14**	**0.16**	**0.057**	**0.0087**	**0.01**	0.0015	**0.011**	**0.031**	**0.086**
magnesium	mg/L	-	-	260	350	150	45	60	39	66	99	190
manganese	mg/L	0.05	-	16	22	7.2	0.98	1.1	0.12	1.5	4	9.9
mercury	mg/L	0.001	0.0002	< 0.0015 (1)	< 0.0001	< 0.0001	< 0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001
molybdenum	mg/L	-	0.04	0.016	0.02	< 0.01	0.002	0.0027	0.0016	0.0024	<0.0050	0.0079
nickel	mg/L	-	0.025	**0.480**	**0.730**	**0.28**	**0.031**	**0.034**	0.0047	**0.039**	**0.13**	**0.33**
nitrate as N	mg/L	10	-	-	0.4	-	< 0.1	<0.10	<0.10	<0.10	0.11	0.19
nitrite as N	mg/L	1	-	-	0.07	-	0.02	0.014	<0.010	0.023	<0.010	<0.010
pH	pH Units	6.5-8.5	6.5-8.5	-	-	-	7.82	7.87	7.80	7.99	7.93	7.81
phenol	mg/L	-	-	-	-	-	< 0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
phosphate	mg/L	-	-	-	< 0.01	-	< 0.01	<0.010	<0.010	<0.010	<0.010	<0.010
total phosphorous	mg/L	-	0.01	-	-	**6.6**	**0.89**	**1**	**0.30**	**1.7**	**4**	**10**
potassium	mg/L	-	-	75	100	57	7.7	10	3.1	10	27	78
selenium	mg/L	0.01	0.1	< 0.02	< 0.02	< 0.02	< 0.002	<0.002	<0.002	<0.0020	<0.020	<0.020
silicon	mg/L	-	-	85	430	180	25	40	10	39	110	350
silver	mg/L	-	0.0001	< 0.001	< 0.001	<0.001	< 0.0001	<0.0001	<0.0001	<0.00010	<0.0010	<0.0010
sodium	mg/L	200 d	-	26	31	22	11	21	13	14	17	18
strontium	mg/L	-	-	10	14	7	2.4	3.5	1.5	3.2	3.3	5.4
sulphide	mg/L	0.05	-	-	-	-	< 0.02	<0.020	<0.020	<0.020	0.027	0.022
sulphate	mg/L	500	-	-	-	-	63	73	88	110	130	130
thallium	mg/L	-	0.0003	**0.0023**	**0.0031**	**0.0018**	0.00022	0.00012	0.000099	0.00021	0.0007	**0.0022**
tin	mg/L	-	-	< 0.01	< 0.01	< 0.01	< 0.001	<0.001	0.0028	<0.0010	<0.010	<0.010
titanium	mg/L	-	-	2.3	4.7	2.1	0.22	0.42	0.027	0.33	0.69	4.8
TSS	mg/L	-	-	-	-	-	1500	1100	97	2900	498	22000
turbidity	NTU	1	-	-	-	-	670	1100	49	710	2400	9400
uranium	mg/L	0.02	0.005	**0.017**	**0.017**	**0.007**	0.002	0.0025	0.0014	0.0024	0.0046	**0.0089**
vanadium	mg/L	-	0.006	**0.42**	**0.57**	**0.24**	**0.026**	**0.032**	0.002	**0.033**	**0.11**	**0.34**
zinc	mg/L	5	0.02	**1.8**	**1.7**	**0.68**	**0.082**	**0.083**	0.015	**0.11**	**0.34**	**0.85**

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.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-06 deep								
				Oct-08	Dec-09	Oct-10	Nov-11	Nov-12	Nov-13	Nov-14	Nov-15	Nov-16
aluminum	mg/L	0.1	[0.075] a	**NOT SAMPLED**	**NOT SAMPLED**	**NOT SAMPLED**	**NOT SAMPLED**	**NOT SAMPLED**	**NOT SAMPLED**	**NOT SAMPLED**	**NOT SAMPLED**	**6.80**
alkalinity	mg CaCO$_3$/L	30-500	-									170
ammonia as N	mg/L	-	-									21
antimony	mg/L	-	[0.02]									0.0034
arsenic	mg/L	0.025	[0.005]									**0.01**
barium	mg/L	1	-									0.15
beryllium	mg/L	-	1.1									<0.0025
bismuth	mg/L	-	-									<0.0050
boron	mg/L	5	0.2									**8.60**
bromide	mg/L	-	-									250
cadmium	mg/L	0.005	0.0005									**0.01**
calcium	mg/L	-	-									4700
chloride	mg/L	250	-									24000
chromium	mg/L	0.05	-									6
cobalt	mg/L	-	0.0009									**0.02**
copper	mg/L	1	[0.005] b									**0.13**
fluoride	mg/L	1.5 - 2.4	-									<0.10
free cyanide	mg/L	0.2	0.005									<0.0010
hardness	mg CaCO$_3$/L	80-100	-									18000
iron	mg/L	0.3	0.3									**21**
lead	mg/L	0.01	[0.005] c									**0.01**
magnesium	mg/L	-	-									1200
manganese	mg/L	0.05	-									2.90
mercury	mg/L	0.001	0.0002									<0.0001
molybdenum	mg/L	-	0.04									**0.23**
nickel	mg/L	-	0.025									**0.89**
nitrate as N	mg/L	10	-									80.2
nitrite as N	mg/L	1	-									0.30
pH	pH Units	6.5-8.5	6.5-8.5									6.92
phenol	mg/L	-	-									0.01
phosphate	mg/L	-	-									<0.010
total phosphorous	mg/L	-	0.01									**0.78**
potassium	mg/L	-	-									190
selenium	mg/L	0.01	0.1									<0.010
silicon	mg/L	-	-									19
silver	mg/L	-	0.0001									<0.00050
sodium	mg/L	200 d	-									10000
strontium	mg/L	-	-									92
sulphide	mg/L	0.05	-									**0.07**
sulphate	mg/L	500	-									1300
thallium	mg/L	-	0.0003									<0.00025
tin	mg/L	-	-	**Note:** Insufficient water	**Note:** Insufficient water	**Note:** Insufficient water	**Note:** Insufficient water	**Note:** Insufficient water	**Note:** Insufficient water	**Note:** Insufficient water	**Note:** Insufficient water	**0.0088**
titanium	mg/L	-	-									<0.25
TSS	mg/L	-	-									520
turbidity	NTU	1	-									230
uranium	mg/L	0.02	0.005									0.04
vanadium	mg/L	-	0.006									0.042
zinc	mg/L	5	0.02									0.069

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.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 overburden								
				Oct-08	Nov-09	Oct-10	Nov-11	Nov-12	Nov-13	Nov-14	Nov-15	Nov-16
aluminum	mg/L	0.1	[0.075] a	**610**	**1200**	**380**	**170**	**36**	**81**	**42**	**96**	**9.3**
alkalinity	mg CaCO$_3$/L	30-500	-	-	559	-	569	570	550	530	510	490
ammonia as N	mg/L	-	-	-	-	-	0.32	0.28	0.20	0.19	0.21	0.2
antimony	mg/L	-	[0.02]	< 0.05	< 0.03	< 0.005	< 0.005	0.00051	<0.0025	<0.0025	<0.0050	<0.00050
arsenic	mg/L	0.025	[0.005]	**0.24**	**0.480**	**0.180**	**0.081**	**0.017**	**0.044**	**0.019**	**0.041**	**0.0083**
barium	mg/L	1	-	5.3	11.0	3.8	1.9	0.31	0.54	0.27	0.62	0.1
beryllium	mg/L	-	1.1	< 0.05	0.06	0.019	0.013	0.0023	0.005	<0.0025	<0.0050	0.00051
bismuth	mg/L	-	-	< 0.1	< 0.05	< 0.01	< 0.01	<0.0010	<0.005	<0.0050	<0.010	<0.0010
boron	mg/L	5	0.2	**3.1**	**6.9**	**5.5**	**5.6**	**6.4**	**8.6**	**7**	**5.2**	**4.6**
bromide	mg/L	-	-	-	< 1	-	< 1	<1.0	<1.0	<1.0	<1.0	<1.0
cadmium	mg/L	0.005	0.0005	< 0.01	**0.026**	**0.004**	**0.002**	**0.001**	**0.00084**	<0.00050	<0.0010	**0.00054**
calcium	mg/L	-	-	3600	8100	2800	1300	270	580	270	620	110
chloride	mg/L	250	-	20	23	22	18	23	34	40	37	42
chromium	mg/L	0.05	-	1	2	0.6	0.28	0.062	0.13	0.063	0.14	0.017
cobalt	mg/L	-	0.0009	**0.54**	**1.10**	**0.36**	**0.16**	**0.032**	**0.078**	**0.032**	**0.072**	**0.0086**
copper	mg/L	1	[0.005] b	**1.1**	**2.3**	**0.74**	**0.35**	**0.062**	**0.16**	**0.074**	**0.14**	**0.017**
fluoride	mg/L	1.5 - 2.4	-	-	0.5	-	0.3	0.33	0.34	0.36	0.38	0.36
free cyanide	mg/L	0.2	0.005	-	-	-	< 0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.0010
hardness	mg CaCO$_3$/L	80-100	-	-	-	-	630	610	500	490	470	460
iron	mg/L	0.3	0.3	**1100**	**2400**	**750**	**330**	**68**	**170**	**72**	**170**	**18**
lead	mg/L	0.01	[0.005] c	**0.55**	**1.10**	**0.33**	**0.16**	**0.032**	**0.068**	**0.031**	**0.068**	**0.0078**
magnesium	mg/L	-	-	740	1400	490	290	150	180	130	170	92
manganese	mg/L	0.05	-	30	67.0	22	10	1.7	4	1.5	3.9	0.55
mercury	mg/L	0.001	0.0002	**0.0017**	**0.0022**	< 0.0015	< 0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001
molybdenum	mg/L	-	0.04	< 0.1	**0.080**	0.032	0.018	0.01	0.013	0.011	0.011	**0.0097**
nickel	mg/L	-	0.025	**1.3**	**2.5**	**0.81**	**0.36**	**0.067**	**0.17**	**0.072**	**0.17**	0.019
nitrate as N	mg/L	10	-	-	< 0.1	-	< 0.1	<0.10	<0.10	<0.10	<0.10	<0.10
nitrite as N	mg/L	1	-	-	0.06	-	0.01	<0.010	0.023	0.029	0.011	0.014
pH	pH Units	6.5-8.5	6.5-8.5	-	-	-	7.7	7.92	7.74	8	8.02	7.89
phenol	mg/L	-	-	-	-	-	< 0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
phosphate	mg/L	-	-	-	< 0.01	-	0.01	<0.010	<0.010	<0.010	<0.010	0.011
total phosphorous	mg/L	-	0.01	-	-	**34**	**9.9**	**1.8**	**4.2**	**2**	**3.6**	**0.46**
potassium	mg/L	-	-	160	230	100	69	17	22	16	34	8.4
selenium	mg/L	0.01	0.1	< 0.2	< 0.1	< 0.02	< 0.02	<0.0020	<0.01	<0.010	<0.020	<0.0020
silicon	mg/L	-	-	140	970	460	240	62	92	64	140	22
silver	mg/L	-	0.0001	< 0.01	< 0.005	**0.002**	< 0.001	**0.00022**	<0.0005	<0.00050	<0.0010	<0.00010
sodium	mg/L	200 d	-	85	110	110	99	99	120	110	100	99
strontium	mg/L	-	-	14	25	11	6.6	3.2	4.5	2.8	4	3.3
sulphide	mg/L	0.05	-	-	-	-	0.02	0.027	0.036	<0.020	0.02	<0.020
sulphate	mg/L	500	-	-	-	-	182	170	160	140	140	140
thallium	mg/L	-	0.0003	**0.007**	**0.012**	**0.0045**	**0.0026**	**0.00047**	**0.00083**	**0.00039**	**0.0011**	0.0001
tin	mg/L	-	-	< 0.1	< 0.05	0.012	< 0.01	<0.0010	<0.005	<0.0050	<0.010	0.0035
titanium	mg/L	-	-	4.9	14	7.2	4	0.92	1.3	0.84	1.2	0.16
TSS	mg/L	-	-	-	-	-	10000	2200	5800	2600	748	1300
turbidity	NTU	1	-	-	-	-	14000	770	250	2300	4800	900
uranium	mg/L	0.02	0.005	**0.086**	**0.140**	**0.047**	**0.029**	**0.011**	**0.013**	**0.01**	**0.014**	**0.0077**
vanadium	mg/L	-	0.006	**1.3**	**2.2**	**0.76**	**0.35**	**0.077**	**0.16**	**0.074**	**0.17**	**0.019**
zinc	mg/L	5	0.02	**3.3**	**6.1**	**2**	**0.91**	**0.17**	**0.44**	**0.2**	**0.65**	**0.051**

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b = interim PWQO if hardness greater than 20 mg/L.

c = interim PWQO if hardness greater than 80 mg/L

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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 deep								
				Oct-08	Dec-09	Oct-10	Nov-11	Nov-12	Nov-13	Nov-14	Nov-15	Nov-16
aluminum	mg/L	0.1	[0.075] a	**6.7**	**2.0**	**0.4**	**2.4**	**8.7**	**4.9**	**0.43**	**0.12**	**0.33**
alkalinity	mg $CaCO_3$/L	30-500	-	-	35	32	33	45	41	74	61	47
ammonia as N	mg/L	-	-	-	-	19	19	22	19	8.9	15	6.4
antimony	mg/L	-	[0.02]	< 0.005	< 0.01	< 0.01	< 0.01	<0.025	<0.01	<0.0050	<0.0050	0.039
arsenic	mg/L	0.025	[0.005]	< 0.01	< 0.03	**0.023**	< 0.02	<0.05	<0.02	<0.010	<0.010	0.002
barium	mg/L	1	-	0.094	< 0.1	< 0.1	0.08	0.22	0.097	0.04	0.038	0.052
beryllium	mg/L	-	1.1	< 0.005	< 0.01	< 0.01	< 0.01	<0.025	<0.01	<0.0050	<0.0050	<0.00050
bismuth	mg/L	-	-	< 0.01	< 0.03	< 0.02	< 0.02	<0.05	<0.02	<0.010	<0.010	<0.0010
boron	mg/L	5	0.2	**6.6**	**6.4**	**7**	**6.1**	**9.4**	**7.6**	**7.3**	**7.3**	**6.6**
bromide	mg/L	-	-	-	203	-	224	320	210	130	110	140
cadmium	mg/L	0.005	0.0005	< 0.001	**0.013**	< 0.002	< 0.002	**0.009**	**0.0028**	**0.0044**	**0.0068**	**0.017**
calcium	mg/L	-	-	2700	2900	3300	3400	4000	3500	2400	2400	2200
chloride	mg/L	250	-	17500	17800	16000	18100	24000	18000	13000	13000	11000
chromium	mg/L	0.05	-	< 0.05	< 0.1	< 0.1	< 0.1	<0.25	<0.1	0.29	0.17	0.08
cobalt	mg/L	-	0.0009	**0.006**	< 0.01	< 0.01	< 0.01	<0.025	<0.01	**0.0074**	**0.0059**	**0.0057**
copper	mg/L	1	[0.005] b	**0.028**	**0.060**	< 0.020	< 0.02	**0.072**	**0.042**	<0.020	<0.020	0.018
fluoride	mg/L	1.5 - 2.4	-	-	0.3	0.2	0.2	0.19	0.24	0.28	0.32	0.28
free cyanide	mg/L	0.2	0.005	-	-	< 0.002	< 0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.0010
hardness	mg $CaCO_3$/L	80-100	-	-	-	10000	10000	13000	11000	2500	8300	8100
iron	mg/L	0.3	0.3	**17**	**9**	**7**	**6.5**	**18.0**	**11**	**1.3**	**1.2**	**1.3**
lead	mg/L	0.01	[0.005] c	**0.009**	**0.01**	< 0.01	< 0.01	<0.025	<0.01	<0.0050	<0.0050	0.0015
magnesium	mg/L	-	-	740	730	810	840	1000	900	650	610	540
manganese	mg/L	0.05	-	1.6	1.5	1.6	1.7	2.3	1.9	1.1	1	1
mercury	mg/L	0.001	0.0002	< 0.0001	< 0.0001	< 0.0001	< 0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001
molybdenum	mg/L	-	0.04	< 0.01	< 0.03	< 0.02	< 0.01	<0.025	0.013	0.015	0.013	0.014
nickel	mg/L	-	0.025	< 0.01	< 0.03	< 0.02	< 0.02	<0.05	<0.02	**0.23**	**0.063**	**0.1**
nitrate as N	mg/L	10	-	-	< 0.1	< 0.1	< 0.1	<0.10	<0.10	<0.10	<0.10	0.59
nitrite as N	mg/L	1	-	-	< 0.01	< 0.01	< 0.1	<0.10	0.017	0.283	3.85	2.4
pH	pH Units	6.5-8.5	6.5-8.5	-	-	6.97	7.02	6.58	6.90	7.38	7.15	6.93
phenol	mg/L	-	-	-	-	< 0.001	0.03	0.0025	0.035	0.018	<0.0010	0.0031
phosphate	mg/L	-	-	-	< 0.01	< 0.01	< 0.01	<0.010	<0.010	<0.010	<0.010	0.011
total phosphorous	mg/L	-	0.01	-	-	< 2	< 2	<5	**0.32**	<1.0	**0.06**	**0.14**
potassium	mg/L	-	-	140	140	160	160	180	170	140	130	130
selenium	mg/L	0.01	0.1	0.021	< 0.05	0.045	< 0.04	<0.1	<0.04	<0.020	<0.020	<0.0020
silicon	mg/L	-	-	15	10	6.3	7.3	15	11	5.6	5.5	5.8
silver	mg/L	-	0.0001	< 0.001	< 0.003	< 0.002	< 0.002	<0.0050	<0.002	<0.0010	<0.0010	**0.00044**
sodium	mg/L	200 d	-	6600	6500	7200	7800	9000	8100	5800	5500	4700
strontium	mg/L	-	-	56	60	66	68	81	75	50	47	46
sulphide	mg/L	0.05	-	-	-	< 0.020	< 0.02	<0.020	0.023	<0.020	<0.020	<0.020
sulphate	mg/L	500	-	-	-	-	1560	1500	1500	1500	1500	1500
thallium	mg/L	-	0.0003	< 0.0005	< 0.001	< 0.001	< 0.001	<0.0025	<0.001	<0.00050	<0.00050	0.00008
tin	mg/L	-	-	< 0.01	< 0.03	< 0.02	< 0.02	<0.05	<0.02	<0.010	<0.010	0.0033
titanium	mg/L	-	-	0.12	< 0.1	< 0.1	< 0.1	<0.25	0.1	<0.050	<0.050	0.022
TSS	mg/L	-	-	-	-	-	310	2100	210	67	22700	65
turbidity	NTU	1	-	-	-	-	330	210	170	10	13	23
uranium	mg/L	0.02	0.005	0.002	< 0.003	< 0.002	< 0.002	<0.0050	**0.0068**	**0.012**	**0.01**	**0.0077**
vanadium	mg/L	-	0.006	< 0.01	< 0.03	**0.033**	< 0.01	0.032	<0.01	<0.010	<0.0050	0.001
zinc	mg/L	5	0.02	**0.059**	**0.100**	< 0.100	< 0.1	<0.25	<0.1	<0.050	<0.050	0.17

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-08 overburden								
				Oct-08	Nov-09	Oct-10	Nov-11	Nov-12	Nov-13	Nov-14	Nov-15	Nov-16
aluminum	mg/L	0.1	[0.075] a	**1900**	**1300**	**140**	**51**	**58**	**280**	**180**	**120**	**6.5**
alkalinity	mg $CaCO_3$/L	30-500	-	-	549	545	553	580	570	570	550	550
ammonia as N	mg/L	-	-	-	-	0.38	0.09	1.3	0.46	0.3	0.18	0.25
antimony	mg/L	-	[0.02]	< 0.05	< 0.03	< 0.005	< 0.0005	<0.00050	<0.005	<0.0050	<0.0050	<0.00050
arsenic	mg/L	0.025	[0.005]	**0.64**	**0.500**	**0.054**	**0.03**	**0.03**	**0.1**	**0.058**	**0.04**	**0.0075**
barium	mg/L	1	-	17	13	1	1	0.57	2.2	1.4	0.92	0.062
beryllium	mg/L	-	1.1	**0.097**	0.08	0.008	0.0031	0.0036	0.014	0.011	0.0068	<0.00050
bismuth	mg/L	-	-	< 0.1	< 0.05	< 0.01	< 0.001	<0.0010	<0.01	<0.010	<0.010	<0.0010
boron	mg/L	5	0.2	**4.2**	**3.7**	**2.0**	**1.1**	**1.8**	**2.6**	**2**	**1.4**	**1.9**
bromide	mg/L	-	-	-	< 1	-	< 1	<5.0	<1.0	<2.0	<5.0	<1.0
cadmium	mg/L	0.005	0.0005	**0.018**	**0.017**	**0.001**	**0.001**	**0.001**	**0.0048**	**0.0021**	**0.0013**	**0.0015**
calcium	mg/L	-	-	11000	8000	740	520	470	1200	790	640	140
chloride	mg/L	250	-	13	13	13	10	16	11	12	18	17
chromium	mg/L	0.05	-	3.3	2.1	0.2	0.095	0.100	0.42	0.28	0.19	0.012
cobalt	mg/L	-	0.0009	**1.9**	**1.3**	**0.1**	**0.056**	**0.058**	**0.23**	**0.14**	**0.1**	**0.0057**
copper	mg/L	1	[0.005] b	**3.6**	**2.3**	**0.2**	**0.093**	**0.094**	**0.43**	**0.3**	**0.17**	**0.011**
fluoride	mg/L	1.5 - 2.4	-	-	0.3	0.2	0.3	0.24	0.23	0.23	0.25	0.23
free cyanide	mg/L	0.2	0.005	-	-	< 0.002	< 0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.0010
hardness	mg $CaCO_3$/L	80-100	-	-	-	990	880	980	910	940	900	900
iron	mg/L	0.3	0.3	**3500**	**2500**	**240**	**110**	**110**	**460**	**300**	**200**	**13**
lead	mg/L	0.01	[0.005] c	**1.4**	**1.00**	**0.10**	**0.06**	**0.05**	**0.2**	**0.11**	**0.082**	**0.0048**
magnesium	mg/L	-	-	2000	1400	270	200	260	400	360	250	160
manganese	mg/L	0.05	-	110	82.0	6.4	4.1	3.6	12	6.6	5.6	0.34
mercury	mg/L	0.001	0.0002	**0.0036** (1)	**0.0020**	0.0001	< 0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001
molybdenum	mg/L	-	0.04	< 0.1	**0.070**	0.014	0.009	0.0090	0.021	0.014	0.0069	0.0049
nickel	mg/L	-	0.025	**4.2**	**2.8**	**0.3**	**0.12**	**0.12**	**0.5**	**0.33**	**0.23**	0.015
nitrate as N	mg/L	10	-	-	< 0.1	< 0.1	0.3	<0.10	<0.10	<0.10	<0.10	<0.10
nitrite as N	mg/L	1	-	-	< 0.01	0.02	< 0.01	<0.010	0.065	0.055	0.016	<0.010
pH	pH Units	6.5-8.5	6.5-8.5	-	-	7.69	7.65	7.81	7.71	7.75	7.79	7.73
phenol	mg/L	-	-	-	-	< 0.001	< 0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
phosphate	mg/L	-	-	-	< 0.01	< 0.01	< 0.01	<0.010	<0.010	<0.010	<0.010	<0.010
total phosphorous	mg/L	-	0.01	-	-	**6.7**	**3.9**	**3.8**	**7.8**	**7.1**	**5**	**0.23**
potassium	mg/L	-	-	410	250	63	22	28	91	82	46	17
selenium	mg/L	0.01	0.1	< 0.2	< 0.1	< 0.02	0.007	<0.0020	<0.02	<0.020	<0.020	<0.0020
silicon	mg/L	-	-	250	940	190	61	73	340	280	170	17
silver	mg/L	-	0.0001	< 0.01	< 0.005	< 0.001	**0.0004**	**0.00033**	**0.0018**	<0.0010	<0.0010	<0.00010
sodium	mg/L	200 d	-	140	120	93	76	98	110	110	82	85
strontium	mg/L	-	-	53	41	14	8.3	12	16	13	9.7	12
sulphide	mg/L	0.05	-	-	-	< 0.020	< 0.02	0.48	0.28	0.075	0.03	<0.020
sulphate	mg/L	500	-	-	-	-	423	560	550	510	520	460
thallium	mg/L	-	0.0003	**0.014**	**0.010**	**0.002**	**0.00046**	**0.00042**	**0.0031**	**0.0019**	**0.0011**	0.000061
tin	mg/L	-	-	< 0.1	< 0.05	< 0.01	< 0.001	<0.0010	<0.01	<0.010	<0.010	0.001
titanium	mg/L	-	-	8.8	12	2.4	0.81	0.82	4.1	3.3	1.2	0.12
TSS	mg/L	-	-	-	-	9000	5700	5200	12000	6800	1300	890
turbidity	NTU	1	-	-	-	14000	710	2500	1100	2700	6400	1900
uranium	mg/L	0.02	0.005	**0.13**	**0.08**	**0.02**	**0.015**	**0.014**	**0.028**	**0.02**	**0.015**	**0.0068**
vanadium	mg/L	-	0.006	**3.5**	**2.2**	**0.3**	**0.1**	**0.1**	**0.5**	**0.33**	**0.21**	**0.014**
zinc	mg/L	5	0.02	**10**	**7**	**1**	**0.3**	**0.3**	**1.3**	**0.9**	**0.6**	**0.038**

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-08 intermediate										
				Oct-08	Nov-09	Oct-10	Oct-10 DUP 1	Nov-11	Nov-11 DUP 1	Nov-12	Nov-13	Nov-14	Nov-15	Nov-16
aluminum	mg/L	0.1	[0.075] a	**2**	**1**	**0.29**	**0.74**	**0.61**	**0.55**	**8.6**	**2.1**	**0.97**	**0.4**	**3.5**
alkalinity	mg CaCO$_3$/L	30-500	-	-	146	139	145	163	168	150	140	140	130	130
ammonia as N	mg/L	-	-	-	-	5.6	5	6.1	5.8	5.8	5.2	5.6	5.7	6.5
antimony	mg/L	-	[0.02]	< 0.005	< 0.0005	< 0.0005	< 0.0005	0.004	< 0.003	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025
arsenic	mg/L	0.025	[0.005]	< 0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	**0.0057**	<0.005	<0.0050	<0.0050	<0.0050
barium	mg/L	1	-	< 0.05	0.018	0.015	0.016	0.02	0.021	0.26	0.036	0.028	0.02	0.11
beryllium	mg/L	-	1.1	< 0.005	< 0.0005	< 0.0005	< 0.0005	< 0.003	< 0.003	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025
bismuth	mg/L	-	-	< 0.01	< 0.001	< 0.001	< 0.001	0.007	< 0.005	<0.0050	<0.005	<0.0050	<0.0050	<0.0050
boron	mg/L	5	0.2	**5.9**	**6.2**	**6.1**	**5.9**	**5.7**	**5.6**	**6.2**	**5.9**	**6.2**	**5.9**	**6.5**
bromide	mg/L	-	-	-	23	-	-	23	21	60	32	<20	26	39
cadmium	mg/L	0.005	0.0005	< 0.001	< 0.0001	< 0.0001	< 0.0001	< 0.0005	< 0.0005	**0.001**	<0.0005	<0.00050	<0.00050	**0.00062**
calcium	mg/L	-	-	430	470	460	460	580	590	650	520	550	590	770
chloride	mg/L	250	-	2110	2100	2240	2150	1710	1730	4100	2400	2400	3000	3400
chromium	mg/L	0.05	-	< 0.05	< 0.005	< 0.005	< 0.005	< 0.03	< 0.03	<0.025	<0.025	<0.025	<0.025	<0.025
cobalt	mg/L	-	0.0009	< 0.005	< 0.0005	< 0.0005	< 0.0005	< 0.003	< 0.003	**0.005**	<0.0025	<0.0025	<0.0025	**0.0029**
copper	mg/L	1	[0.005] b	< 0.01	0.001	< 0.001	< 0.001	< 0.005	< 0.005	**0.019**	<0.005	<0.0050	<0.0050	**0.0052**
fluoride	mg/L	1.5 - 2.4	-	-	0.4	0.4	0.4	0.4	0.5	0.42	0.45	0.43	0.48	0.4
free cyanide	mg/L	0.2	0.005	-	-	< 0.002	< 0.002	< 0.002	< 0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.0010
hardness	mg CaCO$_3$/L	80-100	-	-	-	2000	2000	1700	1700	4100	2100	2000	2300	3000
iron	mg/L	0.3	0.3	**3**	**2**	**1.2**	**1.5**	**1.8**	**2.5**	**13.0**	**2.7**	**2.2**	**1.9**	**7.5**
lead	mg/L	0.01	[0.005] c	< 0.005	0.0006	< 0.0005	< 0.0005	< 0.003	< 0.003	**0.02**	<0.0025	<0.0025	<0.0025	**0.0058**
magnesium	mg/L	-	-	120	140	150	150	160	170	200	150	160	160	230
manganese	mg/L	0.05	-	0.22	0.20	0.21	0.21	0.24	0.25	0.70	0.25	0.24	0.26	0.51
mercury	mg/L	0.001	0.0002	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001
molybdenum	mg/L	-	0.04	< 0.010	0.007	0.007	0.007	0.007	0.006	0.0064	0.0062	0.0074	0.0065	0.0067
nickel	mg/L	-	0.025	< 0.010	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.013	<0.005	<0.0050	<0.0050	0.0067
nitrate as N	mg/L	10	-	-	< 0.1	0.1	0.1	< 0.1	< 0.1	<0.10	<0.10	<0.10	<0.10	<0.10
nitrite as N	mg/L	1	-	-	< 0.01	0.01	< 0.01	0.03	0.04	0.038	<0.010	0.013	0.077	<0.010
pH	pH Units	6.5-8.5	6.5-8.5	-	-	7.55	7.59	7.64	7.58	7.59	7.59	7.65	7.61	7.45
phenol	mg/L	-	-	-	-	0.001	< 0.001	0.005	0.004	<0.0010	0.0030	<0.0010	<0.0010	<0.0010
phosphate	mg/L	-	-	-	< 0.01	0.01	0.01	< 0.01	0.01	<0.010	<0.010	<0.010	<0.010	<0.010
total phosphorous	mg/L	-	0.01	-	-	< 0.1	< 0.1	< 0.5	< 0.5	**0.57**	**0.069**	<0.50	0.039	<0.50
potassium	mg/L	-	-	43	46	47	47	49	50	52	44	48	45	57
selenium	mg/L	0.01	0.1	< 0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	<0.01	<0.01	<0.010	<0.010	<0.010
silicon	mg/L	-	-	7.6	5.8	4.6	5.5	4.7	4.2	19	9.7	5.9	4.5	9.3
silver	mg/L	-	0.0001	< 0.001	**0.0003**	< 0.0001	< 0.0001	< 0.0005	< 0.0005	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050
sodium	mg/L	200 d	-	1100	1100	1100	1100	1300	1300	1500	1200	1300	1200	1600
strontium	mg/L	-	-	12	12	14	14	16	16	16	14	14	16	20
sulphide	mg/L	0.05	-	-	-	< 0.020	< 0.020	< 0.02	< 0.020	<0.020	<0.020	<0.020	<0.020	<0.020
sulphate	mg/L	500	-	-	-	-	-	965	976	1000	1000	1000	1100	1000
thallium	mg/L	-	0.0003	< 0.0005	< 0.00005	< 0.00005	< 0.00005	< 0.0003	< 0.0003	<0.00025	<0.00025	<0.00025	<0.00025	<0.00025
tin	mg/L	-	-	< 0.01	< 0.001	< 0.001	< 0.001	< 0.005	< 0.005	<0.0050	<0.005	<0.0050	<0.0050	<0.0050
titanium	mg/L	-	-	0.058	0.038	0.013	0.03	< 0.03	< 0.03	0.32	0.055	0.03	<0.025	0.085
TSS	mg/L	-	-	-	-	27	26	32	29	4000	170	72	7110	330
turbidity	NTU	1	-	-	-	14	22	30	21	1000	73	34	15	220
uranium	mg/L	0.02	0.005	< 0.001	0.0002	0.0002	0.0002	0.0018	< 0.0005	**0.006**	0.0006	<0.00050	<0.00050	0.0018
vanadium	mg/L	-	0.006	< 0.01	< 0.005	< 0.005	< 0.005	0.006	< 0.003	**0.01**	<0.0025	<0.0025	<0.0025	**0.0063**
zinc	mg/L	5	0.02	< 0.05	< 0.005	< 0.005	< 0.005	< 0.03	< 0.03	**0.1**	<0.025	<0.025	<0.025	<0.025

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 deep								
				Oct-08	Dec-09	Oct-10	Nov-11	Nov-12	Nov-13	Nov-14	Nov-15	Nov-16
aluminum	mg/L	0.1	[0.075] a	**0.88**	**0.41**	**670**	**97**	**4**	**0.5**	**0.5**	**0.1**	**0.28**
alkalinity	mg $CaCO_3$/L	30-500	-	-	412	59	67	440	420	540	540	510
ammonia as N	mg/L	-	-	-	-	39	35	0.10	2.3	0.63	0.59	0.06
antimony	mg/L	-	[0.02]	< 0.001	< 0.0005	< 0.03	< 0.03	<0.00050	0.00062	<0.00050	<0.00050	0.0023
arsenic	mg/L	0.025	[0.005]	**0.006**	< 0.005	**0.39**	**0.093**	**0.0087**	**0.0077**	**0.0055**	**0.0095**	**0.0043**
barium	mg/L	1	-	0.018	0.016	5	1.1	0.041	0.025	0.023	0.019	0.020
beryllium	mg/L	-	1.1	< 0.001	< 0.0005	0.032	< 0.03	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050
bismuth	mg/L	-	-	< 0.001	< 0.001	< 0.05	< 0.05	<0.0010	<0.001	<0.0010	<0.0010	<0.0010
boron	mg/L	5	0.2	**3.7**	**4.6**	**6.8**	**4.9**	**4.4**	**4.2**	**2.5**	**2.2**	**1.60**
bromide	mg/L	-	-	-	3	-	523	<5.0	3.1	<5.0	<2.0	<5.0
cadmium	mg/L	0.005	0.0005	**0.0018**	0.0002	**0.026**	< 0.005	**0.0049**	**0.011**	**0.0015**	**0.00056**	**0.0067**
calcium	mg/L	-	-	150	260	11000	8600	150	140	150	140	66
chloride	mg/L	250	-	49	213	48500	41500	220	240	29	22	91
chromium	mg/L	0.05	-	0.018	< 0.005	1.3	< 0.3	0.093	0.069	0.059	0.025	0.07
cobalt	mg/L	-	0.0009	0.0007	< 0.0005	**0.63**	**0.1**	**0.0022**	0.0008	<0.00050	**0.0011**	**<0.00050**
copper	mg/L	1	[0.005] b	**0.037**	< 0.001	**1.1**	**0.13**	**0.019**	**0.01**	0.0048	0.0031	0.01
fluoride	mg/L	1.5 - 2.4	-	-	0.3	< 0.1	< 0.1	0.28	0.27	0.2	0.22	0.19
free cyanide	mg/L	0.2	0.005	-	-	< 0.002	< 0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.0010
hardness	mg $CaCO_3$/L	80-100	-	-	-	18000	27000	660	600	880	700	710
iron	mg/L	0.3	0.3	**2.3**	**1.3**	**1300**	**200**	**6.5**	**2.7**	**3.8**	**6.7**	**2.30**
lead	mg/L	0.01	[0.005] c	0.003	< 0.0005	**0.33**	**0.049**	0.0025	0.0012	<0.00050	0.00051	0.0012
magnesium	mg/L	-	-	92	120	2400	1800	130	110	170	160	110
manganese	mg/L	0.05	-	0.15	0.16	31	9	0.19	0.16	0.2	0.19	0.09
mercury	mg/L	0.001	0.0002	< 0.0001	< 0.0001	< 0.0015 (1)	< 0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001
molybdenum	mg/L	-	0.04	0.006	0.006	**0.14**	< 0.03	0.0077	0.0067	0.004	**0.0046**	**0.0042**
nickel	mg/L	-	0.025	0.019	0.003	**1.4**	**0.19**	0.023	0.013	0.0036	**0.048**	0.01
nitrate as N	mg/L	10	-	-	< 0.1	< 0.1	< 0.1	1.6	1.7	<0.10	<0.10	0.34
nitrite as N	mg/L	1	-	-	0.01	0.05	< 0.1	0.066	0.035	0.043	0.075	0.03
pH	pH Units	6.5-8.5	6.5-8.5	-	-	6.76	6.75	7.89	8.01	7.64	7.7	7.79
phenol	mg/L	-	-	-	-	< 0.001	0.26	<0.0010	0.0025	<0.0010	<0.0010	<0.0010
phosphate	mg/L	-	-	-	< 0.01	< 0.01	< 0.01	<0.010	<0.010	<0.010	<0.010	<0.010
total phosphorous	mg/L	-	0.01	-	-	**26**	< 5	<0.1	**0.099**	<0.10	**0.037**	<0.10
potassium	mg/L	-	-	27	28	450	300	37	31	22	19	21
selenium	mg/L	0.01	0.1	< 0.002	< 0.01	0.1	< 0.1	<0.0020	<0.002	<0.0020	<0.0020	<0.0020
silicon	mg/L	-	-	6.8	6.4	700	130	17	7.9	11	8.7	5.40
silver	mg/L	-	0.0001	< 0.0001	< 0.0001	< 0.005	< 0.005	<0.00010	<0.0001	<0.00010	<0.00010	<0.00010
sodium	mg/L	200 d	-	210	540	18000	15000	290	260	110	89	210
strontium	mg/L	-	-	17	13	200	170	20	19	16	14	8.20
sulphide	mg/L	0.05	-	-	-	0.130	< 0.02	<0.020	<0.020	<0.020	<0.020	<0.020
sulphate	mg/L	500	-	-	-	-	1130	430	430	630	630	510
thallium	mg/L	-	0.0003	< 0.00005	< 0.00005	**0.005**	< 0.003	<0.000050	<0.00005	<0.00005	<0.00005	<0.000050
tin	mg/L	-	-	0.001	< 0.001	0.11	< 0.05	0.0012	0.0013	<0.0010	<0.0010	0.0019
titanium	mg/L	-	-	0.026	0.034	7.5	1.8	0.2	0.015	0.016	<0.0050	0.010
TSS	mg/L	-	-	-	-	44000	9100	27	69	25	1450	130
turbidity	NTU	1	-	-	-	96000	1900	29	12	21	26	310
uranium	mg/L	0.02	0.005	0.0029	0.0043	**0.037**	**0.007**	**0.0013**	0.0013	0.0031	0.0035	0.0046
vanadium	mg/L	-	0.006	0.002	< 0.005	**1.3**	**0.23**	**0.007**	0.0014	0.0015	<0.00050	0.0011
zinc	mg/L	5	0.02	**0.069**	< 0.005	**3.9**	**0.6**	**0.044**	**0.054**	**0.021**	<0.0050	**0.04**

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 overburden								
				Oct-08	Nov-09	Oct-10	Nov-11	Nov-12	Nov-13	Nov-14	Nov-15	Nov-16
aluminum	mg/L	0.1	[0.075] a	**47**	**160**	**4**	**22**	**61**	**46**	**90**	**50**	**120**
alkalinity	mg $CaCO_3$/L	30-500	-	-	438	412	398	390	420	410	390	370
ammonia as N	mg/L	-	-	-	-	0.17	0.36	0.39	0.20	0.33	0.21	0.51
antimony	mg/L	-	[0.02]	< 0.001	< 0.005	< 0.0005	< 0.0005	<0.00050	<0.0005	<0.0050	<0.0050	<0.0050
arsenic	mg/L	0.025	[0.005]	**0.021**	**0.130**	0.004	**0.013**	**0.034**	**0.022**	**0.033**	**0.02**	**0.05**
barium	mg/L	1	-	0.44	2.0	0.1	0.3	0.75	0.54	0.92	0.51	1.1
beryllium	mg/L	-	1.1	0.003	0.008	< 0.0005	0.0011	0.0035	0.0025	<0.0050	<0.0050	0.006
bismuth	mg/L	-	-	< 0.001	< 0.01	< 0.001	< 0.001	<0.0010	<0.001	<0.010	<0.010	<0.010
boron	mg/L	5	0.2	**0.54**	**4.0**	**0.6**	**1.8**	**1.3**	**0.57**	**0.9**	**0.52**	**0.95**
bromide	mg/L	-	-	-	< 1	-	< 1	<1.0	<1.0	<1.0	<1.0	<1.0
cadmium	mg/L	0.005	0.0005	**0.0008**	**0.0050**	< 0.0001	0.0003	**0.001**	**0.0006**	<0.0010	<0.0010	**0.001**
calcium	mg/L	-	-	280	1200	66	170	440	380	570	280	740
chloride	mg/L	250	-	6	10	10	12	10	6.5	6	6.4	4.5
chromium	mg/L	0.05	-	0.12	0.41	0.01	0.057	0.170	0.11	0.17	0.11	0.26
cobalt	mg/L	-	0.0009	**0.049**	**0.160**	**0.004**	**0.022**	**0.067**	**0.043**	**0.07**	**0.044**	**0.12**
copper	mg/L	1	[0.005] b	**0.054**	**0.170**	0.004	**0.022**	**0.064**	**0.041**	**0.067**	**0.034**	**0.084**
fluoride	mg/L	1.5 - 2.4	-	-	0.2	0.2	0.2	0.27	0.22	0.2	0.22	0.23
free cyanide	mg/L	0.2	0.005	-	-	< 0.002	< 0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.0010
hardness	mg $CaCO_3$/L	80-100	-	-	-	410	380	380	390	380	420	330
iron	mg/L	0.3	0.3	**76**	**290**	**6**	**35**	**110**	**63**	**110**	**63**	**170**
lead	mg/L	0.01	[0.005] c	**0.026**	**0.090**	0.002	**0.013**	**0.038**	**0.027**	**0.039**	**0.022**	**0.062**
magnesium	mg/L	-	-	99	700	64	79	110	98	160	100	150
manganese	mg/L	0.05	-	2.4	7.1	0.2	1.2	3.9	2.9	4.5	2.4	7.5
mercury	mg/L	0.001	0.0002	< 0.0015 (1)	< 0.0001	< 0.0001	< 0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001
molybdenum	mg/L	-	0.04	0.015	**0.080**	0.008	0.010	0.012	0.009	0.011	0.0068	0.01
nickel	mg/L	-	0.025	**0.1**	**0.3**	0.008	**0.044**	**0.14**	**0.083**	**0.14**	**0.09**	**0.22**
nitrate as N	mg/L	10	-	-	2.1	0.4	0.2	0.13	0.31	0.17	0.24	0.18
nitrite as N	mg/L	1	-	-	< 0.01	0.04	0.03	0.012	0.018	0.042	<0.010	<0.010
pH	pH Units	6.5-8.5	6.5-8.5	-	-	7.87	7.85	8.01	7.95	7.92	7.92	7.92
phenol	mg/L	-	-	-	< -	< 0.001	< 0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
phosphate	mg/L	-	-	-	< 0.01	0.01	< 0.01	<0.010	<0.010	<0.010	0.011	0.012
total phosphorous	mg/L	-	0.01	-	-	**0.14**	**1.1**	**3.3**	**2.9**	**4.4**	**1.7**	**5.1**
potassium	mg/L	-	-	30	150	13	17	25	19	49	28	50
selenium	mg/L	0.01	0.1	< 0.002	< 0.02	< 0.002	< 0.002	<0.0020	<0.002	<0.020	<0.020	<0.020
silicon	mg/L	-	-	70	310	14	39	73	65	140	77	180
silver	mg/L	-	0.0001	**0.0003**	< 0.001	< 0.0001	**0.0002**	**0.00058**	**0.00042**	<0.0010	<0.0010	<0.0010
sodium	mg/L	200 d	-	36	310	34	37	37	35	46	30	33
strontium	mg/L	-	-	8.9	48	6.6	7	8.9	7.7	11	8.5	10
sulphide	mg/L	0.05	-	-	-	< 0.02	< 0.02	<0.020	<0.020	<0.020	<0.020	0.038
sulphate	mg/L	500	-	-	-	-	59	50	67	76	97	51
thallium	mg/L	-	0.0003	**0.00038**	**0.00150**	< 0.00005	0.00018	**0.00051**	**0.00034**	**0.00096**	**0.00056**	**0.0011**
tin	mg/L	-	-	0.001	< 0.01	< 0.001	< 0.001	0.0011	<0.001	<0.010	<0.010	<0.010
titanium	mg/L	-	-	0.6	2.6	0.063	0.35	0.67	0.65	1.2	0.52	1.3
TSS	mg/L	-	-	-	-	180	4900	4500	4800	2700	512	14000
turbidity	NTU	1	-	-	-	330	3200	2000	430	900	2500	6300
uranium	mg/L	0.02	0.005	**0.0084**	**0.0420**	0.0034	0.0035	0.0056	**0.0051**	**0.0057**	0.0039	**0.0059**
vanadium	mg/L	-	0.006	**0.092**	**0.320**	**0.008**	**0.04**	**0.11**	**0.078**	**0.14**	**0.082**	**0.2**
zinc	mg/L	5	0.02	**0.37**	**1.30**	**0.03**	**0.14**	**0.39**	**0.24**	**0.38**	**0.23**	**0.6**

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-09 straddle								
				Oct-08	Nov-09	Oct-10	Nov-11	Nov-12	Nov-13	Nov-14	Nov-15	Nov-16
aluminum	mg/L	0.1	[0.075] a	**180**	**310**	**33**	**22**	**27**	**39**	**110**	**88**	**250**
alkalinity	mg $CaCO_3$/L	30-500	-	-	305	261	239	220	240	150	250	180
ammonia as N	mg/L	-	-	-	2.5	2.2	1.7	2.6	3.3	3	2.4	3.30
antimony	mg/L	-	[0.02]	< 0.005	< 0.005	< 0.0005	< 0.0005	<0.00050	<0.0005	<0.0050	<0.0050	<0.0050
arsenic	mg/L	0.025	[0.005]	**0.054**	**0.10**	**0.02**	**0.02**	**0.05**	**0.032**	**0.027**	**0.025**	**0.058**
barium	mg/L	1	-	2.1	4	0.48	0.28	0.46	0.59	1.1	1.1	3.60
beryllium	mg/L	-	1.1	0.009	0.017	0.0021	0.0012	0.0020	0.002	0.0061	<0.0050	0.01
bismuth	mg/L	-	-	< 0.01	< 0.01	< 0.001	< 0.001	<0.0010	<0.001	<0.010	<0.010	<0.010
boron	mg/L	5	0.2	**3.7**	**5.2**	**3.6**	**3.7**	**4.7**	**5.6**	**7**	**4.7**	**5.80**
bromide	mg/L	-	-	-	1	-	3	<10	2.5	<5.0	<2.0	<5.0
cadmium	mg/L	0.005	0.0005	**0.002**	**0.003**	0.0003	0.0002	**0.001**	**0.00061**	**0.001**	<0.0010	**0.0023**
calcium	mg/L	-	-	1300	2200	390	220	520	700	750	700	1600
chloride	mg/L	250	-	142	115	196	252	290	210	510	220	340
chromium	mg/L	0.05	-	0.36	0.52	0.06	0.043	0.06	0.064	0.15	0.13	0.37
cobalt	mg/L	-	0.0009	**0.16**	**0.26**	**0.03**	**0.021**	**0.030**	**0.032**	**0.08**	**0.073**	**0.19**
copper	mg/L	1	[0.005] b	**0.15**	**0.20**	**0.02**	**0.018**	**0.027**	**0.027**	**0.061**	**0.054**	**0.14**
fluoride	mg/L	1.5 - 2.4	-	-	0.5	0.3	0.4	0.44	0.38	0.45	0.42	0.47
free cyanide	mg/L	0.2	0.005	-	< 0.002	< 0.002	< 0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.0010
hardness	mg $CaCO_3$/L	80-100	-	-	-	600	760	600	480	560	470	750
iron	mg/L	0.3	0.3	**260**	**410**	**45**	**34**	**54**	**53**	**120**	**110**	**290**
lead	mg/L	0.01	[0.005] c	**0.1**	**0.2**	**0.02**	**0.013**	**0.026**	**0.034**	**0.042**	**0.041**	**0.12**
magnesium	mg/L	-	-	190	300	82	58	100	120	140	110	230
manganese	mg/L	0.05	-	10	18.0	2.4	1.2	3.4	3.5	4.7	5	13
mercury	mg/L	0.001	0.0002	< 0.0015 (1)	< 0.0001	< 0.0001	< 0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001
molybdenum	mg/L	-	0.04	0.035	**0.050**	0.011	0.012	0.013	0.013	0.019	0.012	0.02
nickel	mg/L	-	0.025	**0.36**	**0.6**	**0.071** (1)	**0.046**	**0.065**	**0.065**	**0.17**	**0.17**	**0.44**
nitrate as N	mg/L	10	-	-	< 0.1	< <0.1	1.8	0.14	0.18	<0.10	0.98	<0.10
nitrite as N	mg/L	1	-	-	< 0.01	0.02	0.44	0.053	0.070	0.032	0.132	<0.010
pH	pH Units	6.5-8.5	6.5-8.5	-	7.8	7.81	7.77	7.84	7.86	7.73	7.92	7.80
phenol	mg/L	-	-	-	< 0.001	< 0.001	< 0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
phosphate	mg/L	-	-	-	< 0.01	< 0.01	< 0.01	<0.010	<0.010	<0.010	<0.010	<0.010
total phosphorous	mg/L	-	0.01	-	-	**1.8**	**1.1**	**2.6**	**3.8**	**4.3**	**3.3**	**11**
potassium	mg/L	-	-	88	130	30	26	33	37	74	49	99
selenium	mg/L	0.01	0.1	< 0.02	< 0.02	< 0.002	< 0.002	<0.0020	0.0027	<0.020	<0.020	<0.020
silicon	mg/L	-	-	77	420	51	38	46	49	170	130	330
silver	mg/L	-	0.0001	**0.003**	**0.002**	**0.0002**	**0.0002**	**0.00029**	**0.00023**	<0.0010	<0.0010	**0.001**
sodium	mg/L	200 d	-	170	200	190	120	250	350	330	190	260
strontium	mg/L	-	-	22	34	18	19	21	20	27	22	24
sulphide	mg/L	0.05	-	-	-	< <0.02	< 0.02	<0.020	<0.020	0.022	0.031	0.04
sulphate	mg/L	500	-	-	-	-	468	560	400	810	370	600
thallium	mg/L	-	0.0003	**0.0019**	**0.0026**	0.0003	0.0002	0.00026	0.00028	0.00091	**0.00072**	**0.0020**
tin	mg/L	-	-	< 0.01	< 0.01	< 0.001	< 0.001	0.0014	0.001	<0.010	<0.010	<0.010
titanium	mg/L	-	-	1.7	4.0	0.4	0.3	0.4	0.44	1.3	0.83	2
TSS	mg/L	-	-	-	16000	3300	3100	2700	5500	9200	1400	13000
turbidity	NTU	1	-	-	-	3400	920	470	690	820	2300	6100
uranium	mg/L	0.02	0.005	**0.01**	**0.02**	0.0023	0.0023	0.0032	0.003	0.004	0.005	**0.010**
vanadium	mg/L	-	0.006	**0.32**	**0.52**	**0.06**	**0.04**	**0.06**	**0.064**	**0.16**	**0.14**	**0.38**
zinc	mg/L	5	0.02	**1.1**	**1.3**	**0.1**	**0.11**	**0.15**	**0.16**	**0.38**	**0.37**	**0.90**

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 deep								
				Oct-08	Nov-09	Oct-10	Nov-11	Nov-12	Nov-13	Nov-14	Nov-15	Nov-16
aluminum	mg/L	0.1	[0.075] a	NOT SAMPLED	NOT SAMPLED	NOT SAMPLED	**0.75**	**1.3**	**1.4**	**5**	**3.2**	**3.7**
alkalinity	mg CaCO$_3$/L	30-500	-				52	52	41	42	43	27
ammonia as N	mg/L	-	-				40	36	39	38	34	38
antimony	mg/L	-	[0.02]				0.0053	<0.025	<0.05	<0.025	<0.025	<0.0050
arsenic	mg/L	0.025	[0.005]				**0.024**	<0.05	<0.1	<0.050	<0.050	<0.010
barium	mg/L	1	-				0.15	0.15	<0.2	0.23	0.12	0.17
beryllium	mg/L	-	1.1				0.0016	<0.025	<0.05	<0.025	<0.025	<0.0050
bismuth	mg/L	-	-				< 0.001	<0.05	<0.1	<0.050	<0.050	<0.010
boron	mg/L	5	0.2				**5.3**	**5**	**3.9**	**5.6**	**4.8**	**4.6**
bromide	mg/L	-	-				696	590	690	590	600	590
cadmium	mg/L	0.005	0.0005				**0.0012**	**0.006**	<0.01	**0.007**	**0.009**	<0.0010
calcium	mg/L	-	-				8800	9100	9200	11000	7700	11000
chloride	mg/L	250	-				46900	52000	53000	53000	49000	50000
chromium	mg/L	0.05	-				0.035	<0.25	<0.5	**1.2**	**0.28**	<0.050
cobalt	mg/L	-	0.0009				< 0.0005	<0.025	<0.05	<0.025	<0.025	<0.025
copper	mg/L	1	[0.005] b				**0.033**	<0.05	<0.1	<0.10	<0.10	<0.050
fluoride	mg/L	1.5 - 2.4	-				< 0.1	<0.10	<0.10	<0.10	0.11	<0.10
free cyanide	mg/L	0.2	0.005				< 0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.0010
hardness	mg CaCO$_3$/L	80-100	-				28000	29000	31000	33000	27000	33000
iron	mg/L	0.3	0.3				**25**	**19**	**61**	**56**	<5.0	**25**
lead	mg/L	0.01	[0.005] c				0.0041	<0.025	<0.05	<0.025	<0.025	<0.0050
magnesium	mg/L	-	-				2000	2100	2100	2400	2000	2300
manganese	mg/L	0.05	-				4.7	4.7	5.8	6	3.1	5.2
mercury	mg/L	0.001	0.0002				< 0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001
molybdenum	mg/L	-	0.04				0.0089	<0.025	<0.05	0.03	**0.13**	0.031
nickel	mg/L	-	0.025				0.006	<0.05	**0.32**	**0.4**	**0.14**	<0.050
nitrate as N	mg/L	10	-				< 0.1	<0.10	<0.10	<5.0	<1.0	<1.0
nitrite as N	mg/L	1	-				< 0.1	<0.10	<0.010	<0.50	<0.10	<0.10
pH	pH Units	6.5-8.5	6.5-8.5				6.84	**6.19**	**6.31**	**6.36**	6.77	6.54
phenol	mg/L	-	-				0.08	0.07	0.025	0.056	0.0066	0.022
phosphate	mg/L	-	-				< 0.01	<0.010	<0.010	<0.010	<0.010	<0.010
total phosphorous	mg/L	-	0.01				< 0.1	<5	**0.65**$^{(1)}$	<5.0	**0.21**	<1.0
potassium	mg/L	-	-				310	320	270	350	300	340
selenium	mg/L	0.01	0.1				0.053	<0.1	<0.2	<0.10	<0.10	<0.020
silicon	mg/L	-	-				< 3	6	<5	9.4	<2.5	1.9
silver	mg/L	-	0.0001				**0.0003**	<0.005	<0.01	<0.0050	<0.0050	<0.0010
sodium	mg/L	200 d	-				18000	19000	18000	21000	19000	21000
strontium	mg/L	-	-				180	190	190	210	160	220
sulphide	mg/L	0.05	-				< 0.02	<0.020	<0.020	<0.020	<0.020	<0.020
sulphate	mg/L	500	-				1470	1300	1200	930	1400	1200
thallium	mg/L	-	0.0003				< 0.00005	<0.0025	<0.005	<0.0025	<0.0025	<0.00050
tin	mg/L	-	-	**Note:** Insufficient water.	**Note:** Insufficient water.	**Note:** Insufficient water.	< 0.001	<0.05	<0.1	<0.050	<0.050	<0.010
titanium	mg/L	-	-				0.021	<0.25	<0.5	<0.25	<0.25	<0.050
TSS	mg/L	-	-				390	260	1000	510	85700	440
turbidity	NTU	1	-				150	38	320	93	68	120
uranium	mg/L	0.02	0.005				**0.0057**	**0.011**	<0.01	**0.012**	**0.023**	**0.0029**
vanadium	mg/L	-	0.006				**0.0074**	<0.05	<0.05	<0.050	<0.025	<0.0050
zinc	mg/L	5	0.02				< 0.005	<0.25	<0.5	**0.3**	**<0.25**	<0.050

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 overburden								
				Oct-08	Nov-09	Oct-10	Nov-11	Nov-12	Nov-13	Nov-14	Nov-15	Nov-16
aluminum	mg/L	0.1	[0.075] a	**1000**	**1800**	**420**	**90**	**870**	**42**	**33**	**1600**	**2.8**
alkalinity	mg $CaCO_3$/L	30-500	-	-	475	472	485	490	490	490	480	480
ammonia as N	mg/L	-	-	-	-	0.43	0.13	0.42	0.13	0.12	0.099	<0.050
antimony	mg/L	-	[0.02]	< 0.05	< 0.03	0.006	< 0.003	<0.05	<0.0005	<0.00050	<0.025	<0.00050
arsenic	mg/L	0.025	[0.005]	**0.27**	**0.59**	**0.12**	**0.054**	**0.300**	**0.019**	**0.011**	**0.49**	0.0028
barium	mg/L	1	-	13	26	5	2	11	0.56	0.37	23	0.071
beryllium	mg/L	-	1.1	0.057	0.10	0.02	0.01	0.051	0.0029	0.0021	0.083	<0.00050
bismuth	mg/L	-	-	< 0.1	< 0.05	< 0.01	< 0.005	<0.1	<0.001	<0.0010	<0.050	<0.0010
boron	mg/L	5	0.2	**1.4**	**3.1**	**0.8**	**0.24**	**2.10**	0.19	0.18	**2.5**	0.15
bromide	mg/L	-	-	-	< 1	-	< 1	<1.0	<1.0	<1.0	<1.0	<1.0
cadmium	mg/L	0.005	0.0005	< 0.01	**0.0190**	**0.003**	**0.0018**	<0.01	**0.00064**	0.00037	**0.02**	**0.0015**
calcium	mg/L	-	-	7800	17000	2900	1200	6400	390	240	15000	69
chloride	mg/L	250	-	3	3	4	16	2.5	2.1	3.9	3.6	3
chromium	mg/L	0.05	-	2	4	1	0.14	1.50	0.081	0.051	2.9	0.0091
cobalt	mg/L	-	0.0009	**1.1**	**2.0**	**0.4**	**0.092**	**0.910**	**0.047**	**0.028**	**1.6**	**0.002**
copper	mg/L	1	[0.005] b	**1.4**	**2.5**	**0.6**	**0.18**	**1.30**	**0.073**	**0.045**	**2.2**	**0.0045**
fluoride	mg/L	1.5 - 2.4	-	-	0.3	0.2	0.2	0.20	0.16	0.16	0.23	0.13
free cyanide	mg/L	0.2	0.005	-	-	< 0.002	< 0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.0010
hardness	mg $CaCO_3$/L	80-100	-	-	-	480	500	480	480	460	460	470
iron	mg/L	0.3	0.3	**1700**	**3200**	**660**	**170**	**1500**	**74**	**47**	**2600**	**2.6**
lead	mg/L	0.01	[0.005] c	**0.65**	**1**	**0.21**	**0.12**	**0.51**	**0.028**	**0.017**	**1.1**	**0.0012**
magnesium	mg/L	-	-	1200	2300	490	220	1000	110	110	2000	80
manganese	mg/L	0.05	-	71	150	28	11	61	3.3	1.7	140	0.11
mercury	mg/L	0.001	0.0002	< 0.0015 (1)	< 0.0015	< 0.0001	< 0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001
molybdenum	mg/L	-	0.04	< 0.1	< 0.05	0.02	0.005	<0.05	0.0036	0.0034	<0.025	0.0022
nickel	mg/L	-	0.025	**2.2**	**4.1**	**0.9**	**0.18**	**1.90**	**0.099**	**0.06**	**3.5**	0.0075
nitrate as N	mg/L	10	-	-	0.4	< 0.1	< 0.1	0.11	<0.10	<0.10	0.18	0.1
nitrite as N	mg/L	1	-	-	0.03	0.05	< 0.01	<0.010	<0.010	0.018	0.043	<0.010
pH	pH Units	6.5-8.5	6.5-8.5	-	-	7.7	7.83	7.98	7.94	7.84	7.97	7.84
phenol	mg/L	-	-	-	-	< 0.001	< 0.001	<0.0010	<0.0010	0.0025	<0.0010	<0.0010
phosphate	mg/L	-	-	-	< 0.01	< 0.01	< 0.01	<0.010	<0.010	<0.010	<0.010	<0.010
total phosphorous	mg/L	-	0.01	-	-	**26**	**11**	**57**	**3.3**	**1.8**		<0.10
potassium	mg/L	-	-	270	360	120	30	200	17	16	230	6.9
selenium	mg/L	0.01	0.1	< 0.2	< 0.1	< 0.02	< 0.01	<0.2	<0.002	<0.0020	<0.10	<0.0020
silicon	mg/L	-	-	190	1100	440	83	870	64	54	1000	14
silver	mg/L	-	0.0001	< 0.01	**0.005**	**0.002**	**0.0006**	<0.01	**0.00019**	0.0001	**0.0055**	<0.00010
sodium	mg/L	200 d	-	74	67	29	26	59	20	23	51	22
strontium	mg/L	-	-	24	40	8.9	4.5	18	2.5	1.9	34	1.3
sulphide	mg/L	0.05	-	-	-	0.230	< 0.02	0.047	0.025	0.035	**0.35**	<0.020
sulphate	mg/L	500	-	-	-	-	58	52	52	50	52	50
thallium	mg/L	-	0.0003	**0.007**	**0.012**	**0.004**	**0.0009**	**0.0068**	**0.00038**	0.00029	**0.0087**	<0.000050
tin	mg/L	-	-	< 0.1	< 0.05	< 0.01	< 0.005	<0.1	<0.001	<0.0010	<0.050	0.0027
titanium	mg/L	-	-	5.3	12	6.1	1.3	8	0.67	0.53	5.8	0.078
TSS	mg/L	-	-	-	-	91000	10000	27000	5800	5700	530	450
turbidity	NTU	1	-	-	-	94000	1500	1200	1900	1300	8800	440
uranium	mg/L	0.02	0.005	**0.09**	**0.13**	**0.03**	**0.027**	**0.059**	**0.0054**	0.004	**0.1**	0.0016
vanadium	mg/L	-	0.006	**1.80**	**2.70**	**0.77**	**0.15**	**1.50**	**0.084**	**0.052**	**2**	0.0052
zinc	mg/L	5	0.02	**5.5**	**9.6**	**2.0**	**0.5**	**4.4**	**0.23**	**0.14**	**8.2**	0.016

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 intermediate							
				Oct-08	Oct-10	Nov-11	Nov-12	Nov-13	Nov-14	Nov-15	Nov-16
aluminum	mg/L	0.1	[0.075] a	**510**	**9.3**	**28**	**5.2**	**8.3**	**23**	**72**	**0.57**
alkalinity	mg $CaCO_3$/L	30-500	-	-	400	416	410	420	430	430	430
ammonia as N	mg/L	-	-	-	0.92	0.82	0.99	0.96	1	0.98	0.69
antimony	mg/L	-	[0.02]	< 0.005	< 0.0005	< 0.0005	<0.0005	<0.0005	<0.00050	<0.0050	0.0005
arsenic	mg/L	0.025	[0.005]	**0.11**	**0.01**	**0.16**	**0.032**	**0.2**	**0.079**	**0.14**	**0.01**
barium	mg/L	1	-	6.9	0.3	0.56	0.14	0.29	0.4	0.98	0.09
beryllium	mg/L	-	1.1	0.025	0.0007	0.0019	<0.0005	0.00096	0.0013	<0.0050	<0.00050
bismuth	mg/L	-	-	< 0.01	< 0.001	< 0.001	<0.001	<0.001	<0.0010	<0.010	<0.0010
boron	mg/L	5	0.2	**4.3**	**1.0**	**0.75**	**0.63**	**0.73**	**1.1**	**0.97**	**0.77**
bromide	mg/L	-	-	-	-	< 1	<1.0	<1.0	<1.0	<1.0	<1.0
cadmium	mg/L	0.005	0.0005	**0.005**	0.0001	**0.0011**	**0.00054**	**0.00064**	0.00022	<0.0010	**0.0032**
calcium	mg/L	-	-	2800	120	330	120	190	170	390	59
chloride	mg/L	250	-	6	7	3	3	2.6	4.9	4	5.6
chromium	mg/L	0.05	-	0.79	0.01	0.052	0.011	0.017	0.035	0.1	0.01
cobalt	mg/L	-	0.0009	**0.51**	**0.01**	**0.031**	**0.0039**	**0.0098**	**0.021**	**0.063**	0.0005
copper	mg/L	1	[0.005] b	**0.43**	**0.01**	**0.031**	**0.0056**	**0.011**	**0.02**	**0.049**	0.0042
fluoride	mg/L	1.5 - 2.4	-	-	0.2	0.2	0.2	0.19	0.19	0.22	0.18
free cyanide	mg/L	0.2	0.005	-	< 0.002	< 0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.0010
hardness	mg $CaCO_3$/L	80-100	-	-	370	340	380	360	360	360	390
iron	mg/L	0.3	0.3	**780**	**15**	**66**	**9.7**	**37**	**41**	**110**	**1.60**
lead	mg/L	0.01	[0.005] c	**0.21**	0.0046	**0.018**	0.0036	**0.01**	**0.012**	**0.031**	**0.0007**
magnesium	mg/L	-	-	480	66	94	65	64	80	120	61
manganese	mg/L	0.05	-	27	1	2.5	0.62	1.2	1.2	3.4	0.04
mercury	mg/L	0.001	0.0002	< 0.0015 (1)	< 0.0001	< 0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001
molybdenum	mg/L	-	0.04	0.023	0.004	0.0045	0.0032	0.003	0.0039	<0.0050	0.0029
nickel	mg/L	-	0.025	**1**	0.019	**0.06**	0.0087	0.021	0.045	**0.13**	0.0068
nitrate as N	mg/L	10	-	-	< 0.1	0.7	0.36	0.72	<0.10	0.83	0.20
nitrite as N	mg/L	1	-	-	0.08	0.1	0.14	0.14	0.079	0.094	0.012
pH	pH Units	6.5-8.5	6.5-8.5	-	7.8	7.83	7.96	7.88	7.85	7.89	7.85
phenol	mg/L	-	-	-	< 0.001	< 0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
phosphate	mg/L	-	-	-	< 0.01	< 0.01	<0.010	<0.010	<0.010	<0.010	<0.010
total phosphorous	mg/L	-	0.01	-	**0.56**	**2.4**	**0.56**	**1.6**	**1.4**	**2.7**	<0.10
potassium	mg/L	-	-	150	15	18	12	13	20	34	11
selenium	mg/L	0.01	0.1	< 0.02	< 0.002	< 0.002	<0.002	<0.002	<0.0020	<0.020	<0.0020
silicon	mg/L	-	-	130	22	8.4	17	23	44	110	10
silver	mg/L	-	0.0001	**0.001**	< 0.0001	0.0001	<0.0001	<0.0001	<0.00010	<0.0010	<0.00010
sodium	mg/L	200 d	-	85	35	31	27	26	38	32	27
strontium	mg/L	-	-	27	12	13	11	12	15	14	11
sulphide	mg/L	0.05	-	-	<0.02	< 0.02	<0.020	<0.020	<0.020	<0.020	<0.020
sulphate	mg/L	500	-	-	-	39	41	40	43	42	35
thallium	mg/L	-	0.0003	**0.004**	0.00009	0.00027	0.000066	0.0001	0.00018	**0.00072**	<0.000050
tin	mg/L	-	-	< 0.01	< 0.001	< 0.001	<0.001	<0.001	<0.0010	<0.010	0.0022
titanium	mg/L	-	-	3.5	0.14	0.42	0.12	0.14	0.35	0.67	0.020
TSS	mg/L	-	-	-	440	2700	1900	2400	1200	492	44
turbidity	NTU	1	-	-	340	540	500	440	170	2400	16
uranium	mg/L	0.02	0.005	**0.03**	0.0011	0.002	0.00073	0.00095	0.0012	0.0043	0.00025
vanadium	mg/L	-	0.006	**0.83**	**0.02**	**0.049**	**0.0094**	**0.017**	**0.038**	**0.11**	0.0012
zinc	mg/L	5	0.02	**2.5**	**0.045**	**0.15**	**0.022**	**0.05**	**0.11**	**0.64**	0.02

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.

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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 deep								
				Oct-08	Dec-09	Oct-10	Nov-11	Nov-12	Nov-13	Nov-14	Nov-15	Nov-16
aluminum	mg/L	0.1	[0.075] a				**4.5**	**0.37**	**1.5**	**0.81**	<0.25	**1.6**
alkalinity	mg $CaCO_3$/L	30-500	-				40	66	39	52	49	43
ammonia as N	mg/L	-	-				34	28	34	32	30	36
antimony	mg/L	-	[0.02]				< 0.0005	<0.005	<0.025	<0.025	<0.025	<0.0050
arsenic	mg/L	0.025	[0.005]				**0.031**	<0.05	<0.05	<0.050	<0.050	<0.010
barium	mg/L	1	-				0.19	0.1	0.17	0.13	<0.10	0.18
beryllium	mg/L	-	1.1				< 0.0005	<0.005	<0.025	<0.025	<0.025	<0.0050
bismuth	mg/L	-	-				< 0.001	<0.01	<0.05	<0.050	<0.050	<0.010
boron	mg/L	5	0.2				**6**	**8.1**	**7.1**	**10**	**12**	**8.2**
bromide	mg/L	-	-				538	390	540	550	<500	530
cadmium	mg/L	0.005	0.0005				**0.012**	**0.0087**	**0.0064**	**0.019**	**0.0075**	**0.0057**
calcium	mg/L	-	-				5600	5300	7600	7500	5700	9100
chloride	mg/L	250	-				41700	36000	44000	40000	37000	46000
chromium	mg/L	0.05	-				0.62	0.22	<0.25	0.59	<0.25	0.83
cobalt	mg/L	-	0.0009				**0.012**	<0.01	<0.025	<0.025	<0.025	<0.025
copper	mg/L	1	[0.005] b				**0.051**	**0.018**	<0.05	<0.10	<0.050	<0.050
fluoride	mg/L	1.5 - 2.4	-	**NOT SAMPLED**	**NOT SAMPLED**	**NOT SAMPLED**	<0.1	0.14	<0.10	0.11	0.14	<0.10
free cyanide	mg/L	0.2	0.005				< 0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.0010
hardness	mg $CaCO_3$/L	80-100	-				25000	17000	26000	25000	21000	33000
iron	mg/L	0.3	0.3				**18**	**2.8**	**32**	**12**	<5.0	**19**
lead	mg/L	0.01	[0.005] c				**0.011**	**0.011**	<0.025	<0.025	<0.025	<0.0050
magnesium	mg/L	-	-				1500	1600	1700	1800	1400	2000
manganese	mg/L	0.05	-				2.5	2.4	4.5	4	2.7	5.2
mercury	mg/L	0.001	0.0002				< 0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001
molybdenum	mg/L	-	0.04				**0.24**	**0.26**	**0.11**	**0.14**	**0.16**	**0.059**
nickel	mg/L	-	0.025				**0.38**	**0.28**	**0.18**	**0.56**	**0.49**	**0.56**
nitrate as N	mg/L	10	-				0.1	<0.10	<0.10	<5.0	<0.50	<1.0
nitrite as N	mg/L	1	-				< 0.1	<0.10	<0.010	<0.50	<0.050	<0.10
pH	pH Units	6.5-8.5	6.5-8.5				6.6	8.22	6.65	7.05	6.94	6.59
phenol	mg/L	-	-				0.05	0.0022	<0.0010	0.033	0.0053	0.014
phosphate	mg/L	-	-				< 0.01	<0.010	<0.010	<0.010	<0.010	<0.010
total phosphorous	mg/L	-	0.01				< 0.1	<1	**1.4**	<5.0	<0.10 (1)	<1.0
potassium	mg/L	-	-				240	240	270	280	220	330
selenium	mg/L	0.01	0.1				0.08	**0.11**	<0.1	<0.10	<0.10	<0.020
silicon	mg/L	-	-				< 3	<5	4.2	3.7	<2.5	5.4
silver	mg/L	-	0.0001				**0.0002**	<0.001	<0.005	<0.0050	<0.0050	<0.0010
sodium	mg/L	200 d	-				16000	16000	16000	18000	14000	17000
strontium	mg/L	-	-				120	120	170	150	130	200
sulphide	mg/L	0.05	-				< 0.02	<0.020	<0.020	<0.020	<0.020	<0.020
sulphate	mg/L	500	-				1360	1700	1400	1300	1500	1200
thallium	mg/L	-	0.0003				< 0.00005	<0.0005	<0.0025	<0.0025	<0.0025	<0.00050
tin	mg/L	-	-	**Note:** Insufficient water.	**Note:** Insufficient water.	**Note:** Insufficient water.	< 0.001	<0.01	<0.05	<0.050	<0.050	<0.010
titanium	mg/L	-	-				0.099	<0.05	<0.25	<0.25	<0.25	0.053
TSS	mg/L	-	-				770	150	4300	150	69200	860
turbidity	NTU	1	-				280	41	260	37	45	290
uranium	mg/L	0.02	0.005				**0.022**	**0.0097**	**0.026**	**0.03**	**0.04**	**0.015**
vanadium	mg/L	-	0.006				**0.034**	<0.05	<0.025	<0.025	<0.025	0.0054
zinc	mg/L	5	0.02				**0.068**	<0.05	**0.35**	**0.3**	**0.26**	**0.088**

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 overburden								
				Oct-08	Dec-09	Oct-10	Nov-11	Nov-12	Nov-13	Nov-14	Nov-15	Nov-16
aluminum	mg/L	0.1	[0.075] a	**840**	**880**	**470**	**49**	**49**	**180**	**260**	**320**	**230**
alkalinity	mg CaCO$_3$/L	30-500	-	-	321	322	341	340	350	350	350	350
ammonia as N	mg/L	-	-	-	-	0.21	0.18	0.26	0.082	0.24	<0.050	0.077
antimony	mg/L	-	[0.02]	< 0.05	< 0.03	< 0.005	< 0.0005	<0.00050	<0.005	<0.0050	<0.0050	<0.0050
arsenic	mg/L	0.025	[0.005]	**0.4**	**0.4**	**0.2**	**0.022**	**0.029**	**0.079**	**0.12**	**0.17**	**0.098**
barium	mg/L	1	-	18	18	9	1	1	3.3	4.6	5.6	3.4
beryllium	mg/L	-	1.1	< 0.05	0.04	0.024	0.0027	0.0030	0.0098	0.013	0.016	0.01
bismuth	mg/L	-	-	< 0.1	< 0.05	< 0.01	< 0.001	<0.0010	<0.01	<0.010	<0.010	<0.010
boron	mg/L	5	0.2	**1.5**	**1.3**	**0.8**	0.1	0.14	**0.69**	**0.49**	**0.86**	**0.43**
bromide	mg/L	-	-	-	< 1	-	< 1	<1.0	<1.0	<1.0	<1.0	<1.0
cadmium	mg/L	0.005	0.0005	< 0.0100	**0.0100**	**0.006**	**0.0007**	**0.0011**	**0.0016**	**0.0029**	**0.0027**	**0.0012**
calcium	mg/L	-	-	7600	7800	3900	400	450	1400	2000	2500	1400
chloride	mg/L	250	-	7	14	3	2	2.6	2.5	4.1	3.7	1.4
chromium	mg/L	0.05	-	3.4	2.9	1.4	0.14	0.15	0.55	0.73	1	0.58
cobalt	mg/L	-	0.0009	**0.88**	**0.85**	**0.42**	**0.045**	**0.049**	**0.17**	**0.21**	**0.32**	**0.17**
copper	mg/L	1	[0.005] b	**2.3**	**2.3**	**1.1**	**0.11**	**0.14**	**0.48**	**0.63**	**0.92**	**0.51**
fluoride	mg/L	1.5 - 2.4	-	-	0.3	0.2	0.1	0.14	0.14	0.15	0.15	0.13
free cyanide	mg/L	0.2	0.005	-	-	< 0.002	< 0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.0010
hardness	mg CaCO$_3$/L	80-100	-	-	-	550	390	410	390	360	390	400
iron	mg/L	0.3	0.3	**1700**	**1600**	**840**	**89**	**100**	**320**	**430**	**620**	**350**
lead	mg/L	0.01	[0.005] c	**0.68**	**0.66**	**0.35**	**0.031**	**0.042**	**0.13**	**0.17**	**0.25**	**0.13**
magnesium	mg/L	-	-	960	960	480	100	93	230	300	350	220
manganese	mg/L	0.05	-	79	82	42	3.6	4.2	14	20	24	14
mercury	mg/L	0.001	0.0002	< 0.0015 (1)	**0.0003**	< 0.0001	< 0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001
molybdenum	mg/L	-	0.04	< 0.1	< 0.05	0.029	0.0054	0.0052	0.012	0.014	0.012	0.0067
nickel	mg/L	-	0.025	**1.8**	**1.8**	**0.9**	**0.1**	**0.1**	**0.34**	**0.45**	**0.7**	**0.38**
nitrate as N	mg/L	10	-	-	< 0.1	< 0.1	< 0.1	<0.10	<0.10	<0.10	<0.10	<0.10
nitrite as N	mg/L	1	-	-	0.03	0.02	0.02	<0.010	<0.010	0.021	0.016	0.016
pH	pH Units	6.5-8.5	6.5-8.5	-	-	7.88	7.95	8.01	7.96	8.03	8.02	8.14
phenol	mg/L	-	-	-	-	< 0.001	< 0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
phosphate	mg/L	-	-	-	< 0.01	< 0.01	< 0.01	<0.010	<0.010	<0.010	<0.010	<0.010
total phosphorous	mg/L	-	0.01	-	-	**28**	**2.4**	**2.6**	**7.7**	**18**	**12**	**10**
potassium	mg/L	-	-	220	190	110	16	15	62	77	76	67
selenium	mg/L	0.01	0.1	< 0.2	< 0.1	< 0.02	< 0.002	<0.0020	<0.02	<0.020	<0.020	<0.020
silicon	mg/L	-	-	86	790	550	67	69	260	340	400	340
silver	mg/L	-	0.0001	< 0.01	< 0.005	**0.003**	**0.0003**	**0.00031**	**0.0013**	<0.0010	**0.0017**	**0.0017**
sodium	mg/L	200 d	-	60	54	22	15	11	24	24	32	16
strontium	mg/L	-	-	16	16	8.5	1.8	1.9	4	5.3	5.8	3.8
sulphide	mg/L	0.05	-	-	-	0.170	0.06	0.042	0.057	0.064	<0.020	0.089
sulphate	mg/L	500	-	-	-	-	79	71	73	66	67	46
thallium	mg/L	-	0.0003	**0.009**	**0.007**	**0.004**	**0.00044**	**0.00049**	**0.002**	**0.0024**	**0.0028**	**0.002**
tin	mg/L	-	-	< 0.100	< 0.05	< 0.01	< 0.001	<0.0010	<0.01	<0.010	0.011	<0.010
titanium	mg/L	-	-	4.8	7.9	5.9	0.57	0.52	2.9	3.7	2.5	4
TSS	mg/L	-	-	-	-	88000	2300	7100	11000	22000	458	13000
turbidity	NTU	1	-	-	-	62000	840	1900	4700	6300	6100	10000
uranium	mg/L	0.02	0.005	**0.093**	**0.066**	**0.04**	**0.0057**	**0.0069**	**0.014**	**0.015**	**0.018**	**0.011**
vanadium	mg/L	-	0.006	**1.6**	**1.6**	**0.9**	**0.091**	**0.096**	**0.34**	**0.44**	**0.59**	**0.38**
zinc	mg/L	5	0.02	**4.5**	**4.4**	**2.1**	**0.24**	**0.36**	**0.87**	**1.4**	**1.8**	**0.99**

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 straddle								
				Oct-08	Dec-09	Oct-10	Nov-11	Nov-12	Nov-13	Nov-14	Nov-15	Nov-16
aluminum	mg/L	0.1	[0.075] a	**12**	**5**	**2**	**13**	**91**	**18**	**19**	**17**	**98**
alkalinity	mg $CaCO_3$/L	30-500	-	-	431	453	450	400	410	420	380	380
ammonia as N	mg/L	-	-	-	-	1.3	1.5	1.8	1.7	1.7	1.7	1.7
antimony	mg/L	-	[0.02]	< 0.001	0.0006	< 0.0005	< 0.0005	<0.0025	<0.0005	<0.00050	<0.00050	<0.0050
arsenic	mg/L	0.025	[0.005]	**0.019**	**0.015**	**0.013**	**0.02**	**0.078**	**0.015**	**0.014**	**0.014**	**0.05**
barium	mg/L	1	-	0.14	0.085	0.057	0.18	1	0.13	0.15	0.13	0.64
beryllium	mg/L	-	1.1	0.001	< 0.0005	< 0.0005	0.0006	0.0060	0.00093	0.00098	0.00092	<0.0050
bismuth	mg/L	-	-	< 0.001	< 0.001	0.003	< 0.001	<0.0050	<0.001	<0.0010	<0.0010	<0.010
boron	mg/L	5	0.2	**1.4**	**1.6**	**1.3**	**1.4**	**1.7**	**2.4**	**2.7**	**2.9**	**2.2**
bromide	mg/L	-	-	-	< 1	-	< 1	<1.0	<1.0	<1.0	<1.0	<1.0
cadmium	mg/L	0.005	0.0005	0.0002	< 0.0001	< 0.0001	0.0003	**0.0015**	0.00021	0.00027	0.00024	<0.0010
calcium	mg/L	-	-	210	140	99	250	1500	260	310	280	890
chloride	mg/L	250	-	9	11	9	10	15	26	27	23	13
chromium	mg/L	0.05	-	0.025	0.012	0.006	0.026	0.19	0.031	0.03	0.031	0.14
cobalt	mg/L	-	0.0009	**0.012**	**0.007**	**0.002**	**0.014**	**0.120**	**0.018**	**0.017**	**0.018**	**0.07**
copper	mg/L	1	[0.005] b	**0.022**	**0.011**	0.005	**0.028**	**0.240**	**0.037**	**0.04**	**0.037**	**0.17**
fluoride	mg/L	1.5 - 2.4	-	-	0.3	0.3	0.3	0.29	0.27	0.3	0.34	0.31
free cyanide	mg/L	0.2	0.005	-	-	< 0.002	< 0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.0010
hardness	mg $CaCO_3$/L	80-100	-	-	-	450	490	430	600	530	450	380
iron	mg/L	0.3	0.3	**20**	**11**	**5**	**25**	**210**	**33**	**31**	**32**	**140**
lead	mg/L	0.01	[0.005] c	**0.008**	0.0046	0.0017	**0.0096**	**0.081**	**0.0091**	**0.01**	**0.01**	**0.05**
magnesium	mg/L	-	-	87	70	72	86	180	100	100	81	150
manganese	mg/L	0.05	-	1.3	0.6	0.2	1.6	13.0	1.5	1.9	1.8	7.8
mercury	mg/L	0.001	0.0002	< 0.0015 (1)	< 0.0001	< 0.0001	< 0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001
molybdenum	mg/L	-	0.04	0.004	0.004	0.004	0.0039	0.0068	0.004	0.0037	0.0033	<0.0050
nickel	mg/L	-	0.025	0.023	0.012	0.005	**0.028**	**0.24**	**0.037**	**0.035**	**0.039**	**0.15**
nitrate as N	mg/L	10	-	-	< 0.1	< 0.1	< 0.1	<0.10	<0.10	<0.10	<0.10	<0.10
nitrite as N	mg/L	1	-	-	< 0.01	< 0.01	< 0.01	<0.010	0.20	<0.010	<0.010	0.01
pH	pH Units	6.5-8.5	6.5-8.5	-	-	7.88	7.95	8.00	7.82	7.92	7.8	8.07
phenol	mg/L	-	-	-	-	< 0.001	< 0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
phosphate	mg/L	-	-	-	< 0.01	< 0.01	< 0.01	<0.010	<0.010	<0.010	<0.010	<0.010
total phosphorous	mg/L	-	0.01	-	-	**0.19**	**1.6**	**10**	**1.6**	**1.8**	**0.82**	**7.2**
potassium	mg/L	-	-	21	18	18	22	33	25	26	23	51
selenium	mg/L	0.01	0.1	< 0.002	< 0.002	< 0.002	< 0.002	<0.01	<0.002	<0.0020	<0.0020	<0.020
silicon	mg/L	-	-	27	17	12	27	91	32	32	29	160
silver	mg/L	-	0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	<0.00050	<0.0001	<0.00010	<0.00010	<0.0010
sodium	mg/L	200 d	-	64	64	60	70	63	91	97	100	75
strontium	mg/L	-	-	12	11	12	11	14	15	15	12	11
sulphide	mg/L	0.05	-	-	-	< 0.020	< 0.02	0.021	<0.020	<0.020	<0.020	<0.020
sulphate	mg/L	500	-	-	-	-	147	160	360	330	270	130
thallium	mg/L	-	0.0003	0.00009	0.00007	< 0.00005	0.00012	**0.00051**	0.00013	0.00012	0.00012	0.001
tin	mg/L	-	-	< 0.001	< 0.001	0.001	< 0.001	<0.0050	<0.001	<0.0010	<0.0010	<0.010
titanium	mg/L	-	-	0.2	0.097	0.038	0.24	1.1	0.33	0.29	0.22	2.1
TSS	mg/L	-	-	-	-	240	1900	14000	5900	2600	804	7500
turbidity	NTU	1	-	-	-	210	410	900	800	460	610	2100
uranium	mg/L	0.02	0.005	0.0017	0.0009	0.0008	0.0014	0.0094	0.0012	0.0016	0.0011	**0.01**
vanadium	mg/L	-	0.006	**0.025**	**0.011**	0.005	**0.025**	**0.190**	**0.035**	**0.032**	**0.033**	**0.17**
zinc	mg/L	5	0.02	**0.06**	**0.03**	0.02	**0.069**	**0.550**	**0.086**	**0.09**	**0.086**	**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-11 deep								
				Oct-08	Dec-09	Oct-10	Nov-11	Nov-12	Nov-13	Nov-14	Nov-15	Nov-16
aluminum	mg/L	0.1	[0.075] a	NOT SAMPLED	NOT SAMPLED	**17**	**17**	**1.4**	**0.77**	**0.38**	**0.35**	**1.8**
alkalinity	mg CaCO$_3$/L	30-500	-			-	50	55	63	64	62	42
ammonia as N	mg/L	-	-			-	34	35	31	29	30	35
antimony	mg/L	-	[0.02]			< 0.03	< 0.03	<0.025	<0.025	<0.025	0.004	<0.0050
arsenic	mg/L	0.025	[0.005]			**0.061**	< 0.05	<0.05	<0.05	<0.050	<0.0050	**0.013**
barium	mg/L	1	-			< 0.3	0.31	0.15	0.11	0.1	0.1	0.16
beryllium	mg/L	-	1.1			< 0.03	< 0.03	<0.025	<0.025	<0.025	<0.0025	<0.0050
bismuth	mg/L	-	-			< 0.05	< 0.05	<0.05	<0.05	<0.050	<0.0050	<0.010
boron	mg/L	5	0.2			**4.8**	**5.1**	**5**	**4.6**	**4.5**	**4.5**	**5.2**
bromide	mg/L	-	-			-	< 500	580	460	780	<500	<1000
cadmium	mg/L	0.005	0.0005			**0.013**	**0.014**	**0.0073**	**0.011**	**0.011**	**0.011**	**0.0045**
calcium	mg/L	-	-			6700	7700	7400	6100	5800	5800	8700
chloride	mg/L	250	-			35800	40700	47000	38000	37000	41000	37000
chromium	mg/L	0.05	-			< 0.3	0.6	<0.25	0.26	<0.25	0.17	0.38
cobalt	mg/L	-	0.0009			< 0.030	< 0.03	<0.025	<0.025	<0.025	**0.011**	<0.025
copper	mg/L	1	[0.005] b			**0.096**	**0.068**	<0.05	<0.05	<0.050	<0.025	**0.012**
fluoride	mg/L	1.5 - 2.4	-			0.1	0.1	0.12	0.15	0.12	0.16	0.11
free cyanide	mg/L	0.2	0.005			< 0.002	< 0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.0010
hardness	mg CaCO$_3$/L	80-100	-			-	26000	27000	24000	21000	19000	29000
iron	mg/L	0.3	0.3			**67**	**84**	**16**	<5	**8.6**	**8.5**	**23**
lead	mg/L	0.01	[0.005] c			< 0.03	< 0.03	<0.025	<0.025	<0.025	<0.0025	<0.0050
magnesium	mg/L	-	-			1500	1800	1700	1600	1700	1600	2100
manganese	mg/L	0.05	-			4.2	5.1	4	2.8	2.8	2.8	4.7
mercury	mg/L	0.001	0.0002			< 0.0001	< 0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001
molybdenum	mg/L	-	0.04			< 0.05	< 0.03	<0.025	**0.12**	**0.15**	**0.15**	**0.041**
nickel	mg/L	-	0.025			< 0.05	**0.095**	**0.21**	**0.19**	**0.5**	**0.51**	**0.31**
nitrate as N	mg/L	10	-			-	< 0.1	<0.10	<0.10	<5.0	<1.0	<0.10
nitrite as N	mg/L	1	-			-	< 0.01	<0.10	<0.010	<0.50	<0.10	<0.010
pH	pH Units	6.5-8.5	6.5-8.5			-	6.69	**6.14**	7.21	6.73	6.74	6.65
phenol	mg/L	-	-			< 0.001	0.017	0.0091	0.0070	0.035	0.0047	<0.010
phosphate	mg/L	-	-			< 0.01	< 0.01	<0.010	<0.010	<0.010	<0.010	<0.010
total phosphorous	mg/L	-	0.01			< 5	< 5	<5	**0.17**	<5.0	**0.15**	<1.0
potassium	mg/L	-	-			260	280	270	250	260	260	300
selenium	mg/L	0.01	0.1			< 0.1	< 0.1	<0.1	<0.1	<0.10	<0.010	<0.020
silicon	mg/L	-	-			25	3.1	5.5	3.5	3.5	3.3	5.7
silver	mg/L	-	0.0001			< 0.005	< 0.005	<0.005	<0.005	<0.0050	<0.00050	<0.0010
sodium	mg/L	200 d	-			14000	16000	16000	15000	16000	15000	17000
strontium	mg/L	-	-			130	160	160	130	120	120	180
sulphide	mg/L	0.05	-			0.040	< 0.02	<0.020	<0.020	<0.020	<0.020	<0.020
sulphate	mg/L	500	-			-	1410	1300	1600	1700	1600	1200
thallium	mg/L	-	0.0003			< 0.003	< 0.003	<0.0025	<0.0025	<0.0025	<0.00025	<0.00050
tin	mg/L	-	-	**Note:** Insufficient water.	**Note:** Insufficient water.	< 0.05	< 0.05	<0.05	<0.05	<0.050	<0.0050	<0.010
titanium	mg/L	-	-			< 0.3	< 0.3	<0.25	<0.25	<0.25	<0.025	0.17
TSS	mg/L	-	-			-	1200	3000	170	58	68300	390
turbidity	NTU	1	-			-	140	320	15	29	69	220
uranium	mg/L	0.02	0.005			**0.011**	**0.01**	**0.015**	**0.029**	**0.032**	**0.028**	**0.010**
vanadium	mg/L	-	0.006			**0.140**	< 0.03	<0.025	<0.025	<0.025	<0.0025	<0.0050
zinc	mg/L	5	0.02			**0.79**	**0.37**	<0.25	**0.44**	**<0.25**	**0.23**	**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.3
Groundwater Quality - Bekkers Well
Tansley Quarry - Forterra Brick Ltd.

Parameter	Units	Criteria				BEKKERS									
		ODWS MAC	ODWS IMAC	ODWS AO	ODWS OG	Jul-07	Oct-08	Dec-09	Oct-10	Nov-11	Nov-12	Nov-13	Nov-14	Nov-15	Nov-16
aluminum	mg/L				0.1	0.038	0.01	0.012	0.015	<0.005	0.0078	**NOT SAMPLED**	**NOT SAMPLED**	**NOT SAMPLED**	<0.0050
alkalinity	mg $CaCO_3$/L				30-500	362	435	77	295	172	100				110
ammonia-N	mg/L					0.31	<0.05	1.0	0.84	0.43	0.94				0.19
antimony	mg/L		0.006			<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005				<0.00050
arsenic	mg/L		0.025			<0.001	<0.001	<0.001	<0.001	<0.001	<0.001				<0.0010
barium	mg/L	1				0.037	0.022	0.010	0.015	0.022	0.016				0.021
beryllium	mg/L					<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005				<0.00050
bismuth	mg/L					<0.001	<0.001	<0.001	<0.001	<0.001	<0.001				<0.0010
boron	mg/L		5			0.69	0.46	1.8	1.5	1.5	1.6				1.5
bromide	mg/L					<1	<1	3	1	<10	<10				2.5
cadmium	mg/L	0.005				<0.0001	<0.0001	<0.0001	<0.0001	0.0003	0.00057				<0.00010
calcium	mg/L					140	130	190	190	190	170				210
chloride	mg/L			250		104	49	**264**	118	195	**270**				**290**
chromium	mg/L	0.05				<0.005	<0.005	<0.005	<0.005	<0.005	<0.005				<0.0050
cobalt	mg/L					<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005				<0.00050
copper	mg/L			1		0.069	0.014	0.006	0.005	0.021	0.031				0.0037
fluoride	mg/L	1.5 [a]				0.2	0.2	0.2	0.2	0.3	0.26				0.24
free cyanide	mg/L					<0.002	<0.002	<0.002	<0.002	<0.002	<0.002				<0.0010
hardness	mg $CaCO_3$/L				80-100	**760**	**890**	**740**	**810**	**780**	**720**				**940**
iron	mg/L			0.3		<0.05	<0.1	<0.1	<0.1	<0.1	<0.1				<0.10
lead	mg/L	0.01 [c]				0.0063	<0.0005	0.0010	0.0014	0.0023	0.0034				<0.00050
magnesium	mg/L					130	140	79	96	100	71				98
manganese	mg/L			0.05		0.043	0.011	**0.15**	**0.1**	**0.071**	**0.084**				**0.25**
mercury	mg/L					<0.0001	<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				0.0077
nickel	mg/L					<0.001	<0.001	<0.001	<0.001	0.005	0.032				<0.0010
nitrate as N	mg/L	10.0 [b]				3	2.9	<0.1	2.4	1.3	0.27				0.29
nitrite as N	mg/L	1.0 [b]				0.11	<0.01	<0.01	0.06	0.05	<0.01				0.027
pH	pH Units				6.5-8.5	8.1	8.2	7.8	7.91	7.96	6.9				7.71
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					0.005	0.01	<0.002	<0.002	0.007	<0.1				<0.10
potassium	mg/L					13	9.6	17	17	16	15				16
selenium	mg/L	0.01				<0.002	<0.002	<0.002	<0.002	<0.002	<0.002				<0.0020
silicon	mg/L					6	6.4	4.3	4.5	5.3	3.7				3.8
silver	mg/L					<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001				<0.00010
sodium	mg/L			20/200 [f]		120	83	**260**	**260**	**210**	**230**				**210**
strontium	mg/L					6.1	5	12	12	11	12				14
sulphide	mg/L					<0.02	<0.02	<0.02	<0.02	<0.02	<0.02				<0.020
sulphate	mg/L			500 [d]		**563**	**543**	**838**	**617**	**762**	**850**				**800**
thallium	mg/L					<0.05	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005				<0.000050
tin	mg/L					0.001	<0.001	<0.001	<0.001	<0.001	<0.001	**Note:** Well not in use.	**Note:** Well inaccessible	**Note:** Well inaccessible	<0.0010
titanium	mg/L					<0.005	<0.005	<0.005	<0.005	<0.005	<0.005				<0.0050
TSS	mg/L					<10	<10	<10	<10	<10	<10				1
turbidity	NTU			5 [e]		1.4	0.3	0.6	0.3	<0.2	0.4				0.2
uranium	mg/L					0.0057	0.0074	0.0004	0.0017	0.003	0.00087				0.0024
vanadium	mg/L					<0.001	<0.001	<0.001	<0.001	0.0009	0.00064				0.00056
zinc	mg/L			5		0.04	0.032	<0.03	0.017	0.38	2.2				0.034

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 - Forterra 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	Nov-14	Nov-15	Nov-16
aluminum	mg/L				0.1	**0.12**	0.036	NOT SAMPLED	NOT SAMPLED	NOT SAMPLED	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.	**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 - Forterra 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**	**Nov-14**	**Nov-15**	**Nov-16**
aluminum	mg/L				0.1	<0.005	0.007	<0.01	0.029	0.005	**NOT SAMPLED**	**NOT SAMPLED**	**NOT SAMPLED**	**NOT SAMPLED**	**NOT SAMPLED**	**NOT SAMPLED**	**NOT SAMPLED**	**NOT SAMPLED**
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	**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:** 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	<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 - Forterra Brick Ltd.

Parameter	Units	Criteria				FINUCCI												
		ODWS MAC	ODWS IMAC	ODWS AO	ODWS OG	Nov-02	Duplicate	Mar-03	Sep-04	Jan-07	Oct-08	Dec-09	Oct-10	Nov-11	Nov-12	Nov-13	Nov-15	Nov-16
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**	**NOT SAMPLED**	**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.	**Note:** Well not in use.	**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 - Forterra Brick Ltd.

Parameter	Units	Criteria				HENDERVALE HOUSE													
		ODWS MAC	ODWS IMAC	ODWS AO	ODWS OG	Nov-02	Mar-03	Duplicate	Sep-04	Jan-07	Oct-08	Dec-09	Oct-10	Nov-11	Nov-11 DUP 2	Nov-12	Nov-14	Nov-15	Nov-16
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**	**NOT SAMPLED**	0.1
alkalinity	mg $CaCO_3$/L				30-500	356	357	362	360	380	353	360	356	350	355	360			91
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			<0.050
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			<0.00050
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			<0.0010
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			0.023
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			<0.00050
bismuth	mg/L					<0.001	<0.001	<0.001	-	<0.001	<0.001	<0.001	<0.001	<0.001	0.001	<0.001			<0.0010
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			0.021
bromide	mg/L					<0.5	<0.5	<0.5	<0.1	<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			<0.00010
calcium	mg/L					91.3	82.8	81.4	72	93	80	85	94	130	120	92			35
chloride	mg/L			250		97.8	63.5	64.4	88	66	69	83	113	117	117	140			28
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			<0.0050
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			<0.00050
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			0.061
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			0.69
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			<0.0010
hardness	mg $CaCO_3$/L				80-100	**613**	**552**	**549**	**470**	**580**	**500**	**550**	**570**	**580**	**560**	**530**			**120**
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**			**<0.10**
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			0.00054
magnesium	mg/L					93.4	84	84.1	69	90	77	84	90	120	110	83			8.8
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			<0.0020
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			<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			0.0013
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			<0.0010
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			0.22
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			<0.010
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			8.03
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			<0.0010
phosphate	mg/L					<1	<1	<1	<0.5	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01			<0.010
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			<0.10
potassium	mg/L					9.1	9.2	9.2	7.5	10	9.9	9.4	10	14	13	9.6			1.9
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			<0.0020
silicon	mg/L					9.92	9.12	9	-	10	8.7	9.2	9.8	13	12	9.4			0.45
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			<0.00010
sodium	mg/L			20/200 [f]		54.9	58.4	58.1	45.0	69	68	64	70	92	85	66			18
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			0.18
sulphide	mg/L					0.01	0.01		<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02			<0.020
sulphate	mg/L			500 [d]		187	213	215	190	210	229	197	197	190	183	170			24
thallium	mg/L					0.00007	<0.00005	0.00005	-	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005			<0.000050
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	**Note:** Well inaccessible.	**Note:** Well inaccessible.	<0.0010
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			<0.0050
TSS	mg/L					4	10	9	2	<1	<10	<10	<10	<10	<10	<10			<1
turbidity	NTU			5 [e]		2.2	**9.7**	**9.7**	**12**	3.5	2	**8**	3.6	1.3	1.7	3.3			0.1
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			0.00029
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			<0.00050
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			0.0097

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 - Forterra 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	Nov-14	Nov-15	Nov-16
aluminum	mg/L				0.1	0.007	0.005	0.006	0.007	<0.005	<0.005	**NOT SAMPLED**	**NOT SAMPLED**	**NOT SAMPLED**	0.094
alkalinity	mg $CaCO_3$/L				30-500	385	361	356	360	354	370				90
ammonia-N	mg/L					0.5	0.39	0.42	0.36	0.31	0.48				<0.050
antimony	mg/L		0.006			<0.001	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005				0.00064
arsenic	mg/L		0.025			0.016	0.014	0.014	0.01	0.014	0.011				<0.0010
barium	mg/L	1				0.032	0.037	0.029	0.03	0.04	0.03				0.023
beryllium	mg/L					<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005				<0.00050
bismuth	mg/L					<0.001	<0.001	<0.001	<0.001	<0.001	<0.0010				<0.0010
boron	mg/L		5			0.52	0.44	0.48	0.4	0.67	0.5				0.018
bromide	mg/L					<1	<1	<1	<1	<1	<1				<1
cadmium	mg/L	0.005				<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001				<0.00010
calcium	mg/L					100.0	92	90	100	130	95				34
chloride	mg/L			250		97	83	131	135	128	150				29
chromium	mg/L	0.05				<0.005	<0.005	<0.005	<0.005	<0.005	<0.005				<0.0050
cobalt	mg/L					<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005				<0.00050
copper	mg/L			1		0.001	0.003	0.006	<0.001	0.002	0.05				0.12
fluoride	mg/L	1.5 [a]				0.2	0.2	0.2	0.2	0.2	0.2				0.67
free cyanide	mg/L					<0.002	<0.002	<0.002	<0.002	<0.002	<0.002				<0.0010
hardness	mg $CaCO_3$/L				80-100	**610**	**510**	**580**	**560**	**590**	**550**				**120**
iron	mg/L			0.3		**1.4**	**1.1**	**1.3**	**1.1**	**0.46**	**1.2**				**<0.10**
lead	mg/L	0.01 [c]				<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0012				0.00099
magnesium	mg/L					85	68	78	86	100	80				8.3
manganese	mg/L			0.05		0.028	0.032	0.029	0.032	**0.051**	0.034				<0.0020
mercury	mg/L					<0.0001	<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				0.0015
nickel	mg/L					<0.001	<0.001	<0.001	<0.001	<0.001	<0.001				<0.0010
nitrate as N	mg/L	10.0 [b]				<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				0.22
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	8.1	8.1	7.9	7.8	7.93	8.03				8.07
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	0.014	<0.002	<0.1	0.008	<0.1				<0.10
potassium	mg/L					8.4	7.9	7.4	8	10	8.2				1.8
selenium	mg/L	0.01				<0.002	<0.002	<0.002	<0.002	<0.002	<0.002				<0.0020
silicon	mg/L					11	10	9.6	11	12	9.5				0.43
silver	mg/L					<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001				<0.00010
sodium	mg/L			20/200 [f]		54.0	45	46	52	66	58				17
strontium	mg/L					4.20	4.3	4.3	4.6	5.6	4.8				0.18
sulphide	mg/L					<0.02	<0.02	<0.02	<0.02	<0.02	<0.02				<0.020
sulphate	mg/L			500 [d]		141	104	144	133	154	150				30
thallium	mg/L					<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005				<0.000050
tin	mg/L					<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	**Note:** Well not in use.	**Note:** Well inaccessible.	**Note:** Well inaccessible.	<0.0010
titanium	mg/L					<0.005	<0.005	<0.005	<0.005	<0.005	<0.005				<0.0050
TSS	mg/L					<3	<10	<10	10	<10	<10				<1
turbidity	NTU			5 [e]		**12.7**	**8.5**	**17**	**8.5**	**2.1**	**7.6**				0.1
uranium	mg/L					0.0011	0.0009	0.0013	0.0012	0.0016	0.0013				0.00026
vanadium	mg/L					<0.001	<0.001	<0.001	<0.001	0.0008	0.00071				<0.00050
zinc	mg/L			5		0.008	0.006	0.007	0.009	0.047	0.038				0.0081

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.9
Groundwater Quality - Hendervale Main Barn Well
Tansley Quarry - Forterra 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	Nov-14	Nov-15	Nov-16
aluminum	mg/L				0.1	**0.48**	0.035	**4.4**	0.07	**NOT SAMPLED**	**NOT SAMPLED**	**NOT SAMPLED**	**NOT SAMPLED**	**NOT SAMPLED**	**NOT SAMPLED**
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	**Note:** Well inaccessible.	**Note:** Well inaccessible.	**Note:** Well inaccessible.	**Note:** Well inaccessible.	**Note:** Well inaccessible.	**Note:** Well inaccessible.
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						

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.10
Groundwater Quality - Hendervale ABC Barn Well
Tansley Quarry - Forterra Brick Ltd.

Parameter	Units	Criteria				HENDERVALE ABC BARN						
		ODWS MAC	ODWS IMAC	ODWS AO	ODWS OG	Oct-10	Nov-11	Nov-12	Nov-13	Nov-14	Nov-15	Nov-16
aluminum	mg/L				0.1	0.083	NOT SAMPLED	NOT SAMPLED	NOT SAMPLED	NOT SAMPLED	NOT SAMPLED	NOT SAMPLED
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	**Note:** Well not in use.	**Note:** Well inaccessible.	**Note:** Well not in use.	**Note:** Well inaccessible.	**Note:** Well inaccessible.	**Note:** Well inaccessible.
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 - Forterra Brick Ltd.

Parameter	Units	Criteria				HENDERVALE BARN CISTERN						
		ODWS MAC	ODWS IMAC	ODWS AO	ODWS OG	Nov-11	Nov-12	Nov-12	Nov-13	Nov-14	Nov-15	Nov-16
						(Main Barn Tap)	**(Main Barn Tap)**	**(XYZ Barn Tap)**	**(Main Barn Tap)**		**(Main Barn Tap)**	**(Main Barn Tap)**
aluminum	mg/L				0.1	**0.11**	0.022	0.044	0.0067	**NOT SAMPLED**	<0.005	<0.0050
alkalinity	mg $CaCO_3$/L				30-500	368	75	75	380		380	380
ammonia-N	mg/L					0.27	0.067	0.14	<0.050		<0.050	<0.050
antimony	mg/L		0.006			<0.0005	<0.0005	<0.0005	<0.0005		<0.0005	<0.00050
arsenic	mg/L		0.025			0.013	<0.001	<0.001	0.0081		0.0051	0.008
barium	mg/L	1				0.046	0.024	0.03	0.035		0.037	0.037
beryllium	mg/L					<0.0005	<0.0005	<0.0005	<0.0005		<0.0005	<0.00050
bismuth	mg/L					<0.001	<0.001	<0.001	<0.001		<0.001	<0.0010
boron	mg/L		5			0.33	2.4	2.4	0.22		0.27	0.24
bromide	mg/L					<1	6.6	6.9	<1.0		<1.0	0.25
cadmium	mg/L	0.005				<0.0001	<0.0001	<0.0001	<0.0001		<0.0001	<0.00010
calcium	mg/L					110	120	120	96		97	98
chloride	mg/L			250		19	**560**	**590**	28		35	41
chromium	mg/L	0.05				<0.005	<0.005	<0.005	<0.005		<0.005	<0.0050
cobalt	mg/L					<0.0005	<0.0005	<0.0005	<0.0005		<0.0005	<0.00050
copper	mg/L			1		0.005	0.0032	0.014	0.025		0.0037	0.001
fluoride	mg/L	1.5 [a]				0.2	0.23	0.25	0.14		0.16	0.16
free cyanide	mg/L					<0.002	<0.002	<0.002	<0.0020		<0.0020	<0.0010
hardness	mg $CaCO_3$/L				80-100	**450**	**420**	**440**	**470**		**480**	**500**
iron	mg/L			0.3		**1.6**	<0.1	**1**	**1.2**		**0.47**	**1**
lead	mg/L	0.01 [c]				<0.0005	0.00052	0.0022	**0.027**		<0.0005	<0.00050
magnesium	mg/L					58	36	37	55		59	62
manganese	mg/L			0.05		**0.051**	**0.057**	**0.067**	0.018		0.011	0.02
mercury	mg/L					<0.0001	<0.0001	<0.0001	<0.00010		<0.00010	<0.0001
molybdenum	mg/L					0.0012	0.0019	0.0023	0.00098		0.001	0.00094
nickel	mg/L					<0.001	<0.001	<0.001	<0.001		<0.001	<0.0010
nitrate as N	mg/L	10.0 [b]				<0.1	1.9	1.9	0.2		0.28	0.26
nitrite as N	mg/L	1.0 [b]				0.06	<0.01	<0.01	<0.010		<0.010	<0.010
pH	pH Units				6.5-8.5	8.1	6.78	6.71	8.13		7.99	7.92
phenol	mg/L					<0.001	<0.001	<0.001	<0.0010		<0.0010	<0.0010
phosphate	mg/L					<0.01	<0.01	<0.01	<0.010		<0.010	<0.010
total phosphorous	mg/L					0.015	<0.1	<0.002	<0.1		<0.1	<0.10
potassium	mg/L					5.2	14	14	4.4		4.8	4.7
selenium	mg/L	0.01				<0.002	<0.002	<0.002	<0.002		<0.002	<0.0020
silicon	mg/L					12	1.8	1.8	10		11	11
silver	mg/L					<0.0001	<0.0001	<0.0001	<0.0001		<0.0001	<0.00010
sodium	mg/L			20/200 [f]		21	**320**	**330**	17		20	20
strontium	mg/L					2.6	3.9	4	2.2		2.4	2.3
sulphide	mg/L					<0.02	<0.02	<0.02	<0.02		<0.02	<0.020
sulphate	mg/L			500 [d]		94	330	340	87		92	84
thallium	mg/L					<0.00005	<0.00005	<0.00005	<0.00005		<0.00005	<0.000050
tin	mg/L					<0.001	<0.001	<0.001	0.003	**Note:** Inaccessilble	<0.001	<0.0010
titanium	mg/L					<0.005	<0.005	<0.005	<0.005		<0.005	<0.0050
TSS	mg/L					12	<10	<10	3		2	1
turbidity	NTU			5 [e]		**6.5**	1.4	4.2	3.9		2.3	**11**
uranium	mg/L					0.001	0.00019	0.00016	0.00066		0.0007	0.00066
vanadium	mg/L					0.0016	0.00094	0.001	<0.0005		<0.0005	<0.00050
zinc	mg/L			5		0.031	0.066	0.26	0.13		0.028	0.0091

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.12
Groundwater Quality - Robinson Well
Tansley Quarry - Forterra 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	Nov-14	Nov-15	Nov-16
aluminum	mg/L				0.1	<0.005	0.013	0.044	**NOT SAMPLED**	**NOT SAMPLED**	**NOT SAMPLED**	**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 municipa water	**Note:** Well filled with municipa water	**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					<0.005	<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:

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.13
Groundwater Quality - Sicard Well
Tansley Quarry - Forterra 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	Nov-15	Nov-16
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	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	**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:

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.14
Groundwater Quality - Simms Well
Tansley Quarry - Forterra 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	Nov-14	Nov-15	Nov-16
aluminum	mg/L				0.1	0.007	0.041	0.019	0.008	0.007	<0.005	<0.005	<0.0050	<0.005	<0.0050
alkalinity	mg $CaCO_3$/L				30-500	345	316	164	244	313	300	280	300	260	270
ammonia-N	mg/L					0.09	<0.05	<0.05	<0.05	<0.05	<0.05	<0.050	<0.050	<0.050	<0.050
antimony	mg/L		0.006			0.0009	0.0008	0.0007	0.0008	0.0015	0.0012	0.0012	0.0012	0.001	0.0011
arsenic	mg/L		0.025			<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0010	<0.001	<0.0010
barium	mg/L	1				0.055	0.052	0.068	0.062	0.072	0.059	0.046	0.049	0.048	0.046
beryllium	mg/L					<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.00050	<0.0005	<0.00050
bismuth	mg/L					<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0010	<0.001	<0.0010
boron	mg/L		5			0.036	0.045	0.45	0.19	0.069	0.1	0.045	0.049	0.065	0.051
bromide	mg/L					<1	<1	<1	<1	<1	<1	<1.0	<1.0	<1.0	<1.0
cadmium	mg/L	0.005				<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.00010	<0.0001	<0.00010
calcium	mg/L					110	98	150	120	120	88	81	85	72	78
chloride	mg/L			250		7	6	7	6	4	7.3	5.3	8.4	6.6	6
chromium	mg/L	0.05				<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0050	<0.005	<0.0050
cobalt	mg/L					<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.00050	<0.0005	<0.00050
copper	mg/L			1		0.015	0.07	0.008	0.007	0.022	0.013	0.013	0.013	0.017	0.013
fluoride	mg/L	1.5 [a]				0.2	0.2	0.2	0.2	0.2	0.22	0.21	0.2	0.24	0.23
free cyanide	mg/L					0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.0020	<0.0020	<0.0020	<0.0010
hardness	mg $CaCO_3$/L				80-100	**360**	**340**	**650**	**500**	**360**	**340**	**330**	**350**	**330**	**330**
iron	mg/L			0.3		<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.10	<0.1	<0.10
lead	mg/L	0.01 [c]				0.0007	**0.021**	0.0006	0.0005	0.0008	0.00079	0.0014	<0.00050	0.00055	<0.00050
magnesium	mg/L					34	28	55	55	41	30	31	34	37	34
manganese	mg/L			0.05		<0.002	0.004	0.003	0.003	<0.002	0.016	0.0058	<0.0020	<0.002	<0.0020
mercury	mg/L					<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.00010	<0.00010	<0.00010	<0.0001
molybdenum	mg/L					<0.001	<0.001	0.004	0.003	0.0012	0.0012	0.0011	0.0009	0.0015	0.0012
nickel	mg/L					<0.001	<0.001	0.002	<0.001	<0.001	<0.001	<0.001	<0.0010	<0.001	<0.0010
nitrate as N	mg/L	10.0 [b]				3.8	4.3	0.4	1.7	1.6	1.3	1.3	1.85	1.51	1.37
nitrite as N	mg/L	1.0 [b]				<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.010	<0.010	<0.010	<0.010
pH	pH Units				6.5-8.5	8.2	8.2	7.9	7.95	8.08	8.02	8.03	8	8.03	8.04
phenol	mg/L					<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0010	<0.001	<0.0010	<0.0010
phosphate	mg/L					<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.010	<0.010	<0.010	<0.010
total phosphorous	mg/L					<0.002	0.013	<0.002	<0.1	<0.1	<0.1	<0.1	0.005	<0.1	<0.10
potassium	mg/L					2.6	2.4	8.3	6.9	4	3.8	3.1	3.2	4	3.6
selenium	mg/L	0.01				<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.0020	<0.002	<0.0020
silicon	mg/L					5.3	5.1	3.3	4.1	6	4	3.9	4.6	3.9	3.8
silver	mg/L					<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.00010	<0.0001	<0.00010
sodium	mg/L			20/200 [f]		12	11	55	37	14	15	12	11	14	12
strontium	mg/L					0.74	0.63	4.6	3.4	0.98	1.1	0.81	0.71	0.9	0.74
sulphide	mg/L					<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.020	<0.020	<0.020	<0.020
sulphate	mg/L			500 [d]		49	38	**597**	295	52	95	66	49	83	56
thallium	mg/L					<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.000050	<0.00005	<0.000050
tin	mg/L					<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0010	<0.001	<0.0010
titanium	mg/L					<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0050	<0.005	<0.0050
TSS	mg/L					<10	<10	<10	<10	<10	<10	<1	<1	<1	<1
turbidity	NTU			5 [e]		0.4	0.5	0.6	0.3	<0.2	0.7	0.8	<0.2	<0.2	0.2
uranium	mg/L					0.0027	0.0024	0.0041	0.0033	0.0036	0.0031	0.0025	0.0023	0.0027	0.0025
vanadium	mg/L					<0.001	<0.001	<0.001	<0.001	0.0008	0.00063	<0.0005	<0.00050	<0.0005	<0.00050
zinc	mg/L			5		2	2.1	1.6	1.4	2.6	1.4	1.3	1.3	0.9	0.99

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 - Forterra 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	Nov-14	Nov-15	Nov-16
aluminum	mg/L				0.1	<0.005	0.017	0.03	NOT SAMPLED	NOT SAMPLED	NOT SAMPLED	NOT SAMPLED	NOT SAMPLED	NOT SAMPLED	NOT SAMPLED	NOT SAMPLED	NOT SAMPLED
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									
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	**Note:** Well decommissioned.	**Note:** Well decommissioned.	**Note:** Well decommissioned.
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 - Forterra 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	Nov-14	Nov-15	Nov-16
aluminum	mg/L				0.1	<0.01	<0.03	<0.05	<0.005	0.012	<0.005	<0.025	**NOT SAMPLED**	**NOT SAMPLED**	**NOT SAMPLED**	**NOT SAMPLED**
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	**Note:** Well not in use.	**Note:** Well not in use.	**Note:** Well not in use.	**Note:** Well not in use.
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 - Forterra 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	Nov-15	Nov-16
aluminum	mg/L				0.1	<0.005	0.034	0.014	<0.005	0.005	NOT SAMPLED	NOT SAMPLED	NOT SAMPLED	NOT SAMPLED	NOT SAMPLED	NOT SAMPLED	NOT SAMPLED
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							
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:** Well decommissioned.		
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.

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[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

ON-SITE AND OFF-SITE MONITORING WELLS

Maxxam
A Bureau Veritas Group Company

Your Project #: 021-1228
Site Location: TANSLEY QUARRY
Your C.O.C. #: 586660-04-01

Attention:Sharon Wood

Golder Associates Ltd
Mississauga - Standing Offer
6925 Century Ave
Suite 100
Mississauga, ON
CANADA L5N 7K2

Report Date: 2016/11/28
Report #: R4266942
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B6P3329
Received: 2016/11/21, 18:12

Sample Matrix: Water
Samples Received: 6

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Alkalinity	6	N/A	2016/11/23	CAM SOP-00448	SM 22 2320 B m
Anions	2	N/A	2016/11/24	CAM SOP-00435	SM 22 4110 B m
Anions	4	N/A	2016/11/25	CAM SOP-00435	SM 22 4110 B m
Conductivity	6	N/A	2016/11/23	CAM SOP-00414	SM 22 2510 m
Free (WAD) Cyanide	6	N/A	2016/11/23	CAM SOP-00457	OMOE E3015 m
Fluoride	6	2016/11/22	2016/11/23	CAM SOP-00449	SM 22 4500-F C m
Hardness (calculated as CaCO3)	6	N/A	2016/11/24	CAM SOP 00102/00408/00447	SM 2340 B
Mercury in Water by CVAA	1	2016/11/23	2016/11/28	CAM SOP-00453	EPA 7470A m
Mercury in Water by CVAA	5	2016/11/24	2016/11/25	CAM SOP-00453	EPA 7470A m
Dissolved Metals by ICPMS	6	N/A	2016/11/24	CAM SOP-00447	EPA 6020B m
Total Metals Analysis by ICPMS	6	N/A	2016/11/24	CAM SOP-00447	EPA 6020B m
Total Ammonia-N	6	N/A	2016/11/28	CAM SOP-00441	EPA GS I-2522-90 m
Nitrate (NO3) and Nitrite (NO2) in Water (1)	5	N/A	2016/11/23	CAM SOP-00440	SM 22 4500-NO3I/NO2B
Nitrate (NO3) and Nitrite (NO2) in Water (1)	1	N/A	2016/11/25	CAM SOP-00440	SM 22 4500-NO3I/NO2B
pH	6	N/A	2016/11/23	CAM SOP-00413	SM 4500H+ B m
Phenols (4AAP)	6	N/A	2016/11/24	CAM SOP-00444	OMOE E3179 m
Orthophosphate	6	N/A	2016/11/24	CAM SOP-00461	EPA 365.1 m
Sulphide	6	N/A	2016/11/23	CAM SOP-00455	SM 22 4500-S G m
Total Dissolved Solids	6	2016/11/24	2016/11/24	CAM SOP-00428	SM 22 2540C m
Total Phosphorus (Colourimetric)	6	2016/11/24	2016/11/24	CAM SOP-00407	SM 22 4500 P B H m
Total Suspended Solids	1	2016/11/23	2016/11/23	CAM SOP-00428	SM 22 2540D m
Low Level Total Suspended Solids	5	2016/11/23	2016/11/23	CAM SOP-00428	SM 22 2540D m
Turbidity	6	N/A	2016/11/22	CAM SOP-00417	SM 22 2130 B m

Remarks:

Maxxam Analytics' laboratories are accredited to ISO/IEC 17025:2005 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Maxxam are based upon recognized Provincial, Federal or US method compendia such as CCME, MDDELCC, EPA, APHA.

Your Project #: 021-1228
Site Location: TANSLEY QUARRY
Your C.O.C. #: 586660-04-01

Attention:Sharon Wood

Golder Associates Ltd
Mississauga - Standing Offer
6925 Century Ave
Suite 100
Mississauga, ON
CANADA L5N 7K2

Report Date: 2016/11/28
Report #: R4266942
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B6P3329
Received: 2016/11/21, 18:12

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported: unless indicated otherwise, associated sample data are not blank corrected.

Maxxam Analytics' liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Maxxam has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Maxxam, unless otherwise agreed in writing.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods. Results relate to samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

* 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.
Ema Gitej, Senior Project Manager
Email: EGitej@maxxam.ca
Phone# (905)817-5829
==

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.

RESULTS OF ANALYSES OF WATER

Maxxam ID		DMJ746			DMJ747			DMJ748		
Sampling Date		2016/11/21 12:45			2016/11/21 13:30			2016/11/21 10:30		
COC Number		586660-04-01			586660-04-01			586660-04-01		
	UNITS	**MW08-I**	**RDL**	**QC Batch**	**MW08-D**	**RDL**	**QC Batch**	**MW07-DEEP**	**RDL**	**QC Batch**
Calculated Parameters										
Hardness (CaCO3)	mg/L	3000	1.0	4758357	710	1.0	4758357	8100	1.0	4758357
Inorganics										
Total Ammonia-N	mg/L	6.5	0.25	4761149	0.061	0.050	4761149	6.4	0.50	4761149
Conductivity	umho/cm	12000	1.0	4760134	2100	1.0	4760134	36000	1.0	4760134
Total Dissolved Solids	mg/L	8290	20	4763458	1400	10	4763458	23500	20	4763458
Fluoride (F-)	mg/L	0.40	0.10	4760138	0.19	0.10	4760138	0.28	0.10	4760138
Free Cyanide	mg/L	<0.0010	0.0010	4760954	<0.0010	0.0010	4760954	<0.0010	0.0010	4760954
Orthophosphate (P)	mg/L	<0.010	0.010	4761251	<0.010	0.010	4761251	0.011	0.010	4761251
pH	pH	7.45		4760140	7.79		4760140	6.93		4760140
Phenols-4AAP	mg/L	<0.0010	0.0010	4762029	<0.0010	0.0010	4762029	0.0031	0.0020	4762029
Total Phosphorus	mg/L	0.15	0.040	4762791	0.061	0.020	4762791	0.18	0.10	4762791
Total Suspended Solids	mg/L	330	5	4761554	130	3	4761084	65	1	4761554
Sulphide	mg/L	<0.020	0.020	4761862	<0.020	0.020	4761862	<0.020	0.020	4761862
Turbidity	NTU	220	0.1	4760159	310	0.1	4760159	23	0.1	4760159
Alkalinity (Total as CaCO3)	mg/L	130	1.0	4760125	510	1.0	4760125	47	1.0	4760125
Nitrite (N)	mg/L	<0.010	0.010	4760248	0.028	0.010	4760248	2.40	0.050	4760248
Dissolved Chloride (Cl)	mg/L	3400	20	4763236	91	5.0	4763236	11000	100	4762292
Nitrate (N)	mg/L	<0.10	0.10	4760248	0.34	0.10	4760248	0.59	0.10	4760248
Nitrate + Nitrite (N)	mg/L	<0.10	0.10	4760248	0.37	0.10	4760248	2.99	0.10	4760248
Dissolved Bromide (Br-)	mg/L	39	20	4763236	<5.0	5.0	4763236	140	50	4762292
Dissolved Sulphate (SO4)	mg/L	1000	20	4763236	510	5.0	4763236	1500	50	4762292

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

RESULTS OF ANALYSES OF WATER

Maxxam ID		DMJ748			DMJ749			DMJ750		
Sampling Date		2016/11/21 10:30			2016/11/21 16:30			2016/11/21 16:00		
COC Number		586660-04-01			586660-04-01			586660-04-01		
	UNITS	**MW07-DEEP Lab-Dup**	**RDL**	**QC Batch**	**MW02-D**	**RDL**	**QC Batch**	**MW02-O**	**RDL**	**QC Batch**
Calculated Parameters										
Hardness (CaCO3)	mg/L		1.0	4758357	7000	1.0	4758357	1900	1.0	4758357
Inorganics										
Total Ammonia-N	mg/L		0.50	4761149	16	0.50	4761149	0.69	0.050	4761149
Conductivity	umho/cm	36000	1.0	4760134	37000	1.0	4760134	2900	1.0	4760134
Total Dissolved Solids	mg/L		20	4763458	25900	20	4763458	2500	10	4763458
Fluoride (F-)	mg/L	0.29	0.10	4760138	0.29	0.10	4760138	0.24	0.10	4760138
Free Cyanide	mg/L		0.0010	4760954	<0.0010	0.0010	4760954	<0.0010	0.0010	4760954
Orthophosphate (P)	mg/L		0.010	4761251	<0.010	0.010	4761251	0.010	0.010	4761251
pH	pH	7.08		4760140	7.05		4760140	7.58		4760140
Phenols-4AAP	mg/L		0.0020	4762029	0.0027	0.0020	4762029	<0.0020 (1)	0.0020	4762029
Total Phosphorus	mg/L		0.10	4762791	0.39	0.10	4762791	1.3	0.10	4762791
Total Suspended Solids	mg/L		1	4761554	610	5	4761554	6300	100	4762031
Sulphide	mg/L		0.020	4761862	<0.020	0.020	4761862	0.61	0.020	4761862
Turbidity	NTU		0.1	4760159	280	0.1	4760159	3800	0.1	4760159
Alkalinity (Total as CaCO3)	mg/L	49	1.0	4760125	42	1.0	4760125	730	1.0	4760125
Nitrite (N)	mg/L		0.050	4760248	<0.010	0.010	4761179	<0.010	0.010	4760248
Dissolved Chloride (Cl)	mg/L		100	4762292	13000	100	4763236	12	5.0	4763236
Nitrate (N)	mg/L		0.10	4760248	<0.10	0.10	4761179	<0.10	0.10	4760248
Nitrate + Nitrite (N)	mg/L		0.10	4760248	<0.10	0.10	4761179	<0.10	0.10	4760248
Dissolved Bromide (Br-)	mg/L		50	4762292	150	100	4763236	<5.0	5.0	4763236
Dissolved Sulphate (SO4)	mg/L		50	4762292	1900	100	4763236	1200	5.0	4763236

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
(1) Detection Limit was raised due to matrix interferences.

RESULTS OF ANALYSES OF WATER

Maxxam ID		DMJ751		
Sampling Date		2016/11/21 16:10		
COC Number		586660-04-01		
	UNITS	**MW02-I**	**RDL**	**QC Batch**
Calculated Parameters				
Hardness (CaCO3)	mg/L	1000	1.0	4758357
Inorganics				
Total Ammonia-N	mg/L	1.8	0.050	4761149
Conductivity	umho/cm	2500	1.0	4760134
Total Dissolved Solids	mg/L	1980	10	4763458
Fluoride (F-)	mg/L	0.22	0.10	4760138
Free Cyanide	mg/L	<0.0010	0.0010	4760954
Orthophosphate (P)	mg/L	<0.010	0.010	4761251
pH	pH	7.70		4760140
Phenols-4AAP	mg/L	<0.0010	0.0010	4762029
Total Phosphorus	mg/L	0.14	0.020	4762791
Total Suspended Solids	mg/L	190	4	4761554
Sulphide	mg/L	<0.020	0.020	4761862
Turbidity	NTU	180	0.1	4760159
Alkalinity (Total as CaCO3)	mg/L	130	1.0	4760125
Nitrite (N)	mg/L	<0.010	0.010	4760248
Dissolved Chloride (Cl)	mg/L	160	5.0	4762292
Nitrate (N)	mg/L	<0.10	0.10	4760248
Nitrate + Nitrite (N)	mg/L	<0.10	0.10	4760248
Dissolved Bromide (Br-)	mg/L	<5.0	5.0	4762292
Dissolved Sulphate (SO4)	mg/L	1000	5.0	4762292

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam Job #: B6P3329
Report Date: 2016/11/28

Golder Associates Ltd
Client Project #: 021-1228
Site Location: TANSLEY QUARRY
Sampler Initials: AM

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		DMJ746			DMJ747		DMJ748	DMJ748		
Sampling Date		2016/11/21 12:45			2016/11/21 13:30		2016/11/21 10:30	2016/11/21 10:30		
COC Number		586660-04-01			586660-04-01		586660-04-01	586660-04-01		
	UNITS	**MW08-I**	**RDL**	**QC Batch**	**MW08-D**	**RDL**	**MW07-DEEP**	**MW07-DEEP Lab-Dup**	**RDL**	**QC Batch**
Metals										
Mercury (Hg)	mg/L	<0.0001	0.0001	4768121	<0.0001	0.0001	<0.0001		0.0001	4764190
Dissolved Aluminum (Al)	ug/L	31	5.0	4761753	<5.0	5.0	<50		50	4761753
Total Aluminum (Al)	ug/L	3500	25	4762909	280	5.0	330	300	5.0	4763149
Dissolved Antimony (Sb)	ug/L	<0.50	0.50	4761753	0.54	0.50	6.1		5.0	4761753
Total Antimony (Sb)	ug/L	<2.5	2.5	4762909	2.3	0.50	39	40	0.50	4763149
Dissolved Arsenic (As)	ug/L	1.7	1.0	4761753	1.0	1.0	<10		10	4761753
Total Arsenic (As)	ug/L	<5.0	5.0	4762909	4.3	1.0	2.0	1.9	1.0	4763149
Dissolved Barium (Ba)	ug/L	15	2.0	4761753	13	2.0	41		20	4761753
Total Barium (Ba)	ug/L	110	10	4762909	20	2.0	52	52	2.0	4763149
Dissolved Beryllium (Be)	ug/L	<0.50	0.50	4761753	<0.50	0.50	<5.0		5.0	4761753
Total Beryllium (Be)	ug/L	<2.5	2.5	4762909	<0.50	0.50	<0.50	<0.50	0.50	4763149
Dissolved Bismuth (Bi)	ug/L	<1.0	1.0	4761753	<1.0	1.0	<10		10	4761753
Total Bismuth (Bi)	ug/L	<5.0	5.0	4762909	<1.0	1.0	<1.0	<1.0	1.0	4763149
Dissolved Boron (B)	ug/L	6200	10	4761753	1800	10	6800		100	4761753
Total Boron (B)	ug/L	6500	50	4762909	1600	10	6600	6700	10	4763149
Dissolved Cadmium (Cd)	ug/L	0.32	0.10	4761753	2.2	0.10	19		1.0	4761753
Total Cadmium (Cd)	ug/L	0.62	0.50	4762909	6.7	0.10	17	17	0.10	4763149
Dissolved Calcium (Ca)	ug/L	860000	1000	4761753	81000	400	2300000		2000	4761753
Total Calcium (Ca)	ug/L	770000	1000	4762909	66000	400	2200000	2200000	2000	4763149
Dissolved Chromium (Cr)	ug/L	<5.0	5.0	4761753	<5.0	5.0	<50		50	4761753
Total Chromium (Cr)	ug/L	<25	25	4762909	72	5.0	80	79	5.0	4763149
Dissolved Cobalt (Co)	ug/L	<2.5 (1)	2.5	4761753	<0.50	0.50	6.6		5.0	4761753
Total Cobalt (Co)	ug/L	2.9	2.5	4762909	<0.50	0.50	5.7	6.0	2.5	4763149
Dissolved Copper (Cu)	ug/L	<1.0	1.0	4761753	1.9	1.0	<10		10	4761753
Total Copper (Cu)	ug/L	5.2	5.0	4762909	9.1	1.0	18	18	5.0	4763149
Dissolved Iron (Fe)	ug/L	1700	100	4761753	220	100	<1000		1000	4761753
Total Iron (Fe)	ug/L	7500	500	4762909	2300	100	1300	1300	100	4763149
Dissolved Lead (Pb)	ug/L	<0.50	0.50	4761753	<0.50	0.50	<5.0		5.0	4761753
Total Lead (Pb)	ug/L	5.8	2.5	4762909	1.2	0.50	1.5	1.5	0.50	4763149
Dissolved Lithium (Li)	ug/L	1800	25	4761753	230	5.0	4800		50	4761753
Total Lithium (Li)	ug/L	1700	25	4762909	230	5.0	4600	4800	100	4763149
Dissolved Magnesium (Mg)	ug/L	220000	50	4761753	120000	50	580000		500	4761753

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
(1) Metal Analysis:Detection Limit was raised due to matrix interferences.

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		DMJ746			DMJ747		DMJ748	DMJ748		
Sampling Date		2016/11/21 12:45			2016/11/21 13:30		2016/11/21 10:30	2016/11/21 10:30		
COC Number		586660-04-01			586660-04-01		586660-04-01	586660-04-01		
	UNITS	**MW08-I**	**RDL**	**QC Batch**	**MW08-D**	**RDL**	**MW07-DEEP**	**MW07-DEEP Lab-Dup**	**RDL**	**QC Batch**
Total Magnesium (Mg)	ug/L	230000	250	4762909	110000	50	540000	550000	250	4763149
Dissolved Manganese (Mn)	ug/L	330	2.0	4761753	89	2.0	1000		20	4761753
Total Manganese (Mn)	ug/L	510	10	4762909	86	2.0	1000	1000	4.0	4763149
Dissolved Molybdenum (Mo)	ug/L	6.5	0.50	4761753	3.1	0.50	14		5.0	4761753
Total Molybdenum (Mo)	ug/L	6.7	2.5	4762909	4.2	0.50	14	15	0.50	4763149
Dissolved Nickel (Ni)	ug/L	<5.0 (1)	5.0	4761753	2.9	1.0	120		10	4761753
Total Nickel (Ni)	ug/L	6.7	5.0	4762909	12	1.0	100	100	5.0	4763149
Dissolved Phosphorus (P)	ug/L	<100	100	4761753	<100	100	<1000		1000	4761753
Total Phosphorus (P)	ug/L	<500	500	4762909	<100	100	140	140	100	4763149
Dissolved Potassium (K)	ug/L	54000	200	4761753	21000	200	130000		2000	4761753
Total Potassium (K)	ug/L	57000	1000	4762909	21000	200	130000	140000	200	4763149
Dissolved Selenium (Se)	ug/L	<2.0	2.0	4761753	<2.0	2.0	<20		20	4761753
Total Selenium (Se)	ug/L	<10	10	4762909	<2.0	2.0	<2.0	<2.0	2.0	4763149
Dissolved Silicon (Si)	ug/L	4200	50	4761753	5800	50	5200		500	4761753
Total Silicon (Si)	ug/L	9300	250	4762909	5400	50	5800	6000	50	4763149
Dissolved Silver (Ag)	ug/L	<0.10	0.10	4761753	<0.10	0.10	<1.0		1.0	4761753
Total Silver (Ag)	ug/L	<0.50	0.50	4762909	<0.10	0.10	0.44	0.41	0.10	4763149
Dissolved Sodium (Na)	ug/L	1700000	500	4761753	190000	100	5000000		1000	4761753
Total Sodium (Na)	ug/L	1600000	500	4762909	210000	100	4700000	4900000	2000	4763149
Dissolved Strontium (Sr)	ug/L	19000	1.0	4761753	9900	1.0	47000		10	4761753
Total Strontium (Sr)	ug/L	20000	5.0	4762909	8200	1.0	46000	47000	1.0	4763149
Dissolved Tellurium (Te)	ug/L	<1.0	1.0	4761753	<1.0	1.0	<10		10	4761753
Total Tellurium (Te)	ug/L	<5.0	5.0	4762909	<1.0	1.0	<1.0	<1.0	1.0	4763149
Dissolved Thallium (Tl)	ug/L	<0.050	0.050	4761753	<0.050	0.050	<0.50		0.50	4761753
Total Thallium (Tl)	ug/L	<0.25	0.25	4762909	<0.050	0.050	0.080	0.096	0.050	4763149
Dissolved Tin (Sn)	ug/L	<1.0	1.0	4761753	<1.0	1.0	<10		10	4761753
Total Tin (Sn)	ug/L	<5.0	5.0	4762909	1.9	1.0	3.3	3.3	1.0	4763149
Dissolved Titanium (Ti)	ug/L	<5.0	5.0	4761753	<5.0	5.0	<50		50	4761753
Total Titanium (Ti)	ug/L	85	25	4762909	10	5.0	22	15	5.0	4763149
Dissolved Tungsten (W)	ug/L	<1.0	1.0	4761753	<1.0	1.0	16		10	4761753
Total Tungsten (W)	ug/L	<5.0	5.0	4762909	<1.0	1.0	31	31	1.0	4763149
Dissolved Uranium (U)	ug/L	0.29	0.10	4761753	3.9	0.10	7.4		1.0	4761753
Total Uranium (U)	ug/L	1.8	0.50	4762909	4.6	0.10	7.7	7.7	0.10	4763149

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
(1) Metal Analysis:Detection Limit was raised due to matrix interferences.

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		DMJ746			DMJ747		DMJ748	DMJ748		
Sampling Date		2016/11/21 12:45			2016/11/21 13:30		2016/11/21 10:30	2016/11/21 10:30		
COC Number		586660-04-01			586660-04-01		586660-04-01	586660-04-01		
	UNITS	**MW08-I**	**RDL**	**QC Batch**	**MW08-D**	**RDL**	**MW07-DEEP**	**MW07-DEEP Lab-Dup**	**RDL**	**QC Batch**
Dissolved Vanadium (V)	ug/L	<2.5 (1)	2.5	4761753	<0.50	0.50	<10		10	4761753
Total Vanadium (V)	ug/L	6.3	2.5	4762909	1.1	0.50	1.0	1.0	0.50	4763149
Dissolved Zinc (Zn)	ug/L	<10 (1)	10	4761753	10	5.0	91		50	4761753
Total Zinc (Zn)	ug/L	<25	25	4762909	41	5.0	170	180	10	4763149
Dissolved Zirconium (Zr)	ug/L	<1.0	1.0	4761753	<1.0	1.0	<10		10	4761753
Total Zirconium (Zr)	ug/L	<5.0	5.0	4762909	<1.0	1.0	<1.0	<1.0	1.0	4763149

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
(1) Metal Analysis:Detection Limit was raised due to matrix interferences.

Maxxam Job #: B6P3329
Report Date: 2016/11/28

Golder Associates Ltd
Client Project #: 021-1228
Site Location: TANSLEY QUARRY
Sampler Initials: AM

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		DMJ749			DMJ750		DMJ751		
Sampling Date		2016/11/21 16:30			2016/11/21 16:00		2016/11/21 16:10		
COC Number		586660-04-01			586660-04-01		586660-04-01		
	UNITS	**MW02-D**	**RDL**	**QC Batch**	**MW02-O**	**RDL**	**MW02-I**	**RDL**	**QC Batch**
Metals									
Mercury (Hg)	mg/L	<0.0001	0.0001	4764190	<0.0001	0.0001	<0.0001	0.0001	4764190
Dissolved Aluminum (Al)	ug/L	110	50	4761753	79	5.0	71	5.0	4762413
Total Aluminum (Al)	ug/L	5100	25	4763149	24000	25	3900	5.0	4763149
Dissolved Antimony (Sb)	ug/L	<5.0	5.0	4761753	<0.50	0.50	0.75	0.50	4762413
Total Antimony (Sb)	ug/L	<2.5	2.5	4763149	<0.50	0.50	<0.50	0.50	4763149
Dissolved Arsenic (As)	ug/L	<10	10	4761753	1.6	1.0	2.5	1.0	4762413
Total Arsenic (As)	ug/L	9.0	5.0	4763149	7.6	1.0	3.7	1.0	4763149
Dissolved Barium (Ba)	ug/L	29	20	4761753	18	2.0	7.2	2.0	4762413
Total Barium (Ba)	ug/L	91	10	4763149	240	2.0	66	2.0	4763149
Dissolved Beryllium (Be)	ug/L	<5.0	5.0	4761753	<0.50	0.50	<0.50	0.50	4762413
Total Beryllium (Be)	ug/L	<2.5	2.5	4763149	1.3	0.50	<0.50	0.50	4763149
Dissolved Bismuth (Bi)	ug/L	<10	10	4761753	<1.0	1.0	<1.0	1.0	4762413
Total Bismuth (Bi)	ug/L	<5.0	5.0	4763149	<1.0	1.0	<1.0	1.0	4763149
Dissolved Boron (B)	ug/L	6200	100	4761753	300	10	2200	10	4762413
Total Boron (B)	ug/L	6100	50	4763149	310	10	2100	10	4763149
Dissolved Cadmium (Cd)	ug/L	<1.0	1.0	4761753	<0.10	0.10	<0.10	0.10	4762413
Total Cadmium (Cd)	ug/L	<0.50	0.50	4763149	0.32	0.10	<0.10	0.10	4763149
Dissolved Calcium (Ca)	ug/L	2000000	2000	4761753	200000	200	210000	1000	4762413
Total Calcium (Ca)	ug/L	1900000	2000	4763149	380000	200	220000	1000	4763149
Dissolved Chromium (Cr)	ug/L	<50	50	4761753	<5.0	5.0	<5.0	5.0	4762413
Total Chromium (Cr)	ug/L	<25	25	4763149	41	5.0	6.7	5.0	4763149
Dissolved Cobalt (Co)	ug/L	<5.0	5.0	4761753	0.83	0.50	2.4	0.50	4762413
Total Cobalt (Co)	ug/L	<5.0	5.0	4763149	19	1.0	2.6	0.50	4763149
Dissolved Copper (Cu)	ug/L	<10	10	4761753	<1.0	1.0	<1.0	1.0	4762413
Total Copper (Cu)	ug/L	<20	20	4763149	41	1.0	4.6	1.0	4763149
Dissolved Iron (Fe)	ug/L	4900	1000	4761753	2200	100	790	100	4762413
Total Iron (Fe)	ug/L	13000	500	4763149	46000	100	5600	100	4763149
Dissolved Lead (Pb)	ug/L	<5.0	5.0	4761753	<0.50	0.50	<0.50	0.50	4762413
Total Lead (Pb)	ug/L	4.1	2.5	4763149	15	0.50	2.2	0.50	4763149
Dissolved Lithium (Li)	ug/L	5700	250	4761753	260	5.0	160	5.0	4762413
Total Lithium (Li)	ug/L	5500	100	4763149	330	5.0	170	5.0	4763149
Dissolved Magnesium (Mg)	ug/L	480000	500	4761753	340000	50	120000	50	4762413
Total Magnesium (Mg)	ug/L	440000	250	4763149	340000	50	120000	50	4763149

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		DMJ749			DMJ750		DMJ751		
Sampling Date		2016/11/21 16:30			2016/11/21 16:00		2016/11/21 16:10		
COC Number		586660-04-01			586660-04-01		586660-04-01		
	UNITS	**MW02-D**	**RDL**	**QC Batch**	**MW02-O**	**RDL**	**MW02-I**	**RDL**	**QC Batch**
Dissolved Manganese (Mn)	ug/L	1100	20	4761753	360	2.0	130	2.0	4762413
Total Manganese (Mn)	ug/L	1200	10	4763149	1500	2.0	260	2.0	4763149
Dissolved Molybdenum (Mo)	ug/L	6.8	5.0	4761753	2.2	0.50	8.4	0.50	4762413
Total Molybdenum (Mo)	ug/L	9.3	2.5	4763149	2.3	0.50	8.8	0.50	4763149
Dissolved Nickel (Ni)	ug/L	<10	10	4761753	3.8	1.0	<1.0	1.0	4762413
Total Nickel (Ni)	ug/L	16	10	4763149	41	2.0	6.3	1.0	4763149
Dissolved Phosphorus (P)	ug/L	<1000	1000	4761753	<100	100	<100	100	4762413
Total Phosphorus (P)	ug/L	<500	500	4763149	1500	100	110	100	4763149
Dissolved Potassium (K)	ug/L	130000	2000	4761753	9200	200	20000	200	4762413
Total Potassium (K)	ug/L	120000	1000	4763149	15000	200	20000	200	4763149
Dissolved Selenium (Se)	ug/L	<20	20	4761753	<2.0	2.0	<2.0	2.0	4762413
Total Selenium (Se)	ug/L	<10	10	4763149	<2.0	2.0	<2.0	2.0	4763149
Dissolved Silicon (Si)	ug/L	3500	500	4761753	9800	50	5000	50	4762413
Total Silicon (Si)	ug/L	10000	250	4763149	45000	50	12000	50	4763149
Dissolved Silver (Ag)	ug/L	<1.0	1.0	4761753	<0.10	0.10	<0.10	0.10	4762413
Total Silver (Ag)	ug/L	<0.50	0.50	4763149	0.15	0.10	<0.10	0.10	4763149
Dissolved Sodium (Na)	ug/L	6300000	5000	4761753	68000	100	200000	100	4762413
Total Sodium (Na)	ug/L	5700000	2000	4763149	63000	100	180000	100	4763149
Dissolved Strontium (Sr)	ug/L	41000	10	4761753	3900	1.0	12000	1.0	4762413
Total Strontium (Sr)	ug/L	40000	5.0	4763149	5000	1.0	13000	1.0	4763149
Dissolved Tellurium (Te)	ug/L	<10	10	4761753	<1.0	1.0	<1.0	1.0	4762413
Total Tellurium (Te)	ug/L	<5.0	5.0	4763149	<1.0	1.0	<1.0	1.0	4763149
Dissolved Thallium (Tl)	ug/L	<0.50	0.50	4761753	<0.050	0.050	<0.050	0.050	4762413
Total Thallium (Tl)	ug/L	<0.25	0.25	4763149	0.22	0.050	<0.050	0.050	4763149
Dissolved Tin (Sn)	ug/L	<10	10	4761753	<1.0	1.0	<1.0	1.0	4762413
Total Tin (Sn)	ug/L	<5.0	5.0	4763149	3.0	1.0	<1.0	1.0	4763149
Dissolved Titanium (Ti)	ug/L	<50	50	4761753	<5.0	5.0	<5.0	5.0	4762413
Total Titanium (Ti)	ug/L	100	25	4763149	470	5.0	94	5.0	4763149
Dissolved Tungsten (W)	ug/L	<10	10	4761753	<1.0	1.0	<1.0	1.0	4762413
Total Tungsten (W)	ug/L	<5.0	5.0	4763149	1.4	1.0	<1.0	1.0	4763149
Dissolved Uranium (U)	ug/L	<1.0	1.0	4761753	14	0.10	0.32	0.10	4762413
Total Uranium (U)	ug/L	0.71	0.50	4763149	11	0.10	0.52	0.10	4763149
Dissolved Vanadium (V)	ug/L	<10	10	4761753	<0.50	0.50	<0.50	0.50	4762413
Total Vanadium (V)	ug/L	14	2.5	4763149	47	0.50	7.7	0.50	4763149

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		DMJ749			DMJ750		DMJ751		
Sampling Date		2016/11/21 16:30			2016/11/21 16:00		2016/11/21 16:10		
COC Number		586660-04-01			586660-04-01		586660-04-01		
	UNITS	**MW02-D**	**RDL**	**QC Batch**	**MW02-O**	**RDL**	**MW02-I**	**RDL**	**QC Batch**
Dissolved Zinc (Zn)	ug/L	<50	50	4761753	<10 (1)	10	<10 (1)	10	4762413
Total Zinc (Zn)	ug/L	38	25	4763149	130	10	14	10	4763149
Dissolved Zirconium (Zr)	ug/L	<10	10	4761753	<1.0	1.0	<1.0	1.0	4762413
Total Zirconium (Zr)	ug/L	<5.0	5.0	4763149	8.6	1.0	3.0	1.0	4763149

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
(1) Metal Analysis:Detection Limit was raised due to matrix interferences.

TEST SUMMARY

Maxxam ID: DMJ746
Sample ID: MW08-I
Matrix: Water

Collected: 2016/11/21
Shipped:
Received: 2016/11/21

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	4760125	N/A	2016/11/23	Surinder Rai
Anions	IC	4763236	N/A	2016/11/25	Fari Dehdezi
Conductivity	AT	4760134	N/A	2016/11/23	Surinder Rai
Free (WAD) Cyanide	SKAL/CN	4760954	N/A	2016/11/23	Louise Harding
Fluoride	ISE	4760138	2016/11/22	2016/11/23	Surinder Rai
Hardness (calculated as CaCO3)		4758357	N/A	2016/11/24	Automated Statchk
Mercury in Water by CVAA	CV/AA	4768121	2016/11/23	2016/11/28	Magdalena Carlos
Dissolved Metals by ICPMS	ICP/MS	4761753	N/A	2016/11/24	Cristina Petran
Total Metals Analysis by ICPMS	ICP/MS	4762909	N/A	2016/11/24	Arefa Dabhad
Total Ammonia-N	LACH/NH4	4761149	N/A	2016/11/28	Anastasia Hamanov
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	4760248	N/A	2016/11/23	Chandra Nandlal
pH	AT	4760140	N/A	2016/11/23	Surinder Rai
Phenols (4AAP)	TECH/PHEN	4762029	N/A	2016/11/24	Bramdeo Motiram
Orthophosphate	KONE	4761251	N/A	2016/11/24	Alina Dobreanu
Sulphide	ISE/S	4761862	N/A	2016/11/23	Neil Dassanayake
Total Dissolved Solids	BAL	4763458	2016/11/24	2016/11/24	Massarat Jan
Total Phosphorus (Colourimetric)	LACH/P	4762791	2016/11/24	2016/11/24	Sarabjit Raina
Low Level Total Suspended Solids	BAL	4761554	2016/11/23	2016/11/23	Arpan Shah
Turbidity	AT	4760159	N/A	2016/11/22	Tahir Anwar

Maxxam ID: DMJ747
Sample ID: MW08-D
Matrix: Water

Collected: 2016/11/21
Shipped:
Received: 2016/11/21

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	4760125	N/A	2016/11/23	Surinder Rai
Anions	IC	4763236	N/A	2016/11/25	Fari Dehdezi
Conductivity	AT	4760134	N/A	2016/11/23	Surinder Rai
Free (WAD) Cyanide	SKAL/CN	4760954	N/A	2016/11/23	Louise Harding
Fluoride	ISE	4760138	2016/11/22	2016/11/23	Surinder Rai
Hardness (calculated as CaCO3)		4758357	N/A	2016/11/24	Automated Statchk
Mercury in Water by CVAA	CV/AA	4764190	2016/11/24	2016/11/25	Magdalena Carlos
Dissolved Metals by ICPMS	ICP/MS	4761753	N/A	2016/11/24	Cristina Petran
Total Metals Analysis by ICPMS	ICP/MS	4763149	N/A	2016/11/24	Cristina Petran
Total Ammonia-N	LACH/NH4	4761149	N/A	2016/11/28	Anastasia Hamanov
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	4760248	N/A	2016/11/23	Chandra Nandlal
pH	AT	4760140	N/A	2016/11/23	Surinder Rai
Phenols (4AAP)	TECH/PHEN	4762029	N/A	2016/11/24	Bramdeo Motiram
Orthophosphate	KONE	4761251	N/A	2016/11/24	Alina Dobreanu
Sulphide	ISE/S	4761862	N/A	2016/11/23	Neil Dassanayake
Total Dissolved Solids	BAL	4763458	2016/11/24	2016/11/24	Massarat Jan
Total Phosphorus (Colourimetric)	LACH/P	4762791	2016/11/24	2016/11/24	Sarabjit Raina
Low Level Total Suspended Solids	BAL	4761084	2016/11/23	2016/11/23	Arpan Shah
Turbidity	AT	4760159	N/A	2016/11/22	Tahir Anwar

TEST SUMMARY

Maxxam ID: DMJ748
Sample ID: MW07-DEEP
Matrix: Water

Collected: 2016/11/21
Shipped:
Received: 2016/11/21

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	4760125	N/A	2016/11/23	Surinder Rai
Anions	IC	4762292	N/A	2016/11/24	Fari Dehdezi
Conductivity	AT	4760134	N/A	2016/11/23	Surinder Rai
Free (WAD) Cyanide	SKAL/CN	4760954	N/A	2016/11/23	Louise Harding
Fluoride	ISE	4760138	2016/11/22	2016/11/23	Surinder Rai
Hardness (calculated as CaCO3)		4758357	N/A	2016/11/24	Automated Statchk
Mercury in Water by CVAA	CV/AA	4764190	2016/11/24	2016/11/25	Magdalena Carlos
Dissolved Metals by ICPMS	ICP/MS	4761753	N/A	2016/11/24	Cristina Petran
Total Metals Analysis by ICPMS	ICP/MS	4763149	N/A	2016/11/24	Cristina Petran
Total Ammonia-N	LACH/NH4	4761149	N/A	2016/11/28	Anastasia Hamanov
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	4760248	N/A	2016/11/23	Chandra Nandlal
pH	AT	4760140	N/A	2016/11/23	Surinder Rai
Phenols (4AAP)	TECH/PHEN	4762029	N/A	2016/11/24	Bramdeo Motiram
Orthophosphate	KONE	4761251	N/A	2016/11/24	Alina Dobreanu
Sulphide	ISE/S	4761862	N/A	2016/11/23	Neil Dassanayake
Total Dissolved Solids	BAL	4763458	2016/11/24	2016/11/24	Massarat Jan
Total Phosphorus (Colourimetric)	LACH/P	4762791	2016/11/24	2016/11/24	Sarabjit Raina
Low Level Total Suspended Solids	BAL	4761554	2016/11/23	2016/11/23	Arpan Shah
Turbidity	AT	4760159	N/A	2016/11/22	Tahir Anwar

Maxxam ID: DMJ748 Dup
Sample ID: MW07-DEEP
Matrix: Water

Collected: 2016/11/21
Shipped:
Received: 2016/11/21

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	4760125	N/A	2016/11/23	Surinder Rai
Conductivity	AT	4760134	N/A	2016/11/23	Surinder Rai
Fluoride	ISE	4760138	2016/11/22	2016/11/23	Surinder Rai
Total Metals Analysis by ICPMS	ICP/MS	4763149	N/A	2016/11/24	Cristina Petran
pH	AT	4760140	N/A	2016/11/23	Surinder Rai

Maxxam ID: DMJ749
Sample ID: MW02-D
Matrix: Water

Collected: 2016/11/21
Shipped:
Received: 2016/11/21

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	4760125	N/A	2016/11/23	Surinder Rai
Anions	IC	4763236	N/A	2016/11/25	Fari Dehdezi
Conductivity	AT	4760134	N/A	2016/11/23	Surinder Rai
Free (WAD) Cyanide	SKAL/CN	4760954	N/A	2016/11/23	Louise Harding
Fluoride	ISE	4760138	2016/11/22	2016/11/23	Surinder Rai
Hardness (calculated as CaCO3)		4758357	N/A	2016/11/24	Automated Statchk
Mercury in Water by CVAA	CV/AA	4764190	2016/11/24	2016/11/25	Magdalena Carlos
Dissolved Metals by ICPMS	ICP/MS	4761753	N/A	2016/11/24	Cristina Petran

TEST SUMMARY

Maxxam ID: DMJ749
Sample ID: MW02-D
Matrix: Water

Collected: 2016/11/21
Shipped:
Received: 2016/11/21

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Total Metals Analysis by ICPMS	ICP/MS	4763149	N/A	2016/11/24	Cristina Petran
Total Ammonia-N	LACH/NH4	4761149	N/A	2016/11/28	Anastasia Hamanov
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	4761179	N/A	2016/11/25	Chandra Nandlal
pH	AT	4760140	N/A	2016/11/23	Surinder Rai
Phenols (4AAP)	TECH/PHEN	4762029	N/A	2016/11/24	Bramdeo Motiram
Orthophosphate	KONE	4761251	N/A	2016/11/24	Alina Dobreanu
Sulphide	ISE/S	4761862	N/A	2016/11/23	Neil Dassanayake
Total Dissolved Solids	BAL	4763458	2016/11/24	2016/11/24	Massarat Jan
Total Phosphorus (Colourimetric)	LACH/P	4762791	2016/11/24	2016/11/24	Sarabjit Raina
Low Level Total Suspended Solids	BAL	4761554	2016/11/23	2016/11/23	Arpan Shah
Turbidity	AT	4760159	N/A	2016/11/22	Tahir Anwar

Maxxam ID: DMJ750
Sample ID: MW02-O
Matrix: Water

Collected: 2016/11/21
Shipped:
Received: 2016/11/21

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	4760125	N/A	2016/11/23	Surinder Rai
Anions	IC	4763236	N/A	2016/11/25	Fari Dehdezi
Conductivity	AT	4760134	N/A	2016/11/23	Surinder Rai
Free (WAD) Cyanide	SKAL/CN	4760954	N/A	2016/11/23	Louise Harding
Fluoride	ISE	4760138	2016/11/22	2016/11/23	Surinder Rai
Hardness (calculated as CaCO3)		4758357	N/A	2016/11/24	Automated Statchk
Mercury in Water by CVAA	CV/AA	4764190	2016/11/24	2016/11/25	Magdalena Carlos
Dissolved Metals by ICPMS	ICP/MS	4762413	N/A	2016/11/24	Arefa Dabhad
Total Metals Analysis by ICPMS	ICP/MS	4763149	N/A	2016/11/24	Cristina Petran
Total Ammonia-N	LACH/NH4	4761149	N/A	2016/11/28	Anastasia Hamanov
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	4760248	N/A	2016/11/23	Chandra Nandlal
pH	AT	4760140	N/A	2016/11/23	Surinder Rai
Phenols (4AAP)	TECH/PHEN	4762029	N/A	2016/11/24	Bramdeo Motiram
Orthophosphate	KONE	4761251	N/A	2016/11/24	Alina Dobreanu
Sulphide	ISE/S	4761862	N/A	2016/11/23	Neil Dassanayake
Total Dissolved Solids	BAL	4763458	2016/11/24	2016/11/24	Massarat Jan
Total Phosphorus (Colourimetric)	LACH/P	4762791	2016/11/24	2016/11/24	Sarabjit Raina
Total Suspended Solids	BAL	4762031	2016/11/23	2016/11/23	Arpan Shah
Turbidity	AT	4760159	N/A	2016/11/22	Tahir Anwar

Maxxam ID: DMJ751
Sample ID: MW02-I
Matrix: Water

Collected: 2016/11/21
Shipped:
Received: 2016/11/21

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	4760125	N/A	2016/11/23	Surinder Rai
Anions	IC	4762292	N/A	2016/11/24	Fari Dehdezi

TEST SUMMARY

Maxxam ID: DMJ751
Sample ID: MW02-I
Matrix: Water

Collected: 2016/11/21
Shipped:
Received: 2016/11/21

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Conductivity	AT	4760134	N/A	2016/11/23	Surinder Rai
Free (WAD) Cyanide	SKAL/CN	4760954	N/A	2016/11/23	Louise Harding
Fluoride	ISE	4760138	2016/11/22	2016/11/23	Surinder Rai
Hardness (calculated as CaCO3)		4758357	N/A	2016/11/24	Automated Statchk
Mercury in Water by CVAA	CV/AA	4764190	2016/11/24	2016/11/25	Magdalena Carlos
Dissolved Metals by ICPMS	ICP/MS	4762413	N/A	2016/11/24	Arefa Dabhad
Total Metals Analysis by ICPMS	ICP/MS	4763149	N/A	2016/11/24	Cristina Petran
Total Ammonia-N	LACH/NH4	4761149	N/A	2016/11/28	Anastasia Hamanov
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	4760248	N/A	2016/11/23	Chandra Nandlal
pH	AT	4760140	N/A	2016/11/23	Surinder Rai
Phenols (4AAP)	TECH/PHEN	4762029	N/A	2016/11/24	Bramdeo Motiram
Orthophosphate	KONE	4761251	N/A	2016/11/24	Alina Dobreanu
Sulphide	ISE/S	4761862	N/A	2016/11/23	Neil Dassanayake
Total Dissolved Solids	BAL	4763458	2016/11/24	2016/11/24	Massarat Jan
Total Phosphorus (Colourimetric)	LACH/P	4762791	2016/11/24	2016/11/24	Sarabjit Raina
Low Level Total Suspended Solids	BAL	4761554	2016/11/23	2016/11/23	Arpan Shah
Turbidity	AT	4760159	N/A	2016/11/22	Tahir Anwar

GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	7.3°C
Package 2	6.7°C

Anions Analysis: Due to the sample matrix, sample required dilution. Detection limits were adjusted accordingly.

Sample DMJ746 [MW08-I] : Metals Analysis: Due to the sample matrix, sample required dilution. Detection limits were adjusted accordingly.

Sample DMJ748 [MW07-DEEP] : Metal Analysis:Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.

Sample DMJ749 [MW02-D] : Metal Analysis: Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.

Results relate only to the items tested.

Maxxam Job #: B6P3329
Report Date: 2016/11/28

QUALITY ASSURANCE REPORT

Golder Associates Ltd
Client Project #: 021-1228

Site Location: TANSLEY QUARRY
Sampler Initials: AM

			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**
4760125	Alkalinity (Total as CaCO3)	2016/11/23			97	85 - 115	<1.0	mg/L	3.3	20		
4760134	Conductivity	2016/11/23			102	85 - 115	<1.0	umho/cm	0.31	25		
4760138	Fluoride (F-)	2016/11/23	59 (1)	80 - 120	104	80 - 120	<0.10	mg/L	NC	20		
4760140	pH	2016/11/23			101	98 - 103			2.0	N/A		
4760159	Turbidity	2016/11/22			100	85 - 115	<0.1	NTU	3.2	20		
4760248	Nitrate (N)	2016/11/23	90	80 - 120	107	80 - 120	<0.10	mg/L	0.085	20		
4760248	Nitrite (N)	2016/11/23	97	80 - 120	96	80 - 120	<0.010	mg/L	NC	20		
4760954	Free Cyanide	2016/11/23	97	80 - 120	101	80 - 120	<0.0010	mg/L	NC	20		
4761084	Total Suspended Solids	2016/11/23					<1	mg/L	5.6	25	96	85 - 115
4761149	Total Ammonia-N	2016/11/28	104	80 - 120	103	85 - 115	<0.050	mg/L	NC	20		
4761179	Nitrate (N)	2016/11/25	NC	80 - 120	95	80 - 120	<0.10	mg/L	0.21	20		
4761179	Nitrite (N)	2016/11/25	99	80 - 120	103	80 - 120	<0.010	mg/L				
4761251	Orthophosphate (P)	2016/11/24	NC	75 - 125	100	80 - 120	<0.010	mg/L	3.1	25		
4761554	Total Suspended Solids	2016/11/23					<1	mg/L	NC	25	100	85 - 115
4761753	Dissolved Aluminum (Al)	2016/11/24	100	80 - 120	97	80 - 120	<5.0	ug/L				
4761753	Dissolved Antimony (Sb)	2016/11/24	102	80 - 120	101	80 - 120	<0.50	ug/L				
4761753	Dissolved Arsenic (As)	2016/11/24	96	80 - 120	97	80 - 120	<1.0	ug/L				
4761753	Dissolved Barium (Ba)	2016/11/24	NC	80 - 120	95	80 - 120	<2.0	ug/L				
4761753	Dissolved Beryllium (Be)	2016/11/24	100	80 - 120	101	80 - 120	<0.50	ug/L				
4761753	Dissolved Bismuth (Bi)	2016/11/24	87	80 - 120	95	80 - 120	<1.0	ug/L				
4761753	Dissolved Boron (B)	2016/11/24	98	80 - 120	99	80 - 120	<10	ug/L				
4761753	Dissolved Cadmium (Cd)	2016/11/24	99	80 - 120	100	80 - 120	<0.10	ug/L				
4761753	Dissolved Calcium (Ca)	2016/11/24	NC	80 - 120	95	80 - 120	<200	ug/L				
4761753	Dissolved Chromium (Cr)	2016/11/24	96	80 - 120	97	80 - 120	<5.0	ug/L				
4761753	Dissolved Cobalt (Co)	2016/11/24	93	80 - 120	96	80 - 120	<0.50	ug/L				
4761753	Dissolved Copper (Cu)	2016/11/24	96	80 - 120	97	80 - 120	<1.0	ug/L				
4761753	Dissolved Iron (Fe)	2016/11/24	95	80 - 120	98	80 - 120	<100	ug/L				
4761753	Dissolved Lead (Pb)	2016/11/24	89	80 - 120	95	80 - 120	<0.50	ug/L				
4761753	Dissolved Lithium (Li)	2016/11/24	99	80 - 120	100	80 - 120	<5.0	ug/L				
4761753	Dissolved Magnesium (Mg)	2016/11/24	NC	80 - 120	99	80 - 120	<50	ug/L				

QUALITY ASSURANCE REPORT(CONT'D)

			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
4761753	Dissolved Manganese (Mn)	2016/11/24	95	80 - 120	96	80 - 120	<2.0	ug/L	2.7	20		
4761753	Dissolved Molybdenum (Mo)	2016/11/24	104	80 - 120	100	80 - 120	<0.50	ug/L				
4761753	Dissolved Nickel (Ni)	2016/11/24	91	80 - 120	96	80 - 120	<1.0	ug/L				
4761753	Dissolved Phosphorus (P)	2016/11/24	104	80 - 120	99	80 - 120	<100	ug/L				
4761753	Dissolved Potassium (K)	2016/11/24	97	80 - 120	97	80 - 120	<200	ug/L				
4761753	Dissolved Selenium (Se)	2016/11/24	97	80 - 120	98	80 - 120	<2.0	ug/L				
4761753	Dissolved Silicon (Si)	2016/11/24	99	80 - 120	96	80 - 120	<50	ug/L				
4761753	Dissolved Silver (Ag)	2016/11/24	93	80 - 120	97	80 - 120	<0.10	ug/L				
4761753	Dissolved Sodium (Na)	2016/11/24	NC	80 - 120	99	80 - 120	<100	ug/L				
4761753	Dissolved Strontium (Sr)	2016/11/24	NC	80 - 120	97	80 - 120	<1.0	ug/L				
4761753	Dissolved Tellurium (Te)	2016/11/24	97	80 - 120	98	80 - 120	<1.0	ug/L				
4761753	Dissolved Thallium (Tl)	2016/11/24	89	80 - 120	95	80 - 120	<0.050	ug/L				
4761753	Dissolved Tin (Sn)	2016/11/24	103	80 - 120	99	80 - 120	<1.0	ug/L				
4761753	Dissolved Titanium (Ti)	2016/11/24	98	80 - 120	96	80 - 120	<5.0	ug/L				
4761753	Dissolved Tungsten (W)	2016/11/24	97	80 - 120	100	80 - 120	<1.0	ug/L				
4761753	Dissolved Uranium (U)	2016/11/24	97	80 - 120	101	80 - 120	<0.10	ug/L				
4761753	Dissolved Vanadium (V)	2016/11/24	97	80 - 120	96	80 - 120	<0.50	ug/L				
4761753	Dissolved Zinc (Zn)	2016/11/24	91	80 - 120	98	80 - 120	<5.0	ug/L				
4761753	Dissolved Zirconium (Zr)	2016/11/24	105	80 - 120	100	80 - 120	<1.0	ug/L				
4761862	Sulphide	2016/11/23	81	80 - 120	94	80 - 120	<0.020	mg/L	NC	20		
4762029	Phenols-4AAP	2016/11/24	96	80 - 120	100	85 - 115	<0.0010	mg/L	NC	20		
4762031	Total Suspended Solids	2016/11/23					<10	mg/L	NC	25	96	85 - 115
4762292	Dissolved Bromide (Br-)	2016/11/24	95	80 - 120	98	80 - 120	<1.0	mg/L	NC	20		
4762292	Dissolved Chloride (Cl)	2016/11/24	94	80 - 120	97	70 - 130	<1.0	mg/L				
4762292	Dissolved Sulphate (SO4)	2016/11/24	91	80 - 120	96	80 - 120	<1.0	mg/L				
4762413	Dissolved Aluminum (Al)	2016/11/24	100	80 - 120	103	80 - 120	<5.0	ug/L				
4762413	Dissolved Antimony (Sb)	2016/11/24	102	80 - 120	104	80 - 120	<0.50	ug/L	NC	20		
4762413	Dissolved Arsenic (As)	2016/11/24	97	80 - 120	99	80 - 120	<1.0	ug/L	NC	20		
4762413	Dissolved Barium (Ba)	2016/11/24	NC	80 - 120	101	80 - 120	<2.0	ug/L	1.3	20		
4762413	Dissolved Beryllium (Be)	2016/11/24	99	80 - 120	101	80 - 120	<0.50	ug/L	NC	20		
4762413	Dissolved Bismuth (Bi)	2016/11/24	91	80 - 120	99	80 - 120	<1.0	ug/L				

QUALITY ASSURANCE REPORT(CONT'D)

			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
4762413	Dissolved Boron (B)	2016/11/24	95	80 - 120	101	80 - 120	<10	ug/L	3.6	20		
4762413	Dissolved Cadmium (Cd)	2016/11/24	99	80 - 120	102	80 - 120	<0.10	ug/L	NC	20		
4762413	Dissolved Calcium (Ca)	2016/11/24	NC	80 - 120	101	80 - 120	<200	ug/L				
4762413	Dissolved Chromium (Cr)	2016/11/24	91	80 - 120	97	80 - 120	<5.0	ug/L	NC	20		
4762413	Dissolved Cobalt (Co)	2016/11/24	93	80 - 120	101	80 - 120	<0.50	ug/L	NC	20		
4762413	Dissolved Copper (Cu)	2016/11/24	93	80 - 120	99	80 - 120	<1.0	ug/L	NC	20		
4762413	Dissolved Iron (Fe)	2016/11/24	94	80 - 120	100	80 - 120	<100	ug/L				
4762413	Dissolved Lead (Pb)	2016/11/24	90	80 - 120	97	80 - 120	<0.50	ug/L	NC	20		
4762413	Dissolved Lithium (Li)	2016/11/24	99	80 - 120	101	80 - 120	<5.0	ug/L				
4762413	Dissolved Magnesium (Mg)	2016/11/24	NC	80 - 120	105	80 - 120	<50	ug/L				
4762413	Dissolved Manganese (Mn)	2016/11/24	NC	80 - 120	101	80 - 120	<2.0	ug/L				
4762413	Dissolved Molybdenum (Mo)	2016/11/24	99	80 - 120	98	80 - 120	<0.50	ug/L	2.8	20		
4762413	Dissolved Nickel (Ni)	2016/11/24	91	80 - 120	98	80 - 120	<1.0	ug/L	NC	20		
4762413	Dissolved Phosphorus (P)	2016/11/24	105	80 - 120	107	80 - 120	<100	ug/L				
4762413	Dissolved Potassium (K)	2016/11/24	98	80 - 120	102	80 - 120	<200	ug/L				
4762413	Dissolved Selenium (Se)	2016/11/24	90	80 - 120	97	80 - 120	<2.0	ug/L	NC	20		
4762413	Dissolved Silicon (Si)	2016/11/24	105	80 - 120	108	80 - 120	<50	ug/L				
4762413	Dissolved Silver (Ag)	2016/11/24	91	80 - 120	98	80 - 120	<0.10	ug/L	NC	20		
4762413	Dissolved Sodium (Na)	2016/11/24	NC	80 - 120	101	80 - 120	<100	ug/L	0.62	20		
4762413	Dissolved Strontium (Sr)	2016/11/24	NC	80 - 120	98	80 - 120	<1.0	ug/L				
4762413	Dissolved Tellurium (Te)	2016/11/24	99	80 - 120	101	80 - 120	<1.0	ug/L				
4762413	Dissolved Thallium (Tl)	2016/11/24	90	80 - 120	96	80 - 120	<0.050	ug/L	NC	20		
4762413	Dissolved Tin (Sn)	2016/11/24	103	80 - 120	104	80 - 120	<1.0	ug/L				
4762413	Dissolved Titanium (Ti)	2016/11/24	105	80 - 120	105	80 - 120	<5.0	ug/L				
4762413	Dissolved Tungsten (W)	2016/11/24	96	80 - 120	98	80 - 120	<1.0	ug/L				
4762413	Dissolved Uranium (U)	2016/11/24	97	80 - 120	98	80 - 120	<0.10	ug/L	NC	20		
4762413	Dissolved Vanadium (V)	2016/11/24	94	80 - 120	97	80 - 120	<0.50	ug/L	NC	20		
4762413	Dissolved Zinc (Zn)	2016/11/24	94	80 - 120	100	80 - 120	<5.0	ug/L	NC	20		
4762413	Dissolved Zirconium (Zr)	2016/11/24	106	80 - 120	106	80 - 120	<1.0	ug/L				
4762791	Total Phosphorus	2016/11/24	104	80 - 120	102	80 - 120	<0.020	mg/L	0.55	20	101	80 - 120
4762909	Total Aluminum (Al)	2016/11/24	NC	80 - 120	100	80 - 120	<5.0	ug/L				

QUALITY ASSURANCE REPORT(CONT'D)

			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
4762909	Total Antimony (Sb)	2016/11/24	104	80 - 120	100	80 - 120	<0.50	ug/L				
4762909	Total Arsenic (As)	2016/11/24	101	80 - 120	100	80 - 120	<1.0	ug/L	NC	20		
4762909	Total Barium (Ba)	2016/11/24	104	80 - 120	102	80 - 120	<2.0	ug/L	4.2	20		
4762909	Total Beryllium (Be)	2016/11/24	100	80 - 120	99	80 - 120	<0.50	ug/L	NC	20		
4762909	Total Bismuth (Bi)	2016/11/24	102	80 - 120	101	80 - 120	<1.0	ug/L				
4762909	Total Boron (B)	2016/11/24	90	80 - 120	91	80 - 120	<10	ug/L	NC	20		
4762909	Total Cadmium (Cd)	2016/11/24	105	80 - 120	101	80 - 120	<0.10	ug/L	NC	20		
4762909	Total Calcium (Ca)	2016/11/24	NC	80 - 120	98	80 - 120	<200	ug/L				
4762909	Total Chromium (Cr)	2016/11/24	98	80 - 120	96	80 - 120	<5.0	ug/L				
4762909	Total Cobalt (Co)	2016/11/24	100	80 - 120	100	80 - 120	<0.50	ug/L	NC	20		
4762909	Total Copper (Cu)	2016/11/24	103	80 - 120	101	80 - 120	<1.0	ug/L	1.3	20		
4762909	Total Iron (Fe)	2016/11/24	98	80 - 120	99	80 - 120	<100	ug/L				
4762909	Total Lead (Pb)	2016/11/24	101	80 - 120	101	80 - 120	<0.50	ug/L	NC	20		
4762909	Total Lithium (Li)	2016/11/24	99	80 - 120	103	80 - 120	<5.0	ug/L				
4762909	Total Magnesium (Mg)	2016/11/24	100	80 - 120	99	80 - 120	<50	ug/L				
4762909	Total Manganese (Mn)	2016/11/24	98	80 - 120	99	80 - 120	<2.0	ug/L				
4762909	Total Molybdenum (Mo)	2016/11/24	99	80 - 120	95	80 - 120	<0.50	ug/L	NC	20		
4762909	Total Nickel (Ni)	2016/11/24	98	80 - 120	98	80 - 120	<1.0	ug/L	3.4	20		
4762909	Total Phosphorus (P)	2016/11/24	105	80 - 120	101	80 - 120	<100	ug/L				
4762909	Total Potassium (K)	2016/11/24	99	80 - 120	99	80 - 120	<200	ug/L				
4762909	Total Selenium (Se)	2016/11/24	100	80 - 120	100	80 - 120	<2.0	ug/L	NC	20		
4762909	Total Silicon (Si)	2016/11/24	98	80 - 120	94	80 - 120	<50	ug/L				
4762909	Total Silver (Ag)	2016/11/24	104	80 - 120	100	80 - 120	<0.10	ug/L	NC	20		
4762909	Total Sodium (Na)	2016/11/24	NC	80 - 120	98	80 - 120	<100	ug/L				
4762909	Total Strontium (Sr)	2016/11/24	94	80 - 120	96	80 - 120	<1.0	ug/L				
4762909	Total Tellurium (Te)	2016/11/24	99	80 - 120	94	80 - 120	<1.0	ug/L				
4762909	Total Thallium (Tl)	2016/11/24	102	80 - 120	102	80 - 120	<0.050	ug/L				
4762909	Total Tin (Sn)	2016/11/24	101	80 - 120	97	80 - 120	<1.0	ug/L				
4762909	Total Titanium (Ti)	2016/11/24	97	80 - 120	97	80 - 120	<5.0	ug/L				
4762909	Total Tungsten (W)	2016/11/24	99	80 - 120	96	80 - 120	<1.0	ug/L				
4762909	Total Uranium (U)	2016/11/24	105	80 - 120	102	80 - 120	<0.10	ug/L	NC	20		

QUALITY ASSURANCE REPORT(CONT'D)

			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**
4762909	Total Vanadium (V)	2016/11/24	100	80 - 120	98	80 - 120	<0.50	ug/L	NC	20		
4762909	Total Zinc (Zn)	2016/11/24	101	80 - 120	101	80 - 120	<5.0	ug/L	NC	20		
4762909	Total Zirconium (Zr)	2016/11/24	106	80 - 120	100	80 - 120	<1.0	ug/L				
4763149	Total Aluminum (Al)	2016/11/24	NC	80 - 120	100	80 - 120	<5.0	ug/L	7.5	20		
4763149	Total Antimony (Sb)	2016/11/24	111	80 - 120	103	80 - 120	<0.50	ug/L	0.82	20		
4763149	Total Arsenic (As)	2016/11/24	97	80 - 120	97	80 - 120	<1.0	ug/L	NC	20		
4763149	Total Barium (Ba)	2016/11/24	106	80 - 120	99	80 - 120	<2.0	ug/L	0.26	20		
4763149	Total Beryllium (Be)	2016/11/24	105	80 - 120	99	80 - 120	<0.50	ug/L	NC	20		
4763149	Total Bismuth (Bi)	2016/11/24	78 (1)	80 - 120	90	80 - 120	<1.0	ug/L	NC	20		
4763149	Total Boron (B)	2016/11/24	NC	80 - 120	96	80 - 120	<10	ug/L	0.94	20		
4763149	Total Cadmium (Cd)	2016/11/24	97	80 - 120	100	80 - 120	<0.10	ug/L	3.4	20		
4763149	Total Calcium (Ca)	2016/11/24	NC	80 - 120	95	80 - 120	<200	ug/L	2.2	20		
4763149	Total Chromium (Cr)	2016/11/24	96	80 - 120	95	80 - 120	<5.0	ug/L	1.5	20		
4763149	Total Cobalt (Co)	2016/11/24	92	80 - 120	94	80 - 120	<0.50	ug/L	NC	20		
4763149	Total Copper (Cu)	2016/11/24	100	80 - 120	97	80 - 120	<1.0	ug/L	NC	20		
4763149	Total Iron (Fe)	2016/11/24	95	80 - 120	96	80 - 120	<100	ug/L	0.44	20		
4763149	Total Lead (Pb)	2016/11/24	83	80 - 120	93	80 - 120	<0.50	ug/L	NC	20		
4763149	Total Lithium (Li)	2016/11/24	NC	80 - 120	97	80 - 120	<5.0	ug/L	4.4	20		
4763149	Total Magnesium (Mg)	2016/11/24	NC	80 - 120	95	80 - 120	<50	ug/L	2.1	20		
4763149	Total Manganese (Mn)	2016/11/24	NC	80 - 120	96	80 - 120	<2.0	ug/L	0.50	20		
4763149	Total Molybdenum (Mo)	2016/11/24	113	80 - 120	101	80 - 120	<0.50	ug/L	3.9	20		
4763149	Total Nickel (Ni)	2016/11/24	87	80 - 120	95	80 - 120	<1.0	ug/L	2.0	20		
4763149	Total Phosphorus (P)	2016/11/24	109	80 - 120	95	80 - 120	<100	ug/L	NC	20		
4763149	Total Potassium (K)	2016/11/24	NC	80 - 120	97	80 - 120	<200	ug/L	1.3	20		
4763149	Total Selenium (Se)	2016/11/24	92	80 - 120	101	80 - 120	<2.0	ug/L	NC	20		
4763149	Total Silicon (Si)	2016/11/24	116	80 - 120	98	80 - 120	<50	ug/L	2.7	20		
4763149	Total Silver (Ag)	2016/11/24	89	80 - 120	96	80 - 120	<0.10	ug/L	NC	20		
4763149	Total Sodium (Na)	2016/11/24	NC	80 - 120	93	80 - 120	<100	ug/L	4.2	20		
4763149	Total Strontium (Sr)	2016/11/24	NC	80 - 120	99	80 - 120	<1.0	ug/L	0.74	20		
4763149	Total Tellurium (Te)	2016/11/24	99	80 - 120	105	80 - 120	<1.0	ug/L	NC	20		
4763149	Total Thallium (Tl)	2016/11/24	81	80 - 120	91	80 - 120	<0.050	ug/L	NC	20		

QUALITY ASSURANCE REPORT(CONT'D)

			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**
4763149	Total Tin (Sn)	2016/11/24	109	80 - 120	103	80 - 120	<1.0	ug/L	NC	20		
4763149	Total Titanium (Ti)	2016/11/24	116	80 - 120	97	80 - 120	<5.0	ug/L	NC	20		
4763149	Total Tungsten (W)	2016/11/24	93	80 - 120	97	80 - 120	<1.0	ug/L	1.9	20		
4763149	Total Uranium (U)	2016/11/24	94	80 - 120	98	80 - 120	<0.10	ug/L	0.23	20		
4763149	Total Vanadium (V)	2016/11/24	104	80 - 120	95	80 - 120	<0.50	ug/L	NC	20		
4763149	Total Zinc (Zn)	2016/11/24	80	80 - 120	99	80 - 120	<5.0	ug/L	3.3	20		
4763149	Total Zirconium (Zr)	2016/11/24	121 (1)	80 - 120	102	80 - 120	<1.0	ug/L	NC	20		
4763236	Dissolved Bromide (Br-)	2016/11/25	94	80 - 120	100	80 - 120	<1.0	mg/L	NC	20		
4763236	Dissolved Chloride (Cl)	2016/11/25	90	80 - 120	98	70 - 130	<1.0	mg/L				
4763236	Dissolved Sulphate (SO4)	2016/11/25	91	80 - 120	97	80 - 120	<1.0	mg/L				
4763458	Total Dissolved Solids	2016/11/24					<10	mg/L	0.34	25	97	90 - 110
4764190	Mercury (Hg)	2016/11/25	109	75 - 125	102	80 - 120	<0.0001	mg/L	NC	20		
4768121	Mercury (Hg)	2016/11/28	102	75 - 125	103	80 - 120	<0.0001	mg/L	NC	20		

N/A = Not Applicable

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 too small to permit a reliable recovery calculation (matrix spike concentration was less than 2x that of the native sample concentration).

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (one or both samples < 5x RDL).

(1) Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

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.

Maxxam
A Bureau Veritas Group Company

Maxxam Analytics International Corporation o/a Maxxam Analytics
6740 Campobello Road Mississauga Ontario Canada L5N 2L8 Tel:(905) 817-5700 Toll-free 800-563-6266 Fax (905) 817-5777 www.maxxam.ca

CHAIN OF CUSTODY RECORD

Page of

INVOICE TO:

Company Name: #1326 Golder Associates Ltd
Attention: Accounts Payable
Address: 6925 Century Ave Suite 100
Mississauga ON L5N 7K2
Tel: (905) 567-4444 Fax: (905) 567-6561
Email: AP-CustomerService@golder.com

REPORT TO:

Company Name:
Attention: Josip Balaban
Address:
Tel: Fax:
Email: josip_balaban@golder.com

PROJECT INFORMATION:

Quotation #: B41022
P.O. #:
Project: 021-1228
Project Name:
Site #: Tansley Quarry
Sampled By:

Laboratory Use Only:

Maxxam Job #:	Bottle Order #:
	586660
COC #:	**Project Manager:**
C#586660-04-01	Ema Gitej

MOE REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE MAXXAM DRINKING WATER CHAIN OF CUSTODY

Regulation 153 (2011)

☐ Table 1 ☐ Res/Park ☐ Medium/Fine
☐ Table 2 ☐ Ind/Comm ☐ Coarse
☐ Table 3 ☐ Agri/Other ☐ **For RSC**
☐ Table ___

Other Regulations

☐ CCME ☐ Sanitary Sewer Bylaw
☐ Reg 558 ☐ Storm Sewer Bylaw
☐ MISA Municipality ________
☐ PWQO
☐ Other ________

Special Instructions

Include Criteria on Certificate of Analysis (Y/N)? ____

ANALYSIS REQUESTED (PLEASE BE SPECIFIC)

21-Nov-16 18:12
Ema Gitej
B6P3329
DM2 ENV-848

Turnaround Time (TAT) Required:
Please provide advance notice for rush projects

Regular (Standard) TAT: ☒
(will be applied if Rush TAT is not specified)
Standard TAT = 5-7 Working days for most tests.
Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

Job Specific Rush TAT (if applies to entire submission)
Date Required: ________ Time Required: ________ ☐
Rush Confirmation Number: ________ *(call lab for #)*

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Field Filtered (please circle): Metals / Hg / Cr VI	ON-SITE GROUNDWATER	# of Bottles	Comments
1	MW08-I		Nov 21/16	12:45	GW		X	10	
2	~~MW08-O~~			~~13:30~~	GW		X	~~10~~	
3	MW08-D			13:30	GW		X	10	
4	MW07-Deep			10:30	GW		X	10	
5	MW02-D			16:30	GW		X	10	
6	MW02-O			16:00	GW		X	10	
7	MW02-I			16:10	GW		X	10	
8									
9									
10									

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted
/ Amanda Malenica	16/11/21	18:00	RAJMEET KAUR	2016/11/21	18:12	

Laboratory Use Only

Time Sensitive	Temperature (°C) on Receipt	Custody Seal	Yes	No
	8/7/7 7/6/7	Present		✓
		Intact		✓

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

SAMPLES MUST BE KEPT COOL (< 10° C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

White: Maxxam Yellow: Client

Maxxam Analytics International Corporation o/a Maxxam Analytics

Your Project #: 021-1228
Site#: TANSLEY QUARRY
Your C.O.C. #: 586660-01-01

Attention:Josip Balaban

Golder Associates Ltd
Mississauga - Standing Offer
6925 Century Ave
Suite 100
Mississauga, ON
CANADA L5N 7K2

Report Date: 2016/12/02
Report #: R4271363
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B6P4448
Received: 2016/11/22, 18:20

Sample Matrix: Water
Samples Received: 8

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Alkalinity	8	N/A	2016/11/25	CAM SOP-00448	SM 22 2320 B m
Anions	8	N/A	2016/11/24	CAM SOP-00435	SM 22 4110 B m
Conductivity	8	N/A	2016/11/25	CAM SOP-00414	SM 22 2510 m
Free (WAD) Cyanide	8	N/A	2016/11/25	CAM SOP-00457	OMOE E3015 m
Fluoride	1	2016/11/24	2016/11/25	CAM SOP-00449	SM 22 4500-F C m
Fluoride	7	2016/11/25	2016/11/25	CAM SOP-00449	SM 22 4500-F C m
Hardness (calculated as CaCO3)	1	N/A	2016/11/24	CAM SOP 00102/00408/00447	SM 2340 B
Hardness (calculated as CaCO3)	7	N/A	2016/11/25	CAM SOP 00102/00408/00447	SM 2340 B
Mercury in Water by CVAA	8	2016/11/25	2016/11/25	CAM SOP-00453	EPA 7470A m
Dissolved Metals by ICPMS	6	N/A	2016/11/24	CAM SOP-00447	EPA 6020B m
Dissolved Metals by ICPMS	2	N/A	2016/11/25	CAM SOP-00447	EPA 6020B m
Total Metals Analysis by ICPMS	3	N/A	2016/11/24	CAM SOP-00447	EPA 6020B m
Total Metals Analysis by ICPMS	2	N/A	2016/11/25	CAM SOP-00447	EPA 6020B m
Total Metals Analysis by ICPMS	3	N/A	2016/11/28	CAM SOP-00447	EPA 6020B m
Total Ammonia-N	8	N/A	2016/11/29	CAM SOP-00441	EPA GS I-2522-90 m
Nitrate (NO3) and Nitrite (NO2) in Water (1)	8	N/A	2016/11/25	CAM SOP-00440	SM 22 4500-NO3I/NO2B
pH	8	N/A	2016/11/25	CAM SOP-00413	SM 4500H+ B m
Phenols (4AAP)	8	N/A	2016/11/25	CAM SOP-00444	OMOE E3179 m
Orthophosphate	8	N/A	2016/11/24	CAM SOP-00461	EPA 365.1 m
Sulphide	8	N/A	2016/11/25	CAM SOP-00455	SM 22 4500-S G m
Total Dissolved Solids	6	2016/11/24	2016/11/24	CAM SOP-00428	SM 22 2540C m
Total Dissolved Solids	2	2016/11/24	2016/11/25	CAM SOP-00428	SM 22 2540C m
Total Phosphorus (Colourimetric)	8	2016/11/25	2016/11/29	CAM SOP-00407	SM 22 4500 P B H m
Total Suspended Solids	4	2016/11/23	2016/11/23	CAM SOP-00428	SM 22 2540D m
Low Level Total Suspended Solids	4	2016/11/23	2016/11/24	CAM SOP-00428	SM 22 2540D m
Turbidity	8	N/A	2016/11/23	CAM SOP-00417	SM 22 2130 B m

Your Project #: 021-1228
Site#: TANSLEY QUARRY
Your C.O.C. #: 586660-01-01

Attention:Josip Balaban

Golder Associates Ltd
Mississauga - Standing Offer
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CANADA L5N 7K2

Report Date: 2016/12/02
Report #: R4271363
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B6P4448
Received: 2016/11/22, 18:20

Remarks:

Maxxam Analytics' laboratories are accredited to ISO/IEC 17025:2005 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Maxxam are based upon recognized Provincial, Federal or US method compendia such as CCME, MDDELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported: unless indicated otherwise, associated sample data are not blank corrected.

Maxxam Analytics' liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Maxxam has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Maxxam, unless otherwise agreed in writing.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods. Results relate to samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* 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.
Ema Gitej, Senior Project Manager
Email: EGitej@maxxam.ca
Phone# (905)817-5829
==
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.

RESULTS OF ANALYSES OF WATER

Maxxam ID		DMP036			DMP037			DMP038		
Sampling Date		2016/11/22 09:15			2016/11/22 12:30			2016/11/22 12:00		
COC Number		586660-01-01			586660-01-01			586660-01-01		
	UNITS	**MW09-I**	**RDL**	**QC Batch**	**MW07-O**	**RDL**	**QC Batch**	**MW08-S**	**RDL**	**QC Batch**
Calculated Parameters										
Hardness (CaCO3)	mg/L	750	1.0	4759096	460	1.0	4759096	900	1.0	4759096
Inorganics										
Total Ammonia-N	mg/L	3.3	0.050	4763113	0.20	0.050	4763113	0.25	0.050	4763113
Conductivity	umho/cm	2500	1.0	4765723	1200	1.0	4765723	1700	1.0	4765723
Total Dissolved Solids	mg/L	1650	10	4763458	722	10	4763456	1190	10	4764050
Fluoride (F-)	mg/L	0.47	0.10	4765724	0.36	0.10	4765724	0.23	0.10	4765724
Free Cyanide	mg/L	<0.0010	0.0010	4763995	<0.0010	0.0010	4763995	<0.0010	0.0010	4763995
Orthophosphate (P)	mg/L	<0.010	0.010	4761251	0.011	0.010	4761251	<0.010	0.010	4761251
pH	pH	7.80		4765726	7.89		4765726	7.73		4765726
Phenols-4AAP	mg/L	<0.0010	0.0010	4762945	<0.0010	0.0010	4762945	<0.0010	0.0010	4762945
Total Phosphorus	mg/L	8.3	0.10	4765485	0.50	0.040	4765485	0.71	0.10	4765485
Total Suspended Solids	mg/L	13000	100	4762031	1300	50	4762031	890	50	4762031
Sulphide	mg/L	0.042	0.020	4763648	<0.020	0.020	4763648	<0.020	0.020	4763648
Turbidity	NTU	6100	5	4760958	900	0.5	4760958	1900	1	4760958
Alkalinity (Total as CaCO3)	mg/L	180	1.0	4765718	490	1.0	4765718	550	1.0	4765718
Nitrite (N)	mg/L	<0.010	0.010	4761190	0.014	0.010	4761190	<0.010	0.010	4761190
Dissolved Chloride (Cl)	mg/L	340	5.0	4762292	42	1.0	4762292	17	1.0	4762292
Nitrate (N)	mg/L	<0.10	0.10	4761190	<0.10	0.10	4761190	<0.10	0.10	4761190
Nitrate + Nitrite (N)	mg/L	<0.10	0.10	4761190	<0.10	0.10	4761190	<0.10	0.10	4761190
Dissolved Bromide (Br-)	mg/L	<5.0	5.0	4762292	<1.0	1.0	4762292	<1.0	1.0	4762292
Dissolved Sulphate (SO4)	mg/L	600	5.0	4762292	140	1.0	4762292	460	1.0	4762292

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

RESULTS OF ANALYSES OF WATER

Maxxam ID		DMP038			DMP039	DMP039		
Sampling Date		2016/11/22 12:00			2016/11/22 09:00	2016/11/22 09:00		
COC Number		586660-01-01			586660-01-01	586660-01-01		
	UNITS	**MW08-S Lab-Dup**	**RDL**	**QC Batch**	**MW09-O**	**MW09-O Lab-Dup**	**RDL**	**QC Batch**
Calculated Parameters								
Hardness (CaCO3)	mg/L		1.0	4759096	330		1.0	4759096
Inorganics								
Total Ammonia-N	mg/L		0.050	4763113	0.51		0.050	4763113
Conductivity	umho/cm		1.0	4765723	750		1.0	4765723
Total Dissolved Solids	mg/L	1270	10	4764050	484		10	4763456
Fluoride (F-)	mg/L		0.10	4765724	0.23		0.10	4765724
Free Cyanide	mg/L		0.0010	4763995	<0.0010		0.0010	4763995
Orthophosphate (P)	mg/L		0.010	4761251	0.012		0.010	4761251
pH	pH			4765726	7.92			4765726
Phenols-4AAP	mg/L		0.0010	4762945	<0.0010		0.0010	4762945
Total Phosphorus	mg/L		0.10	4765485	4.6		0.10	4765485
Total Suspended Solids	mg/L		50	4762031	14000		100	4762031
Sulphide	mg/L		0.020	4763648	0.038	0.036	0.020	4763648
Turbidity	NTU		1	4760958	6300		5	4760958
Alkalinity (Total as CaCO3)	mg/L		1.0	4765718	370		1.0	4765718
Nitrite (N)	mg/L		0.010	4761190	<0.010		0.010	4761190
Dissolved Chloride (Cl)	mg/L		1.0	4762292	4.5		1.0	4762292
Nitrate (N)	mg/L		0.10	4761190	0.18		0.10	4761190
Nitrate + Nitrite (N)	mg/L		0.10	4761190	0.18		0.10	4761190
Dissolved Bromide (Br-)	mg/L		1.0	4762292	<1.0		1.0	4762292
Dissolved Sulphate (SO4)	mg/L		1.0	4762292	51		1.0	4762292

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

RESULTS OF ANALYSES OF WATER

Maxxam ID		DMP040	DMP040			DMP041		
Sampling Date		2016/11/22 10:00	2016/11/22 10:00			2016/11/22 14:15		
COC Number		586660-01-01	586660-01-01			586660-01-01		
	UNITS	**MW09-D**	**MW09-D Lab-Dup**	**RDL**	**QC Batch**	**MW05-I**	**RDL**	**QC Batch**
Calculated Parameters								
Hardness (CaCO3)	mg/L	33000		1.0	4759096	380	1.0	4759096
Inorganics								
Total Ammonia-N	mg/L	38	38	0.50	4763293	2.1	0.050	4763113
Conductivity	umho/cm	>100000	>100000	1.0	4764611	1300	1.0	4765723
Total Dissolved Solids	mg/L	89500		20	4763458	756	10	4764050
Fluoride (F-)	mg/L	<0.10	<0.10	0.10	4764630	0.39	0.10	4765724
Free Cyanide	mg/L	<0.0010		0.0010	4763995	<0.0010	0.0010	4763995
Orthophosphate (P)	mg/L	<0.010		0.010	4761251	<0.010	0.010	4761251
pH	pH	6.54	6.63		4764631	7.74		4765726
Phenols-4AAP	mg/L	0.022		0.0050	4762945	<0.0010	0.0010	4762945
Total Phosphorus	mg/L	<0.40 (1)		0.40	4765485	0.097	0.020	4765485
Total Suspended Solids	mg/L	440		5	4761548	250	2	4761548
Sulphide	mg/L	<0.020		0.020	4763648	<0.020	0.020	4763648
Turbidity	NTU	120		0.1	4760958	160	0.1	4760958
Alkalinity (Total as CaCO3)	mg/L	27	30	1.0	4764610	250	1.0	4765718
Nitrite (N)	mg/L	<0.10		0.10	4761190	0.120	0.010	4761190
Dissolved Chloride (Cl)	mg/L	50000		500	4762292	160	1.0	4762292
Nitrate (N)	mg/L	<1.0		1.0	4761190	<0.10	0.10	4761190
Nitrate + Nitrite (N)	mg/L	<1.0		1.0	4761190	0.19	0.10	4761190
Dissolved Bromide (Br-)	mg/L	590		500	4762292	1.8	1.0	4762292
Dissolved Sulphate (SO4)	mg/L	1200		500	4762292	160	1.0	4762292

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
(1) Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.

RESULTS OF ANALYSES OF WATER

Maxxam ID		DMP042		DMP043		
Sampling Date		2016/11/22 14:30		2016/11/22 16:30		
COC Number		586660-01-01		586660-01-01		
	UNITS	**MW05-D**	**RDL**	**MW10-D**	**RDL**	**QC Batch**
Calculated Parameters						
Hardness (CaCO3)	mg/L	37000	1.0	33000	1.0	4759096
Inorganics						
Total Ammonia-N	mg/L	39	0.50	36	0.50	4763113
Conductivity	umho/cm	>100000	1.0	96000	1.0	4765723
Total Dissolved Solids	mg/L	99500	20	81600	20	4763458
Fluoride (F-)	mg/L	<0.10	0.10	<0.10	0.10	4765724
Free Cyanide	mg/L	<0.0010	0.0010	<0.0010	0.0010	4763995
Orthophosphate (P)	mg/L	<0.050 (1)	0.050	<0.010	0.010	4761251
pH	pH	6.50		6.59		4765726
Phenols-4AAP	mg/L	0.016	0.010	0.014	0.0050	4762945
Total Phosphorus	mg/L	0.46	0.20	0.49	0.40	4765485
Total Suspended Solids	mg/L	630	4	860	5	4761548
Sulphide	mg/L	<0.020	0.020	<0.020	0.020	4763648
Turbidity	NTU	160	0.1	290	0.2	4760958
Alkalinity (Total as CaCO3)	mg/L	49	1.0	43	1.0	4765718
Nitrite (N)	mg/L	<0.10	0.10	<0.10	0.10	4761190
Dissolved Chloride (Cl)	mg/L	56000	500	46000	500	4762292
Nitrate (N)	mg/L	<1.0	1.0	<1.0	1.0	4761190
Nitrate + Nitrite (N)	mg/L	<1.0	1.0	<1.0	1.0	4761190
Dissolved Bromide (Br-)	mg/L	670	500	530	500	4762292
Dissolved Sulphate (SO4)	mg/L	1000	500	1200	500	4762292

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
(1) Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		DMP036		DMP037	DMP037		DMP038		
Sampling Date		2016/11/22 09:15		2016/11/22 12:30	2016/11/22 12:30		2016/11/22 12:00		
COC Number		586660-01-01		586660-01-01	586660-01-01		586660-01-01		
	UNITS	**MW09-I**	**RDL**	**MW07-O**	**MW07-O Lab-Dup**	**RDL**	**MW08-S**	**RDL**	**QC Batch**
Metals									
Mercury (Hg)	mg/L	<0.0001	0.0001	<0.0001	<0.0001	0.0001	<0.0001	0.0001	4765059
Dissolved Aluminum (Al)	ug/L	540	5.0	230		5.0	76	5.0	4763242
Total Aluminum (Al)	ug/L	250000	250	9300		5.0	6500	5.0	4765270
Dissolved Antimony (Sb)	ug/L	<0.50	0.50	<0.50		0.50	<0.50	0.50	4763242
Total Antimony (Sb)	ug/L	<5.0	5.0	<0.50		0.50	<0.50	0.50	4765270
Dissolved Arsenic (As)	ug/L	1.6	1.0	2.2		1.0	3.9	1.0	4763242
Total Arsenic (As)	ug/L	58	10	8.3		1.0	7.5	1.0	4765270
Dissolved Barium (Ba)	ug/L	23	2.0	43		2.0	23	2.0	4763242
Total Barium (Ba)	ug/L	3600	20	100		2.0	62	2.0	4765270
Dissolved Beryllium (Be)	ug/L	<0.50	0.50	<0.50		0.50	<0.50	0.50	4763242
Total Beryllium (Be)	ug/L	12	5.0	0.51		0.50	<0.50	0.50	4765270
Dissolved Bismuth (Bi)	ug/L	<1.0	1.0	<1.0		1.0	<1.0	1.0	4763242
Total Bismuth (Bi)	ug/L	<10	10	<1.0		1.0	<1.0	1.0	4765270
Dissolved Boron (B)	ug/L	5200	10	4500		10	1800	10	4763242
Total Boron (B)	ug/L	5800	100	4600		10	1900	10	4765270
Dissolved Cadmium (Cd)	ug/L	<0.10	0.10	0.10		0.10	<0.10	0.10	4763242
Total Cadmium (Cd)	ug/L	2.3	1.0	0.54		0.10	1.5	0.10	4765270
Dissolved Calcium (Ca)	ug/L	190000	1000	53000		200	110000	1000	4763242
Total Calcium (Ca)	ug/L	1600000	2000	110000		200	140000	1000	4765270
Dissolved Chromium (Cr)	ug/L	<5.0	5.0	<5.0		5.0	<5.0	5.0	4763242
Total Chromium (Cr)	ug/L	370	50	17		5.0	12	5.0	4765270
Dissolved Cobalt (Co)	ug/L	1.5	0.50	0.75		0.50	0.71	0.50	4763242
Total Cobalt (Co)	ug/L	190	5.0	8.6		0.50	5.7	0.50	4765270
Dissolved Copper (Cu)	ug/L	<1.0	1.0	<1.0		1.0	<1.0	1.0	4763242
Total Copper (Cu)	ug/L	140	10	17		1.0	11	1.0	4765270
Dissolved Iron (Fe)	ug/L	790	100	240		100	990	100	4763242
Total Iron (Fe)	ug/L	290000	1000	18000		100	13000	100	4765270
Dissolved Lead (Pb)	ug/L	<0.50	0.50	<0.50		0.50	<0.50	0.50	4763242
Total Lead (Pb)	ug/L	120	5.0	7.8		0.50	4.8	0.50	4765270
Dissolved Lithium (Li)	ug/L	320	5.0	100		5.0	200	5.0	4763242
Total Lithium (Li)	ug/L	990	50	130		5.0	230	5.0	4765270
Dissolved Magnesium (Mg)	ug/L	64000	50	80000		50	150000	50	4763242
Total Magnesium (Mg)	ug/L	230000	500	92000		50	160000	50	4765270
Dissolved Manganese (Mn)	ug/L	78	2.0	75		2.0	96	2.0	4763242

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		DMP036		DMP037	DMP037		DMP038		
Sampling Date		2016/11/22 09:15		2016/11/22 12:30	2016/11/22 12:30		2016/11/22 12:00		
COC Number		586660-01-01		586660-01-01	586660-01-01		586660-01-01		
	UNITS	**MW09-I**	**RDL**	**MW07-O**	**MW07-O Lab-Dup**	**RDL**	**MW08-S**	**RDL**	**QC Batch**
Total Manganese (Mn)	ug/L	13000	20	550		2.0	340	2.0	4765270
Dissolved Molybdenum (Mo)	ug/L	9.4	0.50	9.5		0.50	4.9	0.50	4763242
Total Molybdenum (Mo)	ug/L	19	5.0	9.7		0.50	4.9	0.50	4765270
Dissolved Nickel (Ni)	ug/L	1.6	1.0	1.8		1.0	1.3	1.0	4763242
Total Nickel (Ni)	ug/L	440	10	19		1.0	15	1.0	4765270
Dissolved Phosphorus (P)	ug/L	<100	100	<100		100	<100	100	4763242
Total Phosphorus (P)	ug/L	11000	1000	460		100	230	100	4765270
Dissolved Potassium (K)	ug/L	28000	200	6600		200	16000	200	4763242
Total Potassium (K)	ug/L	99000	2000	8400		200	17000	200	4765270
Dissolved Selenium (Se)	ug/L	<2.0	2.0	<2.0		2.0	<2.0	2.0	4763242
Total Selenium (Se)	ug/L	<20	20	<2.0		2.0	<2.0	2.0	4765270
Dissolved Silicon (Si)	ug/L	5600	50	8800		50	8300	50	4763242
Total Silicon (Si)	ug/L	330000	500	22000		50	17000	50	4765270
Dissolved Silver (Ag)	ug/L	<0.10	0.10	<0.10		0.10	<0.10	0.10	4763242
Total Silver (Ag)	ug/L	1.2	1.0	<0.10		0.10	<0.10	0.10	4765270
Dissolved Sodium (Na)	ug/L	270000	100	93000		100	79000	100	4763242
Total Sodium (Na)	ug/L	260000	1000	99000		100	85000	100	4765270
Dissolved Strontium (Sr)	ug/L	18000	1.0	3100		1.0	11000	1.0	4763242
Total Strontium (Sr)	ug/L	24000	10	3300		1.0	12000	1.0	4765270
Dissolved Tellurium (Te)	ug/L	<1.0	1.0	<1.0		1.0	<1.0	1.0	4763242
Total Tellurium (Te)	ug/L	<10	10	<1.0		1.0	<1.0	1.0	4765270
Dissolved Thallium (Tl)	ug/L	<0.050	0.050	<0.050		0.050	<0.050	0.050	4763242
Total Thallium (Tl)	ug/L	2.0	0.50	0.10		0.050	0.061	0.050	4765270
Dissolved Tin (Sn)	ug/L	<1.0	1.0	<1.0		1.0	<1.0	1.0	4763242
Total Tin (Sn)	ug/L	<10	10	3.5		1.0	1.0	1.0	4765270
Dissolved Titanium (Ti)	ug/L	17	5.0	8.6		5.0	<5.0	5.0	4763242
Total Titanium (Ti)	ug/L	2000	50	160		5.0	120	5.0	4765270
Dissolved Tungsten (W)	ug/L	<1.0	1.0	<1.0		1.0	<1.0	1.0	4763242
Total Tungsten (W)	ug/L	<10	10	<1.0		1.0	<1.0	1.0	4765270
Dissolved Uranium (U)	ug/L	0.41	0.10	6.4		0.10	6.3	0.10	4763242
Total Uranium (U)	ug/L	9.9	1.0	7.7		0.10	6.8	0.10	4765270
Dissolved Vanadium (V)	ug/L	0.87	0.50	0.91		0.50	0.53	0.50	4763242
Total Vanadium (V)	ug/L	380	5.0	19		0.50	14	0.50	4765270
Dissolved Zinc (Zn)	ug/L	<5.0	5.0	<5.0		5.0	<5.0	5.0	4763242
Total Zinc (Zn)	ug/L	900	50	51		5.0	38	5.0	4765270

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		DMP036		DMP037	DMP037		DMP038		
Sampling Date		2016/11/22 09:15		2016/11/22 12:30	2016/11/22 12:30		2016/11/22 12:00		
COC Number		586660-01-01		586660-01-01	586660-01-01		586660-01-01		
	UNITS	**MW09-I**	**RDL**	**MW07-O**	**MW07-O Lab-Dup**	**RDL**	**MW08-S**	**RDL**	**QC Batch**
Dissolved Zirconium (Zr)	ug/L	<1.0	1.0	<1.0		1.0	<1.0	1.0	4763242
Total Zirconium (Zr)	ug/L	46	10	2.7		1.0	3.0	1.0	4765270

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		DMP039		DMP040	DMP040			DMP041		
Sampling Date		2016/11/22 09:00		2016/11/22 10:00	2016/11/22 10:00			2016/11/22 14:15		
COC Number		586660-01-01		586660-01-01	586660-01-01			586660-01-01		
	UNITS	**MW09-O**	**RDL**	**MW09-D**	**MW09-D Lab-Dup**	**RDL**	**QC Batch**	**MW05-I**	**RDL**	**QC Batch**
Metals										
Mercury (Hg)	mg/L	<0.0001	0.0001	<0.0001		0.0001	4765059	<0.0001	0.0001	4765059
Dissolved Aluminum (Al)	ug/L	730	5.0	110	110	50	4763242	100	5.0	4763242
Total Aluminum (Al)	ug/L	120000	50	3700		50	4765270	1200	5.0	4763571
Dissolved Antimony (Sb)	ug/L	0.51	0.50	<5.0	<5.0	5.0	4763242	<0.50	0.50	4763242
Total Antimony (Sb)	ug/L	<5.0	5.0	<5.0		5.0	4765270	1.6	0.50	4763571
Dissolved Arsenic (As)	ug/L	3.7	1.0	<10	<10	10	4763242	1.5	1.0	4763242
Total Arsenic (As)	ug/L	50	10	<10		10	4765270	140	1.0	4763571
Dissolved Barium (Ba)	ug/L	70	2.0	190	180	20	4763242	22	2.0	4763242
Total Barium (Ba)	ug/L	1100	20	170		20	4765270	62	2.0	4763571
Dissolved Beryllium (Be)	ug/L	<0.50	0.50	<5.0	<5.0	5.0	4763242	<0.50	0.50	4763242
Total Beryllium (Be)	ug/L	6.0	5.0	<5.0		5.0	4765270	<0.50	0.50	4763571
Dissolved Bismuth (Bi)	ug/L	<1.0	1.0	<10	<10	10	4763242	<1.0	1.0	4763242
Total Bismuth (Bi)	ug/L	<10	10	<10		10	4765270	<1.0	1.0	4763571
Dissolved Boron (B)	ug/L	590	10	4200	4300	100	4763242	2400	10	4763242
Total Boron (B)	ug/L	950	100	4600		100	4765270	2500	10	4763571
Dissolved Cadmium (Cd)	ug/L	<0.10	0.10	<1.0	<1.0	1.0	4763242	<0.10	0.10	4763242
Total Cadmium (Cd)	ug/L	1.0	1.0	<1.0		1.0	4765270	0.54	0.10	4763571
Dissolved Calcium (Ca)	ug/L	43000	400	9700000	10000000	10000	4763242	97000	1000	4763242
Total Calcium (Ca)	ug/L	740000	2000	11000000		10000	4765270	110000	1000	4763571
Dissolved Chromium (Cr)	ug/L	<5.0	5.0	<50	<50	50	4763242	<5.0	5.0	4763242
Total Chromium (Cr)	ug/L	260	50	<50		50	4765270	8.9	5.0	4763571
Dissolved Cobalt (Co)	ug/L	0.73	0.50	<25	<25	25	4763242	<0.50	0.50	4763242
Total Cobalt (Co)	ug/L	120	5.0	<25		25	4765270	0.97	0.50	4763571
Dissolved Copper (Cu)	ug/L	<1.0	1.0	<50	<50	50	4763242	<1.0	1.0	4763242
Total Copper (Cu)	ug/L	84	10	<50		50	4765270	7.3	1.0	4763571
Dissolved Iron (Fe)	ug/L	420	100	20000	20000	1000	4763242	410	100	4763242
Total Iron (Fe)	ug/L	170000	1000	25000		1000	4765270	37000	100	4763571
Dissolved Lead (Pb)	ug/L	<0.50	0.50	<5.0	<5.0	5.0	4763242	<0.50	0.50	4763242
Total Lead (Pb)	ug/L	62	5.0	<5.0		5.0	4765270	2.7	0.50	4763571
Dissolved Lithium (Li)	ug/L	73	5.0	15000	15000	250	4763242	110	5.0	4763242
Total Lithium (Li)	ug/L	390	50	16000		250	4765270	120	5.0	4763571
Dissolved Magnesium (Mg)	ug/L	54000	50	2200000	2200000	500	4763242	34000	50	4763242
Total Magnesium (Mg)	ug/L	150000	500	2300000		500	4765270	35000	50	4763571
Dissolved Manganese (Mn)	ug/L	39	2.0	5100	5200	20	4763242	38	2.0	4763242

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		DMP039		DMP040	DMP040			DMP041		
Sampling Date		2016/11/22 09:00		2016/11/22 10:00	2016/11/22 10:00			2016/11/22 14:15		
COC Number		586660-01-01		586660-01-01	586660-01-01			586660-01-01		
	UNITS	**MW09-O**	**RDL**	**MW09-D**	**MW09-D Lab-Dup**	**RDL**	**QC Batch**	**MW05-I**	**RDL**	**QC Batch**
Total Manganese (Mn)	ug/L	7500	20	5200		20	4765270	110	2.0	4763571
Dissolved Molybdenum (Mo)	ug/L	5.3	0.50	31	31	5.0	4763242	3.8	0.50	4763242
Total Molybdenum (Mo)	ug/L	10	5.0	31		5.0	4765270	4.9	0.50	4763571
Dissolved Nickel (Ni)	ug/L	1.1	1.0	<50	<50	50	4763242	<1.0	1.0	4763242
Total Nickel (Ni)	ug/L	220	10	<50		50	4765270	4.3	1.0	4763571
Dissolved Phosphorus (P)	ug/L	<100	100	<1000	<1000	1000	4763242	<100	100	4763242
Total Phosphorus (P)	ug/L	5100	1000	<1000		1000	4765270	120	100	4763571
Dissolved Potassium (K)	ug/L	9900	200	340000	340000	2000	4763242	19000	200	4763242
Total Potassium (K)	ug/L	50000	2000	340000		2000	4765270	20000	200	4763571
Dissolved Selenium (Se)	ug/L	<2.0	2.0	<20	<20	20	4763242	<2.0	2.0	4763242
Total Selenium (Se)	ug/L	<20	20	<20		20	4765270	<2.0	2.0	4763571
Dissolved Silicon (Si)	ug/L	11000	50	1400	1500	500	4763242	5500	50	4763242
Total Silicon (Si)	ug/L	180000	500	1900		500	4765270	11000	50	4763571
Dissolved Silver (Ag)	ug/L	<0.10	0.10	<1.0	<1.0	1.0	4763242	<0.10	0.10	4763242
Total Silver (Ag)	ug/L	<1.0	1.0	<1.0		1.0	4765270	<0.10	0.10	4763571
Dissolved Sodium (Na)	ug/L	31000	100	18000000	19000000	5000	4763242	96000	100	4763242
Total Sodium (Na)	ug/L	33000	1000	21000000		5000	4765270	95000	100	4763571
Dissolved Strontium (Sr)	ug/L	8100	1.0	210000	210000	10	4763242	15000	1.0	4763242
Total Strontium (Sr)	ug/L	10000	10	220000		10	4765270	16000	1.0	4763571
Dissolved Tellurium (Te)	ug/L	<1.0	1.0	<10	<10	10	4763242	<1.0	1.0	4763242
Total Tellurium (Te)	ug/L	<10	10	<10		10	4765270	<1.0	1.0	4763571
Dissolved Thallium (Tl)	ug/L	<0.050	0.050	<0.50	<0.50	0.50	4763242	<0.050	0.050	4763242
Total Thallium (Tl)	ug/L	1.1	0.50	<0.50		0.50	4765270	<0.050	0.050	4763571
Dissolved Tin (Sn)	ug/L	<1.0	1.0	<10	<10	10	4763242	<1.0	1.0	4763242
Total Tin (Sn)	ug/L	<10	10	<10		10	4765270	1.5	1.0	4763571
Dissolved Titanium (Ti)	ug/L	24	5.0	<50	<50	50	4763242	<5.0	5.0	4763242
Total Titanium (Ti)	ug/L	1300	50	<50		50	4765270	35	5.0	4763571
Dissolved Tungsten (W)	ug/L	<1.0	1.0	<10	<10	10	4763242	<1.0	1.0	4763242
Total Tungsten (W)	ug/L	<10	10	<10		10	4765270	<1.0	1.0	4763571
Dissolved Uranium (U)	ug/L	0.94	0.10	3.5	3.4	1.0	4763242	0.35	0.10	4763242
Total Uranium (U)	ug/L	5.9	1.0	2.9		1.0	4765270	0.56	0.10	4763571
Dissolved Vanadium (V)	ug/L	1.8	0.50	<25	<25	25	4763242	<0.50	0.50	4763242
Total Vanadium (V)	ug/L	200	5.0	<5.0		5.0	4765270	5.6	0.50	4763571
Dissolved Zinc (Zn)	ug/L	<5.0	5.0	<50	<50	50	4763242	11	5.0	4763242
Total Zinc (Zn)	ug/L	600	50	<50		50	4765270	13	5.0	4763571

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		DMP039		DMP040	DMP040			DMP041		
Sampling Date		2016/11/22 09:00		2016/11/22 10:00	2016/11/22 10:00			2016/11/22 14:15		
COC Number		586660-01-01		586660-01-01	586660-01-01			586660-01-01		
	UNITS	**MW09-O**	**RDL**	**MW09-D**	**MW09-D Lab-Dup**	**RDL**	**QC Batch**	**MW05-I**	**RDL**	**QC Batch**
Dissolved Zirconium (Zr)	ug/L	<1.0	1.0	<10	<10	10	4763242	<1.0	1.0	4763242
Total Zirconium (Zr)	ug/L	21	10	<10		10	4765270	1.9	1.0	4763571

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		DMP042			DMP043		
Sampling Date		2016/11/22 14:30			2016/11/22 16:30		
COC Number		586660-01-01			586660-01-01		
	UNITS	**MW05-D**	**RDL**	**QC Batch**	**MW10-D**	**RDL**	**QC Batch**
Metals							
Mercury (Hg)	mg/L	<0.0001	0.0001	4765059	<0.0001	0.0001	4765059
Dissolved Aluminum (Al)	ug/L	<50	50	4763242	<250	250	4761601
Total Aluminum (Al)	ug/L	630	50	4763571	1600	50	4763571
Dissolved Antimony (Sb)	ug/L	<5.0	5.0	4763242	<25	25	4761601
Total Antimony (Sb)	ug/L	<5.0	5.0	4763571	<5.0	5.0	4763571
Dissolved Arsenic (As)	ug/L	<10	10	4763242	<100	100	4761601
Total Arsenic (As)	ug/L	<10	10	4763571	<10	10	4763571
Dissolved Barium (Ba)	ug/L	160	20	4763242	120	100	4761601
Total Barium (Ba)	ug/L	190	20	4763571	180	20	4763571
Dissolved Beryllium (Be)	ug/L	<5.0	5.0	4763242	<25	25	4761601
Total Beryllium (Be)	ug/L	<5.0	5.0	4763571	<5.0	5.0	4763571
Dissolved Bismuth (Bi)	ug/L	<10	10	4763242	<50	50	4761601
Total Bismuth (Bi)	ug/L	<10	10	4763571	<10	10	4763571
Dissolved Boron (B)	ug/L	5200	100	4763242	8500	500	4761601
Total Boron (B)	ug/L	5400	100	4763571	8200	100	4763571
Dissolved Cadmium (Cd)	ug/L	2.5	1.0	4763242	6.2	5.0	4761601
Total Cadmium (Cd)	ug/L	3.4	1.0	4763571	5.7	1.0	4763571
Dissolved Calcium (Ca)	ug/L	11000000	10000	4763242	9300000	10000	4761601
Total Calcium (Ca)	ug/L	12000000	20000	4763571	9100000	10000	4763571
Dissolved Chromium (Cr)	ug/L	<50	50	4763242	<250	250	4761601
Total Chromium (Cr)	ug/L	53	50	4763571	830	50	4763571
Dissolved Cobalt (Co)	ug/L	<25	25	4763242	<25	25	4761601
Total Cobalt (Co)	ug/L	<25	25	4763571	<25	25	4763571
Dissolved Copper (Cu)	ug/L	<50	50	4763242	<50	50	4761601
Total Copper (Cu)	ug/L	<50	50	4763571	<50	50	4763571
Dissolved Iron (Fe)	ug/L	11000	1000	4763242	15000	5000	4761601
Total Iron (Fe)	ug/L	21000	1000	4763571	19000	1000	4763571
Dissolved Lead (Pb)	ug/L	<5.0	5.0	4763242	<25	25	4761601
Total Lead (Pb)	ug/L	<5.0	5.0	4763571	<5.0	5.0	4763571
Dissolved Lithium (Li)	ug/L	17000	250	4763242	15000	250	4761601
Total Lithium (Li)	ug/L	18000	250	4763571	15000	250	4763571
Dissolved Magnesium (Mg)	ug/L	2400000	500	4763242	2400000	2500	4761601
Total Magnesium (Mg)	ug/L	2600000	500	4763571	2000000	500	4763571
Dissolved Manganese (Mn)	ug/L	5800	20	4763242	5400	100	4761601
Total Manganese (Mn)	ug/L	6100	20	4763571	5200	20	4763571

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		DMP042			DMP043		
Sampling Date		2016/11/22 14:30			2016/11/22 16:30		
COC Number		586660-01-01			586660-01-01		
	UNITS	**MW05-D**	**RDL**	**QC Batch**	**MW10-D**	**RDL**	**QC Batch**
Dissolved Molybdenum (Mo)	ug/L	<5.0	5.0	4763242	57	25	4761601
Total Molybdenum (Mo)	ug/L	6.0	5.0	4763571	59	5.0	4763571
Dissolved Nickel (Ni)	ug/L	<50	50	4763242	380	50	4761601
Total Nickel (Ni)	ug/L	<50	50	4763571	560	50	4763571
Dissolved Phosphorus (P)	ug/L	<1000	1000	4763242	<5000	5000	4761601
Total Phosphorus (P)	ug/L	<1000	1000	4763571	<1000	1000	4763571
Dissolved Potassium (K)	ug/L	340000	2000	4763242	330000	10000	4761601
Total Potassium (K)	ug/L	360000	2000	4763571	330000	2000	4763571
Dissolved Selenium (Se)	ug/L	<20	20	4763242	<200	200	4761601
Total Selenium (Se)	ug/L	<20	20	4763571	<20	20	4763571
Dissolved Silicon (Si)	ug/L	2400	500	4763242	2800	2500	4761601
Total Silicon (Si)	ug/L	3500	500	4763571	5400	500	4763571
Dissolved Silver (Ag)	ug/L	1.1	1.0	4763242	<5.0	5.0	4761601
Total Silver (Ag)	ug/L	<1.0	1.0	4763571	<1.0	1.0	4763571
Dissolved Sodium (Na)	ug/L	18000000	5000	4763242	22000000	5000	4761601
Total Sodium (Na)	ug/L	20000000	5000	4763571	17000000	5000	4763571
Dissolved Strontium (Sr)	ug/L	240000	10	4763242	200000	50	4761601
Total Strontium (Sr)	ug/L	260000	10	4763571	200000	10	4763571
Dissolved Tellurium (Te)	ug/L	<10	10	4763242	<50	50	4761601
Total Tellurium (Te)	ug/L	<10	10	4763571	<10	10	4763571
Dissolved Thallium (Tl)	ug/L	<0.50	0.50	4763242	<2.5	2.5	4761601
Total Thallium (Tl)	ug/L	<0.50	0.50	4763571	<0.50	0.50	4763571
Dissolved Tin (Sn)	ug/L	<10	10	4763242	<50	50	4761601
Total Tin (Sn)	ug/L	<10	10	4763571	<10	10	4763571
Dissolved Titanium (Ti)	ug/L	<50	50	4763242	<250	250	4761601
Total Titanium (Ti)	ug/L	<50	50	4763571	53	50	4763571
Dissolved Tungsten (W)	ug/L	<10	10	4763242	<50	50	4761601
Total Tungsten (W)	ug/L	<10	10	4763571	<10	10	4763571
Dissolved Uranium (U)	ug/L	4.8	1.0	4763242	16	5.0	4761601
Total Uranium (U)	ug/L	3.4	1.0	4763571	15	1.0	4763571
Dissolved Vanadium (V)	ug/L	<25	25	4763242	<50	50	4761601
Total Vanadium (V)	ug/L	<5.0	5.0	4763571	5.4	5.0	4763571
Dissolved Zinc (Zn)	ug/L	<50	50	4763242	<250	250	4761601
Total Zinc (Zn)	ug/L	<50	50	4763571	88	50	4763571
Dissolved Zirconium (Zr)	ug/L	<10	10	4763242	<50	50	4761601
Total Zirconium (Zr)	ug/L	<10	10	4763571	<10	10	4763571

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

TEST SUMMARY

Maxxam ID: DMP036
Sample ID: MW09-I
Matrix: Water

Collected: 2016/11/22
Shipped:
Received: 2016/11/22

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	4765718	N/A	2016/11/25	Surinder Rai
Anions	IC	4762292	N/A	2016/11/24	Fari Dehdezi
Conductivity	AT	4765723	N/A	2016/11/25	Surinder Rai
Free (WAD) Cyanide	SKAL/CN	4763995	N/A	2016/11/25	Xuanhong Qiu
Fluoride	ISE	4765724	2016/11/25	2016/11/25	Surinder Rai
Hardness (calculated as CaCO3)		4759096	N/A	2016/11/25	Automated Statchk
Mercury in Water by CVAA	CV/AA	4765059	2016/11/25	2016/11/25	Magdalena Carlos
Dissolved Metals by ICPMS	ICP/MS	4763242	N/A	2016/11/24	Cristina Petran
Total Metals Analysis by ICPMS	ICP/MS	4765270	N/A	2016/11/28	Kevin Comerford
Total Ammonia-N	LACH/NH4	4763113	N/A	2016/11/29	Charles Opoku-Ware
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	4761190	N/A	2016/11/25	Chandra Nandlal
pH	AT	4765726	N/A	2016/11/25	Surinder Rai
Phenols (4AAP)	TECH/PHEN	4762945	N/A	2016/11/25	Bramdeo Motiram
Orthophosphate	KONE	4761251	N/A	2016/11/24	Alina Dobreanu
Sulphide	ISE/S	4763648	N/A	2016/11/25	Neil Dassanayake
Total Dissolved Solids	BAL	4763458	2016/11/24	2016/11/24	Massarat Jan
Total Phosphorus (Colourimetric)	LACH/P	4765485	2016/11/25	2016/11/29	Sarabjit Raina
Total Suspended Solids	BAL	4762031	2016/11/23	2016/11/23	Arpan Shah
Turbidity	AT	4760958	N/A	2016/11/23	Tahir Anwar

Maxxam ID: DMP037
Sample ID: MW07-O
Matrix: Water

Collected: 2016/11/22
Shipped:
Received: 2016/11/22

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	4765718	N/A	2016/11/25	Surinder Rai
Anions	IC	4762292	N/A	2016/11/24	Fari Dehdezi
Conductivity	AT	4765723	N/A	2016/11/25	Surinder Rai
Free (WAD) Cyanide	SKAL/CN	4763995	N/A	2016/11/25	Xuanhong Qiu
Fluoride	ISE	4765724	2016/11/25	2016/11/25	Surinder Rai
Hardness (calculated as CaCO3)		4759096	N/A	2016/11/25	Automated Statchk
Mercury in Water by CVAA	CV/AA	4765059	2016/11/25	2016/11/25	Magdalena Carlos
Dissolved Metals by ICPMS	ICP/MS	4763242	N/A	2016/11/24	Cristina Petran
Total Metals Analysis by ICPMS	ICP/MS	4765270	N/A	2016/11/25	Kevin Comerford
Total Ammonia-N	LACH/NH4	4763113	N/A	2016/11/29	Charles Opoku-Ware
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	4761190	N/A	2016/11/25	Chandra Nandlal
pH	AT	4765726	N/A	2016/11/25	Surinder Rai
Phenols (4AAP)	TECH/PHEN	4762945	N/A	2016/11/25	Bramdeo Motiram
Orthophosphate	KONE	4761251	N/A	2016/11/24	Alina Dobreanu
Sulphide	ISE/S	4763648	N/A	2016/11/25	Neil Dassanayake
Total Dissolved Solids	BAL	4763456	2016/11/24	2016/11/25	Massarat Jan
Total Phosphorus (Colourimetric)	LACH/P	4765485	2016/11/25	2016/11/29	Sarabjit Raina
Total Suspended Solids	BAL	4762031	2016/11/23	2016/11/23	Arpan Shah
Turbidity	AT	4760958	N/A	2016/11/23	Tahir Anwar

TEST SUMMARY

Maxxam ID: DMP037 Dup
Sample ID: MW07-O
Matrix: Water

Collected: 2016/11/22
Shipped:
Received: 2016/11/22

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Mercury in Water by CVAA	CV/AA	4765059	2016/11/25	2016/11/25	Magdalena Carlos

Maxxam ID: DMP038
Sample ID: MW08-S
Matrix: Water

Collected: 2016/11/22
Shipped:
Received: 2016/11/22

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	4765718	N/A	2016/11/25	Surinder Rai
Anions	IC	4762292	N/A	2016/11/24	Fari Dehdezi
Conductivity	AT	4765723	N/A	2016/11/25	Surinder Rai
Free (WAD) Cyanide	SKAL/CN	4763995	N/A	2016/11/25	Xuanhong Qiu
Fluoride	ISE	4765724	2016/11/25	2016/11/25	Surinder Rai
Hardness (calculated as CaCO3)		4759096	N/A	2016/11/25	Automated Statchk
Mercury in Water by CVAA	CV/AA	4765059	2016/11/25	2016/11/25	Magdalena Carlos
Dissolved Metals by ICPMS	ICP/MS	4763242	N/A	2016/11/24	Cristina Petran
Total Metals Analysis by ICPMS	ICP/MS	4765270	N/A	2016/11/28	Kevin Comerford
Total Ammonia-N	LACH/NH4	4763113	N/A	2016/11/29	Charles Opoku-Ware
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	4761190	N/A	2016/11/25	Chandra Nandlal
pH	AT	4765726	N/A	2016/11/25	Surinder Rai
Phenols (4AAP)	TECH/PHEN	4762945	N/A	2016/11/25	Bramdeo Motiram
Orthophosphate	KONE	4761251	N/A	2016/11/24	Alina Dobreanu
Sulphide	ISE/S	4763648	N/A	2016/11/25	Neil Dassanayake
Total Dissolved Solids	BAL	4764050	2016/11/24	2016/11/24	Arpan Shah
Total Phosphorus (Colourimetric)	LACH/P	4765485	2016/11/25	2016/11/29	Sarabjit Raina
Total Suspended Solids	BAL	4762031	2016/11/23	2016/11/23	Arpan Shah
Turbidity	AT	4760958	N/A	2016/11/23	Tahir Anwar

Maxxam ID: DMP038 Dup
Sample ID: MW08-S
Matrix: Water

Collected: 2016/11/22
Shipped:
Received: 2016/11/22

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Total Dissolved Solids	BAL	4764050	2016/11/24	2016/11/24	Arpan Shah

Maxxam ID: DMP039
Sample ID: MW09-O
Matrix: Water

Collected: 2016/11/22
Shipped:
Received: 2016/11/22

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	4765718	N/A	2016/11/25	Surinder Rai
Anions	IC	4762292	N/A	2016/11/24	Fari Dehdezi
Conductivity	AT	4765723	N/A	2016/11/25	Surinder Rai
Free (WAD) Cyanide	SKAL/CN	4763995	N/A	2016/11/25	Xuanhong Qiu
Fluoride	ISE	4765724	2016/11/25	2016/11/25	Surinder Rai
Hardness (calculated as CaCO3)		4759096	N/A	2016/11/25	Automated Statchk
Mercury in Water by CVAA	CV/AA	4765059	2016/11/25	2016/11/25	Magdalena Carlos

TEST SUMMARY

Maxxam ID: DMP039
Sample ID: MW09-O
Matrix: Water

Collected: 2016/11/22
Shipped:
Received: 2016/11/22

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Dissolved Metals by ICPMS	ICP/MS	4763242	N/A	2016/11/24	Cristina Petran
Total Metals Analysis by ICPMS	ICP/MS	4765270	N/A	2016/11/25	Kevin Comerford
Total Ammonia-N	LACH/NH4	4763113	N/A	2016/11/29	Charles Opoku-Ware
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	4761190	N/A	2016/11/25	Chandra Nandlal
pH	AT	4765726	N/A	2016/11/25	Surinder Rai
Phenols (4AAP)	TECH/PHEN	4762945	N/A	2016/11/25	Bramdeo Motiram
Orthophosphate	KONE	4761251	N/A	2016/11/24	Alina Dobreanu
Sulphide	ISE/S	4763648	N/A	2016/11/25	Neil Dassanayake
Total Dissolved Solids	BAL	4763456	2016/11/24	2016/11/25	Massarat Jan
Total Phosphorus (Colourimetric)	LACH/P	4765485	2016/11/25	2016/11/29	Sarabjit Raina
Total Suspended Solids	BAL	4762031	2016/11/23	2016/11/23	Arpan Shah
Turbidity	AT	4760958	N/A	2016/11/23	Tahir Anwar

Maxxam ID: DMP039 Dup
Sample ID: MW09-O
Matrix: Water

Collected: 2016/11/22
Shipped:
Received: 2016/11/22

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Sulphide	ISE/S	4763648	N/A	2016/11/25	Neil Dassanayake

Maxxam ID: DMP040
Sample ID: MW09-D
Matrix: Water

Collected: 2016/11/22
Shipped:
Received: 2016/11/22

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	4764610	N/A	2016/11/25	Surinder Rai
Anions	IC	4762292	N/A	2016/11/24	Fari Dehdezi
Conductivity	AT	4764611	N/A	2016/11/25	Surinder Rai
Free (WAD) Cyanide	SKAL/CN	4763995	N/A	2016/11/25	Xuanhong Qiu
Fluoride	ISE	4764630	2016/11/24	2016/11/25	Surinder Rai
Hardness (calculated as CaCO3)		4759096	N/A	2016/11/25	Automated Statchk
Mercury in Water by CVAA	CV/AA	4765059	2016/11/25	2016/11/25	Magdalena Carlos
Dissolved Metals by ICPMS	ICP/MS	4763242	N/A	2016/11/25	Cristina Petran
Total Metals Analysis by ICPMS	ICP/MS	4765270	N/A	2016/11/28	Kevin Comerford
Total Ammonia-N	LACH/NH4	4763293	N/A	2016/11/29	Charles Opoku-Ware
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	4761190	N/A	2016/11/25	Chandra Nandlal
pH	AT	4764631	N/A	2016/11/25	Surinder Rai
Phenols (4AAP)	TECH/PHEN	4762945	N/A	2016/11/25	Bramdeo Motiram
Orthophosphate	KONE	4761251	N/A	2016/11/24	Alina Dobreanu
Sulphide	ISE/S	4763648	N/A	2016/11/25	Neil Dassanayake
Total Dissolved Solids	BAL	4763458	2016/11/24	2016/11/24	Massarat Jan
Total Phosphorus (Colourimetric)	LACH/P	4765485	2016/11/25	2016/11/29	Sarabjit Raina
Low Level Total Suspended Solids	BAL	4761548	2016/11/23	2016/11/24	Massarat Jan
Turbidity	AT	4760958	N/A	2016/11/23	Tahir Anwar

TEST SUMMARY

Maxxam ID: DMP040 Dup
Sample ID: MW09-D
Matrix: Water

Collected: 2016/11/22
Shipped:
Received: 2016/11/22

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	4764610	N/A	2016/11/25	Surinder Rai
Conductivity	AT	4764611	N/A	2016/11/25	Surinder Rai
Fluoride	ISE	4764630	2016/11/24	2016/11/25	Surinder Rai
Dissolved Metals by ICPMS	ICP/MS	4763242	N/A	2016/11/25	Cristina Petran
Total Ammonia-N	LACH/NH4	4763293	N/A	2016/11/29	Charles Opoku-Ware
pH	AT	4764631	N/A	2016/11/25	Surinder Rai

Maxxam ID: DMP041
Sample ID: MW05-I
Matrix: Water

Collected: 2016/11/22
Shipped:
Received: 2016/11/22

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	4765718	N/A	2016/11/25	Surinder Rai
Anions	IC	4762292	N/A	2016/11/24	Fari Dehdezi
Conductivity	AT	4765723	N/A	2016/11/25	Surinder Rai
Free (WAD) Cyanide	SKAL/CN	4763995	N/A	2016/11/25	Xuanhong Qiu
Fluoride	ISE	4765724	2016/11/25	2016/11/25	Surinder Rai
Hardness (calculated as CaCO3)		4759096	N/A	2016/11/25	Automated Statchk
Mercury in Water by CVAA	CV/AA	4765059	2016/11/25	2016/11/25	Magdalena Carlos
Dissolved Metals by ICPMS	ICP/MS	4763242	N/A	2016/11/24	Cristina Petran
Total Metals Analysis by ICPMS	ICP/MS	4763571	N/A	2016/11/24	Kevin Comerford
Total Ammonia-N	LACH/NH4	4763113	N/A	2016/11/29	Charles Opoku-Ware
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	4761190	N/A	2016/11/25	Chandra Nandlal
pH	AT	4765726	N/A	2016/11/25	Surinder Rai
Phenols (4AAP)	TECH/PHEN	4762945	N/A	2016/11/25	Bramdeo Motiram
Orthophosphate	KONE	4761251	N/A	2016/11/24	Alina Dobreanu
Sulphide	ISE/S	4763648	N/A	2016/11/25	Neil Dassanayake
Total Dissolved Solids	BAL	4764050	2016/11/24	2016/11/24	Arpan Shah
Total Phosphorus (Colourimetric)	LACH/P	4765485	2016/11/25	2016/11/29	Sarabjit Raina
Low Level Total Suspended Solids	BAL	4761548	2016/11/23	2016/11/24	Massarat Jan
Turbidity	AT	4760958	N/A	2016/11/23	Tahir Anwar

Maxxam ID: DMP042
Sample ID: MW05-D
Matrix: Water

Collected: 2016/11/22
Shipped:
Received: 2016/11/22

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	4765718	N/A	2016/11/25	Surinder Rai
Anions	IC	4762292	N/A	2016/11/24	Fari Dehdezi
Conductivity	AT	4765723	N/A	2016/11/25	Surinder Rai
Free (WAD) Cyanide	SKAL/CN	4763995	N/A	2016/11/25	Xuanhong Qiu
Fluoride	ISE	4765724	2016/11/25	2016/11/25	Surinder Rai
Hardness (calculated as CaCO3)		4759096	N/A	2016/11/25	Automated Statchk
Mercury in Water by CVAA	CV/AA	4765059	2016/11/25	2016/11/25	Magdalena Carlos
Dissolved Metals by ICPMS	ICP/MS	4763242	N/A	2016/11/25	Cristina Petran

TEST SUMMARY

Maxxam ID: DMP042
Sample ID: MW05-D
Matrix: Water

Collected: 2016/11/22
Shipped:
Received: 2016/11/22

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Total Metals Analysis by ICPMS	ICP/MS	4763571	N/A	2016/11/24	Kevin Comerford
Total Ammonia-N	LACH/NH4	4763113	N/A	2016/11/29	Charles Opoku-Ware
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	4761190	N/A	2016/11/25	Chandra Nandlal
pH	AT	4765726	N/A	2016/11/25	Surinder Rai
Phenols (4AAP)	TECH/PHEN	4762945	N/A	2016/11/25	Bramdeo Motiram
Orthophosphate	KONE	4761251	N/A	2016/11/24	Alina Dobreanu
Sulphide	ISE/S	4763648	N/A	2016/11/25	Neil Dassanayake
Total Dissolved Solids	BAL	4763458	2016/11/24	2016/11/24	Massarat Jan
Total Phosphorus (Colourimetric)	LACH/P	4765485	2016/11/25	2016/11/29	Sarabjit Raina
Low Level Total Suspended Solids	BAL	4761548	2016/11/23	2016/11/24	Massarat Jan
Turbidity	AT	4760958	N/A	2016/11/23	Tahir Anwar

Maxxam ID: DMP043
Sample ID: MW10-D
Matrix: Water

Collected: 2016/11/22
Shipped:
Received: 2016/11/22

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	4765718	N/A	2016/11/25	Surinder Rai
Anions	IC	4762292	N/A	2016/11/24	Fari Dehdezi
Conductivity	AT	4765723	N/A	2016/11/25	Surinder Rai
Free (WAD) Cyanide	SKAL/CN	4763995	N/A	2016/11/25	Xuanhong Qiu
Fluoride	ISE	4765724	2016/11/25	2016/11/25	Surinder Rai
Hardness (calculated as CaCO3)		4759096	N/A	2016/11/24	Automated Statchk
Mercury in Water by CVAA	CV/AA	4765059	2016/11/25	2016/11/25	Magdalena Carlos
Dissolved Metals by ICPMS	ICP/MS	4761601	N/A	2016/11/24	Prempal Bhatti
Total Metals Analysis by ICPMS	ICP/MS	4763571	N/A	2016/11/24	Kevin Comerford
Total Ammonia-N	LACH/NH4	4763113	N/A	2016/11/29	Charles Opoku-Ware
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	4761190	N/A	2016/11/25	Chandra Nandlal
pH	AT	4765726	N/A	2016/11/25	Surinder Rai
Phenols (4AAP)	TECH/PHEN	4762945	N/A	2016/11/25	Bramdeo Motiram
Orthophosphate	KONE	4761251	N/A	2016/11/24	Alina Dobreanu
Sulphide	ISE/S	4763648	N/A	2016/11/25	Neil Dassanayake
Total Dissolved Solids	BAL	4763458	2016/11/24	2016/11/24	Massarat Jan
Total Phosphorus (Colourimetric)	LACH/P	4765485	2016/11/25	2016/11/29	Sarabjit Raina
Low Level Total Suspended Solids	BAL	4761548	2016/11/23	2016/11/24	Massarat Jan
Turbidity	AT	4760958	N/A	2016/11/23	Tahir Anwar

GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	5.3°C
Package 2	6.0°C

Anions Analysis: Due to the sample matrix,some of the samples required dilution. Detection limits were adjusted accordingly.

Sample DMP036 [MW09-I] : Metals Analysis: Due to the sample matrix, sample required dilution. Detection limits were adjusted accordingly.

Sample DMP039 [MW09-O] : Metals Analysis: Due to the sample matrix, sample required dilution. Detection limits were adjusted accordingly.

Sample DMP040 [MW09-D] : Metals Analysis: Due to the sample matrix, sample required dilution. Detection limits were adjusted accordingly.

Nitrite+Nitrate: Due to the sample matrix, sample required dilution. Detection limits were adjusted accordingly.

Sample DMP042 [MW05-D] : Metals Analysis: Due to the sample matrix, sample required dilution. Detection limits were adjusted accordingly.

Nitrite+Nitrate: Due to the sample matrix, sample required dilution. Detection limits were adjusted accordingly.

Sample DMP043 [MW10-D] : Metals Analysis: Due to the sample matrix, sample required dilution. Detection limits were adjusted accordingly.

Nitrite+Nitrate: Due to the sample matrix, sample required dilution. Detection limits were adjusted accordingly.

Results relate only to the items tested.

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
4760958	Turbidity	2016/11/23			101	85 - 115	<0.1	NTU	NC	20		
4761190	Nitrate (N)	2016/11/25	98	80 - 120	97	80 - 120	<0.10	mg/L	1.6	20		
4761190	Nitrite (N)	2016/11/25	NC	80 - 120	98	80 - 120	<0.010	mg/L	1.1	20		
4761251	Orthophosphate (P)	2016/11/24	NC	75 - 125	100	80 - 120	<0.010	mg/L	3.1	25		
4761548	Total Suspended Solids	2016/11/24					<1	mg/L	NC	25	96	85 - 115
4761601	Dissolved Aluminum (Al)	2016/11/24	97	80 - 120	103	80 - 120	<5.0	ug/L				
4761601	Dissolved Antimony (Sb)	2016/11/24	100	80 - 120	103	80 - 120	<0.50	ug/L				
4761601	Dissolved Arsenic (As)	2016/11/24	98	80 - 120	100	80 - 120	<1.0	ug/L				
4761601	Dissolved Barium (Ba)	2016/11/24	NC	80 - 120	98	80 - 120	<2.0	ug/L	1.8	20		
4761601	Dissolved Beryllium (Be)	2016/11/24	96	80 - 120	101	80 - 120	<0.50	ug/L				
4761601	Dissolved Bismuth (Bi)	2016/11/24	87	80 - 120	96	80 - 120	<1.0	ug/L				
4761601	Dissolved Boron (B)	2016/11/24	NC	80 - 120	102	80 - 120	<10	ug/L	1.7	20		
4761601	Dissolved Cadmium (Cd)	2016/11/24	98	80 - 120	100	80 - 120	<0.10	ug/L				
4761601	Dissolved Calcium (Ca)	2016/11/24	NC	80 - 120	98	80 - 120	<200	ug/L	1.3	20		
4761601	Dissolved Chromium (Cr)	2016/11/24	95	80 - 120	102	80 - 120	<5.0	ug/L				
4761601	Dissolved Cobalt (Co)	2016/11/24	96	80 - 120	101	80 - 120	<0.50	ug/L	NC	20		
4761601	Dissolved Copper (Cu)	2016/11/24	92	80 - 120	100	80 - 120	<1.0	ug/L	NC	20		
4761601	Dissolved Iron (Fe)	2016/11/24	96	80 - 120	104	80 - 120	<100	ug/L	0.020	20		
4761601	Dissolved Lead (Pb)	2016/11/24	90	80 - 120	98	80 - 120	<0.50	ug/L				
4761601	Dissolved Lithium (Li)	2016/11/24	95	80 - 120	98	80 - 120	<5.0	ug/L				
4761601	Dissolved Magnesium (Mg)	2016/11/24	NC	80 - 120	102	80 - 120	<50	ug/L	0.61	20		
4761601	Dissolved Manganese (Mn)	2016/11/24	NC	80 - 120	102	80 - 120	<2.0	ug/L	1.4	20		
4761601	Dissolved Molybdenum (Mo)	2016/11/24	100	80 - 120	100	80 - 120	<0.50	ug/L				
4761601	Dissolved Nickel (Ni)	2016/11/24	93	80 - 120	99	80 - 120	<1.0	ug/L				
4761601	Dissolved Phosphorus (P)	2016/11/24	103	80 - 120	108	80 - 120	<100	ug/L				
4761601	Dissolved Potassium (K)	2016/11/24	NC	80 - 120	103	80 - 120	<200	ug/L	2.3	20		
4761601	Dissolved Selenium (Se)	2016/11/24	100	80 - 120	101	80 - 120	<2.0	ug/L				
4761601	Dissolved Silicon (Si)	2016/11/24	97	80 - 120	101	80 - 120	<50	ug/L				
4761601	Dissolved Silver (Ag)	2016/11/24	79 (1)	80 - 120	99	80 - 120	<0.10	ug/L				
4761601	Dissolved Sodium (Na)	2016/11/24	NC	80 - 120	103	80 - 120	<100	ug/L	0.26	20		
4761601	Dissolved Strontium (Sr)	2016/11/24	NC	80 - 120	100	80 - 120	<1.0	ug/L				

QUALITY ASSURANCE REPORT(CONT'D)

			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
4761601	Dissolved Tellurium (Te)	2016/11/24	96	80 - 120	102	80 - 120	<1.0	ug/L				
4761601	Dissolved Thallium (Tl)	2016/11/24	90	80 - 120	96	80 - 120	<0.050	ug/L				
4761601	Dissolved Tin (Sn)	2016/11/24	99	80 - 120	102	80 - 120	<1.0	ug/L				
4761601	Dissolved Titanium (Ti)	2016/11/24	98	80 - 120	104	80 - 120	<5.0	ug/L				
4761601	Dissolved Tungsten (W)	2016/11/24	96	80 - 120	100	80 - 120	<1.0	ug/L				
4761601	Dissolved Uranium (U)	2016/11/24	95	80 - 120	98	80 - 120	<0.10	ug/L				
4761601	Dissolved Vanadium (V)	2016/11/24	97	80 - 120	101	80 - 120	<0.50	ug/L				
4761601	Dissolved Zinc (Zn)	2016/11/24	96	80 - 120	102	80 - 120	<5.0	ug/L				
4761601	Dissolved Zirconium (Zr)	2016/11/24	99	80 - 120	100	80 - 120	<1.0	ug/L				
4762031	Total Suspended Solids	2016/11/23					<10	mg/L	NC	25	96	85 - 115
4762292	Dissolved Bromide (Br-)	2016/11/24	95	80 - 120	98	80 - 120	<1.0	mg/L	NC	20		
4762292	Dissolved Chloride (Cl)	2016/11/24	94	80 - 120	97	70 - 130	<1.0	mg/L				
4762292	Dissolved Sulphate (SO4)	2016/11/24	91	80 - 120	96	80 - 120	<1.0	mg/L				
4762945	Phenols-4AAP	2016/11/25	90	80 - 120	100	85 - 115	<0.0010	mg/L	NC	20		
4763113	Total Ammonia-N	2016/11/29	101	80 - 120	103	85 - 115	<0.050	mg/L	NC	20		
4763242	Dissolved Aluminum (Al)	2016/11/25	104	80 - 120	94	80 - 120	<5.0	ug/L	NC	20		
4763242	Dissolved Antimony (Sb)	2016/11/25	106	80 - 120	100	80 - 120	<0.50	ug/L	NC	20		
4763242	Dissolved Arsenic (As)	2016/11/25	99	80 - 120	96	80 - 120	<1.0	ug/L	NC	20		
4763242	Dissolved Barium (Ba)	2016/11/25	107	80 - 120	100	80 - 120	<2.0	ug/L	5.0	20		
4763242	Dissolved Beryllium (Be)	2016/11/25	97	80 - 120	95	80 - 120	<0.50	ug/L	NC	20		
4763242	Dissolved Bismuth (Bi)	2016/11/25	81	80 - 120	90	80 - 120	<1.0	ug/L	NC	20		
4763242	Dissolved Boron (B)	2016/11/25	NC	80 - 120	96	80 - 120	10, RDL=10 (2)	ug/L	2.8	20		
4763242	Dissolved Cadmium (Cd)	2016/11/25	100	80 - 120	97	80 - 120	<0.10	ug/L	NC	20		
4763242	Dissolved Calcium (Ca)	2016/11/25	NC	80 - 120	91	80 - 120	<200	ug/L	3.6	20		
4763242	Dissolved Chromium (Cr)	2016/11/25	96	80 - 120	92	80 - 120	<5.0	ug/L	NC	20		
4763242	Dissolved Cobalt (Co)	2016/11/25	91	80 - 120	92	80 - 120	<0.50	ug/L	NC	20		
4763242	Dissolved Copper (Cu)	2016/11/25	97	80 - 120	95	80 - 120	<1.0	ug/L	NC	20		
4763242	Dissolved Iron (Fe)	2016/11/25	NC	80 - 120	93	80 - 120	<100	ug/L	0.47	20		
4763242	Dissolved Lead (Pb)	2016/11/25	85	80 - 120	90	80 - 120	<0.50	ug/L	NC	20		
4763242	Dissolved Lithium (Li)	2016/11/25	NC	80 - 120	97	80 - 120	<5.0	ug/L	2.7	20		

QUALITY ASSURANCE REPORT(CONT'D)

			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
4763242	Dissolved Magnesium (Mg)	2016/11/25	NC	80 - 120	93	80 - 120	<50	ug/L	1.2	20		
4763242	Dissolved Manganese (Mn)	2016/11/25	NC	80 - 120	95	80 - 120	<2.0	ug/L	1.2	20		
4763242	Dissolved Molybdenum (Mo)	2016/11/25	111	80 - 120	98	80 - 120	<0.50	ug/L	0.83	20		
4763242	Dissolved Nickel (Ni)	2016/11/25	87	80 - 120	91	80 - 120	<1.0	ug/L	NC	20		
4763242	Dissolved Phosphorus (P)	2016/11/25	109	80 - 120	100	80 - 120	<100	ug/L	NC	20		
4763242	Dissolved Potassium (K)	2016/11/25	NC	80 - 120	95	80 - 120	<200	ug/L	0.50	20		
4763242	Dissolved Selenium (Se)	2016/11/25	91	80 - 120	93	80 - 120	<2.0	ug/L	NC	20		
4763242	Dissolved Silicon (Si)	2016/11/25	109	80 - 120	95	80 - 120	<50	ug/L	NC	20		
4763242	Dissolved Silver (Ag)	2016/11/25	84	80 - 120	93	80 - 120	<0.10	ug/L	NC	20		
4763242	Dissolved Sodium (Na)	2016/11/25	NC	80 - 120	91	80 - 120	980, RDL=100	ug/L	5.2	20		
4763242	Dissolved Strontium (Sr)	2016/11/25	NC	80 - 120	97	80 - 120	<1.0	ug/L	0.30	20		
4763242	Dissolved Tellurium (Te)	2016/11/25	103	80 - 120	101	80 - 120	<1.0	ug/L	NC	20		
4763242	Dissolved Thallium (Tl)	2016/11/25	85	80 - 120	89	80 - 120	<0.050	ug/L	NC	20		
4763242	Dissolved Tin (Sn)	2016/11/25	111	80 - 120	100	80 - 120	<1.0	ug/L	NC	20		
4763242	Dissolved Titanium (Ti)	2016/11/25	111	80 - 120	96	80 - 120	<5.0	ug/L	NC	20		
4763242	Dissolved Tungsten (W)	2016/11/25	92	80 - 120	93	80 - 120	<1.0	ug/L	NC	20		
4763242	Dissolved Uranium (U)	2016/11/25	94	80 - 120	95	80 - 120	<0.10	ug/L	NC	20		
4763242	Dissolved Vanadium (V)	2016/11/25	100	80 - 120	91	80 - 120	<0.50	ug/L	NC	20		
4763242	Dissolved Zinc (Zn)	2016/11/25	87	80 - 120	93	80 - 120	<5.0	ug/L	NC	20		
4763242	Dissolved Zirconium (Zr)	2016/11/25	118	80 - 120	100	80 - 120	<1.0	ug/L	NC	20		
4763293	Total Ammonia-N	2016/11/29	NC	80 - 120	101	85 - 115	<0.050	mg/L	0.70	20		
4763456	Total Dissolved Solids	2016/11/25					<10	mg/L	11	25	98	90 - 110
4763458	Total Dissolved Solids	2016/11/24					<10	mg/L	0.34	25	97	90 - 110
4763571	Total Aluminum (Al)	2016/11/24	96	80 - 120	95	80 - 120	<5.0	ug/L	3.2	20		
4763571	Total Antimony (Sb)	2016/11/24	106	80 - 120	102	80 - 120	<0.50	ug/L				
4763571	Total Arsenic (As)	2016/11/24	96	80 - 120	95	80 - 120	<1.0	ug/L				
4763571	Total Barium (Ba)	2016/11/24	102	80 - 120	101	80 - 120	<2.0	ug/L				
4763571	Total Beryllium (Be)	2016/11/24	94	80 - 120	94	80 - 120	<0.50	ug/L				
4763571	Total Bismuth (Bi)	2016/11/24	87	80 - 120	89	80 - 120	<1.0	ug/L				
4763571	Total Boron (B)	2016/11/24	91	80 - 120	94	80 - 120	<10	ug/L	NC	20		
4763571	Total Cadmium (Cd)	2016/11/24	99	80 - 120	99	80 - 120	<0.10	ug/L				

QUALITY ASSURANCE REPORT(CONT'D)

			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
4763571	Total Calcium (Ca)	2016/11/24	NC	80 - 120	93	80 - 120	<200	ug/L	2.6	20		
4763571	Total Chromium (Cr)	2016/11/24	92	80 - 120	92	80 - 120	<5.0	ug/L	NC	20		
4763571	Total Cobalt (Co)	2016/11/24	91	80 - 120	91	80 - 120	<0.50	ug/L	NC	20		
4763571	Total Copper (Cu)	2016/11/24	97	80 - 120	96	80 - 120	<1.0	ug/L	NC	20		
4763571	Total Iron (Fe)	2016/11/24	93	80 - 120	94	80 - 120	<100	ug/L	NC	20		
4763571	Total Lead (Pb)	2016/11/24	89	80 - 120	91	80 - 120	<0.50	ug/L				
4763571	Total Lithium (Li)	2016/11/24	97	80 - 120	98	80 - 120	<5.0	ug/L				
4763571	Total Magnesium (Mg)	2016/11/24	NC	80 - 120	92	80 - 120	<50	ug/L	2.4	20		
4763571	Total Manganese (Mn)	2016/11/24	95	80 - 120	95	80 - 120	<2.0	ug/L	NC	20		
4763571	Total Molybdenum (Mo)	2016/11/24	102	80 - 120	99	80 - 120	<0.50	ug/L				
4763571	Total Nickel (Ni)	2016/11/24	90	80 - 120	90	80 - 120	<1.0	ug/L				
4763571	Total Phosphorus (P)	2016/11/24	102	80 - 120	96	80 - 120	<100	ug/L				
4763571	Total Potassium (K)	2016/11/24	98	80 - 120	98	80 - 120	<200	ug/L	2.8	20		
4763571	Total Selenium (Se)	2016/11/24	95	80 - 120	96	80 - 120	<2.0	ug/L				
4763571	Total Silicon (Si)	2016/11/24	96	80 - 120	96	80 - 120	<50	ug/L				
4763571	Total Silver (Ag)	2016/11/24	95	80 - 120	94	80 - 120	<0.10	ug/L				
4763571	Total Sodium (Na)	2016/11/24	NC	80 - 120	94	80 - 120	900, RDL=100	ug/L	3.6	20		
4763571	Total Strontium (Sr)	2016/11/24	NC	80 - 120	98	80 - 120	<1.0	ug/L				
4763571	Total Tellurium (Te)	2016/11/24	106	80 - 120	106	80 - 120	<1.0	ug/L				
4763571	Total Thallium (Tl)	2016/11/24	88	80 - 120	89	80 - 120	<0.050	ug/L				
4763571	Total Tin (Sn)	2016/11/24	105	80 - 120	102	80 - 120	<1.0	ug/L				
4763571	Total Titanium (Ti)	2016/11/24	97	80 - 120	100	80 - 120	5.8, RDL=5.0	ug/L				
4763571	Total Tungsten (W)	2016/11/24	93	80 - 120	94	80 - 120	<1.0	ug/L				
4763571	Total Uranium (U)	2016/11/24	94	80 - 120	96	80 - 120	<0.10	ug/L				
4763571	Total Vanadium (V)	2016/11/24	94	80 - 120	93	80 - 120	<0.50	ug/L				
4763571	Total Zinc (Zn)	2016/11/24	95	80 - 120	95	80 - 120	<5.0	ug/L	NC	20		
4763571	Total Zirconium (Zr)	2016/11/24	105	80 - 120	103	80 - 120	<1.0	ug/L				
4763648	Sulphide	2016/11/25	87	80 - 120	95	80 - 120	<0.020	mg/L	NC	20		
4763995	Free Cyanide	2016/11/25	99	80 - 120	98	80 - 120	<0.0010	mg/L	NC	20		
4764050	Total Dissolved Solids	2016/11/24					<10	mg/L	6.8	25	98	90 - 110
4764610	Alkalinity (Total as CaCO3)	2016/11/25			98	85 - 115	<1.0	mg/L	11	20		

QUALITY ASSURANCE REPORT(CONT'D)

			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
4764611	Conductivity	2016/11/25			100	85 - 115	<1.0	umho/cm	NC	25		
4764630	Fluoride (F-)	2016/11/25	18 (1)	80 - 120	93	80 - 120	<0.10	mg/L	NC	20		
4764631	pH	2016/11/25			102	98 - 103			1.4	N/A		
4765059	Mercury (Hg)	2016/11/25	124	75 - 125	107	80 - 120	<0.0001	mg/L	NC	20		
4765270	Total Aluminum (Al)	2016/11/25	101	80 - 120	98	80 - 120	<5.0	ug/L	3.0	20		
4765270	Total Antimony (Sb)	2016/11/25	107	80 - 120	99	80 - 120	<0.50	ug/L	NC	20		
4765270	Total Arsenic (As)	2016/11/25	100	80 - 120	98	80 - 120	<1.0	ug/L	NC	20		
4765270	Total Barium (Ba)	2016/11/25	98	80 - 120	94	80 - 120	<2.0	ug/L	5.1	20		
4765270	Total Beryllium (Be)	2016/11/25	104	80 - 120	100	80 - 120	<0.50	ug/L	NC	20		
4765270	Total Bismuth (Bi)	2016/11/25	98	80 - 120	97	80 - 120	<1.0	ug/L	NC	20		
4765270	Total Boron (B)	2016/11/25	101	80 - 120	96	80 - 120	<10	ug/L	1.8	20		
4765270	Total Cadmium (Cd)	2016/11/25	104	80 - 120	99	80 - 120	<0.10	ug/L	NC	20		
4765270	Total Calcium (Ca)	2016/11/25	NC	80 - 120	94	80 - 120	<200	ug/L	2.0	20		
4765270	Total Chromium (Cr)	2016/11/25	99	80 - 120	99	80 - 120	<5.0	ug/L	NC	20		
4765270	Total Cobalt (Co)	2016/11/25	99	80 - 120	99	80 - 120	<0.50	ug/L	NC	20		
4765270	Total Copper (Cu)	2016/11/25	101	80 - 120	97	80 - 120	<1.0	ug/L	NC	20		
4765270	Total Iron (Fe)	2016/11/25	99	80 - 120	99	80 - 120	<100	ug/L				
4765270	Total Lead (Pb)	2016/11/25	100	80 - 120	100	80 - 120	<0.50	ug/L	NC	20		
4765270	Total Lithium (Li)	2016/11/25	103	80 - 120	100	80 - 120	<5.0	ug/L				
4765270	Total Magnesium (Mg)	2016/11/25	99	80 - 120	96	80 - 120	<50	ug/L	1.5	20		
4765270	Total Manganese (Mn)	2016/11/25	99	80 - 120	96	80 - 120	<2.0	ug/L	2.3	20		
4765270	Total Molybdenum (Mo)	2016/11/25	107	80 - 120	101	80 - 120	<0.50	ug/L	0.63	20		
4765270	Total Nickel (Ni)	2016/11/25	99	80 - 120	100	80 - 120	<1.0	ug/L	4.3	20		
4765270	Total Phosphorus (P)	2016/11/25	105	80 - 120	90	80 - 120	<100	ug/L	NC	20		
4765270	Total Potassium (K)	2016/11/25	NC	80 - 120	94	80 - 120	<200	ug/L	1.2	20		
4765270	Total Selenium (Se)	2016/11/25	104	80 - 120	105	80 - 120	<2.0	ug/L	NC	20		
4765270	Total Silicon (Si)	2016/11/25	97	80 - 120	95	80 - 120	<50	ug/L	3.4	20		
4765270	Total Silver (Ag)	2016/11/25	103	80 - 120	101	80 - 120	<0.10	ug/L	NC	20		
4765270	Total Sodium (Na)	2016/11/25	NC	80 - 120	98	80 - 120	<100	ug/L	0.37	20		
4765270	Total Strontium (Sr)	2016/11/25	NC	80 - 120	95	80 - 120	<1.0	ug/L	2.3	20		

QUALITY ASSURANCE REPORT(CONT'D)

			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
4765270	Total Tellurium (Te)	2016/11/25	103	80 - 120	102	80 - 120	<1.0	ug/L	NC	20		
4765270	Total Thallium (Tl)	2016/11/25	99	80 - 120	100	80 - 120	<0.050	ug/L	NC	20		
4765270	Total Tin (Sn)	2016/11/25	104	80 - 120	99	80 - 120	<1.0	ug/L	NC	20		
4765270	Total Titanium (Ti)	2016/11/25	97	80 - 120	97	80 - 120	<5.0	ug/L	NC	20		
4765270	Total Tungsten (W)	2016/11/25	107	80 - 120	105	80 - 120	<1.0	ug/L	1.9	20		
4765270	Total Uranium (U)	2016/11/25	106	80 - 120	103	80 - 120	<0.10	ug/L				
4765270	Total Vanadium (V)	2016/11/25	100	80 - 120	98	80 - 120	<0.50	ug/L	NC	20		
4765270	Total Zinc (Zn)	2016/11/25	101	80 - 120	103	80 - 120	<5.0	ug/L	NC	20		
4765270	Total Zirconium (Zr)	2016/11/25	106	80 - 120	100	80 - 120	<1.0	ug/L				
4765485	Total Phosphorus	2016/11/29	102	80 - 120	101	80 - 120	<0.020	mg/L	NC	20	100	80 - 120
4765718	Alkalinity (Total as CaCO3)	2016/11/25			95	85 - 115	<1.0	mg/L	1.6	20		
4765723	Conductivity	2016/11/25			99	85 - 115	<1.0	umho/cm	0.49	25		
4765724	Fluoride (F-)	2016/11/25	94	80 - 120	96	80 - 120	<0.10	mg/L	NC	20		
4765726	pH	2016/11/25			102	98 - 103			0.16	N/A		

N/A = Not Applicable

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 too small to permit a reliable recovery calculation (matrix spike concentration was less than 2x that of the native sample concentration).

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (one or both samples < 5x RDL).

(1) Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.

(2) Analyte was detected in the method blank at a level marginally above the detection limit. Sample results have not been blank corrected. Those results at or near the detection limit may be biased high..

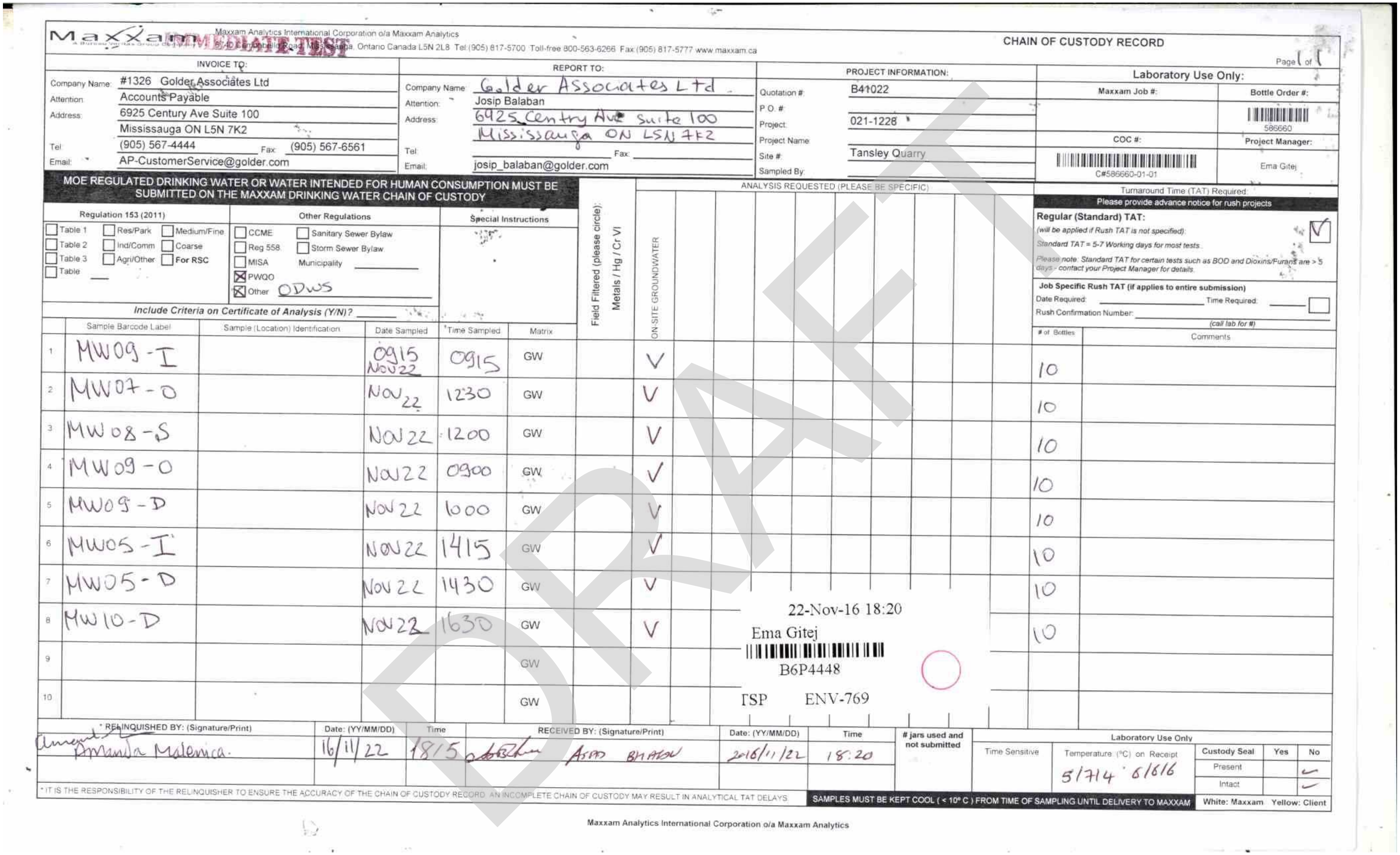
VALIDATION SIGNATURE PAGE

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

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.



Maxxam A Bureau Veritas Group Company

IMMEDIATE TEST

Maxxam Analytics International Corporation o/a Maxxam Analytics
6740 Campobello Road, Mississauga, Ontario Canada L5N 2L8 Tel:(905) 817-5700 Toll-free 800-563-6266 Fax:(905) 817-5777 www.maxxam.ca

CHAIN OF CUSTODY RECORD

Page 1 of 1

INVOICE TO:

Company Name: #1326 Golder Associates Ltd
Attention: Accounts Payable
Address: 6925 Century Ave Suite 100
Mississauga ON L5N 7K2
Tel: (905) 567-4444 Fax: (905) 567-6561
Email: AP-CustomerService@golder.com

REPORT TO:

Company Name: Golder Associates Ltd
Attention: Josip Balaban
Address: 6925 Centry Ave Suite 100
Mississauga ON L5N 7K2
Tel: Fax:
Email: josip_balaban@golder.com

PROJECT INFORMATION:

Quotation #: B41022
P.O. #:
Project: 021-1228
Project Name:
Site #: Tansley Quarry
Sampled By:

Laboratory Use Only:

Maxxam Job #:	Bottle Order #:
	586660
COC #:	Project Manager:
C#586660-01-01	Ema Gitej

MOE REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE MAXXAM DRINKING WATER CHAIN OF CUSTODY

Regulation 153 (2011)

☐ Table 1 ☐ Res/Park ☐ Medium/Fine
☐ Table 2 ☐ Ind/Comm ☐ Coarse
☐ Table 3 ☐ Agri/Other ☐ For RSC
☐ Table ___

Other Regulations

☐ CCME ☐ Sanitary Sewer Bylaw
☐ Reg 558 ☐ Storm Sewer Bylaw
☐ MISA Municipality ___
☒ PWQO
☒ Other ODWS

Special Instructions

Include Criteria on Certificate of Analysis (Y/N)? ___

ANALYSIS REQUESTED (PLEASE BE SPECIFIC)

Turnaround Time (TAT) Required:

Please provide advance notice for rush projects

Regular (Standard) TAT: ☑
(will be applied if Rush TAT is not specified):
Standard TAT = 5-7 Working days for most tests.
Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

Job Specific Rush TAT (if applies to entire submission)
Date Required: ___ Time Required: ___ ☐
Rush Confirmation Number: ___ *(call lab for #)*

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Field Filtered (please circle): Metals / Hg / Cr VI	ON-SITE GROUNDWATER	# of Bottles	Comments
1	MW09-I		0915 NOV22	0915	GW		V	10	
2	MW07-O		NOV 22	1230	GW		V	10	
3	MW08-S		NOV 22	1200	GW		V	10	
4	MW09-O		NOV 22	0900	GW		✓	10	
5	MW09-D		NOV 22	1000	GW		V	10	
6	MW05-I		NOV 22	1415	GW		✓	10	
7	MW05-D		NOV 22	1430	GW		V	10	
8	MW10-D		NOV 22	1630	GW		V	10	
9					GW				
10					GW				

22-Nov-16 18:20
Ema Gitej
B6P4448
TSP ENV-769

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted
Amanda Malenica	16/11/22	1815	ASAD BHATTI	2016/11/22	18:20	

Laboratory Use Only

Time Sensitive	Temperature (°C) on Receipt	Custody Seal	Yes	No
	5/7/4 6/6/6	Present		✓
		Intact		✓

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

SAMPLES MUST BE KEPT COOL (< 10° C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

White: Maxxam Yellow: Client

Maxxam Analytics International Corporation o/a Maxxam Analytics

Maxxam
A Bureau Veritas Group Company

Your Project #: 021-1228
Site#: Tansley Quarry
de Cadena de Custodia: 588515-01-01

Attention:Sharon Wood

Golder Associates Ltd
Mississauga - Standing Offer
6925 Century Ave
Suite 100
Mississauga, ON
CANADA L5N 7K2

Report Date: 2016/12/02
del Reporte: R4271368
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B6P5551
Received: 2016/11/23, 17:24

Sample Matrix:
Samples Received: 10

Analyses	Quantity	DateDEL Extracción	Date Analisis	Analytical Method	Reference
Alkalinity	5	N/A	2016/11/25	CAM SOP-00448	
Alkalinity	5	N/A	2016/11/26	CAM SOP-00448	
Anions	5	N/A	2016/11/28	CAM SOP-00435	
Anions	5	N/A	2016/11/29	CAM SOP-00435	
Conductivity	5	N/A	2016/11/25	CAM SOP-00414	
Conductivity	5	N/A	2016/11/26	CAM SOP-00414	
Free (WAD) Cyanide	10	N/A	2016/11/25	CAM SOP-00457	
Fluoride	5	2016/11/25	2016/11/25	CAM SOP-00449	
Fluoride	5	2016/11/25	2016/11/26	CAM SOP-00449	
Hardness (calculated as CaCO3)	10	N/A	2016/11/29	CAM SOP 00102/00408/00447	SM 2340 B
Mercury	10	2016/11/29	2016/11/29	CAM SOP-00453	
Dissolved Metals by ICPMS	10	N/A	2016/11/29	CAM SOP-00447	
Total Metals Analysis by ICPMS	10	N/A	2016/11/28	CAM SOP-00447	
Ammonia-N	10	N/A	2016/11/30	CAM SOP-00441	
Nitrate (NO3) and Nitrite (NO2) in Water	10	N/A	2016/11/28	CAM SOP-00440	
pH	5	N/A	2016/11/25	CAM SOP-00413	
pH	5	N/A	2016/11/26	CAM SOP-00413	
Phenols (4AAP)	10	N/A	2016/11/28	CAM SOP-00444	
Orthophosphate	10	N/A	2016/11/28	CAM SOP-00461	
SULPHIDE	10	N/A	2016/11/28	CAM SOP-00455	
Total Dissolved Solids	7	2016/11/25	2016/11/25	CAM SOP-00428	
Total Dissolved Solids	3	2016/11/25	2016/11/26	CAM SOP-00428	
Total Phosphorus (Colourimetric)	9	2016/11/25	2016/11/28	CAM SOP-00407	
Total Phosphorus (Colourimetric)	1	2016/11/25	2016/11/29	CAM SOP-00407	
Total Suspended Solids	1	2016/11/26	2016/11/26	CAM SOP-00428	
Total Suspended Solids	9	2016/11/25	2016/11/25	CAM SOP-00428	
Turbidity	5	N/A	2016/11/26	CAM SOP-00417	
Turbidity	2	N/A	2016/11/28	CAM SOP-00417	

Your Project #: 021-1228
Site#: Tansley Quarry
de Cadena de Custodia: 588515-01-01

Attention:Sharon Wood

Golder Associates Ltd
Mississauga - Standing Offer
6925 Century Ave
Suite 100
Mississauga, ON
CANADA L5N 7K2

Report Date: 2016/12/02
del Reporte: R4271368
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B6P5551
Received: 2016/11/23, 17:24

Sample Matrix:
Samples Received: 10

Analyses	Quantity	DateDEL Extracción	Date Analisis	Analytical Method	Reference
Turbidity	3	N/A	2016/11/29	CAM SOP-00417	

Remarks:

Maxxam Analytics' laboratories are accredited to ISO/IEC 17025:2005 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Maxxam are based upon recognized Provincial, Federal or US method compendia such as CCME, MDDELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported: unless indicated otherwise, associated sample data are not blank corrected.

Maxxam Analytics' liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Maxxam has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Maxxam, unless otherwise agreed in writing.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods. Results relate to samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDCOMMENT

Encryption Key

COVERPAGECOMMENT1
Ema Gitej,
Email: EGitej@maxxam.ca
Phone# (905)817-5829
==
ESIGCOMMENT1

Maxxam Job #: B6P5551
Report Date: 2016/12/02

Golder Associates Ltd
Client Project #: 021-1228
Sampler Initials: AF

RESULTADOS DE ANALISIS DE

Maxxam ID		DMU253	DMU253			DMU254		
Sampling Date		2016/11/23 13:40	2016/11/23 13:40			2016/11/23 10:00		
COC Number		588515-01-01	588515-01-01			588515-01-01		
	Units	**MW06-D**	**MW06-D Lab-Dup.**	**RDL**	**QC Batch**	**MW10-I**	**RDL**	**QC Batch**
Hardness (CaCO3)	mg/L	18000		1.0	4764841	390	1.0	4764841
Ammonia-N	mg/L	21		0.50	4765614	0.69	0.050	4765614
Conductivity	umho/cm	60000		1.0	4765723	820	1.0	4765723
Dissolved Solids	mg/L	48000		20	4765523	480	10	4765410
Fluoride (F-)	mg/L	<0.10		0.10	4765724	0.18	0.10	4765724
Free Cyanide	mg/L	<0.0010		0.0010	4765496	<0.0010	0.0010	4765496
Orthophosphate (P)	mg/L	<0.010		0.010	4765526	<0.010	0.010	4765526
pH	pH	6.92			4765726	7.85		4765726
Phenols-4AAP	mg/L	0.0086	0.0077	0.0010	4768031	<0.0010	0.0010	4768031
Phosphorus	mg/L	0.50		0.04	4765592	0.06	0.04	4765592
Solids	mg/L	520		5	4765538	44	1	4765538
Sulphide	mg/L	0.071		0.020	4766760	<0.020	0.020	4766760
Turbidity	NTU	230		0.1	4765121	16	0.1	4765511
Alkalinity (Total as CaCO3)	mg/L	170		1.0	4765718	430	1.0	4765718
Nitrite (N)	mg/L	0.301		0.010	4765611	0.012	0.010	4765611
Chloride (Cl)	mg/L	24000		200	4770421	5.6	1.0	4767377
Nitrate (N)	mg/L	80.2		2.0	4765611	0.20	0.10	4765611
Nitrate + Nitrite (N)	mg/L	80.5		2.0	4765611	0.21	0.10	4765611
Bromide (Br-)	mg/L	250		200	4770421	<1.0	1.0	4767377
Sulphate (SO4)	mg/L	1300		200	4770421	35	1.0	4767377

RDL = Reportable Detection Limit
Lab-Dup = Laboratory Initiated Duplicate

RESULTADOS DE ANALISIS DE

Maxxam ID		DMU255			DMU256	DMU256		
Sampling Date		2016/11/23 13:00			2016/11/23 11:00	2016/11/23 11:00		
COC Number		588515-01-01			588515-01-01	588515-01-01		
	Units	**MW04-I**	**RDL**	**QC Batch**	**MW04-D**	**MW04-D Lab-Dup.**	**RDL**	**QC Batch**
Hardness (CaCO3)	mg/L	1500	1.0	4764841	1100		1.0	4764841
Ammonia-N	mg/L	5.5	0.25	4765614	2.2		0.050	4765614
Conductivity	umho/cm	5900	1.0	4765723	3800		1.0	4765723
Dissolved Solids	mg/L	4340	10	4765410	2670		10	4765410
Fluoride (F-)	mg/L	0.53	0.10	4765724	0.57		0.10	4765724
Free Cyanide	mg/L	<0.0010	0.0010	4765496	<0.0010		0.0010	4765496
Orthophosphate (P)	mg/L	<0.010	0.010	4765526	<0.010		0.010	4765526
pH	pH	7.46		4765726	7.59			4765726
Phenols-4AAP	mg/L	<0.0010	0.0010	4768031	<0.0010		0.0010	4768031
Phosphorus	mg/L	0.58	0.04	4765592	0.08		0.04	4765592
Solids	mg/L	230	3	4765538	33		1	4765538
Sulphide	mg/L	0.021	0.020	4766760	<0.020		0.020	4766760
Turbidity	NTU	170	0.1	4765121	5.1		0.1	4765511
Alkalinity (Total as CaCO3)	mg/L	55	1.0	4765718	97		1.0	4765718
Nitrite (N)	mg/L	<0.010	0.010	4765611	0.058	0.055	0.010	4765611
Chloride (Cl)	mg/L	1100	10	4766374	500		10	4767377
Nitrate (N)	mg/L	<0.10	0.10	4765611	0.38	0.38	0.10	4765611
Nitrate + Nitrite (N)	mg/L	<0.10	0.10	4765611	0.44	0.44	0.10	4765611
Bromide (Br-)	mg/L	11	10	4766374	<10		10	4767377
Sulphate (SO4)	mg/L	1500	10	4766374	1200		10	4767377

RDL = Reportable Detection Limit
Lab-Dup = Laboratory Initiated Duplicate

RESULTADOS DE ANALISIS DE

Maxxam ID		DMU257			DMU258			DMU259		
Sampling Date		2016/11/23 11:30			2016/11/23			2016/11/23 08:45		
COC Number		588515-01-01			588515-01-01			588515-01-01		
	Units	**MW04-S**	**RDL**	**QC Batch**	**DUP 1**	**RDL**	**QC Batch**	**MW05-ST**	**RDL**	**QC Batch**
Hardness (CaCO3)	mg/L	470	1.0	4764841	240	1.0	4764841	230	1.0	4764841
Ammonia-N	mg/L	<0.050	0.050	4765614	0.68	0.050	4765614	0.68	0.050	4765614
Conductivity	umho/cm	870	1.0	4765723	610	1.0	4765723	610	1.0	4765723
Dissolved Solids	mg/L	548	10	4765858	362	10	4765523	384	10	4765858
Fluoride (F-)	mg/L	0.21	0.10	4765724	0.37	0.10	4765724	0.42	0.10	4765724
Free Cyanide	mg/L	<0.0010	0.0010	4765496	<0.0010	0.0010	4765496	<0.0010	0.0010	4765496
Orthophosphate (P)	mg/L	<0.010	0.010	4765526	<0.010	0.010	4765526	<0.010	0.010	4765526
pH	pH	7.81		4765726	7.91		4765726	7.87		4765726
Phenols-4AAP	mg/L	<0.0010	0.0010	4768031	<0.0010	0.0010	4768031	<0.0010	0.0010	4768031
Phosphorus	mg/L	0.44	0.04	4765592	0.22	0.04	4765592	0.14	0.02	4765592
Solids	mg/L	350	3	4765538	270	2	4765538	360	2	4765538
Sulphide	mg/L	0.023	0.020	4766760	<0.020	0.020	4766760	<0.020	0.020	4766760
Turbidity	NTU	220	0.1	4765511	150	0.1	4765121	100	0.1	4765121
Alkalinity (Total as CaCO3)	mg/L	420	1.0	4765718	250	1.0	4765718	250	1.0	4765718
Nitrite (N)	mg/L	<0.010	0.010	4765611	0.015	0.010	4765611	0.023	0.010	4765649
Chloride (Cl)	mg/L	4.2	1.0	4766374	7.9	1.0	4766374	9.3	1.0	4770421
Nitrate (N)	mg/L	<0.10	0.10	4765611	0.22	0.10	4765611	0.22	0.10	4765649
Nitrate + Nitrite (N)	mg/L	<0.10	0.10	4765611	0.24	0.10	4765611	0.24	0.10	4765649
Bromide (Br-)	mg/L	<1.0	1.0	4766374	<1.0	1.0	4766374	<1.0	1.0	4770421
Sulphate (SO4)	mg/L	86	1.0	4766374	49	1.0	4766374	67	1.0	4770421
RDL = Reportable Detection Limit										

RESULTADOS DE ANALISIS DE

Maxxam ID		DMU259			DMU260			DMU261		
Sampling Date		2016/11/23 08:45			2016/11/23 09:15			2016/11/23 10:15		
COC Number		588515-01-01			588515-01-01			588515-01-01		
	Units	**MW05-ST Lab-Dup.**	**RDL**	**QC Batch**	**MW05-O**	**RDL**	**QC Batch**	**MW10-O**	**RDL**	**QC Batch**
Hardness (CaCO3)	mg/L		1.0	4764841	480	1.0	4764841	470	1.0	4764841
Ammonia-N	mg/L		0.050	4765614	<0.050	0.050	4765614	<0.050	0.050	4765614
Conductivity	umho/cm	610	1.0	4765723	900	1.0	4765723	890	1.0	4765723
Dissolved Solids	mg/L		10	4765858	578	10	4765410	500	10	4765523
Fluoride (F-)	mg/L	0.39	0.10	4765724	0.10	0.10	4765724	0.13	0.10	4765724
Free Cyanide	mg/L		0.0010	4765496	<0.0010	0.0010	4765496	<0.0010	0.0010	4765496
Orthophosphate (P)	mg/L		0.010	4765526	<0.010	0.010	4765526	<0.010	0.010	4765526
pH	pH	7.89		4765726	7.74		4765726	7.84		4765726
Phenols-4AAP	mg/L		0.0010	4768031	<0.0010	0.0010	4768031	<0.0010	0.0010	4768031
Phosphorus	mg/L		0.02	4765592	0.72	0.04	4765592	0.29	0.04	4765592
Solids	mg/L		2	4765538	850	5	4765538	450	5	4765538
Sulphide	mg/L		0.020	4766760	<0.020	0.020	4766760	<0.020	0.020	4766760
Turbidity	NTU		0.1	4765121	440	0.5	4765121	440	0.2	4765511
Alkalinity (Total as CaCO3)	mg/L	250	1.0	4765718	340	1.0	4765718	480	1.0	4765718
Nitrite (N)	mg/L		0.010	4765649	<0.010	0.010	4765611	<0.010	0.010	4765611
Chloride (Cl)	mg/L		1.0	4770421	44	1.0	4766374	3.0	1.0	4770421
Nitrate (N)	mg/L		0.10	4765649	<0.10	0.10	4765611	0.10	0.10	4765611
Nitrate + Nitrite (N)	mg/L		0.10	4765649	<0.10	0.10	4765611	0.10	0.10	4765611
Bromide (Br-)	mg/L		1.0	4770421	<1.0	1.0	4766374	<1.0	1.0	4770421
Sulphate (SO4)	mg/L		1.0	4770421	94	1.0	4766374	50	1.0	4770421

RDL = Reportable Detection Limit
Lab-Dup = Laboratory Initiated Duplicate

RESULTADOS DE ANALISIS DE

Maxxam ID		DMU261			DMU262		
Sampling Date		2016/11/23 10:15			2016/11/23 16:00		
COC Number		588515-01-01			588515-01-01		
	Units	**MW10-O Lab-Dup.**	**RDL**	**QC Batch**	**MW06-S**	**RDL**	**QC Batch**
Hardness (CaCO3)	mg/L		1.0	4764841	440	1.0	4764841
Ammonia-N	mg/L		0.050	4765614	0.39	0.050	4765614
Conductivity	umho/cm		1.0	4765723	820	1.0	4765723
Dissolved Solids	mg/L		10	4765523	580	10	4765858
Fluoride (F-)	mg/L		0.10	4765724	0.12	0.10	4765724
Free Cyanide	mg/L		0.0010	4765496	<0.0010	0.0010	4765496
Orthophosphate (P)	mg/L		0.010	4765526	<0.010	0.010	4765526
pH	pH			4765726	7.81		4765726
Phenols-4AAP	mg/L		0.0010	4768031	<0.0010	0.0010	4768031
Phosphorus	mg/L		0.04	4765592	9.9	0.2	4765592
Solids	mg/L		5	4765538	22000	100	4767182
Sulphide	mg/L		0.020	4766760	0.022	0.020	4766760
Turbidity	NTU		0.2	4765511	9400	5	4765511
Alkalinity (Total as CaCO3)	mg/L		1.0	4765718	310	1.0	4765718
Nitrite (N)	mg/L		0.010	4765611	<0.010	0.010	4765611
Chloride (Cl)	mg/L	3.6	1.0	4770421	11	1.0	4766374
Nitrate (N)	mg/L		0.10	4765611	0.19	0.10	4765611
Nitrate + Nitrite (N)	mg/L		0.10	4765611	0.19	0.10	4765611
Bromide (Br-)	mg/L	<1.0	1.0	4770421	<1.0	1.0	4766374
Sulphate (SO4)	mg/L	51	1.0	4770421	130	1.0	4766374

RDL = Reportable Detection Limit
Lab-Dup = Laboratory Initiated Duplicate

ELEMENTS BY ATOMIC SPECTROSCOPY ()

Maxxam ID		DMU253			DMU254		DMU255		
Sampling Date		2016/11/23 13:40			2016/11/23 10:00		2016/11/23 13:00		
COC Number		588515-01-01			588515-01-01		588515-01-01		
	Units	**MW06-D**	**RDL**	**QC Batch**	**MW10-I**	**RDL**	**MW04-I**	**RDL**	**QC Batch**
Mercury (Hg)	mg/L	<0.0001	0.0001	4769511	<0.0001	0.0001	<0.0001	0.0001	4769499
Aluminum (Al)	ug/L	<50	50	4766801	8.0	5.0	100	25	4766801
Aluminum (Al)	ug/L	6800	25	4768110	570	5.0	4800	25	4768110
Antimony (Sb)	ug/L	<5.0	5.0	4766801	<0.50	0.50	<2.5	2.5	4766801
Antimony (Sb)	ug/L	3.4	2.5	4768110	0.53	0.50	<2.5	2.5	4768110
Arsenic (As)	ug/L	<10	10	4766801	3.4	1.0	<5.0	5.0	4766801
Arsenic (As)	ug/L	8.7	5.0	4768110	14	1.0	<5.0	5.0	4768110
Barium (Ba)	ug/L	72	20	4766801	73	2.0	<10	10	4766801
Barium (Ba)	ug/L	150	10	4768110	88	2.0	55	10	4768110
Beryllium (Be)	ug/L	<5.0	5.0	4766801	<0.50	0.50	<2.5	2.5	4766801
Beryllium (Be)	ug/L	<2.5	2.5	4768110	<0.50	0.50	<2.5	2.5	4768110
Bismuth (Bi)	ug/L	<10	10	4766801	<1.0	1.0	<5.0	5.0	4766801
Bismuth (Bi)	ug/L	<5.0	5.0	4768110	<1.0	1.0	<5.0	5.0	4768110
Boron (B)	ug/L	9000	100	4766801	700	10	7100	50	4766801
Boron (B)	ug/L	8600	50	4768110	770	10	7200	50	4768110
Cadmium (Cd)	ug/L	<1.0	1.0	4766801	1.2	0.10	<0.50	0.50	4766801
Cadmium (Cd)	ug/L	8.5	0.50	4768110	3.2	0.10	<0.50	0.50	4768110
Calcium (Ca)	ug/L	4900000	4000	4766801	56000	400	420000	1000	4766801
Calcium (Ca)	ug/L	4700000	10000	4768110	59000	1000	440000	1000	4768110
Chromium (Cr)	ug/L	<50	50	4766801	<5.0	5.0	<25	25	4766801
Chromium (Cr)	ug/L	6000	250	4768110	12	5.0	<25	25	4768110
Cobalt (Co)	ug/L	16	10	4766801	0.78	0.50	<2.5	2.5	4766801
Cobalt (Co)	ug/L	24	13	4768110	0.52	0.50	<2.5	2.5	4768110
Copper (Cu)	ug/L	<10	10	4766801	1.5	1.0	<5.0	5.0	4766801
Copper (Cu)	ug/L	130	5.0	4768110	4.2	1.0	<5.0	5.0	4768110
Iron (Fe)	ug/L	12000	1000	4766801	<100	100	750	500	4766801
Iron (Fe)	ug/L	21000	500	4768110	1600	100	5400	500	4768110
Lead (Pb)	ug/L	<5.0	5.0	4766801	<0.50	0.50	<2.5	2.5	4766801
Lead (Pb)	ug/L	7.7	2.5	4768110	0.74	0.50	3.3	2.5	4768110
Lithium (Li)	ug/L	9600	250	4766801	63	5.0	820	25	4766801
Lithium (Li)	ug/L	10000	250	4768110	64	5.0	850	25	4768110
Magnesium (Mg)	ug/L	1300000	500	4766801	61000	50	120000	250	4766801
Magnesium (Mg)	ug/L	1200000	250	4768110	61000	50	130000	250	4768110
Manganese (Mn)	ug/L	2700	20	4766801	13	2.0	160	10	4766801
Manganese (Mn)	ug/L	2900	10	4768110	41	2.0	290	10	4768110

RDL = Reportable Detection Limit

ELEMENTS BY ATOMIC SPECTROSCOPY ()

Maxxam ID		DMU253			DMU254		DMU255		
Sampling Date		2016/11/23 13:40			2016/11/23 10:00		2016/11/23 13:00		
COC Number		588515-01-01			588515-01-01		588515-01-01		
	Units	**MW06-D**	**RDL**	**QC Batch**	**MW10-I**	**RDL**	**MW04-I**	**RDL**	**QC Batch**
Molybdenum (Mo)	ug/L	9.5	5.0	4766801	2.8	0.50	7.0	2.5	4766801
Molybdenum (Mo)	ug/L	230	2.5	4768110	2.9	0.50	7.9	2.5	4768110
Nickel (Ni)	ug/L	680	20	4766801	<1.0	1.0	<5.0	5.0	4766801
Nickel (Ni)	ug/L	890	25	4768110	6.8	1.0	14	5.0	4768110
Phosphorus (P)	ug/L	<1000	1000	4766801	<100	100	<500	500	4766801
Phosphorus (P)	ug/L	780	500	4768110	<100	100	<500	500	4768110
Potassium (K)	ug/L	200000	2000	4766801	11000	200	42000	1000	4766801
Potassium (K)	ug/L	190000	1000	4768110	11000	200	44000	1000	4768110
Selenium (Se)	ug/L	<20	20	4766801	<2.0	2.0	<10	10	4766801
Selenium (Se)	ug/L	<10	10	4768110	<2.0	2.0	<10	10	4768110
Silicon (Si)	ug/L	4000	500	4766801	9000	50	3800	250	4766801
Silicon (Si)	ug/L	19000	250	4768110	10000	50	14000	250	4768110
Silver (Ag)	ug/L	1.8	1.0	4766801	<0.10	0.10	<0.50	0.50	4766801
Silver (Ag)	ug/L	<0.50	0.50	4768110	<0.10	0.10	<0.50	0.50	4768110
Sodium (Na)	ug/L	9600000	5000	4766801	27000	100	760000	500	4766801
Sodium (Na)	ug/L	10000000	5000	4768110	27000	100	820000	500	4768110
Strontium (Sr)	ug/L	89000	10	4766801	10000	1.0	11000	5.0	4766801
Strontium (Sr)	ug/L	92000	5.0	4768110	11000	1.0	13000	5.0	4768110
Tellurium	ug/L	<10	10	4766801	<1.0	1.0	<5.0	5.0	4766801
Tellurium	ug/L	<5.0	5.0	4768110	<1.0	1.0	<5.0	5.0	4768110
Thallium (Tl)	ug/L	<0.50	0.50	4766801	<0.050	0.050	<0.25	0.25	4766801
Thallium (Tl)	ug/L	<0.25	0.25	4768110	<0.050	0.050	<0.25	0.25	4768110
Tin (Sn)	ug/L	<10	10	4766801	3.6	1.0	<5.0	5.0	4766801
Tin (Sn)	ug/L	8.8	5.0	4768110	2.2	1.0	<5.0	5.0	4768110
Titanium (Ti)	ug/L	<50	50	4766801	<5.0	5.0	<25	25	4766801
Titanium (Ti)	ug/L	<250	250	4768110	20	5.0	110	25	4768110
Tungsten (W)	ug/L	<10	10	4766801	<1.0	1.0	<5.0	5.0	4766801
Tungsten (W)	ug/L	16	5.0	4768110	<1.0	1.0	<5.0	5.0	4768110
Uranium (U)	ug/L	35	1.0	4766801	0.21	0.10	<0.50	0.50	4766801
Uranium (U)	ug/L	40	0.50	4768110	0.25	0.10	1.2	0.50	4768110
Vanadium (V)	ug/L	<25	25	4766801	<0.50	0.50	<2.5	2.5	4766801
Vanadium (V)	ug/L	42	2.5	4768110	1.2	0.50	8.4	2.5	4768110
Zinc (Zn)	ug/L	<50	50	4766801	8.1	5.0	<25	25	4766801
Zinc (Zn)	ug/L	69	25	4768110	22	5.0	<25	25	4768110
Zirconium (Zr)	ug/L	<10	10	4766801	<1.0	1.0	<5.0	5.0	4766801
Zirconium (Zr)	ug/L	<5.0	5.0	4768110	<1.0	1.0	11	5.0	4768110

RDL = Reportable Detection Limit

ELEMENTS BY ATOMIC SPECTROSCOPY ()

Maxxam ID		DMU256			DMU257			DMU258		
Sampling Date		2016/11/23 11:00			2016/11/23 11:30			2016/11/23		
COC Number		588515-01-01			588515-01-01			588515-01-01		
	Units	**MW04-D**	**RDL**	**QC Batch**	**MW04-S**	**RDL**	**QC Batch**	**DUP 1**	**RDL**	**QC Batch**
Mercury (Hg)	mg/L	<0.0001	0.0001	4769511	<0.0001	0.0001	4769499	<0.0001	0.0001	4769511
Aluminum (Al)	ug/L	<25	25	4766801	52	5.0	4766801	26	5.0	4766801
Aluminum (Al)	ug/L	150	25	4768110	7900	5.0	4768110	4300	5.0	4768110
Antimony (Sb)	ug/L	<2.5	2.5	4766801	<0.50	0.50	4766801	<0.50	0.50	4766801
Antimony (Sb)	ug/L	<2.5	2.5	4768110	<0.50	0.50	4768110	0.98	0.50	4768110
Arsenic (As)	ug/L	<5.0	5.0	4766801	<1.0	1.0	4766801	6.4	1.0	4766801
Arsenic (As)	ug/L	<5.0	5.0	4768110	2.3	1.0	4768110	25	1.0	4768110
Barium (Ba)	ug/L	12	10	4766801	55	2.0	4766801	45	2.0	4766801
Barium (Ba)	ug/L	15	10	4768110	100	2.0	4768110	81	2.0	4768110
Beryllium (Be)	ug/L	<2.5	2.5	4766801	<0.50	0.50	4766801	<0.50	0.50	4766801
Beryllium (Be)	ug/L	<2.5	2.5	4768110	<0.50	0.50	4768110	<0.50	0.50	4768110
Bismuth (Bi)	ug/L	<5.0	5.0	4766801	<1.0	1.0	4766801	<1.0	1.0	4766801
Bismuth (Bi)	ug/L	<5.0	5.0	4768110	<1.0	1.0	4768110	<1.0	1.0	4768110
Boron (B)	ug/L	6900	50	4766801	140	10	4766801	1800	10	4766801
Boron (B)	ug/L	7800	50	4768110	160	10	4768110	1900	10	4768110
Cadmium (Cd)	ug/L	1.3	0.50	4766801	<0.10	0.10	4766801	0.96	0.10	4766801
Cadmium (Cd)	ug/L	5.8	0.50	4768110	<0.10	0.10	4768110	6.9	0.10	4768110
Calcium (Ca)	ug/L	280000	1000	4766801	76000	200	4766801	50000	400	4766801
Calcium (Ca)	ug/L	310000	1000	4768110	94000	200	4768110	71000	400	4768110
Chromium (Cr)	ug/L	<25	25	4766801	<5.0	5.0	4766801	<5.0	5.0	4766801
Chromium (Cr)	ug/L	25	25	4768110	9.9	5.0	4768110	38	5.0	4768110
Cobalt (Co)	ug/L	<2.5	2.5	4766801	1.5	0.50	4766801	<0.50	0.50	4766801
Cobalt (Co)	ug/L	<2.5	2.5	4768110	4.6	0.50	4768110	2.8	0.50	4768110
Copper (Cu)	ug/L	<5.0	5.0	4766801	<1.0	1.0	4766801	<1.0	1.0	4766801
Copper (Cu)	ug/L	6.0	5.0	4768110	7.6	1.0	4768110	12	1.0	4768110
Iron (Fe)	ug/L	<500	500	4766801	<100	100	4766801	<100	100	4766801
Iron (Fe)	ug/L	1100	500	4768110	8100	100	4768110	6200	100	4768110
Lead (Pb)	ug/L	<2.5	2.5	4766801	<0.50	0.50	4766801	<0.50	0.50	4766801
Lead (Pb)	ug/L	<2.5	2.5	4768110	6.0	0.50	4768110	3.1	0.50	4768110
Lithium (Li)	ug/L	520	25	4766801	55	5.0	4766801	56	5.0	4766801
Lithium (Li)	ug/L	560	25	4768110	64	5.0	4768110	63	5.0	4768110
Magnesium (Mg)	ug/L	91000	250	4766801	67000	50	4766801	27000	50	4766801
Magnesium (Mg)	ug/L	98000	250	4768110	70000	50	4768110	30000	50	4768110
Manganese (Mn)	ug/L	190	10	4766801	210	2.0	4766801	25	2.0	4766801
Manganese (Mn)	ug/L	230	10	4768110	370	2.0	4768110	230	2.0	4768110

RDL = Reportable Detection Limit

ELEMENTS BY ATOMIC SPECTROSCOPY ()

Maxxam ID		DMU256			DMU257			DMU258		
Sampling Date		2016/11/23 11:00			2016/11/23 11:30			2016/11/23		
COC Number		588515-01-01			588515-01-01			588515-01-01		
	Units	**MW04-D**	**RDL**	**QC Batch**	**MW04-S**	**RDL**	**QC Batch**	**DUP 1**	**RDL**	**QC Batch**
Molybdenum (Mo)	ug/L	14	2.5	4766801	3.5	0.50	4766801	7.9	0.50	4766801
Molybdenum (Mo)	ug/L	15	2.5	4768110	3.9	0.50	4768110	8.5	0.50	4768110
Nickel (Ni)	ug/L	40	5.0	4766801	1.1	1.0	4766801	2.0	1.0	4766801
Nickel (Ni)	ug/L	59	5.0	4768110	9.4	1.0	4768110	22	1.0	4768110
Phosphorus (P)	ug/L	<500	500	4766801	<100	100	4766801	<100	100	4766801
Phosphorus (P)	ug/L	<500	500	4768110	150	100	4768110	190	100	4768110
Potassium (K)	ug/L	34000	1000	4766801	5100	200	4766801	8300	200	4766801
Potassium (K)	ug/L	36000	1000	4768110	7600	200	4768110	9800	200	4768110
Selenium (Se)	ug/L	<10	10	4766801	<2.0	2.0	4766801	<2.0	2.0	4766801
Selenium (Se)	ug/L	<10	10	4768110	<2.0	2.0	4768110	<2.0	2.0	4768110
Silicon (Si)	ug/L	5300	250	4766801	7500	50	4766801	6700	50	4766801
Silicon (Si)	ug/L	5600	250	4768110	24000	50	4768110	15000	50	4768110
Silver (Ag)	ug/L	<0.50	0.50	4766801	<0.10	0.10	4766801	<0.10	0.10	4766801
Silver (Ag)	ug/L	<0.50	0.50	4768110	<0.10	0.10	4768110	0.11	0.10	4768110
Sodium (Na)	ug/L	440000	500	4766801	22000	100	4766801	35000	100	4766801
Sodium (Na)	ug/L	470000	500	4768110	22000	100	4768110	36000	100	4768110
Strontium (Sr)	ug/L	11000	5.0	4766801	1700	1.0	4766801	7600	1.0	4766801
Strontium (Sr)	ug/L	13000	5.0	4768110	1900	1.0	4768110	8300	1.0	4768110
Tellurium	ug/L	<5.0	5.0	4766801	<1.0	1.0	4766801	<1.0	1.0	4766801
Tellurium	ug/L	<5.0	5.0	4768110	<1.0	1.0	4768110	<1.0	1.0	4768110
Thallium (Tl)	ug/L	<0.25	0.25	4766801	<0.050	0.050	4766801	<0.050	0.050	4766801
Thallium (Tl)	ug/L	<0.25	0.25	4768110	0.070	0.050	4768110	<0.050	0.050	4768110
Tin (Sn)	ug/L	<5.0	5.0	4766801	<1.0	1.0	4766801	<1.0	1.0	4766801
Tin (Sn)	ug/L	<5.0	5.0	4768110	<1.0	1.0	4768110	3.7	1.0	4768110
Titanium (Ti)	ug/L	<25	25	4766801	<5.0	5.0	4766801	<5.0	5.0	4766801
Titanium (Ti)	ug/L	<25	25	4768110	250	5.0	4768110	130	5.0	4768110
Tungsten (W)	ug/L	<5.0	5.0	4766801	<1.0	1.0	4766801	<1.0	1.0	4766801
Tungsten (W)	ug/L	<5.0	5.0	4768110	<1.0	1.0	4768110	<1.0	1.0	4768110
Uranium (U)	ug/L	6.4	0.50	4766801	4.6	0.10	4766801	0.18	0.10	4766801
Uranium (U)	ug/L	6.6	0.50	4768110	5.3	0.10	4768110	0.33	0.10	4768110
Vanadium (V)	ug/L	<2.5	2.5	4766801	<0.50	0.50	4766801	<0.50	0.50	4766801
Vanadium (V)	ug/L	<2.5	2.5	4768110	14	0.50	4768110	7.7	0.50	4768110
Zinc (Zn)	ug/L	<25	25	4766801	<5.0	5.0	4766801	6.0	5.0	4766801
Zinc (Zn)	ug/L	42	25	4768110	24	5.0	4768110	41	5.0	4768110
Zirconium (Zr)	ug/L	<5.0	5.0	4766801	<1.0	1.0	4766801	<1.0	1.0	4766801
Zirconium (Zr)	ug/L	<5.0	5.0	4768110	4.3	1.0	4768110	3.8	1.0	4768110

RDL = Reportable Detection Limit

ELEMENTS BY ATOMIC SPECTROSCOPY ()

Maxxam ID		DMU259	DMU259		DMU260			DMU261		
Sampling Date		2016/11/23 08:45	2016/11/23 08:45		2016/11/23 09:15			2016/11/23 10:15		
COC Number		588515-01-01	588515-01-01		588515-01-01			588515-01-01		
	Units	**MW05-ST**	**MW05-ST Lab-Dup.**	**RDL**	**MW05-O**	**RDL**	**QC Batch**	**MW10-O**	**RDL**	**QC Batch**
Mercury (Hg)	mg/L	<0.0001	<0.0001	0.0001	<0.0001	0.0001	4769511	<0.0001	0.0001	4769499
Aluminum (Al)	ug/L	36		5.0	29	5.0	4766801	66	5.0	4766801
Aluminum (Al)	ug/L	4100		5.0	23000	25	4768110	2800	5.0	4768110
Antimony (Sb)	ug/L	0.52		0.50	<0.50	0.50	4766801	<0.50	0.50	4766801
Antimony (Sb)	ug/L	0.77		0.50	<0.50	0.50	4768110	<0.50	0.50	4768110
Arsenic (As)	ug/L	6.0		1.0	<1.0	1.0	4766801	1.7	1.0	4766801
Arsenic (As)	ug/L	25		1.0	10	1.0	4768110	2.8	1.0	4768110
Barium (Ba)	ug/L	45		2.0	55	2.0	4766801	50	2.0	4766801
Barium (Ba)	ug/L	79		2.0	390	2.0	4768110	71	2.0	4768110
Beryllium (Be)	ug/L	<0.50		0.50	<0.50	0.50	4766801	<0.50	0.50	4766801
Beryllium (Be)	ug/L	<0.50		0.50	1.2	0.50	4768110	<0.50	0.50	4768110
Bismuth (Bi)	ug/L	<1.0		1.0	<1.0	1.0	4766801	<1.0	1.0	4766801
Bismuth (Bi)	ug/L	<1.0		1.0	<1.0	1.0	4768110	<1.0	1.0	4768110
Boron (B)	ug/L	2000		10	13	10	4766801	100	10	4766801
Boron (B)	ug/L	1900		10	53	10	4768110	150	10	4768110
Cadmium (Cd)	ug/L	0.81		0.10	0.29	0.10	4766801	0.25	0.10	4766801
Cadmium (Cd)	ug/L	5.1		0.10	1.7	0.10	4768110	1.5	0.10	4768110
Calcium (Ca)	ug/L	49000		400	130000	200	4766801	61000	200	4766801
Calcium (Ca)	ug/L	77000		400	270000	200	4768110	69000	200	4768110
Chromium (Cr)	ug/L	<5.0		5.0	<5.0	5.0	4766801	<5.0	5.0	4766801
Chromium (Cr)	ug/L	32		5.0	47	5.0	4768110	9.1	5.0	4768110
Cobalt (Co)	ug/L	0.99		0.50	0.64	0.50	4766801	0.65	0.50	4766801
Cobalt (Co)	ug/L	2.7		0.50	17	0.50	4768110	2.0	0.50	4768110
Copper (Cu)	ug/L	1.4		1.0	1.6	1.0	4766801	<1.0	1.0	4766801
Copper (Cu)	ug/L	11		1.0	89	1.0	4768110	4.5	1.0	4768110
Iron (Fe)	ug/L	<100		100	<100	100	4766801	<100	100	4766801
Iron (Fe)	ug/L	6100		100	38000	100	4768110	2600	100	4768110
Lead (Pb)	ug/L	<0.50		0.50	<0.50	0.50	4766801	<0.50	0.50	4766801
Lead (Pb)	ug/L	2.9		0.50	25	0.50	4768110	1.2	0.50	4768110
Lithium (Li)	ug/L	56		5.0	13	5.0	4766801	72	5.0	4766801
Lithium (Li)	ug/L	66		5.0	54	5.0	4768110	74	5.0	4768110
Magnesium (Mg)	ug/L	27000		50	38000	50	4766801	77000	50	4766801
Magnesium (Mg)	ug/L	31000		50	53000	50	4768110	80000	50	4768110
Manganese (Mn)	ug/L	24		2.0	3.3	2.0	4766801	40	2.0	4766801
Manganese (Mn)	ug/L	280		2.0	1900	2.0	4768110	110	2.0	4768110

RDL = Reportable Detection Limit
Lab-Dup = Laboratory Initiated Duplicate

ELEMENTS BY ATOMIC SPECTROSCOPY ()

Maxxam ID		DMU259	DMU259		DMU260			DMU261		
Sampling Date		2016/11/23 08:45	2016/11/23 08:45		2016/11/23 09:15			2016/11/23 10:15		
COC Number		588515-01-01	588515-01-01		588515-01-01			588515-01-01		
	Units	**MW05-ST**	**MW05-ST Lab-Dup.**	**RDL**	**MW05-O**	**RDL**	**QC Batch**	**MW10-O**	**RDL**	**QC Batch**
Molybdenum (Mo)	ug/L	8.0		0.50	<0.50	0.50	4766801	1.9	0.50	4766801
Molybdenum (Mo)	ug/L	8.4		0.50	1.5	0.50	4768110	2.2	0.50	4768110
Nickel (Ni)	ug/L	1.0		1.0	<1.0	1.0	4766801	1.6	1.0	4766801
Nickel (Ni)	ug/L	18		1.0	36	1.0	4768110	7.5	1.0	4768110
Phosphorus (P)	ug/L	<100		100	<100	100	4766801	<100	100	4766801
Phosphorus (P)	ug/L	230		100	1100	100	4768110	<100	100	4768110
Potassium (K)	ug/L	9000		200	880	200	4766801	5800	200	4766801
Potassium (K)	ug/L	10000		200	6800	200	4768110	6900	200	4768110
Selenium (Se)	ug/L	<2.0		2.0	<2.0	2.0	4766801	<2.0	2.0	4766801
Selenium (Se)	ug/L	<2.0		2.0	<2.0	2.0	4768110	<2.0	2.0	4768110
Silicon (Si)	ug/L	7000		50	5600	50	4766801	9100	50	4766801
Silicon (Si)	ug/L	15000		50	42000	50	4768110	14000	50	4768110
Silver (Ag)	ug/L	<0.10		0.10	<0.10	0.10	4766801	<0.10	0.10	4766801
Silver (Ag)	ug/L	<0.10		0.10	0.15	0.10	4768110	<0.10	0.10	4768110
Sodium (Na)	ug/L	36000		100	8300	100	4766801	21000	100	4766801
Sodium (Na)	ug/L	37000		100	8900	100	4768110	22000	100	4768110
Strontium (Sr)	ug/L	7800		1.0	210	1.0	4766801	1200	1.0	4766801
Strontium (Sr)	ug/L	8600		1.0	450	1.0	4768110	1300	1.0	4768110
Tellurium	ug/L	<1.0		1.0	<1.0	1.0	4766801	<1.0	1.0	4766801
Tellurium	ug/L	<1.0		1.0	<1.0	1.0	4768110	<1.0	1.0	4768110
Thallium (Tl)	ug/L	<0.050		0.050	<0.050	0.050	4766801	<0.050	0.050	4766801
Thallium (Tl)	ug/L	<0.050		0.050	0.27	0.050	4768110	<0.050	0.050	4768110
Tin (Sn)	ug/L	<1.0		1.0	1.5	1.0	4766801	<1.0	1.0	4766801
Tin (Sn)	ug/L	3.4		1.0	4.1	1.0	4768110	2.7	1.0	4768110
Titanium (Ti)	ug/L	<5.0		5.0	<5.0	5.0	4766801	<5.0	5.0	4766801
Titanium (Ti)	ug/L	100		5.0	480	5.0	4768110	78	5.0	4768110
Tungsten (W)	ug/L	<1.0		1.0	<1.0	1.0	4766801	<1.0	1.0	4766801
Tungsten (W)	ug/L	<1.0		1.0	1.1	1.0	4768110	<1.0	1.0	4768110
Uranium (U)	ug/L	<0.10		0.10	2.0	0.10	4766801	1.5	0.10	4766801
Uranium (U)	ug/L	0.31		0.10	3.4	0.10	4768110	1.6	0.10	4768110
Vanadium (V)	ug/L	<0.50		0.50	<0.50	0.50	4766801	0.88	0.50	4766801
Vanadium (V)	ug/L	8.2		0.50	40	0.50	4768110	5.2	0.50	4768110
Zinc (Zn)	ug/L	6.3		5.0	<5.0	5.0	4766801	<5.0	5.0	4766801
Zinc (Zn)	ug/L	36		5.0	110	5.0	4768110	16	5.0	4768110
Zirconium (Zr)	ug/L	<1.0		1.0	<1.0	1.0	4766801	<1.0	1.0	4766801
Zirconium (Zr)	ug/L	3.8		1.0	2.1	1.0	4768110	2.0	1.0	4768110

RDL = Reportable Detection Limit
Lab-Dup = Laboratory Initiated Duplicate

ELEMENTS BY ATOMIC SPECTROSCOPY ()

Maxxam ID		DMU262		
Sampling Date		2016/11/23 16:00		
COC Number		588515-01-01		
	Units	**MW06-S**	**RDL**	**QC Batch**
Mercury (Hg)	mg/L	<0.0001	0.0001	4769511
Aluminum (Al)	ug/L	170	5.0	4766801
Aluminum (Al)	ug/L	220000	250	4768110
Antimony (Sb)	ug/L	<0.50	0.50	4766801
Antimony (Sb)	ug/L	<5.0	5.0	4768110
Arsenic (As)	ug/L	4.1	1.0	4766801
Arsenic (As)	ug/L	73	10	4768110
Barium (Ba)	ug/L	35	2.0	4766801
Barium (Ba)	ug/L	2700	20	4768110
Beryllium (Be)	ug/L	<0.50	0.50	4766801
Beryllium (Be)	ug/L	11	5.0	4768110
Bismuth (Bi)	ug/L	<1.0	1.0	4766801
Bismuth (Bi)	ug/L	<10	10	4768110
Boron (B)	ug/L	110	10	4766801
Boron (B)	ug/L	670	100	4768110
Cadmium (Cd)	ug/L	<0.10	0.10	4766801
Cadmium (Cd)	ug/L	1.4	1.0	4768110
Calcium (Ca)	ug/L	98000	200	4766801
Calcium (Ca)	ug/L	1000000	2000	4768110
Chromium (Cr)	ug/L	<5.0	5.0	4766801
Chromium (Cr)	ug/L	280	50	4768110
Cobalt (Co)	ug/L	0.96	0.50	4766801
Cobalt (Co)	ug/L	160	5.0	4768110
Copper (Cu)	ug/L	<1.0	1.0	4766801
Copper (Cu)	ug/L	250	10	4768110
Iron (Fe)	ug/L	480	100	4766801
Iron (Fe)	ug/L	290000	1000	4768110
Lead (Pb)	ug/L	<0.50	0.50	4766801
Lead (Pb)	ug/L	86	5.0	4768110
Lithium (Li)	ug/L	27	5.0	4766801
Lithium (Li)	ug/L	550	50	4768110
Magnesium (Mg)	ug/L	47000	50	4766801
Magnesium (Mg)	ug/L	190000	500	4768110
Manganese (Mn)	ug/L	43	2.0	4766801
Manganese (Mn)	ug/L	9900	20	4768110

RDL = Reportable Detection Limit

ELEMENTS BY ATOMIC SPECTROSCOPY ()

Maxxam ID		DMU262		
Sampling Date		2016/11/23 16:00		
COC Number		588515-01-01		
	Units	**MW06-S**	**RDL**	**QC Batch**
Molybdenum (Mo)	ug/L	1.5	0.50	4766801
Molybdenum (Mo)	ug/L	7.9	5.0	4768110
Nickel (Ni)	ug/L	<1.0	1.0	4766801
Nickel (Ni)	ug/L	330	10	4768110
Phosphorus (P)	ug/L	<100	100	4766801
Phosphorus (P)	ug/L	10000	1000	4768110
Potassium (K)	ug/L	5100	200	4766801
Potassium (K)	ug/L	78000	2000	4768110
Selenium (Se)	ug/L	<2.0	2.0	4766801
Selenium (Se)	ug/L	<20	20	4768110
Silicon (Si)	ug/L	9500	50	4766801
Silicon (Si)	ug/L	350000	500	4768110
Silver (Ag)	ug/L	<0.10	0.10	4766801
Silver (Ag)	ug/L	<1.0	1.0	4768110
Sodium (Na)	ug/L	15000	100	4766801
Sodium (Na)	ug/L	18000	1000	4768110
Strontium (Sr)	ug/L	4100	1.0	4766801
Strontium (Sr)	ug/L	5400	10	4768110
Tellurium	ug/L	<1.0	1.0	4766801
Tellurium	ug/L	<10	10	4768110
Thallium (Tl)	ug/L	<0.050	0.050	4766801
Thallium (Tl)	ug/L	2.2	0.50	4768110
Tin (Sn)	ug/L	<1.0	1.0	4766801
Tin (Sn)	ug/L	<10	10	4768110
Titanium (Ti)	ug/L	6.8	5.0	4766801
Titanium (Ti)	ug/L	4800	50	4768110
Tungsten (W)	ug/L	<1.0	1.0	4766801
Tungsten (W)	ug/L	<10	10	4768110
Uranium (U)	ug/L	1.1	0.10	4766801
Uranium (U)	ug/L	8.9	1.0	4768110
Vanadium (V)	ug/L	<0.50	0.50	4766801
Vanadium (V)	ug/L	340	5.0	4768110
Zinc (Zn)	ug/L	<5.0	5.0	4766801
Zinc (Zn)	ug/L	850	50	4768110
Zirconium (Zr)	ug/L	<1.0	1.0	4766801
Zirconium (Zr)	ug/L	70	10	4768110

RDL = Reportable Detection Limit

TEST SUMMARY

Maxxam ID: DMU253
Sample ID: MW06-D
Matrix:

Collected: 2016/11/23
Shipped:
Received: 2016/11/23

Test Description	Instrumentation	Batch		Date Analisis	Analyst
Alkalinity	AT	4765718	N/A	2016/11/25	Surinder Rai
Anions	IC	4770421	N/A	2016/11/29	Fari Dehdezi
Conductivity	AT	4765723	N/A	2016/11/25	Surinder Rai
Free (WAD) Cyanide	SKAL/CN	4765496	N/A	2016/11/25	Louise Harding
Fluoride	ISE	4765724	2016/11/25	2016/11/25	Surinder Rai
Hardness (calculated as CaCO3)		4764841	N/A	2016/11/29	Automated Statchk
Mercury	CV/AA	4769511	2016/11/29	2016/11/29	Magdalena Carlos
Dissolved Metals by ICPMS	ICP/MS	4766801	N/A	2016/11/29	Arefa Dabhad
Total Metals Analysis by ICPMS	ICP/MS	4768110	N/A	2016/11/28	Cristina Petran
Ammonia-N	LACH/NH4	4765614	N/A	2016/11/30	Charles Opoku-Ware
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	4765611	N/A	2016/11/28	Chandra Nandlal
pH	AT	4765726	N/A	2016/11/25	Surinder Rai
Phenols (4AAP)	TECH/PHEN	4768031	N/A	2016/11/28	Bramdeo Motiram
Orthophosphate	KONE	4765526	N/A	2016/11/28	Alina Dobreanu
SULPHIDE	ISE/S	4766760	N/A	2016/11/28	Neil Dassanayake
Total Dissolved Solids	BAL	4765523	2016/11/25	2016/11/25	Massarat Jan
Total Phosphorus (Colourimetric)	LACH/P	4765592	2016/11/25	2016/11/28	Sarabjit Raina
Total Suspended Solids	BAL	4765538	2016/11/25	2016/11/25	Gurpreet Kaur
Turbidity	AT	4765121	N/A	2016/11/29	Tahir Anwar

Maxxam ID: DMU253 Dup
Sample ID: MW06-D
Matrix:

Collected: 2016/11/23
Shipped:
Received: 2016/11/23

Test Description	Instrumentation	Batch		Date Analisis	Analyst
Phenols (4AAP)	TECH/PHEN	4768031	N/A	2016/11/28	Bramdeo Motiram

Maxxam ID: DMU254
Sample ID: MW10-I
Matrix:

Collected: 2016/11/23
Shipped:
Received: 2016/11/23

Test Description	Instrumentation	Batch		Date Analisis	Analyst
Alkalinity	AT	4765718	N/A	2016/11/26	Surinder Rai
Anions	IC	4767377	N/A	2016/11/29	Fari Dehdezi
Conductivity	AT	4765723	N/A	2016/11/26	Surinder Rai
Free (WAD) Cyanide	SKAL/CN	4765496	N/A	2016/11/25	Louise Harding
Fluoride	ISE	4765724	2016/11/25	2016/11/26	Surinder Rai
Hardness (calculated as CaCO3)		4764841	N/A	2016/11/29	Automated Statchk
Mercury	CV/AA	4769499	2016/11/29	2016/11/29	Magdalena Carlos
Dissolved Metals by ICPMS	ICP/MS	4766801	N/A	2016/11/29	Arefa Dabhad
Total Metals Analysis by ICPMS	ICP/MS	4768110	N/A	2016/11/28	Cristina Petran
Ammonia-N	LACH/NH4	4765614	N/A	2016/11/30	Charles Opoku-Ware
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	4765611	N/A	2016/11/28	Chandra Nandlal
pH	AT	4765726	N/A	2016/11/26	Surinder Rai
Phenols (4AAP)	TECH/PHEN	4768031	N/A	2016/11/28	Bramdeo Motiram

TEST SUMMARY

Maxxam ID: DMU254
Sample ID: MW10-I
Matrix:

Collected: 2016/11/23
Shipped:
Received: 2016/11/23

Test Description	Instrumentation	Batch		Date Analisis	Analyst
Orthophosphate	KONE	4765526	N/A	2016/11/28	Alina Dobreanu
SULPHIDE	ISE/S	4766760	N/A	2016/11/28	Neil Dassanayake
Total Dissolved Solids	BAL	4765410	2016/11/25	2016/11/25	Arpan Shah
Total Phosphorus (Colourimetric)	LACH/P	4765592	2016/11/25	2016/11/28	Sarabjit Raina
Total Suspended Solids	BAL	4765538	2016/11/25	2016/11/25	Gurpreet Kaur
Turbidity	AT	4765511	N/A	2016/11/26	Tahir Anwar

Maxxam ID: DMU255
Sample ID: MW04-I
Matrix:

Collected: 2016/11/23
Shipped:
Received: 2016/11/23

Test Description	Instrumentation	Batch		Date Analisis	Analyst
Alkalinity	AT	4765718	N/A	2016/11/25	Surinder Rai
Anions	IC	4766374	N/A	2016/11/28	Fari Dehdezi
Conductivity	AT	4765723	N/A	2016/11/25	Surinder Rai
Free (WAD) Cyanide	SKAL/CN	4765496	N/A	2016/11/25	Louise Harding
Fluoride	ISE	4765724	2016/11/25	2016/11/25	Surinder Rai
Hardness (calculated as CaCO3)		4764841	N/A	2016/11/29	Automated Statchk
Mercury	CV/AA	4769499	2016/11/29	2016/11/29	Magdalena Carlos
Dissolved Metals by ICPMS	ICP/MS	4766801	N/A	2016/11/29	Arefa Dabhad
Total Metals Analysis by ICPMS	ICP/MS	4768110	N/A	2016/11/28	Cristina Petran
Ammonia-N	LACH/NH4	4765614	N/A	2016/11/30	Charles Opoku-Ware
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	4765611	N/A	2016/11/28	Chandra Nandlal
pH	AT	4765726	N/A	2016/11/25	Surinder Rai
Phenols (4AAP)	TECH/PHEN	4768031	N/A	2016/11/28	Bramdeo Motiram
Orthophosphate	KONE	4765526	N/A	2016/11/28	Alina Dobreanu
SULPHIDE	ISE/S	4766760	N/A	2016/11/28	Neil Dassanayake
Total Dissolved Solids	BAL	4765410	2016/11/25	2016/11/25	Arpan Shah
Total Phosphorus (Colourimetric)	LACH/P	4765592	2016/11/25	2016/11/28	Sarabjit Raina
Total Suspended Solids	BAL	4765538	2016/11/25	2016/11/25	Gurpreet Kaur
Turbidity	AT	4765121	N/A	2016/11/28	Tahir Anwar

Maxxam ID: DMU256
Sample ID: MW04-D
Matrix:

Collected: 2016/11/23
Shipped:
Received: 2016/11/23

Test Description	Instrumentation	Batch		Date Analisis	Analyst
Alkalinity	AT	4765718	N/A	2016/11/26	Surinder Rai
Anions	IC	4767377	N/A	2016/11/29	Fari Dehdezi
Conductivity	AT	4765723	N/A	2016/11/26	Surinder Rai
Free (WAD) Cyanide	SKAL/CN	4765496	N/A	2016/11/25	Louise Harding
Fluoride	ISE	4765724	2016/11/25	2016/11/26	Surinder Rai
Hardness (calculated as CaCO3)		4764841	N/A	2016/11/29	Automated Statchk
Mercury	CV/AA	4769511	2016/11/29	2016/11/29	Magdalena Carlos
Dissolved Metals by ICPMS	ICP/MS	4766801	N/A	2016/11/29	Arefa Dabhad

TEST SUMMARY

Maxxam ID: DMU256
Sample ID: MW04-D
Matrix:

Collected: 2016/11/23
Shipped:
Received: 2016/11/23

Test Description	Instrumentation	Batch		Date Analisis	Analyst
Total Metals Analysis by ICPMS	ICP/MS	4768110	N/A	2016/11/28	Cristina Petran
Ammonia-N	LACH/NH4	4765614	N/A	2016/11/30	Charles Opoku-Ware
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	4765611	N/A	2016/11/28	Chandra Nandlal
pH	AT	4765726	N/A	2016/11/26	Surinder Rai
Phenols (4AAP)	TECH/PHEN	4768031	N/A	2016/11/28	Bramdeo Motiram
Orthophosphate	KONE	4765526	N/A	2016/11/28	Alina Dobreanu
SULPHIDE	ISE/S	4766760	N/A	2016/11/28	Neil Dassanayake
Total Dissolved Solids	BAL	4765410	2016/11/25	2016/11/25	Arpan Shah
Total Phosphorus (Colourimetric)	LACH/P	4765592	2016/11/25	2016/11/28	Sarabjit Raina
Total Suspended Solids	BAL	4765538	2016/11/25	2016/11/25	Gurpreet Kaur
Turbidity	AT	4765511	N/A	2016/11/26	Tahir Anwar

Maxxam ID: DMU256 Dup
Sample ID: MW04-D
Matrix:

Collected: 2016/11/23
Shipped:
Received: 2016/11/23

Test Description	Instrumentation	Batch		Date Analisis	Analyst
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	4765611	N/A	2016/11/28	Chandra Nandlal

Maxxam ID: DMU257
Sample ID: MW04-S
Matrix:

Collected: 2016/11/23
Shipped:
Received: 2016/11/23

Test Description	Instrumentation	Batch		Date Analisis	Analyst
Alkalinity	AT	4765718	N/A	2016/11/26	Surinder Rai
Anions	IC	4766374	N/A	2016/11/28	Fari Dehdezi
Conductivity	AT	4765723	N/A	2016/11/26	Surinder Rai
Free (WAD) Cyanide	SKAL/CN	4765496	N/A	2016/11/25	Louise Harding
Fluoride	ISE	4765724	2016/11/25	2016/11/26	Surinder Rai
Hardness (calculated as CaCO3)		4764841	N/A	2016/11/29	Automated Statchk
Mercury	CV/AA	4769499	2016/11/29	2016/11/29	Magdalena Carlos
Dissolved Metals by ICPMS	ICP/MS	4766801	N/A	2016/11/29	Arefa Dabhad
Total Metals Analysis by ICPMS	ICP/MS	4768110	N/A	2016/11/28	Cristina Petran
Ammonia-N	LACH/NH4	4765614	N/A	2016/11/30	Charles Opoku-Ware
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	4765611	N/A	2016/11/28	Chandra Nandlal
pH	AT	4765726	N/A	2016/11/26	Surinder Rai
Phenols (4AAP)	TECH/PHEN	4768031	N/A	2016/11/28	Bramdeo Motiram
Orthophosphate	KONE	4765526	N/A	2016/11/28	Alina Dobreanu
SULPHIDE	ISE/S	4766760	N/A	2016/11/28	Neil Dassanayake
Total Dissolved Solids	BAL	4765858	2016/11/25	2016/11/26	Arpan Shah
Total Phosphorus (Colourimetric)	LACH/P	4765592	2016/11/25	2016/11/28	Sarabjit Raina
Total Suspended Solids	BAL	4765538	2016/11/25	2016/11/25	Gurpreet Kaur
Turbidity	AT	4765511	N/A	2016/11/26	Tahir Anwar

TEST SUMMARY

Maxxam ID: DMU258
Sample ID: DUP 1
Matrix:

Collected: 2016/11/23
Shipped:
Received: 2016/11/23

Test Description	Instrumentation	Batch		Date Analisis	Analyst
Alkalinity	AT	4765718	N/A	2016/11/25	Surinder Rai
Anions	IC	4766374	N/A	2016/11/28	Fari Dehdezi
Conductivity	AT	4765723	N/A	2016/11/25	Surinder Rai
Free (WAD) Cyanide	SKAL/CN	4765496	N/A	2016/11/25	Louise Harding
Fluoride	ISE	4765724	2016/11/25	2016/11/25	Surinder Rai
Hardness (calculated as CaCO3)		4764841	N/A	2016/11/29	Automated Statchk
Mercury	CV/AA	4769511	2016/11/29	2016/11/29	Magdalena Carlos
Dissolved Metals by ICPMS	ICP/MS	4766801	N/A	2016/11/29	Arefa Dabhad
Total Metals Analysis by ICPMS	ICP/MS	4768110	N/A	2016/11/28	Cristina Petran
Ammonia-N	LACH/NH4	4765614	N/A	2016/11/30	Charles Opoku-Ware
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	4765611	N/A	2016/11/28	Chandra Nandlal
pH	AT	4765726	N/A	2016/11/25	Surinder Rai
Phenols (4AAP)	TECH/PHEN	4768031	N/A	2016/11/28	Bramdeo Motiram
Orthophosphate	KONE	4765526	N/A	2016/11/28	Alina Dobreanu
SULPHIDE	ISE/S	4766760	N/A	2016/11/28	Neil Dassanayake
Total Dissolved Solids	BAL	4765523	2016/11/25	2016/11/25	Massarat Jan
Total Phosphorus (Colourimetric)	LACH/P	4765592	2016/11/25	2016/11/28	Sarabjit Raina
Total Suspended Solids	BAL	4765538	2016/11/25	2016/11/25	Gurpreet Kaur
Turbidity	AT	4765121	N/A	2016/11/28	Tahir Anwar

Maxxam ID: DMU259
Sample ID: MW05-ST
Matrix:

Collected: 2016/11/23
Shipped:
Received: 2016/11/23

Test Description	Instrumentation	Batch		Date Analisis	Analyst
Alkalinity	AT	4765718	N/A	2016/11/25	Surinder Rai
Anions	IC	4770421	N/A	2016/11/29	Fari Dehdezi
Conductivity	AT	4765723	N/A	2016/11/25	Surinder Rai
Free (WAD) Cyanide	SKAL/CN	4765496	N/A	2016/11/25	Louise Harding
Fluoride	ISE	4765724	2016/11/25	2016/11/25	Surinder Rai
Hardness (calculated as CaCO3)		4764841	N/A	2016/11/29	Automated Statchk
Mercury	CV/AA	4769511	2016/11/29	2016/11/29	Magdalena Carlos
Dissolved Metals by ICPMS	ICP/MS	4766801	N/A	2016/11/29	Arefa Dabhad
Total Metals Analysis by ICPMS	ICP/MS	4768110	N/A	2016/11/28	Cristina Petran
Ammonia-N	LACH/NH4	4765614	N/A	2016/11/30	Charles Opoku-Ware
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	4765649	N/A	2016/11/28	Chandra Nandlal
pH	AT	4765726	N/A	2016/11/25	Surinder Rai
Phenols (4AAP)	TECH/PHEN	4768031	N/A	2016/11/28	Bramdeo Motiram
Orthophosphate	KONE	4765526	N/A	2016/11/28	Alina Dobreanu
SULPHIDE	ISE/S	4766760	N/A	2016/11/28	Neil Dassanayake
Total Dissolved Solids	BAL	4765858	2016/11/25	2016/11/26	Arpan Shah
Total Phosphorus (Colourimetric)	LACH/P	4765592	2016/11/25	2016/11/28	Sarabjit Raina
Total Suspended Solids	BAL	4765538	2016/11/25	2016/11/25	Gurpreet Kaur
Turbidity	AT	4765121	N/A	2016/11/29	Tahir Anwar

TEST SUMMARY

Maxxam ID: DMU259 Dup
Sample ID: MW05-ST
Matrix:

Collected: 2016/11/23
Shipped:
Received: 2016/11/23

Test Description	Instrumentation	Batch		Date Analisis	Analyst
Alkalinity	AT	4765718	N/A	2016/11/25	Surinder Rai
Conductivity	AT	4765723	N/A	2016/11/25	Surinder Rai
Fluoride	ISE	4765724	2016/11/25	2016/11/25	Surinder Rai
Mercury	CV/AA	4769511	2016/11/29	2016/11/29	Magdalena Carlos
pH	AT	4765726	N/A	2016/11/25	Surinder Rai

Maxxam ID: DMU260
Sample ID: MW05-O
Matrix:

Collected: 2016/11/23
Shipped:
Received: 2016/11/23

Test Description	Instrumentation	Batch		Date Analisis	Analyst
Alkalinity	AT	4765718	N/A	2016/11/25	Surinder Rai
Anions	IC	4766374	N/A	2016/11/28	Fari Dehdezi
Conductivity	AT	4765723	N/A	2016/11/25	Surinder Rai
Free (WAD) Cyanide	SKAL/CN	4765496	N/A	2016/11/25	Louise Harding
Fluoride	ISE	4765724	2016/11/25	2016/11/25	Surinder Rai
Hardness (calculated as CaCO3)		4764841	N/A	2016/11/29	Automated Statchk
Mercury	CV/AA	4769511	2016/11/29	2016/11/29	Magdalena Carlos
Dissolved Metals by ICPMS	ICP/MS	4766801	N/A	2016/11/29	Arefa Dabhad
Total Metals Analysis by ICPMS	ICP/MS	4768110	N/A	2016/11/28	Cristina Petran
Ammonia-N	LACH/NH4	4765614	N/A	2016/11/30	Charles Opoku-Ware
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	4765611	N/A	2016/11/28	Chandra Nandlal
pH	AT	4765726	N/A	2016/11/25	Surinder Rai
Phenols (4AAP)	TECH/PHEN	4768031	N/A	2016/11/28	Bramdeo Motiram
Orthophosphate	KONE	4765526	N/A	2016/11/28	Alina Dobreanu
SULPHIDE	ISE/S	4766760	N/A	2016/11/28	Neil Dassanayake
Total Dissolved Solids	BAL	4765410	2016/11/25	2016/11/25	Arpan Shah
Total Phosphorus (Colourimetric)	LACH/P	4765592	2016/11/25	2016/11/28	Sarabjit Raina
Total Suspended Solids	BAL	4765538	2016/11/25	2016/11/25	Gurpreet Kaur
Turbidity	AT	4765121	N/A	2016/11/29	Tahir Anwar

Maxxam ID: DMU261
Sample ID: MW10-O
Matrix:

Collected: 2016/11/23
Shipped:
Received: 2016/11/23

Test Description	Instrumentation	Batch		Date Analisis	Analyst
Alkalinity	AT	4765718	N/A	2016/11/26	Surinder Rai
Anions	IC	4770421	N/A	2016/11/29	Fari Dehdezi
Conductivity	AT	4765723	N/A	2016/11/26	Surinder Rai
Free (WAD) Cyanide	SKAL/CN	4765496	N/A	2016/11/25	Louise Harding
Fluoride	ISE	4765724	2016/11/25	2016/11/26	Surinder Rai
Hardness (calculated as CaCO3)		4764841	N/A	2016/11/29	Automated Statchk
Mercury	CV/AA	4769499	2016/11/29	2016/11/29	Magdalena Carlos
Dissolved Metals by ICPMS	ICP/MS	4766801	N/A	2016/11/29	Arefa Dabhad
Total Metals Analysis by ICPMS	ICP/MS	4768110	N/A	2016/11/28	Cristina Petran

TEST SUMMARY

Maxxam ID: DMU261
Sample ID: MW10-O
Matrix:

Collected: 2016/11/23
Shipped:
Received: 2016/11/23

Test Description	Instrumentation	Batch		Date Analisis	Analyst
Ammonia-N	LACH/NH4	4765614	N/A	2016/11/30	Charles Opoku-Ware
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	4765611	N/A	2016/11/28	Chandra Nandlal
pH	AT	4765726	N/A	2016/11/26	Surinder Rai
Phenols (4AAP)	TECH/PHEN	4768031	N/A	2016/11/28	Bramdeo Motiram
Orthophosphate	KONE	4765526	N/A	2016/11/28	Alina Dobreanu
SULPHIDE	ISE/S	4766760	N/A	2016/11/28	Neil Dassanayake
Total Dissolved Solids	BAL	4765523	2016/11/25	2016/11/25	Massarat Jan
Total Phosphorus (Colourimetric)	LACH/P	4765592	2016/11/25	2016/11/28	Sarabjit Raina
Total Suspended Solids	BAL	4765538	2016/11/25	2016/11/25	Gurpreet Kaur
Turbidity	AT	4765511	N/A	2016/11/26	Tahir Anwar

Maxxam ID: DMU261 Dup
Sample ID: MW10-O
Matrix:

Collected: 2016/11/23
Shipped:
Received: 2016/11/23

Test Description	Instrumentation	Batch		Date Analisis	Analyst
Anions	IC	4770421	N/A	2016/11/29	Fari Dehdezi

Maxxam ID: DMU262
Sample ID: MW06-S
Matrix:

Collected: 2016/11/23
Shipped:
Received: 2016/11/23

Test Description	Instrumentation	Batch		Date Analisis	Analyst
Alkalinity	AT	4765718	N/A	2016/11/26	Surinder Rai
Anions	IC	4766374	N/A	2016/11/28	Fari Dehdezi
Conductivity	AT	4765723	N/A	2016/11/26	Surinder Rai
Free (WAD) Cyanide	SKAL/CN	4765496	N/A	2016/11/25	Louise Harding
Fluoride	ISE	4765724	2016/11/25	2016/11/26	Surinder Rai
Hardness (calculated as CaCO3)		4764841	N/A	2016/11/29	Automated Statchk
Mercury	CV/AA	4769511	2016/11/29	2016/11/29	Magdalena Carlos
Dissolved Metals by ICPMS	ICP/MS	4766801	N/A	2016/11/29	Arefa Dabhad
Total Metals Analysis by ICPMS	ICP/MS	4768110	N/A	2016/11/28	Cristina Petran
Ammonia-N	LACH/NH4	4765614	N/A	2016/11/30	Charles Opoku-Ware
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	4765611	N/A	2016/11/28	Chandra Nandlal
pH	AT	4765726	N/A	2016/11/26	Surinder Rai
Phenols (4AAP)	TECH/PHEN	4768031	N/A	2016/11/28	Bramdeo Motiram
Orthophosphate	KONE	4765526	N/A	2016/11/28	Alina Dobreanu
SULPHIDE	ISE/S	4766760	N/A	2016/11/28	Neil Dassanayake
Total Dissolved Solids	BAL	4765858	2016/11/25	2016/11/26	Arpan Shah
Total Phosphorus (Colourimetric)	LACH/P	4765592	2016/11/25	2016/11/29	Sarabjit Raina
Total Suspended Solids	BAL	4767182	2016/11/26	2016/11/26	Arpan Shah
Turbidity	AT	4765511	N/A	2016/11/26	Tahir Anwar

GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	5.3°C
Package 2	6.7°C

Sample DMU253 [MW06-D] : Metal Analysis:Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.

Anions Analysis: Due to the sample matrix, sample required dilution. Detection limits were adjusted accordingly.

Sample DMU255 [MW04-I] : Metal Analysis:Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.

Sample DMU256 [MW04-D] : Metal Analysis:Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.
Anions Analysis: Due to the sample matrix, sample required dilution. Detection limits were adjusted accordingly.

Results relate only to the items tested.

QUALITY ASSURANCE REPORT

			MATRIX SPIKE		Spiked Blank		Method Blank		RPD		Estandar C.C.	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
4765121	Turbidity	2016/11/28			97	85 - 115	<0.1	NTU	18	20		
4765410	Dissolved Solids	2016/11/25					<10	mg/L	2.0	25	97	90 - 110
4765496	Free Cyanide	2016/11/25	72 (1)	80 - 120	103	80 - 120	<0.0010	mg/L	NC	20		
4765511	Turbidity	2016/11/26			96	85 - 115	<0.1	NTU	0.44	20		
4765523	Dissolved Solids	2016/11/25					<10	mg/L	1.9	25	99	90 - 110
4765526	Orthophosphate (P)	2016/11/28	107	75 - 125	99	80 - 120	<0.010	mg/L	NC	25		
4765538	Solids	2016/11/25					<1	mg/L	NC	25	100	85 - 115
4765592	Phosphorus	2016/11/28	NC	80 - 120	90	80 - 120	<0.004	mg/L	0.49	20	94	80 - 120
4765611	Nitrate (N)	2016/11/28	100	80 - 120	103	80 - 120	<0.10	mg/L	NC	20		
4765611	Nitrite (N)	2016/11/28	90	80 - 120	94	80 - 120	<0.010	mg/L	4.9	20		
4765614	Ammonia-N	2016/11/30	105	80 - 120	103	85 - 115	<0.050	mg/L	NC	20		
4765649	Nitrate (N)	2016/11/28	97	80 - 120	100	80 - 120	<0.10	mg/L	NC	20		
4765649	Nitrite (N)	2016/11/28	93	80 - 120	93	80 - 120	<0.010	mg/L	NC	20		
4765718	Alkalinity (Total as CaCO3)	2016/11/25			95	85 - 115	<1.0	mg/L	1.6	20		
4765723	Conductivity	2016/11/25			99	85 - 115	<1.0	umho/cm	0.49	25		
4765724	Fluoride (F-)	2016/11/25	94	80 - 120	96	80 - 120	<0.10	mg/L	NC	20		
4765726	pH	2016/11/25			102	98 - 103			0.16	N/A		
4765858	Dissolved Solids	2016/11/26					<10	mg/L	NC	25	99	90 - 110
4766374	Bromide (Br-)	2016/11/28	94	80 - 120	103	80 - 120	<1.0	mg/L	NC	20		
4766374	Chloride (Cl)	2016/11/28	93	80 - 120	101	70 - 130	<1.0	mg/L	2.1	20		
4766374	Sulphate (SO4)	2016/11/28	93	80 - 120	99	80 - 120	<1.0	mg/L	1.7	20		
4766760	Sulphide	2016/11/28	83	80 - 120	96	80 - 120	<0.020	mg/L	NC	20		
4766801	Aluminum (Al)	2016/11/29	98	80 - 120	100	80 - 120	<5.0	ug/L				
4766801	Antimony (Sb)	2016/11/29	100	80 - 120	98	80 - 120	<0.50	ug/L				
4766801	Arsenic (As)	2016/11/29	97	80 - 120	99	80 - 120	<1.0	ug/L				
4766801	Barium (Ba)	2016/11/29	94	80 - 120	99	80 - 120	<2.0	ug/L				
4766801	Beryllium (Be)	2016/11/29	98	80 - 120	101	80 - 120	<0.50	ug/L				
4766801	Bismuth (Bi)	2016/11/29	93	80 - 120	91	80 - 120	<1.0	ug/L				
4766801	Boron (B)	2016/11/29	94	80 - 120	97	80 - 120	<10	ug/L				
4766801	Cadmium (Cd)	2016/11/29	98	80 - 120	97	80 - 120	<0.10	ug/L				

QUALITY ASSURANCE REPORT(CONT'D)

			MATRIX SPIKE		Spiked Blank		Method Blank		RPD		Estandar C.C.	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
4766801	Calcium (Ca)	2016/11/29	NC	80 - 120	97	80 - 120	<200	ug/L	0.96	20		
4766801	Chromium (Cr)	2016/11/29	98	80 - 120	100	80 - 120	<5.0	ug/L				
4766801	Cobalt (Co)	2016/11/29	94	80 - 120	96	80 - 120	<0.50	ug/L				
4766801	Copper (Cu)	2016/11/29	96	80 - 120	103	80 - 120	<1.0	ug/L				
4766801	Iron (Fe)	2016/11/29	96	80 - 120	98	80 - 120	<100	ug/L	NC	20		
4766801	Lead (Pb)	2016/11/29	93	80 - 120	93	80 - 120	<0.50	ug/L				
4766801	Lithium (Li)	2016/11/29	99	80 - 120	104	80 - 120	<5.0	ug/L				
4766801	Magnesium (Mg)	2016/11/29	NC	80 - 120	103	80 - 120	<50	ug/L	3.0	20		
4766801	Manganese (Mn)	2016/11/29	95	80 - 120	96	80 - 120	<2.0	ug/L	1.7	20		
4766801	Molybdenum (Mo)	2016/11/29	101	80 - 120	97	80 - 120	<0.50	ug/L				
4766801	Nickel (Ni)	2016/11/29	90	80 - 120	97	80 - 120	<1.0	ug/L				
4766801	Phosphorus (P)	2016/11/29	108	80 - 120	112	80 - 120	<100	ug/L				
4766801	Potassium (K)	2016/11/29	99	80 - 120	104	80 - 120	<200	ug/L	2.3	20		
4766801	Selenium (Se)	2016/11/29	93	80 - 120	98	80 - 120	<2.0	ug/L				
4766801	Silicon (Si)	2016/11/29	95	80 - 120	101	80 - 120	<50	ug/L				
4766801	Silver (Ag)	2016/11/29	59 (1)	80 - 120	91	80 - 120	<0.10	ug/L				
4766801	Sodium (Na)	2016/11/29	97	80 - 120	102	80 - 120	<100	ug/L	2.0	20		
4766801	Strontium (Sr)	2016/11/29	98	80 - 120	95	80 - 120	<1.0	ug/L				
4766801	Tellurium	2016/11/29	96	80 - 120	99	80 - 120	<1.0	ug/L				
4766801	Thallium (Tl)	2016/11/29	92	80 - 120	94	80 - 120	<0.050	ug/L				
4766801	Tin (Sn)	2016/11/29	101	80 - 120	104	80 - 120	<1.0	ug/L				
4766801	Titanium (Ti)	2016/11/29	95	80 - 120	101	80 - 120	<5.0	ug/L				
4766801	Tungsten (W)	2016/11/29	94	80 - 120	94	80 - 120	<1.0	ug/L				
4766801	Uranium (U)	2016/11/29	93	80 - 120	95	80 - 120	<0.10	ug/L				
4766801	Vanadium (V)	2016/11/29	96	80 - 120	98	80 - 120	<0.50	ug/L				
4766801	Zinc (Zn)	2016/11/29	95	80 - 120	97	80 - 120	<5.0	ug/L				
4766801	Zirconium (Zr)	2016/11/29	100	80 - 120	100	80 - 120	<1.0	ug/L				
4767182	Solids	2016/11/26					<10	mg/L	NC	25	97	85 - 115
4767377	Bromide (Br-)	2016/11/29	95	80 - 120	99	80 - 120	<1.0	mg/L	NC	20		
4767377	Chloride (Cl)	2016/11/29	94	80 - 120	97	70 - 130	<1.0	mg/L	4.9	20		
4767377	Sulphate (SO4)	2016/11/29	NC	80 - 120	97	80 - 120	<1.0	mg/L	0.23	20		

QUALITY ASSURANCE REPORT(CONT'D)

			MATRIX SPIKE		Spiked Blank		Method Blank		RPD		Estandar C.C.	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
4768031	Phenols-4AAP	2016/11/28	99	80 - 120	98	85 - 115	<0.0010	mg/L	11	20		
4768110	Aluminum (Al)	2016/11/28	99	80 - 120	102	80 - 120	<5.0	ug/L	NC	20		
4768110	Antimony (Sb)	2016/11/28	106	80 - 120	106	80 - 120	<0.50	ug/L	NC	20		
4768110	Arsenic (As)	2016/11/28	98	80 - 120	101	80 - 120	<1.0	ug/L	NC	20		
4768110	Barium (Ba)	2016/11/28	96	80 - 120	100	80 - 120	<2.0	ug/L	3.0	20		
4768110	Beryllium (Be)	2016/11/28	104	80 - 120	105	80 - 120	<0.50	ug/L	NC	20		
4768110	Bismuth (Bi)	2016/11/28	95	80 - 120	98	80 - 120	<1.0	ug/L				
4768110	Boron (B)	2016/11/28	98	80 - 120	103	80 - 120	<10	ug/L	1.6	20		
4768110	Cadmium (Cd)	2016/11/28	101	80 - 120	103	80 - 120	<0.10	ug/L	NC	20		
4768110	Calcium (Ca)	2016/11/28	NC	80 - 120	98	80 - 120	<200	ug/L	2.5	20		
4768110	Chromium (Cr)	2016/11/28	97	80 - 120	100	80 - 120	<5.0	ug/L	NC	20		
4768110	Cobalt (Co)	2016/11/28	95	80 - 120	100	80 - 120	<0.50	ug/L	NC	20		
4768110	Copper (Cu)	2016/11/28	97	80 - 120	102	80 - 120	<1.0	ug/L	NC	20		
4768110	Iron (Fe)	2016/11/28	97	80 - 120	101	80 - 120	<100	ug/L	2.9	20		
4768110	Lead (Pb)	2016/11/28	97	80 - 120	100	80 - 120	<0.50	ug/L	NC	20		
4768110	Lithium (Li)	2016/11/28	102	80 - 120	103	80 - 120	<5.0	ug/L				
4768110	Magnesium (Mg)	2016/11/28	NC	80 - 120	100	80 - 120	<50	ug/L	3.2	20		
4768110	Manganese (Mn)	2016/11/28	95	80 - 120	101	80 - 120	<2.0	ug/L	5.3	20		
4768110	Molybdenum (Mo)	2016/11/28	104	80 - 120	103	80 - 120	<0.50	ug/L	NC	20		
4768110	Nickel (Ni)	2016/11/28	94	80 - 120	100	80 - 120	<1.0	ug/L	NC	20		
4768110	Phosphorus (P)	2016/11/28	104	80 - 120	99	80 - 120	<100	ug/L				
4768110	Potassium (K)	2016/11/28	95	80 - 120	100	80 - 120	<200	ug/L	3.8	20		
4768110	Selenium (Se)	2016/11/28	100	80 - 120	105	80 - 120	<2.0	ug/L	NC	20		
4768110	Silicon (Si)	2016/11/28	97	80 - 120	101	80 - 120	<50	ug/L	2.7	20		
4768110	Silver (Ag)	2016/11/28	98	80 - 120	102	80 - 120	<0.10	ug/L	NC	20		
4768110	Sodium (Na)	2016/11/28	NC	80 - 120	99	80 - 120	<100	ug/L	2.2	20		
4768110	Strontium (Sr)	2016/11/28	NC	80 - 120	101	80 - 120	<1.0	ug/L	4.0	20		
4768110	Tellurium	2016/11/28	102	80 - 120	109	80 - 120	<1.0	ug/L				
4768110	Thallium (Tl)	2016/11/28	96	80 - 120	98	80 - 120	<0.050	ug/L	NC	20		
4768110	Tin (Sn)	2016/11/28	102	80 - 120	106	80 - 120	<1.0	ug/L				
4768110	Titanium (Ti)	2016/11/28	99	80 - 120	101	80 - 120	<5.0	ug/L	NC	20		

QUALITY ASSURANCE REPORT(CONT'D)

			MATRIX SPIKE		Spiked Blank		Method Blank		RPD		Estandar C.C.	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
4768110	Tungsten (W)	2016/11/28	102	80 - 120	102	80 - 120	<1.0	ug/L				
4768110	Uranium (U)	2016/11/28	102	80 - 120	103	80 - 120	<0.10	ug/L	NC	20		
4768110	Vanadium (V)	2016/11/28	98	80 - 120	101	80 - 120	<0.50	ug/L	NC	20		
4768110	Zinc (Zn)	2016/11/28	97	80 - 120	104	80 - 120	<5.0	ug/L	NC	20		
4768110	Zirconium (Zr)	2016/11/28	104	80 - 120	105	80 - 120	<1.0	ug/L				
4769499	Mercury (Hg)	2016/11/29	108	75 - 125	102	80 - 120	<0.0001	mg/L	NC	20		
4769511	Mercury (Hg)	2016/11/29	106	75 - 125	101	80 - 120	<0.0001	mg/L	NC	20		
4770421	Bromide (Br-)	2016/11/29	94	80 - 120	99	80 - 120	<1.0	mg/L	NC	20		
4770421	Chloride (Cl)	2016/11/29	96	80 - 120	97	70 - 130	<1.0	mg/L	NC	20		
4770421	Sulphate (SO4)	2016/11/29	96	80 - 120	98	80 - 120	<1.0	mg/L	3.4	20		

CAMP_99992

CAMP_99995

CAMP_99997

CAMP_99998

CAMP_99999

CAMP_NCMATRIX

CAMP_NCDUPLICATE

(1) CAMP_GENERAL

VALIDATION SIGNATURE PAGE

SIGPAGECOMMENT1

Cristina Carriere

Cristina Carriere

ESIGCOMMENT1

Maxxam A Bureau Veritas Group Company IMMEDIATE TEST Maxxam Analytics International Corporation o/a Maxxam Analytics
6740 Campobello Road, Mississauga, Ontario Canada L5N 2L8 Tel (905) 817-5700 Toll-free 800-563-6266 Fax (905) 817-5777 www.maxxam.ca

CHAIN OF CUSTODY RECORD

Page of

INVOICE TO:

Company Name: #1326 Golder Associates Ltd
Attention: Accounts Payable
Address: 6925 Century Ave Suite 100
Mississauga ON L5N 7K2
Tel: (905) 567-4444 Fax: (905) 567-6561
Email: AP-CustomerService@golder.com

REPORT TO:

Company Name:
Attention: Sharon Wood
Address:
Tel: (905) 567-6100 x1117 Fax:
Email: Sharon_Wood@golder.com

PROJECT INFORMATION:

Quotation #: B41022
P.O. #:
Project: 021-1228
Project Name:
Site #: Tansley Quarry
Sampled By:

Laboratory Use Only:

Maxxam Job #:
Bottle Order #: 588515
COC #: C#588515-01-01
Project Manager: Ema Gitej

MOE REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE MAXXAM DRINKING WATER CHAIN OF CUSTODY

Regulation 153 (2011)

☐ Table 1 ☐ Res/Park ☐ Medium/Fine
☐ Table 2 ☐ Ind/Comm ☐ Coarse
☐ Table 3 ☐ Agri/Other ☐ **For RSC**
☐ Table ___

Other Regulations

☐ CCME ☐ Sanitary Sewer Bylaw
☐ Reg 558 ☐ Storm Sewer Bylaw
☐ MISA Municipality ______
☒ PWQO
☒ Other ODWS

Special Instructions

Include Criteria on Certificate of Analysis (Y/N)? ______

ANALYSIS REQUESTED (PLEASE BE SPECIFIC)

Turnaround Time (TAT) Required:

Please provide advance notice for rush projects

Regular (Standard) TAT: ☒
(will be applied if Rush TAT is not specified):
Standard TAT = 5-7 Working days for most tests.
Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

Job Specific Rush TAT (if applies to entire submission)
Date Required: ______ Time Required: ______ ☐
Rush Confirmation Number: ______ *(call lab for #)*

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Field Filtered (please circle): Metals / Hg / Cr VI	ON-SITE GROUNDWATER	# of Bottles	Comments
1	mw06-D		NOV 23/16	13:40	GW	Y	X	6	
2	mw10-I			10:00	GW	Y	X	10	
3	mw04-I			13:00	GW	Y	X	10	
4	mw04-D			11:00	GW	Y	X	10	
5	mw04-S			11:30	GW	Y	X	10	
6	DUP 1			–	GW	Y	X	10	
7	mw05-ST			8:45	GW	Y	X	10	
8	mw05-O			9:15	GW	Y	X	10	
9	mw10-O			10:15	GW	Y	X	10	
10	mw06-I			16:00	GW	Y	X	10	High Sed?

23-Nov-16 17:24
Ema Gitej
B6P5551
TSP ENV-1268

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted
Andrey Fomenko	16/11/23	1720	Asad Bhatti	2016/11/23	17:24	

Laboratory Use Only

Time Sensitive	Temperature (°C) on Receipt	Custody Seal	Yes	No
	5/5/6 7/6/7	Present		✓
		Intact		✓

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

SAMPLES MUST BE KEPT COOL (< 10° C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

White: Maxxam Yellow: Client

Maxxam Analytics International Corporation o/a Maxxam Analytics

Your Project #: 021-1228
Site#: Tansley Quarry
Your C.O.C. #: 586660-03-01

Attention:Josip Balaban

Golder Associates Ltd
Mississauga - Standing Offer
6925 Century Ave
Suite 100
Mississauga, ON
CANADA L5N 7K2

Report Date: 2016/12/05
Report #: R4275087
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B6P6843
Received: 2016/11/24, 17:33

Sample Matrix: Water
Samples Received: 9

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Alkalinity	8	N/A	2016/11/30	CAM SOP-00448	SM 22 2320 B m
Alkalinity	1	N/A	2016/12/02	CAM SOP-00448	SM 22 2320 B m
Anions	8	N/A	2016/11/30	CAM SOP-00435	SM 22 4110 B m
Anions	1	N/A	2016/12/01	CAM SOP-00435	SM 22 4110 B m
Conductivity	9	N/A	2016/11/30	CAM SOP-00414	SM 22 2510 m
Free (WAD) Cyanide	2	N/A	2016/11/28	CAM SOP-00457	OMOE E3015 m
Free (WAD) Cyanide	7	N/A	2016/11/29	CAM SOP-00457	OMOE E3015 m
Fluoride	9	2016/11/25	2016/11/30	CAM SOP-00449	SM 22 4500-F C m
Hardness (calculated as CaCO3)	3	N/A	2016/11/29	CAM SOP 00102/00408/00447	SM 2340 B
Hardness (calculated as CaCO3)	6	N/A	2016/12/01	CAM SOP 00102/00408/00447	SM 2340 B
Mercury in Water by CVAA	2	2016/11/29	2016/11/30	CAM SOP-00453	EPA 7470A m
Mercury in Water by CVAA	7	2016/11/30	2016/11/30	CAM SOP-00453	EPA 7470A m
Dissolved Metals by ICPMS	3	N/A	2016/11/29	CAM SOP-00447	EPA 6020B m
Dissolved Metals by ICPMS	5	N/A	2016/11/30	CAM SOP-00447	EPA 6020B m
Dissolved Metals by ICPMS	1	N/A	2016/12/02	CAM SOP-00447	EPA 6020B m
Total Metals Analysis by ICPMS	9	N/A	2016/11/29	CAM SOP-00447	EPA 6020B m
Total Ammonia-N	9	N/A	2016/12/01	CAM SOP-00441	EPA GS I-2522-90 m
Nitrate (NO3) and Nitrite (NO2) in Water (1)	2	N/A	2016/11/29	CAM SOP-00440	SM 22 4500-NO3I/NO2B
Nitrate (NO3) and Nitrite (NO2) in Water (1)	7	N/A	2016/11/30	CAM SOP-00440	SM 22 4500-NO3I/NO2B
pH	9	N/A	2016/11/30	CAM SOP-00413	SM 4500H+ B m
Phenols (4AAP)	9	N/A	2016/11/29	CAM SOP-00444	OMOE E3179 m
Orthophosphate	8	N/A	2016/11/28	CAM SOP-00461	EPA 365.1 m
Orthophosphate	1	N/A	2016/11/30	CAM SOP-00461	EPA 365.1 m
Sulphide	1	N/A	2016/11/25	CAM SOP-00455	SM 22 4500-S G m
Sulphide	8	N/A	2016/11/28	CAM SOP-00455	SM 22 4500-S G m
Total Dissolved Solids	9	2016/11/26	2016/11/28	CAM SOP-00428	SM 22 2540C m
Total Phosphorus (Colourimetric)	4	2016/11/28	2016/11/28	CAM SOP-00407	SM 22 4500 P B H m

Your Project #: 021-1228
Site#: Tansley Quarry
Your C.O.C. #: 586660-03-01

Attention:Josip Balaban

Golder Associates Ltd
Mississauga - Standing Offer
6925 Century Ave
Suite 100
Mississauga, ON
CANADA L5N 7K2

Report Date: 2016/12/05
Report #: R4275087
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B6P6843
Received: 2016/11/24, 17:33

Sample Matrix: Water
Samples Received: 9

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Total Phosphorus (Colourimetric)	4	2016/11/28	2016/11/29	CAM SOP-00407	SM 22 4500 P B H m
Total Phosphorus (Colourimetric)	1	2016/11/29	2016/11/30	CAM SOP-00407	SM 22 4500 P B H m
Total Suspended Solids	4	2016/11/26	2016/11/28	CAM SOP-00428	SM 22 2540D m
Low Level Total Suspended Solids	5	2016/11/26	2016/11/26	CAM SOP-00428	SM 22 2540D m
Turbidity	9	N/A	2016/11/30	CAM SOP-00417	SM 22 2130 B m

Remarks:

Maxxam Analytics' laboratories are accredited to ISO/IEC 17025:2005 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Maxxam are based upon recognized Provincial, Federal or US method compendia such as CCME, MDDELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported: unless indicated otherwise, associated sample data are not blank corrected.

Maxxam Analytics' liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Maxxam has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Maxxam, unless otherwise agreed in writing.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods. Results relate to samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

* 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.

Your Project #: 021-1228
Site#: Tansley Quarry
Your C.O.C. #: 586660-03-01

Attention:Josip Balaban

Golder Associates Ltd
Mississauga - Standing Offer
6925 Century Ave
Suite 100
Mississauga, ON
CANADA L5N 7K2

Report Date: 2016/12/05
Report #: R4275087
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B6P6843
Received: 2016/11/24, 17:33

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Ema Gitej, Senior Project Manager
Email: EGitej@maxxam.ca
Phone# (905)817-5829
==
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 : 3

RESULTS OF ANALYSES OF WATER

Maxxam ID		DNA320			DNA321			DNA322		
Sampling Date		2016/11/24 09:00			2016/11/24			2016/11/24 10:30		
COC Number		586660-03-01			586660-03-01			586660-03-01		
	UNITS	**MW01-I**	**RDL**	**QC Batch**	**DUP 2**	**RDL**	**QC Batch**	**MW03-I**	**RDL**	**QC Batch**
Calculated Parameters										
Hardness (CaCO3)	mg/L	1100	1.0	4764759	1100	1.0	4764759	6000	1.0	4764759
Inorganics										
Total Ammonia-N	mg/L	<0.050	0.050	4768573	<0.050	0.050	4768573	11	0.25	4768573
Conductivity	umho/cm	2000	1.0	4766515	2000	1.0	4766515	25000	1.0	4766515
Total Dissolved Solids	mg/L	1530	10	4767131	1580	10	4767131	18500	20	4767131
Fluoride (F-)	mg/L	0.28	0.10	4766506	0.29	0.10	4766506	0.27	0.10	4766506
Free Cyanide	mg/L	<0.0010	0.0010	4768033	<0.0010	0.0010	4769829	<0.0010	0.0010	4769829
Orthophosphate (P)	mg/L	<0.010	0.010	4767304	<0.010	0.010	4767304	<0.010	0.010	4767304
pH	pH	7.87		4766512	7.94		4766512	7.31		4766512
Phenols-4AAP	mg/L	<0.0010	0.0010	4769564	<0.0010	0.0010	4768027	0.0028	0.0020	4769564
Total Phosphorus	mg/L	1.9	0.2	4768530	1.2	0.2	4768530	0.29	0.04	4768530
Total Suspended Solids	mg/L	2900	50	4767487	710	5	4767122	390	5	4767122
Sulphide	mg/L	<0.020	0.020	4763763	<0.020	0.020	4766760	<0.020	0.020	4766760
Turbidity	NTU	1500	0.5	4766296	1000	0.5	4766296	310	0.1	4766296
Alkalinity (Total as CaCO3)	mg/L	500	1.0	4766516	500	1.0	4766516	58	1.0	4766516
Nitrite (N)	mg/L	<0.010	0.010	4767331	<0.010	0.010	4767331	0.014	0.010	4770677
Dissolved Chloride (Cl)	mg/L	77	5.0	4766378	79	5.0	4766378	7600	50	4766378
Nitrate (N)	mg/L	<0.10	0.10	4767331	<0.10	0.10	4767331	<0.10	0.10	4770677
Nitrate + Nitrite (N)	mg/L	<0.10	0.10	4767331	<0.10	0.10	4767331	<0.10	0.10	4770677
Dissolved Bromide (Br-)	mg/L	<5.0	5.0	4766378	<5.0	5.0	4766378	84	50	4766378
Dissolved Sulphate (SO4)	mg/L	620	5.0	4766378	620	5.0	4766378	1400	50	4766378

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

RESULTS OF ANALYSES OF WATER

Maxxam ID		DNA323	DNA323			DNA324	DNA324		
Sampling Date		2016/11/24 09:15	2016/11/24 09:15			2016/11/24 13:45	2016/11/24 13:45		
COC Number		586660-03-01	586660-03-01			586660-03-01	586660-03-01		
	UNITS	**MW01-D**	**MW01-D Lab-Dup**	**RDL**	**QC Batch**	**MW11-D**	**MW11-D Lab-Dup**	**RDL**	**QC Batch**
Calculated Parameters									
Hardness (CaCO3)	mg/L	6200		1.0	4764759	29000		1.0	4764759
Inorganics									
Total Ammonia-N	mg/L	16		0.25	4768573	35		0.50	4768573
Conductivity	umho/cm	36000		1.0	4766515	93000	93000	1.0	4766515
Total Dissolved Solids	mg/L	25800		20	4767131	80700		20	4767131
Fluoride (F-)	mg/L	0.33		0.10	4766506	0.11	0.11	0.10	4766506
Free Cyanide	mg/L	<0.0010		0.0010	4769829	<0.0010		0.0010	4769829
Orthophosphate (P)	mg/L	<0.010		0.010	4768426	<0.010		0.010	4767304
pH	pH	6.49			4766512	6.65	6.75		4766512
Phenols-4AAP	mg/L	<0.0010		0.0010	4767920	<0.010 (1)		0.010	4769564
Total Phosphorus	mg/L	0.04		0.02	4768530	0.13		0.04	4768530
Total Suspended Solids	mg/L	34		1	4767122	390		5	4767122
Sulphide	mg/L	<0.020	<0.020	0.020	4766760	<0.020		0.020	4766760
Turbidity	NTU	27		0.1	4766296	220		0.1	4766296
Alkalinity (Total as CaCO3)	mg/L	12		1.0	4766516	42	44	1.0	4766516
Nitrite (N)	mg/L	<0.010	<0.010	0.010	4767325	<0.010		0.010	4767555
Dissolved Chloride (Cl)	mg/L	11000		100	4766378	37000		1000	4766378
Nitrate (N)	mg/L	<0.10	<0.10	0.10	4767325	<0.10		0.10	4767555
Nitrate + Nitrite (N)	mg/L	<0.10	<0.10	0.10	4767325	<0.10		0.10	4767555
Dissolved Bromide (Br-)	mg/L	120		100	4766378	<1000		1000	4766378
Dissolved Sulphate (SO4)	mg/L	1700		100	4766378	1200		1000	4766378

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
(1) Detection Limit was raised due to matrix interferences.

RESULTS OF ANALYSES OF WATER

Maxxam ID		DNA325			DNA326			DNA327		
Sampling Date		2016/11/24 14:00			2016/11/24 10:45			2016/11/24		
COC Number		586660-03-01			586660-03-01			586660-03-01		
	UNITS	**MW11-S**	**RDL**	**QC Batch**	**MW03-O**	**RDL**	**QC Batch**	**DUP 3**	**RDL**	**QC Batch**
Calculated Parameters										
Hardness (CaCO3)	mg/L	380	1.0	4764759	870	1.0	4764759	6000	1.0	4764841
Inorganics										
Total Ammonia-N	mg/L	1.7	0.050	4768573	1.2	0.050	4768573	11	0.25	4768573
Conductivity	umho/cm	1000	1.0	4766515	2500	1.0	4766515	25000	1.0	4766515
Total Dissolved Solids	mg/L	1390	10	4767131	1610	10	4767131	18600	20	4767131
Fluoride (F-)	mg/L	0.31	0.10	4766506	0.20	0.10	4766506	0.28	0.10	4766506
Free Cyanide	mg/L	<0.0010	0.0010	4768033	<0.0010	0.0010	4769829	<0.0010	0.0010	4769829
Orthophosphate (P)	mg/L	<0.010	0.010	4767304	<0.010	0.010	4767304	<0.010	0.010	4767304
pH	pH	8.07		4766512	7.87		4766512	7.39		4766512
Phenols-4AAP	mg/L	<0.0010	0.0010	4768027	<0.0010	0.0010	4767920	0.0031	0.0020	4769564
Total Phosphorus	mg/L	5.9	0.04	4770337	2.6	0.2	4768530	0.27	0.04	4768530
Total Suspended Solids	mg/L	7500	50	4769010	3500	50	4767487	340	5	4767122
Sulphide	mg/L	<0.020	0.020	4766760	<0.020	0.020	4766760	<0.020	0.020	4766760
Turbidity	NTU	2100	1	4766296	1900	1	4766296	260	0.1	4766296
Alkalinity (Total as CaCO3)	mg/L	380	1.0	4766516	130	1.0	4774343	51	1.0	4766516
Nitrite (N)	mg/L	0.014	0.010	4767331	0.136	0.010	4767331	<0.010	0.010	4767331
Dissolved Chloride (Cl)	mg/L	13	1.0	4766378	240	5.0	4774406	7700	50	4766378
Nitrate (N)	mg/L	<0.10	0.10	4767331	0.13	0.10	4767331	<0.10	0.10	4767331
Nitrate + Nitrite (N)	mg/L	<0.10	0.10	4767331	0.26	0.10	4767331	<0.10	0.10	4767331
Dissolved Bromide (Br-)	mg/L	<1.0	1.0	4766378	<5.0	5.0	4774406	83	50	4766378
Dissolved Sulphate (SO4)	mg/L	130	1.0	4766378	850	5.0	4774406	1500	50	4766378

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

RESULTS OF ANALYSES OF WATER

Maxxam ID		DNA328		
Sampling Date		2016/11/24 13:30		
COC Number		586660-03-01		
	UNITS	**MW11-0**	**RDL**	**QC Batch**
Calculated Parameters				
Hardness (CaCO3)	mg/L	400	1.0	4764841
Inorganics				
Total Ammonia-N	mg/L	0.077	0.050	4768573
Conductivity	umho/cm	740	1.0	4766515
Total Dissolved Solids	mg/L	570	10	4767131
Fluoride (F-)	mg/L	0.13	0.10	4766506
Free Cyanide	mg/L	<0.0010	0.0010	4769829
Orthophosphate (P)	mg/L	<0.010	0.010	4767304
pH	pH	8.14		4766512
Phenols-4AAP	mg/L	<0.0010	0.0010	4769564
Total Phosphorus	mg/L	9.0	0.2	4768530
Total Suspended Solids	mg/L	13000	100	4767487
Sulphide	mg/L	0.089	0.020	4766760
Turbidity	NTU	10000	5	4766296
Alkalinity (Total as CaCO3)	mg/L	350	1.0	4766516
Nitrite (N)	mg/L	0.016	0.010	4767331
Dissolved Chloride (Cl)	mg/L	1.4	1.0	4766378
Nitrate (N)	mg/L	<0.10	0.10	4767331
Nitrate + Nitrite (N)	mg/L	<0.10	0.10	4767331
Dissolved Bromide (Br-)	mg/L	<1.0	1.0	4766378
Dissolved Sulphate (SO4)	mg/L	46	1.0	4766378

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		DNA320	DNA321			DNA322		
Sampling Date		2016/11/24 09:00	2016/11/24			2016/11/24 10:30		
COC Number		586660-03-01	586660-03-01			586660-03-01		
	UNITS	**MW01-I**	**DUP 2**	**RDL**	**QC Batch**	**MW03-I**	**RDL**	**QC Batch**
Metals								
Mercury (Hg)	mg/L	<0.0001	<0.0001	0.0001	4769996	<0.0001	0.0001	4771470
Dissolved Aluminum (Al)	ug/L	53	680	5.0	4767543	180	25	4767540
Total Aluminum (Al)	ug/L	26000	21000	25	4769677	8800	25	4769677
Dissolved Antimony (Sb)	ug/L	<0.50	0.55	0.50	4767543	<2.5	2.5	4767540
Total Antimony (Sb)	ug/L	<0.50	<0.50	0.50	4769677	<2.5	2.5	4769677
Dissolved Arsenic (As)	ug/L	<1.0	<1.0	1.0	4767543	<5.0	5.0	4767540
Total Arsenic (As)	ug/L	11	8.7	1.0	4769677	<5.0	5.0	4769677
Dissolved Barium (Ba)	ug/L	19	21	2.0	4767543	22	10	4767540
Total Barium (Ba)	ug/L	180	150	2.0	4769677	120	10	4769677
Dissolved Beryllium (Be)	ug/L	<0.50	<0.50	0.50	4767543	<2.5	2.5	4767540
Total Beryllium (Be)	ug/L	1.4	1.1	0.50	4769677	<2.5	2.5	4769677
Dissolved Bismuth (Bi)	ug/L	<1.0	<1.0	1.0	4767543	<5.0	5.0	4767540
Total Bismuth (Bi)	ug/L	<1.0	<1.0	1.0	4769677	<5.0	5.0	4769677
Dissolved Boron (B)	ug/L	160	170	10	4767543	5200	50	4767540
Total Boron (B)	ug/L	190	190	10	4769677	4800	50	4769677
Dissolved Cadmium (Cd)	ug/L	<0.10	<0.10	0.10	4767543	<0.50	0.50	4767540
Total Cadmium (Cd)	ug/L	0.28	0.21	0.10	4769677	1.3	0.50	4769677
Dissolved Calcium (Ca)	ug/L	110000	110000	200	4767543	1600000	2000	4767540
Total Calcium (Ca)	ug/L	280000	220000	200	4769677	1600000	2000	4769677
Dissolved Chromium (Cr)	ug/L	<5.0	<5.0	5.0	4767543	<25	25	4767540
Total Chromium (Cr)	ug/L	43	32	5.0	4769677	<25	25	4769677
Dissolved Cobalt (Co)	ug/L	0.55	1.3	0.50	4767543	<5.0	5.0	4767540
Total Cobalt (Co)	ug/L	24	18	0.50	4769677	5.0	5.0	4769677
Dissolved Copper (Cu)	ug/L	<1.0	<1.0	1.0	4767543	<5.0	5.0	4767540
Total Copper (Cu)	ug/L	35	26	1.0	4769677	8.1	5.0	4769677
Dissolved Iron (Fe)	ug/L	<100	470	100	4767543	3900	500	4767540
Total Iron (Fe)	ug/L	46000	34000	100	4769677	12000	500	4769677
Dissolved Lead (Pb)	ug/L	<0.50	<0.50	0.50	4767543	<2.5	2.5	4767540
Total Lead (Pb)	ug/L	23	17	0.50	4769677	4.1	2.5	4769677
Dissolved Lithium (Li)	ug/L	140	140	5.0	4767543	3700	50	4767540
Total Lithium (Li)	ug/L	190	170	5.0	4769677	3700	50	4769677
Dissolved Magnesium (Mg)	ug/L	200000	200000	50	4767543	480000	250	4767540
Total Magnesium (Mg)	ug/L	230000	210000	50	4769677	450000	250	4769677
Dissolved Manganese (Mn)	ug/L	44	47	2.0	4767543	640	10	4767540
Total Manganese (Mn)	ug/L	1200	830	2.0	4769677	1000	10	4769677

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		DNA320	DNA321			DNA322		
Sampling Date		2016/11/24 09:00	2016/11/24			2016/11/24 10:30		
COC Number		586660-03-01	586660-03-01			586660-03-01		
	UNITS	**MW01-I**	**DUP 2**	**RDL**	**QC Batch**	**MW03-I**	**RDL**	**QC Batch**
Dissolved Molybdenum (Mo)	ug/L	1.6	1.6	0.50	4767543	7.2	2.5	4767540
Total Molybdenum (Mo)	ug/L	2.2	2.0	0.50	4769677	6.6	2.5	4769677
Dissolved Nickel (Ni)	ug/L	1.8	2.3	1.0	4767543	<10	10	4767540
Total Nickel (Ni)	ug/L	43	33	1.0	4769677	15	10	4769677
Dissolved Phosphorus (P)	ug/L	<100	<100	100	4767543	<500	500	4767540
Total Phosphorus (P)	ug/L	1400	910	100	4769677	<500	500	4769677
Dissolved Potassium (K)	ug/L	5700	6100	200	4767543	100000	1000	4767540
Total Potassium (K)	ug/L	11000	11000	200	4769677	92000	1000	4769677
Dissolved Selenium (Se)	ug/L	<2.0	<2.0	2.0	4767543	<10	10	4767540
Total Selenium (Se)	ug/L	<2.0	<2.0	2.0	4769677	<10	10	4769677
Dissolved Silicon (Si)	ug/L	6800	8300	50	4767543	4100	250	4767540
Total Silicon (Si)	ug/L	46000	38000	50	4769677	20000	250	4769677
Dissolved Silver (Ag)	ug/L	<0.10	<0.10	0.10	4767543	<0.50	0.50	4767540
Total Silver (Ag)	ug/L	0.11	<0.10	0.10	4769677	<0.50	0.50	4769677
Dissolved Sodium (Na)	ug/L	50000	51000	100	4767543	3800000	1000	4767540
Total Sodium (Na)	ug/L	52000	50000	100	4769677	3800000	1000	4769677
Dissolved Strontium (Sr)	ug/L	2600	2600	1.0	4767543	34000	5.0	4767540
Total Strontium (Sr)	ug/L	2900	2700	1.0	4769677	35000	5.0	4769677
Dissolved Tellurium (Te)	ug/L	<1.0	<1.0	1.0	4767543	<5.0	5.0	4767540
Total Tellurium (Te)	ug/L	<1.0	<1.0	1.0	4769677	<5.0	5.0	4769677
Dissolved Thallium (Tl)	ug/L	<0.050	<0.050	0.050	4767543	<0.25	0.25	4767540
Total Thallium (Tl)	ug/L	0.26	0.22	0.050	4769677	<0.25	0.25	4769677
Dissolved Tin (Sn)	ug/L	<1.0	<1.0	1.0	4767543	<5.0	5.0	4767540
Total Tin (Sn)	ug/L	2.4	2.8	1.0	4769677	<5.0	5.0	4769677
Dissolved Titanium (Ti)	ug/L	<5.0	24	5.0	4767543	<25	25	4767540
Total Titanium (Ti)	ug/L	440	430	5.0	4769677	310	25	4769677
Dissolved Tungsten (W)	ug/L	<1.0	<1.0	1.0	4767543	<5.0	5.0	4767540
Total Tungsten (W)	ug/L	<1.0	<1.0	1.0	4769677	<5.0	5.0	4769677
Dissolved Uranium (U)	ug/L	14	13	0.10	4767543	<0.50	0.50	4767540
Total Uranium (U)	ug/L	16	15	0.10	4769677	0.62	0.50	4769677
Dissolved Vanadium (V)	ug/L	<0.50	1.3	0.50	4767543	<10	10	4767540
Total Vanadium (V)	ug/L	50	38	0.50	4769677	14	2.5	4769677
Dissolved Zinc (Zn)	ug/L	<5.0	32	5.0	4767543	<25	25	4767540
Total Zinc (Zn)	ug/L	110	86	5.0	4769677	120	25	4769677
Dissolved Zirconium (Zr)	ug/L	<1.0	<1.0	1.0	4767543	<5.0	5.0	4767540
Total Zirconium (Zr)	ug/L	8.7	3.9	1.0	4769677	6.5	5.0	4769677

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		DNA323		DNA324		DNA325		
Sampling Date		2016/11/24 09:15		2016/11/24 13:45		2016/11/24 14:00		
COC Number		586660-03-01		586660-03-01		586660-03-01		
	UNITS	**MW01-D**	**RDL**	**MW11-D**	**RDL**	**MW11-S**	**RDL**	**QC Batch**
Metals								
Mercury (Hg)	mg/L	<0.0001	0.0001	<0.0001	0.0001	<0.0001	0.0001	4771470
Dissolved Aluminum (Al)	ug/L	<50	50	<250	250	140	5.0	4767543
Total Aluminum (Al)	ug/L	230	50	1800	50	98000	50	4769677
Dissolved Antimony (Sb)	ug/L	<5.0	5.0	<25	25	<0.50	0.50	4767543
Total Antimony (Sb)	ug/L	<5.0	5.0	<5.0	5.0	<5.0	5.0	4769677
Dissolved Arsenic (As)	ug/L	<10	10	<50	50	6.1	1.0	4767543
Total Arsenic (As)	ug/L	<10	10	13	10	45	10	4769677
Dissolved Barium (Ba)	ug/L	25	20	130	100	15	2.0	4767543
Total Barium (Ba)	ug/L	32	20	160	20	640	20	4769677
Dissolved Beryllium (Be)	ug/L	<5.0	5.0	<25	25	<0.50	0.50	4767543
Total Beryllium (Be)	ug/L	<5.0	5.0	<5.0	5.0	<5.0	5.0	4769677
Dissolved Bismuth (Bi)	ug/L	<10	10	<50	50	<1.0	1.0	4767543
Total Bismuth (Bi)	ug/L	<10	10	<10	10	<10	10	4769677
Dissolved Boron (B)	ug/L	6100	100	4800	500	2000	10	4767543
Total Boron (B)	ug/L	6000	100	5200	100	2200	100	4769677
Dissolved Cadmium (Cd)	ug/L	<1.0	1.0	<5.0	5.0	<0.10	0.10	4767543
Total Cadmium (Cd)	ug/L	<1.0	1.0	4.5	1.0	<1.0	1.0	4769677
Dissolved Calcium (Ca)	ug/L	1800000	2000	8300000	10000	70000	400	4767543
Total Calcium (Ca)	ug/L	1800000	2000	8700000	10000	890000	2000	4769677
Dissolved Chromium (Cr)	ug/L	89	50	<250	250	<5.0	5.0	4767543
Total Chromium (Cr)	ug/L	160	50	380	50	140	50	4769677
Dissolved Cobalt (Co)	ug/L	<5.0	5.0	<25	25	<0.50	0.50	4767543
Total Cobalt (Co)	ug/L	5.5	5.0	<25	25	71	5.0	4769677
Dissolved Copper (Cu)	ug/L	<10	10	<50	50	<1.0	1.0	4767543
Total Copper (Cu)	ug/L	<10	10	12	10	170	10	4769677
Dissolved Iron (Fe)	ug/L	11000	1000	25000	5000	800	100	4767543
Total Iron (Fe)	ug/L	11000	1000	23000	1000	140000	1000	4769677
Dissolved Lead (Pb)	ug/L	<5.0	5.0	<25	25	<0.50	0.50	4767543
Total Lead (Pb)	ug/L	<5.0	5.0	<5.0	5.0	52	5.0	4769677
Dissolved Lithium (Li)	ug/L	4900	50	14000	250	110	5.0	4767543
Total Lithium (Li)	ug/L	4900	50	14000	250	330	50	4769677
Dissolved Magnesium (Mg)	ug/L	430000	500	2000000	2500	51000	50	4767543
Total Magnesium (Mg)	ug/L	440000	500	2100000	500	150000	500	4769677
Dissolved Manganese (Mn)	ug/L	1100	20	4600	100	31	2.0	4767543
Total Manganese (Mn)	ug/L	1200	20	4700	20	7800	20	4769677

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		DNA323		DNA324		DNA325		
Sampling Date		2016/11/24 09:15		2016/11/24 13:45		2016/11/24 14:00		
COC Number		586660-03-01		586660-03-01		586660-03-01		
	UNITS	**MW01-D**	**RDL**	**MW11-D**	**RDL**	**MW11-S**	**RDL**	**QC Batch**
Dissolved Molybdenum (Mo)	ug/L	8.8	5.0	31	25	2.8	0.50	4767543
Total Molybdenum (Mo)	ug/L	13	5.0	41	5.0	<5.0	5.0	4769677
Dissolved Nickel (Ni)	ug/L	320	10	270	50	<1.0	1.0	4767543
Total Nickel (Ni)	ug/L	340	10	310	50	150	10	4769677
Dissolved Phosphorus (P)	ug/L	<1000	1000	<5000	5000	<100	100	4767543
Total Phosphorus (P)	ug/L	<1000	1000	<1000	1000	7200	1000	4769677
Dissolved Potassium (K)	ug/L	130000	2000	300000	10000	18000	200	4767543
Total Potassium (K)	ug/L	120000	2000	300000	2000	51000	2000	4769677
Dissolved Selenium (Se)	ug/L	<20	20	<100	100	<2.0	2.0	4767543
Total Selenium (Se)	ug/L	<20	20	<20	20	<20	20	4769677
Dissolved Silicon (Si)	ug/L	2900	500	<2500	2500	7300	50	4767543
Total Silicon (Si)	ug/L	3600	500	5700	500	160000	500	4769677
Dissolved Silver (Ag)	ug/L	<1.0	1.0	<5.0	5.0	<0.10	0.10	4767543
Total Silver (Ag)	ug/L	<1.0	1.0	<1.0	1.0	<1.0	1.0	4769677
Dissolved Sodium (Na)	ug/L	5600000	1000	17000000	5000	69000	100	4767543
Total Sodium (Na)	ug/L	5700000	1000	17000000	5000	75000	1000	4769677
Dissolved Strontium (Sr)	ug/L	38000	10	180000	50	9800	1.0	4767543
Total Strontium (Sr)	ug/L	38000	10	180000	10	11000	10	4769677
Dissolved Tellurium (Te)	ug/L	<10	10	<50	50	<1.0	1.0	4767543
Total Tellurium (Te)	ug/L	<10	10	<10	10	<10	10	4769677
Dissolved Thallium (Tl)	ug/L	<0.50	0.50	<2.5	2.5	<0.050	0.050	4767543
Total Thallium (Tl)	ug/L	<0.50	0.50	<0.50	0.50	0.97	0.50	4769677
Dissolved Tin (Sn)	ug/L	<10	10	<50	50	<1.0	1.0	4767543
Total Tin (Sn)	ug/L	<10	10	<10	10	<10	10	4769677
Dissolved Titanium (Ti)	ug/L	<50	50	<250	250	5.8	5.0	4767543
Total Titanium (Ti)	ug/L	<50	50	170	50	2100	50	4769677
Dissolved Tungsten (W)	ug/L	<10	10	<50	50	<1.0	1.0	4767543
Total Tungsten (W)	ug/L	<10	10	<10	10	<10	10	4769677
Dissolved Uranium (U)	ug/L	<1.0	1.0	8.3	5.0	0.20	0.10	4767543
Total Uranium (U)	ug/L	<1.0	1.0	10	1.0	5.0	1.0	4769677
Dissolved Vanadium (V)	ug/L	<10	10	<50	50	<0.50	0.50	4767543
Total Vanadium (V)	ug/L	<5.0	5.0	<5.0	5.0	170	5.0	4769677
Dissolved Zinc (Zn)	ug/L	<50	50	280	250	<5.0	5.0	4767543
Total Zinc (Zn)	ug/L	<50	50	360	50	360	50	4769677
Dissolved Zirconium (Zr)	ug/L	<10	10	<50	50	<1.0	1.0	4767543
Total Zirconium (Zr)	ug/L	<10	10	<10	10	37	10	4769677

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		DNA326			DNA327		DNA328		
Sampling Date		2016/11/24 10:45			2016/11/24		2016/11/24 13:30		
COC Number		586660-03-01			586660-03-01		586660-03-01		
	UNITS	MW03-O	RDL	QC Batch	DUP 3	RDL	MW11-0	RDL	QC Batch
Metals									
Mercury (Hg)	mg/L	<0.0001	0.0001	4771470	<0.0001	0.0001	<0.0001	0.0001	4771470
Dissolved Aluminum (Al)	ug/L	360	5.0	4775756	170	25	93	5.0	4767540
Total Aluminum (Al)	ug/L	18000	5.0	4769677	9500	25	230000	250	4769677
Dissolved Antimony (Sb)	ug/L	0.83	0.50	4775756	<2.5	2.5	0.64	0.50	4767540
Total Antimony (Sb)	ug/L	<0.50	0.50	4769677	<2.5	2.5	<5.0	5.0	4769677
Dissolved Arsenic (As)	ug/L	3.0	1.0	4775756	<5.0	5.0	6.9	1.0	4767540
Total Arsenic (As)	ug/L	16	1.0	4769677	<5.0	5.0	98	10	4769677
Dissolved Barium (Ba)	ug/L	11	2.0	4775756	24	10	56	2.0	4767540
Total Barium (Ba)	ug/L	130	2.0	4769677	110	10	3400	20	4769677
Dissolved Beryllium (Be)	ug/L	<0.50	0.50	4775756	<2.5	2.5	<0.50	0.50	4767540
Total Beryllium (Be)	ug/L	0.86	0.50	4769677	<2.5	2.5	10	5.0	4769677
Dissolved Bismuth (Bi)	ug/L	<1.0	1.0	4775756	<5.0	5.0	<1.0	1.0	4767540
Total Bismuth (Bi)	ug/L	<1.0	1.0	4769677	<5.0	5.0	<10	10	4769677
Dissolved Boron (B)	ug/L	1100	10	4775756	5200	50	100	10	4767540
Total Boron (B)	ug/L	1200	10	4769677	5000	50	430	100	4769677
Dissolved Cadmium (Cd)	ug/L	<0.10	0.10	4775756	<0.50	0.50	<0.10	0.10	4767540
Total Cadmium (Cd)	ug/L	0.58	0.10	4769677	0.96	0.50	1.2	1.0	4769677
Dissolved Calcium (Ca)	ug/L	150000	1000	4775756	1600000	2000	60000	200	4767540
Total Calcium (Ca)	ug/L	480000	1000	4769677	1600000	2000	1400000	2000	4769677
Dissolved Chromium (Cr)	ug/L	<5.0	5.0	4775756	<25	25	<5.0	5.0	4767540
Total Chromium (Cr)	ug/L	38	5.0	4769677	<25	25	580	50	4769677
Dissolved Cobalt (Co)	ug/L	0.58	0.50	4775756	<5.0	5.0	2.1	0.50	4767540
Total Cobalt (Co)	ug/L	15	1.0	4769677	<5.0	5.0	170	5.0	4769677
Dissolved Copper (Cu)	ug/L	<1.0	1.0	4775756	<5.0	5.0	<1.0	1.0	4767540
Total Copper (Cu)	ug/L	46	1.0	4769677	8.8	5.0	510	10	4769677
Dissolved Iron (Fe)	ug/L	960	100	4775756	3900	500	840	100	4767540
Total Iron (Fe)	ug/L	35000	100	4769677	13000	500	350000	1000	4769677
Dissolved Lead (Pb)	ug/L	<0.50	0.50	4775756	<2.5	2.5	<0.50	0.50	4767540
Total Lead (Pb)	ug/L	16	0.50	4769677	3.9	2.5	130	5.0	4769677
Dissolved Lithium (Li)	ug/L	84	5.0	4775756	3700	50	43	5.0	4767540
Total Lithium (Li)	ug/L	160	5.0	4769677	3600	50	510	50	4769677
Dissolved Magnesium (Mg)	ug/L	120000	50	4775756	490000	250	61000	50	4767540
Total Magnesium (Mg)	ug/L	150000	50	4769677	470000	250	220000	500	4769677
Dissolved Manganese (Mn)	ug/L	100	2.0	4775756	650	10	49	2.0	4767540
Total Manganese (Mn)	ug/L	2600	2.0	4769677	1000	10	14000	20	4769677

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		DNA326			DNA327		DNA328		
Sampling Date		2016/11/24 10:45			2016/11/24		2016/11/24 13:30		
COC Number		586660-03-01			586660-03-01		586660-03-01		
	UNITS	**MW03-O**	**RDL**	**QC Batch**	**DUP 3**	**RDL**	**MW11-0**	**RDL**	**QC Batch**
Dissolved Molybdenum (Mo)	ug/L	7.5	0.50	4775756	7.3	2.5	1.9	0.50	4767540
Total Molybdenum (Mo)	ug/L	8.9	0.50	4769677	7.3	2.5	6.7	5.0	4769677
Dissolved Nickel (Ni)	ug/L	<1.0	1.0	4775756	<10	10	1.3	1.0	4767540
Total Nickel (Ni)	ug/L	31	2.0	4769677	15	10	380	10	4769677
Dissolved Phosphorus (P)	ug/L	<100	100	4775756	<500	500	<100	100	4767540
Total Phosphorus (P)	ug/L	2200	100	4769677	<500	500	10000	1000	4769677
Dissolved Potassium (K)	ug/L	10000	200	4775756	100000	1000	4100	200	4767540
Total Potassium (K)	ug/L	17000	200	4769677	96000	1000	67000	2000	4769677
Dissolved Selenium (Se)	ug/L	<2.0	2.0	4775756	<10	10	<2.0	2.0	4767540
Total Selenium (Se)	ug/L	<2.0	2.0	4769677	<10	10	<20	20	4769677
Dissolved Silicon (Si)	ug/L	7100	50	4775756	4300	250	10000	50	4767540
Total Silicon (Si)	ug/L	36000	50	4769677	23000	250	340000	500	4769677
Dissolved Silver (Ag)	ug/L	<0.10	0.10	4775756	<0.50	0.50	<0.10	0.10	4767540
Total Silver (Ag)	ug/L	<0.10	0.10	4769677	<0.50	0.50	1.7	1.0	4769677
Dissolved Sodium (Na)	ug/L	130000	100	4775756	3900000	1000	10000	100	4767540
Total Sodium (Na)	ug/L	190000	100	4769677	3800000	1000	16000	1000	4769677
Dissolved Strontium (Sr)	ug/L	11000	1.0	4775756	35000	5.0	1400	1.0	4767540
Total Strontium (Sr)	ug/L	12000	1.0	4769677	36000	5.0	3800	10	4769677
Dissolved Tellurium (Te)	ug/L	<1.0	1.0	4775756	<5.0	5.0	<1.0	1.0	4767540
Total Tellurium (Te)	ug/L	<1.0	1.0	4769677	<5.0	5.0	<10	10	4769677
Dissolved Thallium (Tl)	ug/L	<0.050	0.050	4775756	<0.25	0.25	<0.050	0.050	4767540
Total Thallium (Tl)	ug/L	0.16	0.050	4769677	<0.25	0.25	2.0	0.50	4769677
Dissolved Tin (Sn)	ug/L	<1.0	1.0	4775756	<5.0	5.0	<1.0	1.0	4767540
Total Tin (Sn)	ug/L	2.2	1.0	4769677	<5.0	5.0	<10	10	4769677
Dissolved Titanium (Ti)	ug/L	16	5.0	4775756	<25	25	5.9	5.0	4767540
Total Titanium (Ti)	ug/L	520	25	4769677	71	25	4000	250	4769677
Dissolved Tungsten (W)	ug/L	<1.0	1.0	4775756	<5.0	5.0	<1.0	1.0	4767540
Total Tungsten (W)	ug/L	<1.0	1.0	4769677	<5.0	5.0	<10	10	4769677
Dissolved Uranium (U)	ug/L	0.32	0.10	4775756	<0.50	0.50	1.5	0.10	4767540
Total Uranium (U)	ug/L	1.8	0.10	4769677	0.57	0.50	11	1.0	4769677
Dissolved Vanadium (V)	ug/L	0.52	0.50	4775756	<10	10	<0.50	0.50	4767540
Total Vanadium (V)	ug/L	37	0.50	4769677	14	2.5	380	5.0	4769677
Dissolved Zinc (Zn)	ug/L	<10 (1)	10	4775756	<25	25	<5.0	5.0	4767540
Total Zinc (Zn)	ug/L	120	10	4769677	110	25	990	50	4769677
Dissolved Zirconium (Zr)	ug/L	<1.0	1.0	4775756	<5.0	5.0	<1.0	1.0	4767540

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
(1) Metals Analysis: Detection Limit was raised due to matrix interferences.

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		DNA326			DNA327		DNA328		
Sampling Date		2016/11/24 10:45			2016/11/24		2016/11/24 13:30		
COC Number		586660-03-01			586660-03-01		586660-03-01		
	UNITS	**MW03-O**	**RDL**	**QC Batch**	**DUP 3**	**RDL**	**MW11-0**	**RDL**	**QC Batch**
Total Zirconium (Zr)	ug/L	9.3	1.0	4769677	6.0	5.0	63	10	4769677

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

TEST SUMMARY

Maxxam ID: DNA320
Sample ID: MW01-I
Matrix: Water

Collected: 2016/11/24
Shipped:
Received: 2016/11/24

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	4766516	N/A	2016/11/30	Surinder Rai
Anions	IC	4766378	N/A	2016/11/30	Fari Dehdezi
Conductivity	AT	4766515	N/A	2016/11/30	Surinder Rai
Free (WAD) Cyanide	SKAL/CN	4768033	N/A	2016/11/28	Louise Harding
Fluoride	ISE	4766506	2016/11/25	2016/11/30	Surinder Rai
Hardness (calculated as CaCO3)		4764759	N/A	2016/12/01	Automated Statchk
Mercury in Water by CVAA	CV/AA	4769996	2016/11/29	2016/11/30	Magdalena Carlos
Dissolved Metals by ICPMS	ICP/MS	4767543	N/A	2016/11/30	Arefa Dabhad
Total Metals Analysis by ICPMS	ICP/MS	4769677	N/A	2016/11/29	Cristina Petran
Total Ammonia-N	LACH/NH4	4768573	N/A	2016/12/01	Charles Opoku-Ware
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	4767331	N/A	2016/11/30	Chandra Nandlal
pH	AT	4766512	N/A	2016/11/30	Surinder Rai
Phenols (4AAP)	TECH/PHEN	4769564	N/A	2016/11/29	Bramdeo Motiram
Orthophosphate	KONE	4767304	N/A	2016/11/28	Alina Dobreanu
Sulphide	ISE/S	4763763	N/A	2016/11/25	Neil Dassanayake
Total Dissolved Solids	BAL	4767131	2016/11/26	2016/11/28	Massarat Jan
Total Phosphorus (Colourimetric)	LACH/P	4768530	2016/11/28	2016/11/29	Sarabjit Raina
Total Suspended Solids	BAL	4767487	2016/11/26	2016/11/28	Massarat Jan
Turbidity	AT	4766296	N/A	2016/11/30	Tahir Anwar

Maxxam ID: DNA321
Sample ID: DUP 2
Matrix: Water

Collected: 2016/11/24
Shipped:
Received: 2016/11/24

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	4766516	N/A	2016/11/30	Surinder Rai
Anions	IC	4766378	N/A	2016/11/30	Fari Dehdezi
Conductivity	AT	4766515	N/A	2016/11/30	Surinder Rai
Free (WAD) Cyanide	SKAL/CN	4769829	N/A	2016/11/29	Xuanhong Qiu
Fluoride	ISE	4766506	2016/11/25	2016/11/30	Surinder Rai
Hardness (calculated as CaCO3)		4764759	N/A	2016/12/01	Automated Statchk
Mercury in Water by CVAA	CV/AA	4769996	2016/11/29	2016/11/30	Magdalena Carlos
Dissolved Metals by ICPMS	ICP/MS	4767543	N/A	2016/11/30	Arefa Dabhad
Total Metals Analysis by ICPMS	ICP/MS	4769677	N/A	2016/11/29	Cristina Petran
Total Ammonia-N	LACH/NH4	4768573	N/A	2016/12/01	Charles Opoku-Ware
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	4767331	N/A	2016/11/30	Chandra Nandlal
pH	AT	4766512	N/A	2016/11/30	Surinder Rai
Phenols (4AAP)	TECH/PHEN	4768027	N/A	2016/11/29	Bramdeo Motiram
Orthophosphate	KONE	4767304	N/A	2016/11/28	Alina Dobreanu
Sulphide	ISE/S	4766760	N/A	2016/11/28	Neil Dassanayake
Total Dissolved Solids	BAL	4767131	2016/11/26	2016/11/28	Massarat Jan
Total Phosphorus (Colourimetric)	LACH/P	4768530	2016/11/28	2016/11/29	Sarabjit Raina
Low Level Total Suspended Solids	BAL	4767122	2016/11/26	2016/11/26	Zahid Soikot
Turbidity	AT	4766296	N/A	2016/11/30	Tahir Anwar

TEST SUMMARY

Maxxam ID: DNA322
Sample ID: MW03-I
Matrix: Water

Collected: 2016/11/24
Shipped:
Received: 2016/11/24

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	4766516	N/A	2016/11/30	Surinder Rai
Anions	IC	4766378	N/A	2016/11/30	Fari Dehdezi
Conductivity	AT	4766515	N/A	2016/11/30	Surinder Rai
Free (WAD) Cyanide	SKAL/CN	4769829	N/A	2016/11/29	Xuanhong Qiu
Fluoride	ISE	4766506	2016/11/25	2016/11/30	Surinder Rai
Hardness (calculated as CaCO3)		4764759	N/A	2016/11/29	Automated Statchk
Mercury in Water by CVAA	CV/AA	4771470	2016/11/30	2016/11/30	Magdalena Carlos
Dissolved Metals by ICPMS	ICP/MS	4767540	N/A	2016/11/29	Arefa Dabhad
Total Metals Analysis by ICPMS	ICP/MS	4769677	N/A	2016/11/29	Cristina Petran
Total Ammonia-N	LACH/NH4	4768573	N/A	2016/12/01	Charles Opoku-Ware
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	4770677	N/A	2016/11/30	Chandra Nandlal
pH	AT	4766512	N/A	2016/11/30	Surinder Rai
Phenols (4AAP)	TECH/PHEN	4769564	N/A	2016/11/29	Bramdeo Motiram
Orthophosphate	KONE	4767304	N/A	2016/11/28	Alina Dobreanu
Sulphide	ISE/S	4766760	N/A	2016/11/28	Neil Dassanayake
Total Dissolved Solids	BAL	4767131	2016/11/26	2016/11/28	Massarat Jan
Total Phosphorus (Colourimetric)	LACH/P	4768530	2016/11/28	2016/11/28	Sarabjit Raina
Low Level Total Suspended Solids	BAL	4767122	2016/11/26	2016/11/26	Zahid Soikot
Turbidity	AT	4766296	N/A	2016/11/30	Tahir Anwar

Maxxam ID: DNA323
Sample ID: MW01-D
Matrix: Water

Collected: 2016/11/24
Shipped:
Received: 2016/11/24

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	4766516	N/A	2016/11/30	Surinder Rai
Anions	IC	4766378	N/A	2016/11/30	Fari Dehdezi
Conductivity	AT	4766515	N/A	2016/11/30	Surinder Rai
Free (WAD) Cyanide	SKAL/CN	4769829	N/A	2016/11/29	Xuanhong Qiu
Fluoride	ISE	4766506	2016/11/25	2016/11/30	Surinder Rai
Hardness (calculated as CaCO3)		4764759	N/A	2016/12/01	Automated Statchk
Mercury in Water by CVAA	CV/AA	4771470	2016/11/30	2016/11/30	Magdalena Carlos
Dissolved Metals by ICPMS	ICP/MS	4767543	N/A	2016/11/30	Arefa Dabhad
Total Metals Analysis by ICPMS	ICP/MS	4769677	N/A	2016/11/29	Cristina Petran
Total Ammonia-N	LACH/NH4	4768573	N/A	2016/12/01	Charles Opoku-Ware
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	4767325	N/A	2016/11/29	Chandra Nandlal
pH	AT	4766512	N/A	2016/11/30	Surinder Rai
Phenols (4AAP)	TECH/PHEN	4767920	N/A	2016/11/29	Bramdeo Motiram
Orthophosphate	KONE	4768426	N/A	2016/11/30	Alina Dobreanu
Sulphide	ISE/S	4766760	N/A	2016/11/28	Neil Dassanayake
Total Dissolved Solids	BAL	4767131	2016/11/26	2016/11/28	Massarat Jan
Total Phosphorus (Colourimetric)	LACH/P	4768530	2016/11/28	2016/11/28	Sarabjit Raina
Low Level Total Suspended Solids	BAL	4767122	2016/11/26	2016/11/26	Zahid Soikot
Turbidity	AT	4766296	N/A	2016/11/30	Tahir Anwar

TEST SUMMARY

Maxxam ID: DNA323 Dup
Sample ID: MW01-D
Matrix: Water

Collected: 2016/11/24
Shipped:
Received: 2016/11/24

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	4767325	N/A	2016/11/29	Chandra Nandlal
Sulphide	ISE/S	4766760	N/A	2016/11/28	Neil Dassanayake

Maxxam ID: DNA324
Sample ID: MW11-D
Matrix: Water

Collected: 2016/11/24
Shipped:
Received: 2016/11/24

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	4766516	N/A	2016/11/30	Surinder Rai
Anions	IC	4766378	N/A	2016/11/30	Fari Dehdezi
Conductivity	AT	4766515	N/A	2016/11/30	Surinder Rai
Free (WAD) Cyanide	SKAL/CN	4769829	N/A	2016/11/29	Xuanhong Qiu
Fluoride	ISE	4766506	2016/11/25	2016/11/30	Surinder Rai
Hardness (calculated as CaCO3)		4764759	N/A	2016/12/01	Automated Statchk
Mercury in Water by CVAA	CV/AA	4771470	2016/11/30	2016/11/30	Magdalena Carlos
Dissolved Metals by ICPMS	ICP/MS	4767543	N/A	2016/11/30	Arefa Dabhad
Total Metals Analysis by ICPMS	ICP/MS	4769677	N/A	2016/11/29	Cristina Petran
Total Ammonia-N	LACH/NH4	4768573	N/A	2016/12/01	Charles Opoku-Ware
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	4767555	N/A	2016/11/29	Chandra Nandlal
pH	AT	4766512	N/A	2016/11/30	Surinder Rai
Phenols (4AAP)	TECH/PHEN	4769564	N/A	2016/11/29	Bramdeo Motiram
Orthophosphate	KONE	4767304	N/A	2016/11/28	Alina Dobreanu
Sulphide	ISE/S	4766760	N/A	2016/11/28	Neil Dassanayake
Total Dissolved Solids	BAL	4767131	2016/11/26	2016/11/28	Massarat Jan
Total Phosphorus (Colourimetric)	LACH/P	4768530	2016/11/28	2016/11/28	Sarabjit Raina
Low Level Total Suspended Solids	BAL	4767122	2016/11/26	2016/11/26	Zahid Soikot
Turbidity	AT	4766296	N/A	2016/11/30	Tahir Anwar

Maxxam ID: DNA324 Dup
Sample ID: MW11-D
Matrix: Water

Collected: 2016/11/24
Shipped:
Received: 2016/11/24

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	4766516	N/A	2016/11/30	Surinder Rai
Conductivity	AT	4766515	N/A	2016/11/30	Surinder Rai
Fluoride	ISE	4766506	2016/11/25	2016/11/30	Surinder Rai
pH	AT	4766512	N/A	2016/11/30	Surinder Rai

Maxxam ID: DNA325
Sample ID: MW11-S
Matrix: Water

Collected: 2016/11/24
Shipped:
Received: 2016/11/24

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	4766516	N/A	2016/11/30	Surinder Rai
Anions	IC	4766378	N/A	2016/11/30	Fari Dehdezi
Conductivity	AT	4766515	N/A	2016/11/30	Surinder Rai

TEST SUMMARY

Maxxam ID: DNA325
Sample ID: MW11-S
Matrix: Water

Collected: 2016/11/24
Shipped:
Received: 2016/11/24

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Free (WAD) Cyanide	SKAL/CN	4768033	N/A	2016/11/28	Louise Harding
Fluoride	ISE	4766506	2016/11/25	2016/11/30	Surinder Rai
Hardness (calculated as CaCO3)		4764759	N/A	2016/12/01	Automated Statchk
Mercury in Water by CVAA	CV/AA	4771470	2016/11/30	2016/11/30	Magdalena Carlos
Dissolved Metals by ICPMS	ICP/MS	4767543	N/A	2016/11/30	Arefa Dabhad
Total Metals Analysis by ICPMS	ICP/MS	4769677	N/A	2016/11/29	Cristina Petran
Total Ammonia-N	LACH/NH4	4768573	N/A	2016/12/01	Charles Opoku-Ware
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	4767331	N/A	2016/11/30	Chandra Nandlal
pH	AT	4766512	N/A	2016/11/30	Surinder Rai
Phenols (4AAP)	TECH/PHEN	4768027	N/A	2016/11/29	Bramdeo Motiram
Orthophosphate	KONE	4767304	N/A	2016/11/28	Alina Dobreanu
Sulphide	ISE/S	4766760	N/A	2016/11/28	Neil Dassanayake
Total Dissolved Solids	BAL	4767131	2016/11/26	2016/11/28	Massarat Jan
Total Phosphorus (Colourimetric)	LACH/P	4770337	2016/11/29	2016/11/30	Sarabjit Raina
Total Suspended Solids	BAL	4769010	2016/11/26	2016/11/28	Massarat Jan
Turbidity	AT	4766296	N/A	2016/11/30	Tahir Anwar

Maxxam ID: DNA326
Sample ID: MW03-O
Matrix: Water

Collected: 2016/11/24
Shipped:
Received: 2016/11/24

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	4774343	N/A	2016/12/02	Surinder Rai
Anions	IC	4774406	N/A	2016/12/01	Fari Dehdezi
Conductivity	AT	4766515	N/A	2016/11/30	Surinder Rai
Free (WAD) Cyanide	SKAL/CN	4769829	N/A	2016/11/29	Xuanhong Qiu
Fluoride	ISE	4766506	2016/11/25	2016/11/30	Surinder Rai
Hardness (calculated as CaCO3)		4764759	N/A	2016/12/01	Automated Statchk
Mercury in Water by CVAA	CV/AA	4771470	2016/11/30	2016/11/30	Magdalena Carlos
Dissolved Metals by ICPMS	ICP/MS	4775756	N/A	2016/12/02	Prempal Bhatti
Total Metals Analysis by ICPMS	ICP/MS	4769677	N/A	2016/11/29	Cristina Petran
Total Ammonia-N	LACH/NH4	4768573	N/A	2016/12/01	Charles Opoku-Ware
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	4767331	N/A	2016/11/30	Chandra Nandlal
pH	AT	4766512	N/A	2016/11/30	Surinder Rai
Phenols (4AAP)	TECH/PHEN	4767920	N/A	2016/11/29	Bramdeo Motiram
Orthophosphate	KONE	4767304	N/A	2016/11/28	Alina Dobreanu
Sulphide	ISE/S	4766760	N/A	2016/11/28	Neil Dassanayake
Total Dissolved Solids	BAL	4767131	2016/11/26	2016/11/28	Massarat Jan
Total Phosphorus (Colourimetric)	LACH/P	4768530	2016/11/28	2016/11/29	Sarabjit Raina
Total Suspended Solids	BAL	4767487	2016/11/26	2016/11/28	Massarat Jan
Turbidity	AT	4766296	N/A	2016/11/30	Tahir Anwar

TEST SUMMARY

Maxxam ID: DNA327
Sample ID: DUP 3
Matrix: Water

Collected: 2016/11/24
Shipped:
Received: 2016/11/24

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	4766516	N/A	2016/11/30	Surinder Rai
Anions	IC	4766378	N/A	2016/11/30	Fari Dehdezi
Conductivity	AT	4766515	N/A	2016/11/30	Surinder Rai
Free (WAD) Cyanide	SKAL/CN	4769829	N/A	2016/11/29	Xuanhong Qiu
Fluoride	ISE	4766506	2016/11/25	2016/11/30	Surinder Rai
Hardness (calculated as CaCO3)		4764841	N/A	2016/11/29	Automated Statchk
Mercury in Water by CVAA	CV/AA	4771470	2016/11/30	2016/11/30	Magdalena Carlos
Dissolved Metals by ICPMS	ICP/MS	4767540	N/A	2016/11/29	Arefa Dabhad
Total Metals Analysis by ICPMS	ICP/MS	4769677	N/A	2016/11/29	Cristina Petran
Total Ammonia-N	LACH/NH4	4768573	N/A	2016/12/01	Charles Opoku-Ware
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	4767331	N/A	2016/11/30	Chandra Nandlal
pH	AT	4766512	N/A	2016/11/30	Surinder Rai
Phenols (4AAP)	TECH/PHEN	4769564	N/A	2016/11/29	Bramdeo Motiram
Orthophosphate	KONE	4767304	N/A	2016/11/28	Alina Dobreanu
Sulphide	ISE/S	4766760	N/A	2016/11/28	Neil Dassanayake
Total Dissolved Solids	BAL	4767131	2016/11/26	2016/11/28	Massarat Jan
Total Phosphorus (Colourimetric)	LACH/P	4768530	2016/11/28	2016/11/28	Sarabjit Raina
Low Level Total Suspended Solids	BAL	4767122	2016/11/26	2016/11/26	Zahid Soikot
Turbidity	AT	4766296	N/A	2016/11/30	Tahir Anwar

Maxxam ID: DNA328
Sample ID: MW11-0
Matrix: Water

Collected: 2016/11/24
Shipped:
Received: 2016/11/24

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	4766516	N/A	2016/11/30	Surinder Rai
Anions	IC	4766378	N/A	2016/11/30	Fari Dehdezi
Conductivity	AT	4766515	N/A	2016/11/30	Surinder Rai
Free (WAD) Cyanide	SKAL/CN	4769829	N/A	2016/11/29	Xuanhong Qiu
Fluoride	ISE	4766506	2016/11/25	2016/11/30	Surinder Rai
Hardness (calculated as CaCO3)		4764841	N/A	2016/11/29	Automated Statchk
Mercury in Water by CVAA	CV/AA	4771470	2016/11/30	2016/11/30	Magdalena Carlos
Dissolved Metals by ICPMS	ICP/MS	4767540	N/A	2016/11/29	Arefa Dabhad
Total Metals Analysis by ICPMS	ICP/MS	4769677	N/A	2016/11/29	Cristina Petran
Total Ammonia-N	LACH/NH4	4768573	N/A	2016/12/01	Charles Opoku-Ware
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	4767331	N/A	2016/11/30	Chandra Nandlal
pH	AT	4766512	N/A	2016/11/30	Surinder Rai
Phenols (4AAP)	TECH/PHEN	4769564	N/A	2016/11/29	Bramdeo Motiram
Orthophosphate	KONE	4767304	N/A	2016/11/28	Alina Dobreanu
Sulphide	ISE/S	4766760	N/A	2016/11/28	Neil Dassanayake
Total Dissolved Solids	BAL	4767131	2016/11/26	2016/11/28	Massarat Jan
Total Phosphorus (Colourimetric)	LACH/P	4768530	2016/11/28	2016/11/29	Sarabjit Raina
Total Suspended Solids	BAL	4767487	2016/11/26	2016/11/28	Massarat Jan
Turbidity	AT	4766296	N/A	2016/11/30	Tahir Anwar

GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	8.0°C
Package 2	8.3°C

Anions Analysis: Due to the sample matrix, sample required dilution. Detection limits were adjusted accordingly.

Sample DNA322 [MW03-I] : Metals Analysis: Due to the sample matrix, sample required dilution. Detection limits were adjusted accordingly.

Metal Analysis:Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.

Sample DNA323 [MW01-D] : Metal Analysis:Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.

Sample DNA324 [MW11-D] : Metal Analysis:Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.

Sample DNA327 [DUP 3] : Metals Analysis: Due to the sample matrix, sample required dilution. Detection limits were adjusted accordingly.
Metal Analysis:Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.

Sample DNA328 [MW11-0] : Metal Analysis:Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.

Results relate only to the items tested.

			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
4763763	Sulphide	2016/11/25	94	80 - 120	98	80 - 120	<0.020	mg/L	NC	20		
4766296	Turbidity	2016/11/29			97	85 - 115	<0.1	NTU	11	20		
4766378	Dissolved Bromide (Br-)	2016/11/30			97	80 - 120	<1.0	mg/L				
4766378	Dissolved Chloride (Cl)	2016/11/30			98	70 - 130	<1.0	mg/L				
4766378	Dissolved Sulphate (SO4)	2016/11/30	96	80 - 120	99	80 - 120	<1.0	mg/L	14	20		
4766506	Fluoride (F-)	2016/11/30	26 (1)	80 - 120	98	80 - 120	<0.10	mg/L	NC	20		
4766512	pH	2016/11/30			101	98 - 103			1.4	N/A		
4766515	Conductivity	2016/11/30			102	85 - 115	<1.0	umho/cm	0.71	25		
4766516	Alkalinity (Total as CaCO3)	2016/11/30			95	85 - 115	<1.0	mg/L	4.8	20		
4766760	Sulphide	2016/11/28	83	80 - 120	96	80 - 120	<0.020	mg/L	NC	20		
4767122	Total Suspended Solids	2016/11/26					<1	mg/L	NC	25	97	85 - 115
4767131	Total Dissolved Solids	2016/11/28					<10	mg/L	8.2	25	99	90 - 110
4767304	Orthophosphate (P)	2016/11/28	106	75 - 125	100	80 - 120	<0.010	mg/L	NC	25		
4767325	Nitrate (N)	2016/11/29	77 (1)	80 - 120	94	80 - 120	<0.10	mg/L	NC	20		
4767325	Nitrite (N)	2016/11/29	68 (1)	80 - 120	93	80 - 120	<0.010	mg/L	NC	20		
4767331	Nitrate (N)	2016/11/30	104	80 - 120	101	80 - 120	<0.10	mg/L	NC	20		
4767331	Nitrite (N)	2016/11/30	92	80 - 120	90	80 - 120	<0.010	mg/L	NC	20		
4767487	Total Suspended Solids	2016/11/28					<10	mg/L	NC	25	98	85 - 115
4767540	Dissolved Aluminum (Al)	2016/11/28	102	80 - 120	100	80 - 120	<5.0	ug/L	NC	20		
4767540	Dissolved Antimony (Sb)	2016/11/28	97	80 - 120	95	80 - 120	<0.50	ug/L	NC	20		
4767540	Dissolved Arsenic (As)	2016/11/28	97	80 - 120	98	80 - 120	<1.0	ug/L	NC	20		
4767540	Dissolved Barium (Ba)	2016/11/28	99	80 - 120	100	80 - 120	<2.0	ug/L	2.5	20		
4767540	Dissolved Beryllium (Be)	2016/11/28	105	80 - 120	104	80 - 120	<0.50	ug/L	NC	20		
4767540	Dissolved Bismuth (Bi)	2016/11/28	90	80 - 120	98	80 - 120	<1.0	ug/L				
4767540	Dissolved Boron (B)	2016/11/28	NC	80 - 120	104	80 - 120	<10	ug/L	2.7	20		
4767540	Dissolved Cadmium (Cd)	2016/11/28	96	80 - 120	96	80 - 120	<0.10	ug/L	NC	20		
4767540	Dissolved Calcium (Ca)	2016/11/28	NC	80 - 120	97	80 - 120	<200	ug/L	0.61	20		
4767540	Dissolved Chromium (Cr)	2016/11/28	97	80 - 120	99	80 - 120	<5.0	ug/L	NC	20		
4767540	Dissolved Cobalt (Co)	2016/11/28	93	80 - 120	96	80 - 120	<0.50	ug/L	NC	20		
4767540	Dissolved Copper (Cu)	2016/11/28	97	80 - 120	98	80 - 120	<1.0	ug/L	0.67	20		

			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
4767540	Dissolved Iron (Fe)	2016/11/28	96	80 - 120	97	80 - 120	<100	ug/L	NC	20		
4767540	Dissolved Lead (Pb)	2016/11/28	90	80 - 120	100	80 - 120	<0.50	ug/L	NC	20		
4767540	Dissolved Lithium (Li)	2016/11/28	103	80 - 120	103	80 - 120	<5.0	ug/L				
4767540	Dissolved Magnesium (Mg)	2016/11/28	NC	80 - 120	99	80 - 120	<50	ug/L	0.88	20		
4767540	Dissolved Manganese (Mn)	2016/11/28	92	80 - 120	92	80 - 120	<2.0	ug/L	NC	20		
4767540	Dissolved Molybdenum (Mo)	2016/11/28	104	80 - 120	101	80 - 120	<0.50	ug/L	NC	20		
4767540	Dissolved Nickel (Ni)	2016/11/28	86	80 - 120	91	80 - 120	<1.0	ug/L	1.5	20		
4767540	Dissolved Phosphorus (P)	2016/11/28	117	80 - 120	112	80 - 120	<100	ug/L				
4767540	Dissolved Potassium (K)	2016/11/28	104	80 - 120	102	80 - 120	<200	ug/L	0.025	20		
4767540	Dissolved Selenium (Se)	2016/11/28	94	80 - 120	98	80 - 120	<2.0	ug/L	NC	20		
4767540	Dissolved Silicon (Si)	2016/11/28	101	80 - 120	97	80 - 120	<50	ug/L	2.2	20		
4767540	Dissolved Silver (Ag)	2016/11/28	89	80 - 120	93	80 - 120	<0.10	ug/L	NC	20		
4767540	Dissolved Sodium (Na)	2016/11/28	NC	80 - 120	99	80 - 120	<100	ug/L	0.43	20		
4767540	Dissolved Strontium (Sr)	2016/11/28	NC	80 - 120	93	80 - 120	<1.0	ug/L	0.15	20		
4767540	Dissolved Tellurium (Te)	2016/11/28	100	80 - 120	101	80 - 120	<1.0	ug/L				
4767540	Dissolved Thallium (Tl)	2016/11/28	90	80 - 120	100	80 - 120	<0.050	ug/L	NC	20		
4767540	Dissolved Tin (Sn)	2016/11/28	101	80 - 120	99	80 - 120	<1.0	ug/L				
4767540	Dissolved Titanium (Ti)	2016/11/28	98	80 - 120	98	80 - 120	<5.0	ug/L	NC	20		
4767540	Dissolved Tungsten (W)	2016/11/28	95	80 - 120	100	80 - 120	<1.0	ug/L				
4767540	Dissolved Uranium (U)	2016/11/28	89	80 - 120	93	80 - 120	<0.10	ug/L	3.9	20		
4767540	Dissolved Vanadium (V)	2016/11/28	98	80 - 120	98	80 - 120	<0.50	ug/L	0.25	20		
4767540	Dissolved Zinc (Zn)	2016/11/28	92	80 - 120	95	80 - 120	<5.0	ug/L	NC	20		
4767540	Dissolved Zirconium (Zr)	2016/11/28	108	80 - 120	100	80 - 120	<1.0	ug/L				
4767543	Dissolved Aluminum (Al)	2016/11/30	94	80 - 120	96	80 - 120	<5.0	ug/L				
4767543	Dissolved Antimony (Sb)	2016/11/30	100	80 - 120	104	80 - 120	<0.50	ug/L	NC	20		
4767543	Dissolved Arsenic (As)	2016/11/30	96	80 - 120	98	80 - 120	<1.0	ug/L	NC	20		
4767543	Dissolved Barium (Ba)	2016/11/30	96	80 - 120	98	80 - 120	<2.0	ug/L	NC	20		
4767543	Dissolved Beryllium (Be)	2016/11/30	104	80 - 120	101	80 - 120	<0.50	ug/L	NC	20		
4767543	Dissolved Bismuth (Bi)	2016/11/30	93	80 - 120	95	80 - 120	<1.0	ug/L				
4767543	Dissolved Boron (B)	2016/11/30	98	80 - 120	101	80 - 120	<10	ug/L	NC	20		
4767543	Dissolved Cadmium (Cd)	2016/11/30	98	80 - 120	101	80 - 120	<0.10	ug/L	NC	20		

QUALITY ASSURANCE REPORT(CONT'D)

			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
4767543	Dissolved Calcium (Ca)	2016/11/30	NC	80 - 120	93	80 - 120	<200	ug/L				
4767543	Dissolved Chromium (Cr)	2016/11/30	96	80 - 120	99	80 - 120	<5.0	ug/L	NC	20		
4767543	Dissolved Cobalt (Co)	2016/11/30	93	80 - 120	98	80 - 120	<0.50	ug/L	NC	20		
4767543	Dissolved Copper (Cu)	2016/11/30	93	80 - 120	97	80 - 120	<1.0	ug/L	NC	20		
4767543	Dissolved Iron (Fe)	2016/11/30	94	80 - 120	97	80 - 120	<100	ug/L				
4767543	Dissolved Lead (Pb)	2016/11/30	95	80 - 120	96	80 - 120	<0.50	ug/L	NC	20		
4767543	Dissolved Lithium (Li)	2016/11/30	101	80 - 120	103	80 - 120	<5.0	ug/L				
4767543	Dissolved Magnesium (Mg)	2016/11/30	93	80 - 120	96	80 - 120	<50	ug/L				
4767543	Dissolved Manganese (Mn)	2016/11/30	94	80 - 120	96	80 - 120	<2.0	ug/L				
4767543	Dissolved Molybdenum (Mo)	2016/11/30	99	80 - 120	101	80 - 120	<0.50	ug/L	NC	20		
4767543	Dissolved Nickel (Ni)	2016/11/30	89	80 - 120	93	80 - 120	<1.0	ug/L	NC	20		
4767543	Dissolved Phosphorus (P)	2016/11/30	105	80 - 120	111	80 - 120	<100	ug/L				
4767543	Dissolved Potassium (K)	2016/11/30	96	80 - 120	100	80 - 120	<200	ug/L				
4767543	Dissolved Selenium (Se)	2016/11/30	93	80 - 120	96	80 - 120	<2.0	ug/L	NC	20		
4767543	Dissolved Silicon (Si)	2016/11/30	96	80 - 120	96	80 - 120	<50	ug/L				
4767543	Dissolved Silver (Ag)	2016/11/30	93	80 - 120	97	80 - 120	<0.10	ug/L	NC	20		
4767543	Dissolved Sodium (Na)	2016/11/30	94	80 - 120	96	80 - 120	<100	ug/L	1.3	20		
4767543	Dissolved Strontium (Sr)	2016/11/30	104	80 - 120	98	80 - 120	<1.0	ug/L				
4767543	Dissolved Tellurium (Te)	2016/11/30	102	80 - 120	103	80 - 120	<1.0	ug/L				
4767543	Dissolved Thallium (Tl)	2016/11/30	94	80 - 120	97	80 - 120	<0.050	ug/L	NC	20		
4767543	Dissolved Tin (Sn)	2016/11/30	101	80 - 120	105	80 - 120	<1.0	ug/L				
4767543	Dissolved Titanium (Ti)	2016/11/30	96	80 - 120	99	80 - 120	<5.0	ug/L				
4767543	Dissolved Tungsten (W)	2016/11/30	95	80 - 120	98	80 - 120	<1.0	ug/L				
4767543	Dissolved Uranium (U)	2016/11/30	93	80 - 120	98	80 - 120	<0.10	ug/L	NC	20		
4767543	Dissolved Vanadium (V)	2016/11/30	96	80 - 120	96	80 - 120	<0.50	ug/L	NC	20		
4767543	Dissolved Zinc (Zn)	2016/11/30	96	80 - 120	97	80 - 120	<5.0	ug/L	NC	20		
4767543	Dissolved Zirconium (Zr)	2016/11/30	99	80 - 120	102	80 - 120	<1.0	ug/L				
4767555	Nitrate (N)	2016/11/29	94	80 - 120	93	80 - 120	<0.10	mg/L	NC	20		
4767555	Nitrite (N)	2016/11/29	97	80 - 120	93	80 - 120	<0.010	mg/L	NC	20		
4767920	Phenols-4AAP	2016/11/29	91	80 - 120	94	85 - 115	<0.0010	mg/L	NC	20		
4768027	Phenols-4AAP	2016/11/29	95	80 - 120	96	85 - 115	<0.0010	mg/L	NC	20		

			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
4768033	Free Cyanide	2016/11/28	98	80 - 120	102	80 - 120	<0.0010	mg/L	NC	20		
4768426	Orthophosphate (P)	2016/11/30	102	75 - 125	101	80 - 120	<0.010	mg/L	NC	25		
4768530	Total Phosphorus	2016/11/28	NC	80 - 120	96	80 - 120	<0.004	mg/L	3.2	20	96	80 - 120
4768573	Total Ammonia-N	2016/12/01	101	80 - 120	97	85 - 115	<0.050	mg/L	3.7	20		
4769010	Total Suspended Solids	2016/11/28					<10	mg/L	1.2	25	99	85 - 115
4769564	Phenols-4AAP	2016/11/29	100	80 - 120	99	85 - 115	<0.0010	mg/L	NC	20		
4769677	Total Aluminum (Al)	2016/11/29	97	80 - 120	101	80 - 120	5.2, RDL=5.0	ug/L	1.1	20		
4769677	Total Antimony (Sb)	2016/11/29	105	80 - 120	106	80 - 120	<0.50	ug/L				
4769677	Total Arsenic (As)	2016/11/29	97	80 - 120	101	80 - 120	<1.0	ug/L				
4769677	Total Barium (Ba)	2016/11/29	97	80 - 120	100	80 - 120	<2.0	ug/L				
4769677	Total Beryllium (Be)	2016/11/29	101	80 - 120	104	80 - 120	<0.50	ug/L				
4769677	Total Bismuth (Bi)	2016/11/29	91	80 - 120	97	80 - 120	<1.0	ug/L				
4769677	Total Boron (B)	2016/11/29	NC	80 - 120	100	80 - 120	<10	ug/L				
4769677	Total Cadmium (Cd)	2016/11/29	99	80 - 120	102	80 - 120	<0.10	ug/L	NC	20		
4769677	Total Calcium (Ca)	2016/11/29	NC	80 - 120	97	80 - 120	<200	ug/L				
4769677	Total Chromium (Cr)	2016/11/29	95	80 - 120	100	80 - 120	<5.0	ug/L	NC	20		
4769677	Total Cobalt (Co)	2016/11/29	95	80 - 120	99	80 - 120	<0.50	ug/L				
4769677	Total Copper (Cu)	2016/11/29	98	80 - 120	100	80 - 120	<1.0	ug/L	NC	20		
4769677	Total Iron (Fe)	2016/11/29	94	80 - 120	100	80 - 120	<100	ug/L	NC	20		
4769677	Total Lead (Pb)	2016/11/29	93	80 - 120	100	80 - 120	<0.50	ug/L	NC	20		
4769677	Total Lithium (Li)	2016/11/29	99	80 - 120	102	80 - 120	<5.0	ug/L				
4769677	Total Magnesium (Mg)	2016/11/29	NC	80 - 120	99	80 - 120	<50	ug/L				
4769677	Total Manganese (Mn)	2016/11/29	95	80 - 120	100	80 - 120	<2.0	ug/L				
4769677	Total Molybdenum (Mo)	2016/11/29	103	80 - 120	102	80 - 120	<0.50	ug/L				
4769677	Total Nickel (Ni)	2016/11/29	94	80 - 120	101	80 - 120	<1.0	ug/L	NC	20		
4769677	Total Phosphorus (P)	2016/11/29	105	80 - 120	96	80 - 120	<100	ug/L				
4769677	Total Potassium (K)	2016/11/29	NC	80 - 120	98	80 - 120	<200	ug/L				
4769677	Total Selenium (Se)	2016/11/29	99	80 - 120	106	80 - 120	<2.0	ug/L				
4769677	Total Silicon (Si)	2016/11/29	97	80 - 120	101	80 - 120	<50	ug/L				
4769677	Total Silver (Ag)	2016/11/29	96	80 - 120	100	80 - 120	<0.10	ug/L				
4769677	Total Sodium (Na)	2016/11/29	NC	80 - 120	98	80 - 120	<100	ug/L				

QUALITY ASSURANCE REPORT(CONT'D)

			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
4769677	Total Strontium (Sr)	2016/11/29	NC	80 - 120	99	80 - 120	<1.0	ug/L				
4769677	Total Tellurium (Te)	2016/11/29	103	80 - 120	107	80 - 120	<1.0	ug/L				
4769677	Total Thallium (Tl)	2016/11/29	92	80 - 120	99	80 - 120	<0.050	ug/L				
4769677	Total Tin (Sn)	2016/11/29	104	80 - 120	103	80 - 120	<1.0	ug/L				
4769677	Total Titanium (Ti)	2016/11/29	100	80 - 120	103	80 - 120	<5.0	ug/L				
4769677	Total Tungsten (W)	2016/11/29	99	80 - 120	103	80 - 120	<1.0	ug/L				
4769677	Total Uranium (U)	2016/11/29	98	80 - 120	102	80 - 120	<0.10	ug/L				
4769677	Total Vanadium (V)	2016/11/29	97	80 - 120	100	80 - 120	<0.50	ug/L				
4769677	Total Zinc (Zn)	2016/11/29	96	80 - 120	103	80 - 120	<5.0	ug/L	6.6	20		
4769677	Total Zirconium (Zr)	2016/11/29	103	80 - 120	103	80 - 120	<1.0	ug/L				
4769829	Free Cyanide	2016/11/29	102	80 - 120	102	80 - 120	<0.0010	mg/L	NC	20		
4769996	Mercury (Hg)	2016/11/30	107	75 - 125	100	80 - 120	<0.0001	mg/L	NC	20		
4770337	Total Phosphorus	2016/11/30	89	80 - 120	90	80 - 120	<0.004	mg/L	NC	20	80	80 - 120
4770677	Nitrate (N)	2016/11/30	101	80 - 120	101	80 - 120	<0.10	mg/L	NC	20		
4770677	Nitrite (N)	2016/11/30	95	80 - 120	91	80 - 120	<0.010	mg/L	NC	20		
4771470	Mercury (Hg)	2016/11/30	107	75 - 125	102	80 - 120	<0.0001	mg/L	NC	20		
4774343	Alkalinity (Total as CaCO3)	2016/12/02			97	85 - 115	<1.0	mg/L	2.4	20		
4774406	Dissolved Bromide (Br-)	2016/12/01	93	80 - 120	101	80 - 120	<1.0	mg/L	NC	20		
4774406	Dissolved Chloride (Cl)	2016/12/01	94	80 - 120	98	70 - 130	<1.0	mg/L	1.8	20		
4774406	Dissolved Sulphate (SO4)	2016/12/01	NC	80 - 120	99	80 - 120	<1.0	mg/L	1.6	20		
4775756	Dissolved Aluminum (Al)	2016/12/02	99	80 - 120	102	80 - 120	<5.0	ug/L				
4775756	Dissolved Antimony (Sb)	2016/12/02	105	80 - 120	107	80 - 120	<0.50	ug/L				
4775756	Dissolved Arsenic (As)	2016/12/02	99	80 - 120	101	80 - 120	<1.0	ug/L	NC	20		
4775756	Dissolved Barium (Ba)	2016/12/02	97	80 - 120	101	80 - 120	<2.0	ug/L	3.2	20		
4775756	Dissolved Beryllium (Be)	2016/12/02	102	80 - 120	104	80 - 120	<0.50	ug/L				
4775756	Dissolved Bismuth (Bi)	2016/12/02	92	80 - 120	96	80 - 120	<1.0	ug/L				
4775756	Dissolved Boron (B)	2016/12/02	101	80 - 120	102	80 - 120	<10	ug/L	3.2	20		
4775756	Dissolved Cadmium (Cd)	2016/12/02	101	80 - 120	103	80 - 120	<0.10	ug/L	NC	20		
4775756	Dissolved Calcium (Ca)	2016/12/02	NC	80 - 120	99	80 - 120	<200	ug/L	3.6	20		
4775756	Dissolved Chromium (Cr)	2016/12/02	98	80 - 120	103	80 - 120	<5.0	ug/L	NC	20		
4775756	Dissolved Cobalt (Co)	2016/12/02	99	80 - 120	103	80 - 120	<0.50	ug/L				

QUALITY ASSURANCE REPORT(CONT'D)

			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
4775756	Dissolved Copper (Cu)	2016/12/02	95	80 - 120	101	80 - 120	<1.0	ug/L	NC	20		
4775756	Dissolved Iron (Fe)	2016/12/02	99	80 - 120	102	80 - 120	<100	ug/L	NC	20		
4775756	Dissolved Lead (Pb)	2016/12/02	94	80 - 120	96	80 - 120	<0.50	ug/L	NC	20		
4775756	Dissolved Lithium (Li)	2016/12/02	98	80 - 120	101	80 - 120	<5.0	ug/L				
4775756	Dissolved Magnesium (Mg)	2016/12/02	NC	80 - 120	101	80 - 120	<50	ug/L	2.1	20		
4775756	Dissolved Manganese (Mn)	2016/12/02	NC	80 - 120	104	80 - 120	<2.0	ug/L	3.3	20		
4775756	Dissolved Molybdenum (Mo)	2016/12/02	104	80 - 120	102	80 - 120	<0.50	ug/L				
4775756	Dissolved Nickel (Ni)	2016/12/02	97	80 - 120	101	80 - 120	<1.0	ug/L				
4775756	Dissolved Phosphorus (P)	2016/12/02	104	80 - 120	104	80 - 120	<100	ug/L				
4775756	Dissolved Potassium (K)	2016/12/02	98	80 - 120	100	80 - 120	<200	ug/L	4.5	20		
4775756	Dissolved Selenium (Se)	2016/12/02	100	80 - 120	103	80 - 120	<2.0	ug/L				
4775756	Dissolved Silicon (Si)	2016/12/02	99	80 - 120	99	80 - 120	<50	ug/L				
4775756	Dissolved Silver (Ag)	2016/12/02	87	80 - 120	101	80 - 120	0.18, RDL=0.10	ug/L				
4775756	Dissolved Sodium (Na)	2016/12/02	NC	80 - 120	101	80 - 120	<100	ug/L	2.3	20		
4775756	Dissolved Strontium (Sr)	2016/12/02	NC	80 - 120	101	80 - 120	<1.0	ug/L				
4775756	Dissolved Tellurium (Te)	2016/12/02	98	80 - 120	103	80 - 120	<1.0	ug/L				
4775756	Dissolved Thallium (Tl)	2016/12/02	93	80 - 120	97	80 - 120	<0.050	ug/L				
4775756	Dissolved Tin (Sn)	2016/12/02	104	80 - 120	105	80 - 120	<1.0	ug/L				
4775756	Dissolved Titanium (Ti)	2016/12/02	99	80 - 120	103	80 - 120	<5.0	ug/L				
4775756	Dissolved Tungsten (W)	2016/12/02	100	80 - 120	100	80 - 120	<1.0	ug/L				
4775756	Dissolved Uranium (U)	2016/12/02	100	80 - 120	97	80 - 120	<0.10	ug/L				
4775756	Dissolved Vanadium (V)	2016/12/02	100	80 - 120	102	80 - 120	<0.50	ug/L				
4775756	Dissolved Zinc (Zn)	2016/12/02	96	80 - 120	101	80 - 120	<5.0	ug/L	NC	20		

QUALITY ASSURANCE REPORT(CONT'D)

			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**
4775756	Dissolved Zirconium (Zr)	2016/12/02	105	80 - 120	103	80 - 120	<1.0	ug/L				

N/A = Not Applicable

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 too small to permit a reliable recovery calculation (matrix spike concentration was less than 2x that of the native sample concentration).

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (one or both samples < 5x RDL).

(1) Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.

VALIDATION SIGNATURE PAGE

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

Maxxam Analytics International Corporation o/a Maxxam Analytics
6740 Campobello Road, Mississauga, Ontario Canada L5N 2L8 Tel (905) 817-5700 Toll-free 800-563-6266 Fax (905) 817-5777 www.maxxam.ca

IMMEDIATE TEST

CHAIN OF CUSTODY RECORD

Page 1 of 1

INVOICE TO:

Company Name: #1326 Golder Associates Ltd
Attention: Accounts Payable
Address: 6925 Century Ave Suite 100
Mississauga ON L5N 7K2
Tel: (905) 567-4444 Fax: (905) 567-6561
Email: AP-CustomerService@golder.com

REPORT TO:

Company Name:
Attention: Josip Balaban
Address:
Tel: Fax:
Email: josip_balaban@golder.com

PROJECT INFORMATION:

Quotation #: B41022
P.O. #:
Project: 021-1228
Project Name:
Site #: Tansley Quarry
Sampled By:

Laboratory Use Only:

Maxxam Job #:
Bottle Order #: 586660
COC #: C#586660-03-01
Project Manager: Ema Gitej

MOE REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE MAXXAM DRINKING WATER CHAIN OF CUSTODY

Regulation 153 (2011)

☐ Table 1 ☐ Res/Park ☐ Medium/Fine
☐ Table 2 ☐ Ind/Comm ☐ Coarse
☐ Table 3 ☐ Agri/Other ☐ **For RSC**
☐ Table ___

Other Regulations

☐ CCME ☐ Sanitary Sewer Bylaw
☐ Reg 558 ☐ Storm Sewer Bylaw
☐ MISA Municipality ________
☒ PWQO
☒ Other ODWS

Special Instructions

Include Criteria on Certificate of Analysis (Y/N)? ______

ANALYSIS REQUESTED (PLEASE BE SPECIFIC)

Turnaround Time (TAT) Required:

Please provide advance notice for rush projects

Regular (Standard) TAT: ☒
(will be applied if Rush TAT is not specified)
Standard TAT = 5-7 Working days for most tests.
Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

Job Specific Rush TAT (if applies to entire submission)
Date Required: ________ Time Required: ______ ☐
Rush Confirmation Number: ________ *(call lab for #)*

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Field Filtered (please circle): [✓ Metals] / [✓ Hg] / Cr VI	ON-SITE GROUNDWATER	# of Bottles	Comments
1	MW01-I		NOV 24/16	9:00	GW	Y	X	10	
2	DUP 2				GW	Y	X	10	
3	MW03-I			10:30	GW	Y	X	10	
4	MW-01-D			9:15	GW	Y	X	10	
5	MW11-D			13:45	GW	Y	X	10	
6	MW11-S			1400	GW	Y	X	10	
7	MW 03-D			10:45	GW	Y	X	10	24-Nov-16 17:33 Ema Gitej B6P6843 KP7 ENV-581
8	DUP3				GW	Y	X	10	
9	MW11-D		↓	13:30	GW	Y	X	10	
10					GW	~~Y~~	~~X~~	~~10~~	

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted
Andrey Fomenko	16/11/24	1430	[illegible]	16/11/24	17:33	

Laboratory Use Only

Time Sensitive	Temperature (°C) on Receipt	Custody Seal	Yes	No
	8/8/8 8/8/9	Present		✓
		Intact		✓

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

SAMPLES MUST BE KEPT COOL (< 10° C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

White: Maxxam Yellow: Client

Maxxam Analytics International Corporation o/a Maxxam Analytics

PRIVATE WELLS

Your Project #: 021-1228
Site Location: TANSLEY QUARRY
Your C.O.C. #: 586661-01-01

Attention:Sharon Wood

Golder Associates Ltd
Mississauga - Standing Offer
6925 Century Ave
Suite 100
Mississauga, ON
CANADA L5N 7K2

Report Date: 2016/11/23
Report #: R4257180
Version: 3 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

MAXXAM JOB #: B6O7052
Received: 2016/11/14, 12:01

Sample Matrix: Water
Samples Received: 1

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Alkalinity	1	N/A	2016/11/16	CAM SOP-00448	SM 22 2320 B m
Anions	1	N/A	2016/11/16	CAM SOP-00435	SM 22 4110 B m
Conductivity	1	N/A	2016/11/16	CAM SOP-00414	SM 22 2510 m
Free (WAD) Cyanide	1	N/A	2016/11/17	CAM SOP-00457	OMOE E3015 m
Fluoride	1	2016/11/16	2016/11/16	CAM SOP-00449	SM 22 4500-F C m
Hardness (calculated as CaCO3)	1	N/A	2016/11/16	CAM SOP 00102/00408/00447	SM 2340 B
Mercury in Water by CVAA	1	2016/11/16	2016/11/16	CAM SOP-00453	EPA 7470A m
Metals Analysis by ICPMS (as received) (1)	1	2016/11/15	2016/11/16	CAM SOP-00447	EPA 6020B m
Total Ammonia-N	1	N/A	2016/11/17	CAM SOP-00441	EPA GS I-2522-90 m
Nitrate (NO3) and Nitrite (NO2) in Water (2)	1	N/A	2016/11/16	CAM SOP-00440	SM 22 4500-NO3I/NO2B
pH	1	N/A	2016/11/16	CAM SOP-00413	SM 4500H+ B m
Phenols (4AAP)	1	N/A	2016/11/17	CAM SOP-00444	OMOE E3179 m
Orthophosphate	1	N/A	2016/11/16	CAM SOP-00461	EPA 365.1 m
Sulphide	1	N/A	2016/11/16	CAM SOP-00455	SM 22 4500-S G m
Total Dissolved Solids	1	2016/11/15	2016/11/15	CAM SOP-00428	SM 22 2540C m
Total Phosphorus (Colourimetric)	1	2016/11/16	2016/11/16	CAM SOP-00407	SM 22 4500 P B H m
Low Level Total Suspended Solids	1	2016/11/15	2016/11/15	CAM SOP-00428	SM 22 2540D m
Turbidity	1	N/A	2016/11/16	CAM SOP-00417	SM 22 2130 B m

Remarks:

Maxxam Analytics' laboratories are accredited to ISO/IEC 17025:2005 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Maxxam are based upon recognized Provincial, Federal or US method compendia such as CCME, MDDELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported: unless indicated otherwise, associated sample data are not blank corrected.

Maxxam Analytics' liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed

Your Project #: 021-1228
Site Location: TANSLEY QUARRY
Your C.O.C. #: 586661-01-01

Attention:Sharon Wood

Golder Associates Ltd
Mississauga - Standing Offer
6925 Century Ave
Suite 100
Mississauga, ON
CANADA L5N 7K2

Report Date: 2016/11/23
Report #: R4257180
Version: 3 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

MAXXAM JOB #: B6O7052
Received: 2016/11/14, 12:01

or implied. Maxxam has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Maxxam, unless otherwise agreed in writing.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods. Results relate to samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(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.
Ema Gitej, Senior Project Manager
Email: EGitej@maxxam.ca
Phone# (905)817-5829
==
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.

Maxxam Job #: B6O7052
Report Date: 2016/11/23

Golder Associates Ltd
Client Project #: 021-1228
Site Location: TANSLEY QUARRY
Sampler Initials: LB

RESULTS OF ANALYSES OF WATER

Maxxam ID				DLF291	DLF291		
Sampling Date				2016/11/14	2016/11/14		
COC Number				586661-01-01	586661-01-01		
	UNITS	**MAC**	**A/O**	**BEKKERS**	**BEKKERS Lab-Dup**	**RDL**	**QC Batch**
Calculated Parameters							
Hardness (CaCO3)	mg/L	-	80:100	940		1.0	4746662
Inorganics							
Total Ammonia-N	mg/L	-	-	0.19		0.050	4750913
Conductivity	umho/cm	-	-	2500		1.0	4750745
Total Dissolved Solids	mg/L	-	500	1810		10	4748365
Fluoride (F-)	mg/L	**1.5**	-	0.24		0.10	4750737
Free Cyanide	mg/L	**0.2**	-	<0.0010	<0.0010	0.0010	4751788
Orthophosphate (P)	mg/L	-	-	<0.010		0.010	4749380
pH	pH	-	6.5:8.5	7.71			4750747
Phenols-4AAP	mg/L	-	-	<0.0010		0.0010	4752261
Total Phosphorus	mg/L	-	-	<0.004		0.004	4750392
Total Suspended Solids	mg/L	-	-	1		1	4749074
Sulphide	mg/L	-	0.05	<0.020		0.020	4749148
Turbidity	NTU	-	5	0.2		0.1	4748718
Alkalinity (Total as CaCO3)	mg/L	-	30:500	110		1.0	4750750
Nitrite (N)	mg/L	**1**	-	0.027		0.010	4749295
Chloride (Cl)	mg/L	-	250	290	290	5.0	4749665
Nitrate (N)	mg/L	**10**	-	0.29		0.10	4749295
Nitrate + Nitrite (N)	mg/L	**10**	-	0.32		0.10	4749295
Bromide (Br-)	mg/L	-	-	2.5	2.5	1.0	4749665
Sulphate (SO4)	mg/L	-	500	800	820	5.0	4749665

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
MAC,A/O: Ontario Drinking Water Standards - Maximum Acceptable Concentration [MAC], Interim Maximum Acceptable Concentration [IMC] & Table 4-Chemical/Physical Objectives [A/O] - Not Health Related, respectively
(Made under the Ontario Safe Drinking Water Act, 2002)

Maxxam Job #: B6O7052
Report Date: 2016/11/23

Golder Associates Ltd
Client Project #: 021-1228
Site Location: TANSLEY QUARRY
Sampler Initials: LB

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID					DLF291		
Sampling Date					2016/11/14		
COC Number					586661-01-01		
	UNITS	**MAC**	**IMC**	**A/O**	**BEKKERS**	**RDL**	**QC Batch**
Metals							
Mercury (Hg)	mg/L	**0.001**	-	-	<0.0001	0.0001	4750143
. Aluminum (Al)	ug/L	-	-	100	<5.0	5.0	4749093
. Antimony (Sb)	ug/L	-	6	-	<0.50	0.50	4749093
. Arsenic (As)	ug/L	-	25	-	<1.0	1.0	4749093
. Barium (Ba)	ug/L	**1000**	-	-	21	2.0	4749093
. Beryllium (Be)	ug/L	-	-	-	<0.50	0.50	4749093
. Bismuth (Bi)	ug/L	-	-	-	<1.0	1.0	4749093
. Boron (B)	ug/L	-	5000	-	1500	10	4749093
. Cadmium (Cd)	ug/L	**5**	-	-	<0.10	0.10	4749093
. Calcium (Ca)	ug/L	-	-	-	210000	1000	4749093
. Chromium (Cr)	ug/L	**50**	-	-	<5.0	5.0	4749093
. Cobalt (Co)	ug/L	-	-	-	<0.50	0.50	4749093
. Copper (Cu)	ug/L	-	-	1000	3.7	1.0	4749093
. Iron (Fe)	ug/L	-	-	300	<100	100	4749093
. Lead (Pb)	ug/L	**10**	-	-	<0.50	0.50	4749093
. Magnesium (Mg)	ug/L	-	-	-	98000	50	4749093
. Manganese (Mn)	ug/L	-	-	50	250	2.0	4749093
. Molybdenum (Mo)	ug/L	-	-	-	7.7	0.50	4749093
. Nickel (Ni)	ug/L	-	-	-	<1.0	1.0	4749093
. Phosphorus (P)	ug/L	-	-	-	<100	100	4749093
. Potassium (K)	ug/L	-	-	-	16000	200	4749093
. Selenium (Se)	ug/L	**10**	-	-	<2.0	2.0	4749093
. Silicon (Si)	ug/L	-	-	-	3800	50	4749093
. Silver (Ag)	ug/L	-	-	-	<0.10	0.10	4749093
. Sodium (Na)	ug/L	**20000**	-	200000	210000	100	4749093
. Strontium (Sr)	ug/L	-	-	-	14000	1.0	4749093
. Thallium (Tl)	ug/L	-	-	-	<0.050	0.050	4749093
. Tin (Sn)	ug/L	-	-	-	<1.0	1.0	4749093
. Titanium (Ti)	ug/L	-	-	-	<5.0	5.0	4749093
. Uranium (U)	ug/L	**20**	-	-	2.4	0.10	4749093
. Vanadium (V)	ug/L	-	-	-	0.56	0.50	4749093

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

MAC,IMC,A/O: Ontario Drinking Water Standards - Maximum Acceptable Concentration [MAC], Interim Maximum Acceptable Concentration [IMC] & Table 4-Chemical/Physical Objectives [A/O] - Not Health Related, respectively
(Made under the Ontario Safe Drinking Water Act, 2002)

Maxxam Job #: B6O7052
Report Date: 2016/11/23

Golder Associates Ltd
Client Project #: 021-1228
Site Location: TANSLEY QUARRY
Sampler Initials: LB

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID					DLF291		
Sampling Date					2016/11/14		
COC Number					586661-01-01		
	UNITS	**MAC**	**IMC**	**A/O**	**BEKKERS**	**RDL**	**QC Batch**
. Zinc (Zn)	ug/L	-	-	5000	34	10	4749093

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

MAC,IMC,A/O: Ontario Drinking Water Standards - Maximum Acceptable Concentration [MAC], Interim Maximum Acceptable Concentration [IMC] & Table 4-Chemical/Physical Objectives [A/O] - Not Health Related, respectively
(Made under the Ontario Safe Drinking Water Act, 2002)

TEST SUMMARY

Maxxam ID: DLF291
Sample ID: BEKKERS
Matrix: Water

Collected: 2016/11/14
Shipped:
Received: 2016/11/14

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	4750750	N/A	2016/11/16	Surinder Rai
Anions	IC	4749665	N/A	2016/11/16	Fari Dehdezi
Conductivity	AT	4750745	N/A	2016/11/16	Surinder Rai
Free (WAD) Cyanide	SKAL/CN	4751788	N/A	2016/11/17	Xuanhong Qiu
Fluoride	ISE	4750737	2016/11/16	2016/11/16	Surinder Rai
Hardness (calculated as CaCO3)		4746662	N/A	2016/11/16	Automated Statchk
Mercury in Water by CVAA	CV/AA	4750143	2016/11/16	2016/11/16	Magdalena Carlos
Metals Analysis by ICPMS (as received)	ICP/MS	4749093	2016/11/15	2016/11/16	Prempal Bhatti
Total Ammonia-N	LACH/NH4	4750913	N/A	2016/11/17	Charles Opoku-Ware
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	4749295	N/A	2016/11/16	Chandra Nandlal
pH	AT	4750747	N/A	2016/11/16	Surinder Rai
Phenols (4AAP)	TECH/PHEN	4752261	N/A	2016/11/17	Bramdeo Motiram
Orthophosphate	KONE	4749380	N/A	2016/11/16	Alina Dobreanu
Sulphide	ISE/S	4749148	N/A	2016/11/16	Neil Dassanayake
Total Dissolved Solids	BAL	4748365	2016/11/15	2016/11/15	Zahid Soikot
Total Phosphorus (Colourimetric)	LACH/P	4750392	2016/11/16	2016/11/16	Sarabjit Raina
Low Level Total Suspended Solids	BAL	4749074	2016/11/15	2016/11/15	Massarat Jan
Turbidity	AT	4748718	N/A	2016/11/16	Tahir Anwar

Maxxam ID: DLF291 Dup
Sample ID: BEKKERS
Matrix: Water

Collected: 2016/11/14
Shipped:
Received: 2016/11/14

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Anions	IC	4749665	N/A	2016/11/16	Fari Dehdezi
Free (WAD) Cyanide	SKAL/CN	4751788	N/A	2016/11/17	Xuanhong Qiu

GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	12.0°C
Package 2	13.7°C

Revised report (2016/11/23): Split report as per client request.

Revised report (2016/11/22): Criteria is included in this report as requested.

Results relate only to the items tested.

Maxxam Job #: B6O7052
Report Date: 2016/11/23

QUALITY ASSURANCE REPORT

Golder Associates Ltd
Client Project #: 021-1228

Site Location: TANSLEY QUARRY
Sampler Initials: LB

			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
4748365	Total Dissolved Solids	2016/11/15					<10	mg/L	1.7	25	96	90 - 110
4748718	Turbidity	2016/11/16			100	85 - 115	<0.1	NTU	NC	20		
4749074	Total Suspended Solids	2016/11/15					<1	mg/L	NC	25	98	85 - 115
4749093	. Aluminum (Al)	2016/11/16	94	80 - 120	102	80 - 120	<5.0	ug/L	2.4	20		
4749093	. Antimony (Sb)	2016/11/16	98	80 - 120	102	80 - 120	<0.50	ug/L	NC	20		
4749093	. Arsenic (As)	2016/11/16	97	80 - 120	98	80 - 120	<1.0	ug/L	NC	20		
4749093	. Barium (Ba)	2016/11/16	96	80 - 120	98	80 - 120	<2.0	ug/L	2.2	20		
4749093	. Beryllium (Be)	2016/11/16	97	80 - 120	100	80 - 120	<0.50	ug/L	NC	20		
4749093	. Bismuth (Bi)	2016/11/16	91	80 - 120	94	80 - 120	<1.0	ug/L	NC	20		
4749093	. Boron (B)	2016/11/16	95	80 - 120	96	80 - 120	<10	ug/L	NC	20		
4749093	. Cadmium (Cd)	2016/11/16	97	80 - 120	99	80 - 120	<0.10	ug/L	NC	20		
4749093	. Calcium (Ca)	2016/11/16	NC	80 - 120	101	80 - 120	<200	ug/L	3.0	20		
4749093	. Chromium (Cr)	2016/11/16	99	80 - 120	102	80 - 120	<5.0	ug/L	NC	20		
4749093	. Cobalt (Co)	2016/11/16	98	80 - 120	101	80 - 120	<0.50	ug/L	NC	20		
4749093	. Copper (Cu)	2016/11/16	94	80 - 120	98	80 - 120	<1.0	ug/L	2.3	20		
4749093	. Iron (Fe)	2016/11/16	101	80 - 120	104	80 - 120	<100	ug/L	NC	20		
4749093	. Lead (Pb)	2016/11/16	93	80 - 120	95	80 - 120	<0.50	ug/L	NC	20		
4749093	. Magnesium (Mg)	2016/11/16	100	80 - 120	105	80 - 120	<50	ug/L	2.0	20		
4749093	. Manganese (Mn)	2016/11/16	100	80 - 120	103	80 - 120	<2.0	ug/L	NC	20		
4749093	. Molybdenum (Mo)	2016/11/16	98	80 - 120	101	80 - 120	<0.50	ug/L	NC	20		
4749093	. Nickel (Ni)	2016/11/16	96	80 - 120	99	80 - 120	<1.0	ug/L	NC	20		
4749093	. Phosphorus (P)	2016/11/16	98	80 - 120	106	80 - 120	<100	ug/L	NC	20		
4749093	. Potassium (K)	2016/11/16	99	80 - 120	103	80 - 120	<200	ug/L	2.8	20		
4749093	. Selenium (Se)	2016/11/16	96	80 - 120	99	80 - 120	<2.0	ug/L	NC	20		
4749093	. Silicon (Si)	2016/11/16	96	80 - 120	102	80 - 120	<50	ug/L	1.2	20		
4749093	. Silver (Ag)	2016/11/16	95	80 - 120	98	80 - 120	<0.10	ug/L	NC	20		
4749093	. Sodium (Na)	2016/11/16	NC	80 - 120	102	80 - 120	<100	ug/L	2.6	20		
4749093	. Strontium (Sr)	2016/11/16	93	80 - 120	98	80 - 120	<1.0	ug/L	1.0	20		
4749093	. Thallium (Tl)	2016/11/16	94	80 - 120	94	80 - 120	<0.050	ug/L	NC	20		
4749093	. Tin (Sn)	2016/11/16	97	80 - 120	101	80 - 120	<1.0	ug/L	NC	20		
4749093	. Titanium (Ti)	2016/11/16	100	80 - 120	103	80 - 120	<5.0	ug/L	NC	20		

QUALITY ASSURANCE REPORT(CONT'D)

			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
4749093	. Uranium (U)	2016/11/16	90	80 - 120	91	80 - 120	<0.10	ug/L	NC	20		
4749093	. Vanadium (V)	2016/11/16	98	80 - 120	101	80 - 120	<0.50	ug/L	NC	20		
4749093	. Zinc (Zn)	2016/11/16	96	80 - 120	100	80 - 120	<5.0	ug/L	NC	20		
4749148	Sulphide	2016/11/16	104	80 - 120	104	80 - 120	<0.020	mg/L	NC	20		
4749295	Nitrate (N)	2016/11/16	102	80 - 120	101	80 - 120	<0.10	mg/L	NC	20		
4749295	Nitrite (N)	2016/11/16	104	80 - 120	96	80 - 120	<0.010	mg/L	NC	20		
4749380	Orthophosphate (P)	2016/11/16	120	75 - 125	99	80 - 120	<0.010	mg/L	NC	25		
4749665	Bromide (Br-)	2016/11/16	104	80 - 120	106	80 - 120	<1.0	mg/L	NC	20		
4749665	Chloride (Cl)	2016/11/16	NC	80 - 120	99	70 - 130	<1.0	mg/L	0.64	20		
4749665	Sulphate (SO4)	2016/11/16	NC	80 - 120	100	80 - 120	<1.0	mg/L	2.6	20		
4750143	Mercury (Hg)	2016/11/16	105	75 - 125	105	80 - 120	<0.0001	mg/L	NC	20		
4750392	Total Phosphorus	2016/11/16	99	80 - 120	100	80 - 120	<0.004	mg/L	NC	20	97	80 - 120
4750737	Fluoride (F-)	2016/11/16	102	80 - 120	106	80 - 120	<0.10	mg/L	NC	20		
4750745	Conductivity	2016/11/16			101	85 - 115	<1.0	umho/cm	0.078	25		
4750747	pH	2016/11/16			102	98 - 103			0.51	N/A		
4750750	Alkalinity (Total as CaCO3)	2016/11/16			95	85 - 115	<1.0	mg/L	0.19	20		
4750913	Total Ammonia-N	2016/11/17	99	80 - 120	100	85 - 115	<0.050	mg/L	NC	20		
4751788	Free Cyanide	2016/11/17	107	80 - 120	101	80 - 120	<0.0010	mg/L	NC	20		
4752261	Phenols-4AAP	2016/11/17	NC	80 - 120	100	85 - 115	<0.0010	mg/L	NC	20		

N/A = Not Applicable

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 too small to permit a reliable recovery calculation (matrix spike concentration was less than 2x that of the native sample concentration).

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (one or both samples < 5x RDL).

Maxxam Job #: B6O7052
Report Date: 2016/11/23

Golder Associates Ltd
Client Project #: 021-1228
Site Location: TANSLEY QUARRY
Sampler Initials: LB

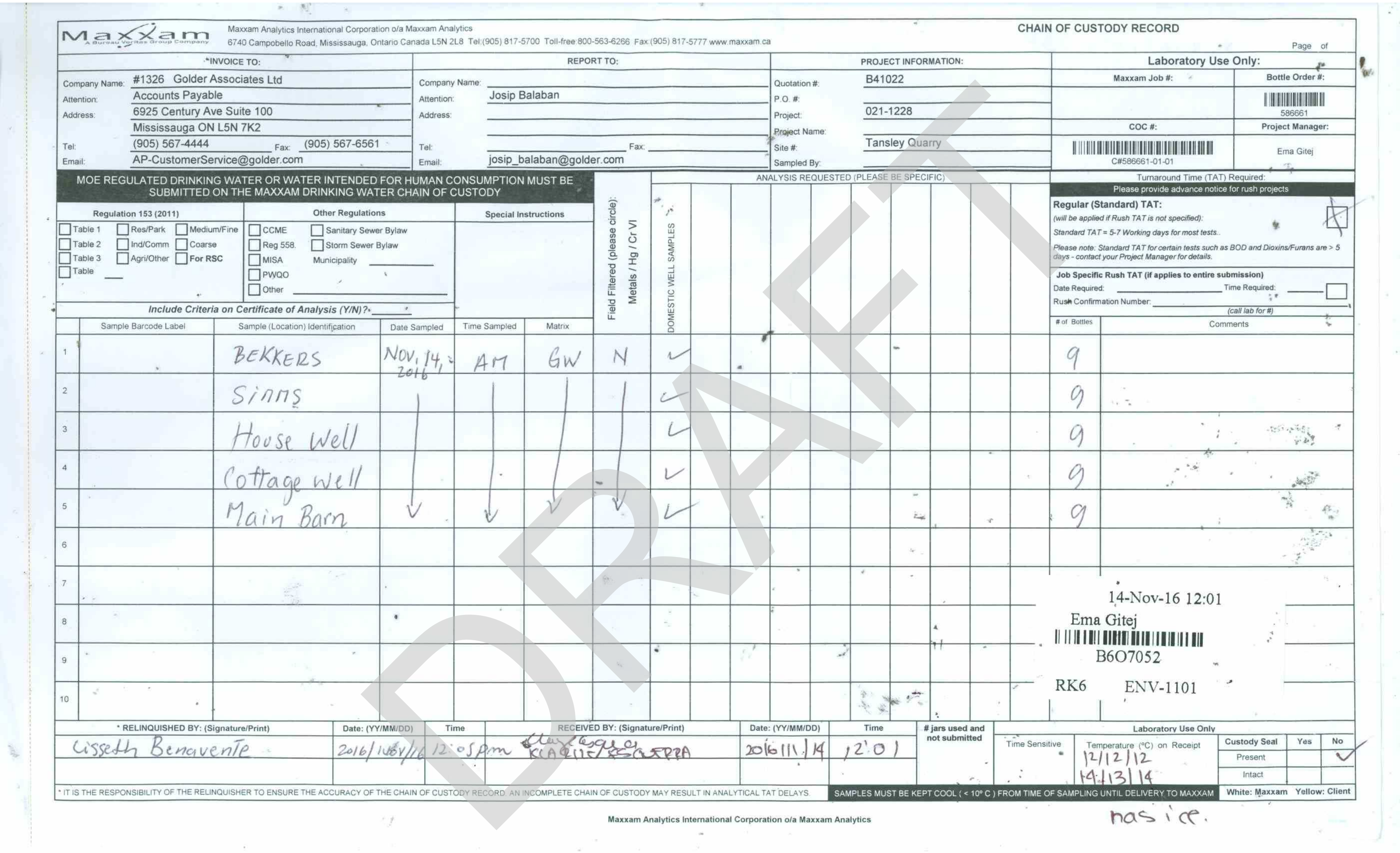
VALIDATION SIGNATURE PAGE

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

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.



Maxxam
A Bureau Veritas Group Company

Maxxam Analytics International Corporation o/a Maxxam Analytics
6740 Campobello Road, Mississauga, Ontario Canada L5N 2L8 Tel:(905) 817-5700 Toll-free:800-563-6266 Fax:(905) 817-5777 www.maxxam.ca

CHAIN OF COUSTODY RECORD

Page of

***INVOICE TO:**

Company Name: #1326 Golder Associates Ltd
Attention: Accounts Payable
Address: 6925 Century Ave Suite 100
Mississauga ON L5N 7K2
Tel: (905) 567-4444 Fax: (905) 567-6561
Email: AP-CustomerService@golder.com

REPORT TO:

Company Name:
Attention: Josip Balaban
Address:
Tel: Fax:
Email: josip_balaban@golder.com

PROJECT INFORMATION:

Quotation #: B41022
P.O. #:
Project: 021-1228
Project Name:
Site #: Tansley Quarry
Sampled By:

Laboratory Use Only:

Maxxam Job #:
Bottle Order #: 586661
COC #: C#586661-01-01
Project Manager: Ema Gitej

MOE REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE MAXXAM DRINKING WATER CHAIN OF CUSTODY

Regulation 153 (2011)

☐ Table 1 ☐ Res/Park ☐ Medium/Fine
☐ Table 2 ☐ Ind/Comm ☐ Coarse
☐ Table 3 ☐ Agri/Other ☐ **For RSC**
☐ Table ___

Other Regulations

☐ CCME ☐ Sanitary Sewer Bylaw
☐ Reg 558. ☐ Storm Sewer Bylaw
☐ MISA Municipality ________
☐ PWQO
☐ Other ________

Special Instructions

Include Criteria on Certificate of Analysis (Y/N)? ____

ANALYSIS REQUESTED (PLEASE BE SPECIFIC)

Turnaround Time (TAT) Required:
Please provide advance notice for rush projects

Regular (Standard) TAT: ☒
(will be applied if Rush TAT is not specified):
Standard TAT = 5-7 Working days for most tests..
Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

Job Specific Rush TAT (if applies to entire submission) ☐
Date Required: ________ Time Required: ________
Rush Confirmation Number: ________ *(call lab for #)*

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Field Filtered (please circle): Metals / Hg / Cr VI	DOMESTIC WELL SAMPLES	# of Bottles	Comments
1		BEKKERS	NOV, 14, 2016	AM	GW	N	✓	9	
2		Sinns	↓	↓	↓	↓	✓	9	
3		House Well	↓	↓	↓	↓	✓	9	
4		Cottage well	↓	↓	↓	↓	✓	9	
5		Main Barn	↓	↓	↓	↓	✓	9	
6									
7									
8									
9									
10									

14-Nov-16 12:01
Ema Gitej
B6O7052
RK6 ENV-1101

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted
Cisseth Benavente	2016/NOV/14	12:05pm	KLARISSA SERRA	2016/11/14	12:01	

Laboratory Use Only

Time Sensitive
Temperature (°C) on Receipt: 12/12/12 14/13/14

Custody Seal	Yes	No
Present		✓
Intact		

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

SAMPLES MUST BE KEPT COOL (< 10° C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

White: Maxxam Yellow: Client

Maxxam Analytics International Corporation o/a Maxxam Analytics

has ice.

Your Project #: 021-1228
Site Location: TANSLEY QUARRY
Your C.O.C. #: 586661-01-01

Attention:Sharon Wood

Golder Associates Ltd
Mississauga - Standing Offer
6925 Century Ave
Suite 100
Mississauga, ON
CANADA L5N 7K2

Report Date: 2016/11/23
Report #: R4257203
Version: 5 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

MAXXAM JOB #: B6O7052
Received: 2016/11/14, 12:01

Sample Matrix: Water
Samples Received: 3

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Alkalinity	3	N/A	2016/11/16	CAM SOP-00448	SM 22 2320 B m
Anions	3	N/A	2016/11/17	CAM SOP-00435	SM 22 4110 B m
Conductivity	3	N/A	2016/11/16	CAM SOP-00414	SM 22 2510 m
Free (WAD) Cyanide	3	N/A	2016/11/17	CAM SOP-00457	OMOE E3015 m
Fluoride	3	2016/11/16	2016/11/16	CAM SOP-00449	SM 22 4500-F C m
Hardness (calculated as CaCO3)	3	N/A	2016/11/16	CAM SOP 00102/00408/00447	SM 2340 B
Mercury in Water by CVAA	3	2016/11/16	2016/11/16	CAM SOP-00453	EPA 7470A m
Metals Analysis by ICPMS (as received) (1)	3	2016/11/15	2016/11/16	CAM SOP-00447	EPA 6020B m
Total Ammonia-N	3	N/A	2016/11/17	CAM SOP-00441	EPA GS I-2522-90 m
Nitrate (NO3) and Nitrite (NO2) in Water (2)	3	N/A	2016/11/16	CAM SOP-00440	SM 22 4500-NO3I/NO2B
pH	3	N/A	2016/11/16	CAM SOP-00413	SM 4500H+ B m
Phenols (4AAP)	3	N/A	2016/11/17	CAM SOP-00444	OMOE E3179 m
Orthophosphate	3	N/A	2016/11/16	CAM SOP-00461	EPA 365.1 m
Sulphide	2	N/A	2016/11/15	CAM SOP-00455	SM 22 4500-S G m
Sulphide	1	N/A	2016/11/16	CAM SOP-00455	SM 22 4500-S G m
Total Dissolved Solids	3	2016/11/15	2016/11/15	CAM SOP-00428	SM 22 2540C m
Total Phosphorus (Colourimetric)	3	2016/11/16	2016/11/16	CAM SOP-00407	SM 22 4500 P B H m
Low Level Total Suspended Solids	3	2016/11/15	2016/11/15	CAM SOP-00428	SM 22 2540D m
Turbidity	3	N/A	2016/11/16	CAM SOP-00417	SM 22 2130 B m

Remarks:

Maxxam Analytics' laboratories are accredited to ISO/IEC 17025:2005 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Maxxam are based upon recognized Provincial, Federal or US method compendia such as CCME, MDDELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported: unless indicated otherwise, associated sample data are not blank corrected.

Your Project #: 021-1228
Site Location: TANSLEY QUARRY
Your C.O.C. #: 586661-01-01

Attention:Sharon Wood

Golder Associates Ltd
Mississauga - Standing Offer
6925 Century Ave
Suite 100
Mississauga, ON
CANADA L5N 7K2

Report Date: 2016/11/23
Report #: R4257203
Version: 5 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

MAXXAM JOB #: B6O7052
Received: 2016/11/14, 12:01

Maxxam Analytics' liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Maxxam has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Maxxam, unless otherwise agreed in writing.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods. Results relate to samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(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.
Ema Gitej, Senior Project Manager
Email: EGitej@maxxam.ca
Phone# (905)817-5829
==
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.

RESULTS OF ANALYSES OF WATER

Maxxam ID				DLF293		DLF294		DLF295		
Sampling Date				2016/11/14		2016/11/14		2016/11/14		
COC Number				586661-01-01		586661-01-01		586661-01-01		
	UNITS	**MAC**	**A/O**	**HOUSE WELL**	**QC Batch**	**COTTAGE WELL**	**QC Batch**	**MAIN BARN**	**RDL**	**QC Batch**
Calculated Parameters										
Hardness (CaCO3)	mg/L	-	80:100	120	4746662	120	4746662	500	1.0	4746662
Inorganics										
Total Ammonia-N	mg/L	-	-	<0.050	4750913	<0.050	4750913	<0.050	0.050	4750913
Conductivity	umho/cm	-	-	340	4750745	340	4750745	980	1.0	4750745
Total Dissolved Solids	mg/L	-	500	192	4748365	198	4748365	574	10	4748365
Fluoride (F-)	mg/L	**1.5**	-	0.69	4750737	0.67	4750737	0.16	0.10	4750737
Free Cyanide	mg/L	**0.2**	-	<0.0010	4751788	<0.0010	4751788	<0.0010	0.0010	4751788
Orthophosphate (P)	mg/L	-	-	<0.010	4749380	<0.010	4749380	<0.010	0.010	4749380
pH	pH	-	6.5:8.5	8.03	4750747	8.07	4750747	7.92		4750747
Phenols-4AAP	mg/L	-	-	<0.0010	4752261	<0.0010	4752261	<0.0010	0.0010	4752261
Total Phosphorus	mg/L	-	-	<0.004	4750392	<0.004	4750392	<0.004	0.004	4750392
Total Suspended Solids	mg/L	-	-	<1	4749074	<1	4749074	1	1	4749074
Sulphide	mg/L	-	0.05	<0.020	4749185	<0.020	4749148	<0.020	0.020	4749185
Turbidity	NTU	-	5	0.1	4748718	0.1	4748718	11	0.1	4748718
Alkalinity (Total as CaCO3)	mg/L	-	30:500	91	4750750	90	4750750	380	1.0	4750750
Nitrite (N)	mg/L	**1**	-	<0.010	4749295	<0.010	4749295	<0.010	0.010	4749287
Chloride (Cl)	mg/L	-	250	28	4749665	29	4749665	41	1.0	4749665
Nitrate (N)	mg/L	**10**	-	0.22	4749295	0.22	4749295	0.26	0.10	4749287
Nitrate + Nitrite (N)	mg/L	**10**	-	0.22	4749295	0.22	4749295	0.26	0.10	4749287
Bromide (Br-)	mg/L	-	-	<1.0	4749665	<1.0	4749665	<1.0	1.0	4749665
Sulphate (SO4)	mg/L	-	500	24	4749665	30	4749665	84	1.0	4749665

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

MAC,A/O: Ontario Drinking Water Standards - Maximum Acceptable Concentration [MAC], Interim Maximum Acceptable Concentration [IMC] & Table 4-Chemical/Physical Objectives [A/O] - Not Health Related, respectively
(Made under the Ontario Safe Drinking Water Act, 2002)

Maxxam Job #: B6O7052
Report Date: 2016/11/23

Golder Associates Ltd
Client Project #: 021-1228
Site Location: TANSLEY QUARRY
Sampler Initials: LB

RESULTS OF ANALYSES OF WATER

Maxxam ID				DLF295		
Sampling Date				2016/11/14		
COC Number				586661-01-01		
	UNITS	**MAC**	**A/O**	**MAIN BARN Lab-Dup**	**RDL**	**QC Batch**
Inorganics						
Orthophosphate (P)	mg/L	-	-	<0.010	0.010	4749380

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
MAC,A/O: Ontario Drinking Water Standards - Maximum Acceptable Concentration [MAC], Interim Maximum Acceptable Concentration [IMC] & Table 4-Chemical/Physical Objectives [A/O] - Not Health Related, respectively
(Made under the Ontario Safe Drinking Water Act, 2002)

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID					DLF293	DLF294	DLF294	DLF295		
Sampling Date					2016/11/14	2016/11/14	2016/11/14	2016/11/14		
COC Number					586661-01-01	586661-01-01	586661-01-01	586661-01-01		
	UNITS	**MAC**	**IMC**	**A/O**	**HOUSE WELL**	**COTTAGE WELL**	**COTTAGE WELL Lab-Dup**	**MAIN BARN**	**RDL**	**QC Batch**
Metals										
Mercury (Hg)	mg/L	**0.001**	-	-	<0.0001	<0.0001		<0.0001	0.0001	4750143
. Aluminum (Al)	ug/L	-	-	100	100	94	97	<5.0	5.0	4749093
. Antimony (Sb)	ug/L	-	6	-	<0.50	0.64	<0.50	<0.50	0.50	4749093
. Arsenic (As)	ug/L	-	25	-	<1.0	<1.0	<1.0	8.0	1.0	4749093
. Barium (Ba)	ug/L	**1000**	-	-	23	23	22	37	2.0	4749093
. Beryllium (Be)	ug/L	-	-	-	<0.50	<0.50	<0.50	<0.50	0.50	4749093
. Bismuth (Bi)	ug/L	-	-	-	<1.0	<1.0	<1.0	<1.0	1.0	4749093
. Boron (B)	ug/L	-	5000	-	21	18	18	240	10	4749093
. Cadmium (Cd)	ug/L	**5**	-	-	<0.10	<0.10	<0.10	<0.10	0.10	4749093
. Calcium (Ca)	ug/L	-	-	-	35000	34000	35000	98000	200	4749093
. Chromium (Cr)	ug/L	**50**	-	-	<5.0	<5.0	<5.0	<5.0	5.0	4749093
. Cobalt (Co)	ug/L	-	-	-	<0.50	<0.50	<0.50	<0.50	0.50	4749093
. Copper (Cu)	ug/L	-	-	1000	61	120	120	1.0	1.0	4749093
. Iron (Fe)	ug/L	-	-	300	<100	<100	<100	1000	100	4749093
. Lead (Pb)	ug/L	**10**	-	-	0.54	0.99	1.0	<0.50	0.50	4749093
. Magnesium (Mg)	ug/L	-	-	-	8800	8300	8500	62000	50	4749093
. Manganese (Mn)	ug/L	-	-	50	<2.0	<2.0	<2.0	20	2.0	4749093
. Molybdenum (Mo)	ug/L	-	-	-	1.3	1.5	1.4	0.94	0.50	4749093
. Nickel (Ni)	ug/L	-	-	-	<1.0	<1.0	<1.0	<1.0	1.0	4749093
. Phosphorus (P)	ug/L	-	-	-	<100	<100	<100	<100	100	4749093
. Potassium (K)	ug/L	-	-	-	1900	1800	1800	4700	200	4749093
. Selenium (Se)	ug/L	**10**	-	-	<2.0	<2.0	<2.0	<2.0	2.0	4749093
. Silicon (Si)	ug/L	-	-	-	450	430	440	11000	50	4749093
. Silver (Ag)	ug/L	-	-	-	<0.10	<0.10	<0.10	<0.10	0.10	4749093
. Sodium (Na)	ug/L	**20000**	-	200000	18000	17000	18000	20000	100	4749093
. Strontium (Sr)	ug/L	-	-	-	180	180	180	2300	1.0	4749093
. Thallium (Tl)	ug/L	-	-	-	<0.050	<0.050	<0.050	<0.050	0.050	4749093
. Tin (Sn)	ug/L	-	-	-	<1.0	<1.0	<1.0	<1.0	1.0	4749093
. Titanium (Ti)	ug/L	-	-	-	<5.0	<5.0	<5.0	<5.0	5.0	4749093
. Uranium (U)	ug/L	**20**	-	-	0.29	0.26	0.24	0.66	0.10	4749093

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

Lab-Dup = Laboratory Initiated Duplicate

MAC,IMC,A/O: Ontario Drinking Water Standards - Maximum Acceptable Concentration [MAC], Interim Maximum Acceptable Concentration [IMC] & Table 4-Chemical/Physical Objectives [A/O] - Not Health Related, respectively
(Made under the Ontario Safe Drinking Water Act, 2002)

Maxxam Job #: B6O7052
Report Date: 2016/11/23

Golder Associates Ltd
Client Project #: 021-1228
Site Location: TANSLEY QUARRY
Sampler Initials: LB

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID					DLF293	DLF294	DLF294	DLF295		
Sampling Date					2016/11/14	2016/11/14	2016/11/14	2016/11/14		
COC Number					586661-01-01	586661-01-01	586661-01-01	586661-01-01		
	UNITS	**MAC**	**IMC**	**A/O**	**HOUSE WELL**	**COTTAGE WELL**	**COTTAGE WELL Lab-Dup**	**MAIN BARN**	**RDL**	**QC Batch**
. Vanadium (V)	ug/L	-	-	-	<0.50	<0.50	<0.50	<0.50	0.50	4749093
. Zinc (Zn)	ug/L	-	-	5000	9.7	8.1	8.6	9.1	5.0	4749093

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

Lab-Dup = Laboratory Initiated Duplicate

MAC,IMC,A/O: Ontario Drinking Water Standards - Maximum Acceptable Concentration [MAC], Interim Maximum Acceptable Concentration [IMC] & Table 4-Chemical/Physical Objectives [A/O] - Not Health Related, respectively
(Made under the Ontario Safe Drinking Water Act, 2002)

TEST SUMMARY

Maxxam ID: DLF293
Sample ID: HOUSE WELL
Matrix: Water

Collected: 2016/11/14
Shipped:
Received: 2016/11/14

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	4750750	N/A	2016/11/16	Surinder Rai
Anions	IC	4749665	N/A	2016/11/17	Fari Dehdezi
Conductivity	AT	4750745	N/A	2016/11/16	Surinder Rai
Free (WAD) Cyanide	SKAL/CN	4751788	N/A	2016/11/17	Xuanhong Qiu
Fluoride	ISE	4750737	2016/11/16	2016/11/16	Surinder Rai
Hardness (calculated as CaCO3)		4746662	N/A	2016/11/16	Automated Statchk
Mercury in Water by CVAA	CV/AA	4750143	2016/11/16	2016/11/16	Magdalena Carlos
Metals Analysis by ICPMS (as received)	ICP/MS	4749093	2016/11/15	2016/11/16	Prempal Bhatti
Total Ammonia-N	LACH/NH4	4750913	N/A	2016/11/17	Charles Opoku-Ware
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	4749295	N/A	2016/11/16	Chandra Nandlal
pH	AT	4750747	N/A	2016/11/16	Surinder Rai
Phenols (4AAP)	TECH/PHEN	4752261	N/A	2016/11/17	Bramdeo Motiram
Orthophosphate	KONE	4749380	N/A	2016/11/16	Alina Dobreanu
Sulphide	ISE/S	4749185	N/A	2016/11/15	Neil Dassanayake
Total Dissolved Solids	BAL	4748365	2016/11/15	2016/11/15	Zahid Soikot
Total Phosphorus (Colourimetric)	LACH/P	4750392	2016/11/16	2016/11/16	Sarabjit Raina
Low Level Total Suspended Solids	BAL	4749074	2016/11/15	2016/11/15	Massarat Jan
Turbidity	AT	4748718	N/A	2016/11/16	Tahir Anwar

Maxxam ID: DLF294
Sample ID: COTTAGE WELL
Matrix: Water

Collected: 2016/11/14
Shipped:
Received: 2016/11/14

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	4750750	N/A	2016/11/16	Surinder Rai
Anions	IC	4749665	N/A	2016/11/17	Fari Dehdezi
Conductivity	AT	4750745	N/A	2016/11/16	Surinder Rai
Free (WAD) Cyanide	SKAL/CN	4751788	N/A	2016/11/17	Xuanhong Qiu
Fluoride	ISE	4750737	2016/11/16	2016/11/16	Surinder Rai
Hardness (calculated as CaCO3)		4746662	N/A	2016/11/16	Automated Statchk
Mercury in Water by CVAA	CV/AA	4750143	2016/11/16	2016/11/16	Magdalena Carlos
Metals Analysis by ICPMS (as received)	ICP/MS	4749093	2016/11/15	2016/11/16	Prempal Bhatti
Total Ammonia-N	LACH/NH4	4750913	N/A	2016/11/17	Charles Opoku-Ware
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	4749295	N/A	2016/11/16	Chandra Nandlal
pH	AT	4750747	N/A	2016/11/16	Surinder Rai
Phenols (4AAP)	TECH/PHEN	4752261	N/A	2016/11/17	Bramdeo Motiram
Orthophosphate	KONE	4749380	N/A	2016/11/16	Alina Dobreanu
Sulphide	ISE/S	4749148	N/A	2016/11/16	Neil Dassanayake
Total Dissolved Solids	BAL	4748365	2016/11/15	2016/11/15	Zahid Soikot
Total Phosphorus (Colourimetric)	LACH/P	4750392	2016/11/16	2016/11/16	Sarabjit Raina
Low Level Total Suspended Solids	BAL	4749074	2016/11/15	2016/11/15	Massarat Jan
Turbidity	AT	4748718	N/A	2016/11/16	Tahir Anwar

TEST SUMMARY

Maxxam ID: DLF294 Dup
Sample ID: COTTAGE WELL
Matrix: Water

Collected: 2016/11/14
Shipped:
Received: 2016/11/14

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Metals Analysis by ICPMS (as received)	ICP/MS	4749093	2016/11/15	2016/11/16	Prempal Bhatti

Maxxam ID: DLF295
Sample ID: MAIN BARN
Matrix: Water

Collected: 2016/11/14
Shipped:
Received: 2016/11/14

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	4750750	N/A	2016/11/16	Surinder Rai
Anions	IC	4749665	N/A	2016/11/17	Fari Dehdezi
Conductivity	AT	4750745	N/A	2016/11/16	Surinder Rai
Free (WAD) Cyanide	SKAL/CN	4751788	N/A	2016/11/17	Xuanhong Qiu
Fluoride	ISE	4750737	2016/11/16	2016/11/16	Surinder Rai
Hardness (calculated as CaCO3)		4746662	N/A	2016/11/16	Automated Statchk
Mercury in Water by CVAA	CV/AA	4750143	2016/11/16	2016/11/16	Magdalena Carlos
Metals Analysis by ICPMS (as received)	ICP/MS	4749093	2016/11/15	2016/11/16	Prempal Bhatti
Total Ammonia-N	LACH/NH4	4750913	N/A	2016/11/17	Charles Opoku-Ware
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	4749287	N/A	2016/11/16	Chandra Nandlal
pH	AT	4750747	N/A	2016/11/16	Surinder Rai
Phenols (4AAP)	TECH/PHEN	4752261	N/A	2016/11/17	Bramdeo Motiram
Orthophosphate	KONE	4749380	N/A	2016/11/16	Alina Dobreanu
Sulphide	ISE/S	4749185	N/A	2016/11/15	Neil Dassanayake
Total Dissolved Solids	BAL	4748365	2016/11/15	2016/11/15	Zahid Soikot
Total Phosphorus (Colourimetric)	LACH/P	4750392	2016/11/16	2016/11/16	Sarabjit Raina
Low Level Total Suspended Solids	BAL	4749074	2016/11/15	2016/11/15	Massarat Jan
Turbidity	AT	4748718	N/A	2016/11/16	Tahir Anwar

Maxxam ID: DLF295 Dup
Sample ID: MAIN BARN
Matrix: Water

Collected: 2016/11/14
Shipped:
Received: 2016/11/14

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Orthophosphate	KONE	4749380	N/A	2016/11/16	Alina Dobreanu

GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	12.0°C
Package 2	13.7°C

Revised report (2016/11/23): Split report as per client request.

Revised report (2016/11/22): Criteria is included in this report as requested.

Results relate only to the items tested.

Maxxam Job #: B6O7052
Report Date: 2016/11/23

QUALITY ASSURANCE REPORT

Golder Associates Ltd
Client Project #: 021-1228

Site Location: TANSLEY QUARRY
Sampler Initials: LB

			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
4748365	Total Dissolved Solids	2016/11/15					<10	mg/L	1.7	25	96	90 - 110
4748718	Turbidity	2016/11/16			100	85 - 115	<0.1	NTU	NC	20		
4749074	Total Suspended Solids	2016/11/15					<1	mg/L	NC	25	98	85 - 115
4749093	. Aluminum (Al)	2016/11/16	94	80 - 120	102	80 - 120	<5.0	ug/L	2.4	20		
4749093	. Antimony (Sb)	2016/11/16	98	80 - 120	102	80 - 120	<0.50	ug/L	NC	20		
4749093	. Arsenic (As)	2016/11/16	97	80 - 120	98	80 - 120	<1.0	ug/L	NC	20		
4749093	. Barium (Ba)	2016/11/16	96	80 - 120	98	80 - 120	<2.0	ug/L	2.2	20		
4749093	. Beryllium (Be)	2016/11/16	97	80 - 120	100	80 - 120	<0.50	ug/L	NC	20		
4749093	. Bismuth (Bi)	2016/11/16	91	80 - 120	94	80 - 120	<1.0	ug/L	NC	20		
4749093	. Boron (B)	2016/11/16	95	80 - 120	96	80 - 120	<10	ug/L	NC	20		
4749093	. Cadmium (Cd)	2016/11/16	97	80 - 120	99	80 - 120	<0.10	ug/L	NC	20		
4749093	. Calcium (Ca)	2016/11/16	NC	80 - 120	101	80 - 120	<200	ug/L	3.0	20		
4749093	. Chromium (Cr)	2016/11/16	99	80 - 120	102	80 - 120	<5.0	ug/L	NC	20		
4749093	. Cobalt (Co)	2016/11/16	98	80 - 120	101	80 - 120	<0.50	ug/L	NC	20		
4749093	. Copper (Cu)	2016/11/16	94	80 - 120	98	80 - 120	<1.0	ug/L	2.3	20		
4749093	. Iron (Fe)	2016/11/16	101	80 - 120	104	80 - 120	<100	ug/L	NC	20		
4749093	. Lead (Pb)	2016/11/16	93	80 - 120	95	80 - 120	<0.50	ug/L	NC	20		
4749093	. Magnesium (Mg)	2016/11/16	100	80 - 120	105	80 - 120	<50	ug/L	2.0	20		
4749093	. Manganese (Mn)	2016/11/16	100	80 - 120	103	80 - 120	<2.0	ug/L	NC	20		
4749093	. Molybdenum (Mo)	2016/11/16	98	80 - 120	101	80 - 120	<0.50	ug/L	NC	20		
4749093	. Nickel (Ni)	2016/11/16	96	80 - 120	99	80 - 120	<1.0	ug/L	NC	20		
4749093	. Phosphorus (P)	2016/11/16	98	80 - 120	106	80 - 120	<100	ug/L	NC	20		
4749093	. Potassium (K)	2016/11/16	99	80 - 120	103	80 - 120	<200	ug/L	2.8	20		
4749093	. Selenium (Se)	2016/11/16	96	80 - 120	99	80 - 120	<2.0	ug/L	NC	20		
4749093	. Silicon (Si)	2016/11/16	96	80 - 120	102	80 - 120	<50	ug/L	1.2	20		
4749093	. Silver (Ag)	2016/11/16	95	80 - 120	98	80 - 120	<0.10	ug/L	NC	20		
4749093	. Sodium (Na)	2016/11/16	NC	80 - 120	102	80 - 120	<100	ug/L	2.6	20		
4749093	. Strontium (Sr)	2016/11/16	93	80 - 120	98	80 - 120	<1.0	ug/L	1.0	20		
4749093	. Thallium (Tl)	2016/11/16	94	80 - 120	94	80 - 120	<0.050	ug/L	NC	20		
4749093	. Tin (Sn)	2016/11/16	97	80 - 120	101	80 - 120	<1.0	ug/L	NC	20		
4749093	. Titanium (Ti)	2016/11/16	100	80 - 120	103	80 - 120	<5.0	ug/L	NC	20		

QUALITY ASSURANCE REPORT(CONT'D)

			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**
4749093	. Uranium (U)	2016/11/16	90	80 - 120	91	80 - 120	<0.10	ug/L	NC	20		
4749093	. Vanadium (V)	2016/11/16	98	80 - 120	101	80 - 120	<0.50	ug/L	NC	20		
4749093	. Zinc (Zn)	2016/11/16	96	80 - 120	100	80 - 120	<5.0	ug/L	NC	20		
4749148	Sulphide	2016/11/16	104	80 - 120	104	80 - 120	<0.020	mg/L	NC	20		
4749185	Sulphide	2016/11/15	90	80 - 120	99	80 - 120	<0.020	mg/L	NC	20		
4749287	Nitrate (N)	2016/11/16	103	80 - 120	101	80 - 120	<0.10	mg/L	NC	20		
4749287	Nitrite (N)	2016/11/16	104	80 - 120	96	80 - 120	<0.010	mg/L	NC	20		
4749295	Nitrate (N)	2016/11/16	102	80 - 120	101	80 - 120	<0.10	mg/L	NC	20		
4749295	Nitrite (N)	2016/11/16	104	80 - 120	96	80 - 120	<0.010	mg/L	NC	20		
4749380	Orthophosphate (P)	2016/11/16	120	75 - 125	99	80 - 120	<0.010	mg/L	NC	25		
4749665	Bromide (Br-)	2016/11/16	104	80 - 120	106	80 - 120	<1.0	mg/L	NC	20		
4749665	Chloride (Cl)	2016/11/16	NC	80 - 120	99	70 - 130	<1.0	mg/L	0.64	20		
4749665	Sulphate (SO4)	2016/11/16	NC	80 - 120	100	80 - 120	<1.0	mg/L	2.6	20		
4750143	Mercury (Hg)	2016/11/16	105	75 - 125	105	80 - 120	<0.0001	mg/L	NC	20		
4750392	Total Phosphorus	2016/11/16	99	80 - 120	100	80 - 120	<0.004	mg/L	NC	20	97	80 - 120
4750737	Fluoride (F-)	2016/11/16	102	80 - 120	106	80 - 120	<0.10	mg/L	NC	20		
4750745	Conductivity	2016/11/16			101	85 - 115	<1.0	umho/cm	0.078	25		
4750747	pH	2016/11/16			102	98 - 103			0.51	N/A		
4750750	Alkalinity (Total as CaCO3)	2016/11/16			95	85 - 115	<1.0	mg/L	0.19	20		
4750913	Total Ammonia-N	2016/11/17	99	80 - 120	100	85 - 115	<0.050	mg/L	NC	20		
4751788	Free Cyanide	2016/11/17	107	80 - 120	101	80 - 120	<0.0010	mg/L	NC	20		

QUALITY ASSURANCE REPORT(CONT'D)

			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
4752261	Phenols-4AAP	2016/11/17	NC	80 - 120	100	85 - 115	<0.0010	mg/L	NC	20		

N/A = Not Applicable

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 too small to permit a reliable recovery calculation (matrix spike concentration was less than 2x that of the native sample concentration).

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (one or both samples < 5x RDL).

VALIDATION SIGNATURE PAGE

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

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.

Maxxam
A Bureau Veritas Group Company

Maxxam Analytics International Corporation o/a Maxxam Analytics
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CHAIN OF CUSTODY RECORD

Page of

INVOICE TO:

Company Name: #1326 Golder Associates Ltd
Attention: Accounts Payable
Address: 6925 Century Ave Suite 100
Mississauga ON L5N 7K2
Tel: (905) 567-4444 Fax: (905) 567-6561
Email: AP-CustomerService@golder.com

REPORT TO:

Company Name:
Attention: Josip Balaban
Address:
Tel: Fax:
Email: josip_balaban@golder.com

PROJECT INFORMATION:

Quotation #: B41022
P.O. #:
Project: 021-1228
Project Name:
Site #: Tansley Quarry
Sampled By:

Laboratory Use Only:

Maxxam Job #:
Bottle Order #: 586661
COC #: C#586661-01-01
Project Manager: Ema Gitej

MOE REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE MAXXAM DRINKING WATER CHAIN OF CUSTODY

Regulation 153 (2011)

☐ Table 1 ☐ Res/Park ☐ Medium/Fine
☐ Table 2 ☐ Ind/Comm ☐ Coarse
☐ Table 3 ☐ Agri/Other ☐ **For RSC**
☐ Table ___

Other Regulations

☐ CCME ☐ Sanitary Sewer Bylaw
☐ Reg 558. ☐ Storm Sewer Bylaw
☐ MISA Municipality ________
☐ PWQO
☐ Other ________

Special Instructions

Include Criteria on Certificate of Analysis (Y/N)? ____

ANALYSIS REQUESTED (PLEASE BE SPECIFIC)

Turnaround Time (TAT) Required:
Please provide advance notice for rush projects

Regular (Standard) TAT: ☒
(will be applied if Rush TAT is not specified):
Standard TAT = 5-7 Working days for most tests.
Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

Job Specific Rush TAT (if applies to entire submission) ☐
Date Required: ________ Time Required: ________
Rush Confirmation Number: ________ *(call lab for #)*

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Field Filtered (please circle): Metals / Hg / Cr VI	DOMESTIC WELL SAMPLES									# of Bottles	Comments
1		BEKKERS	NOV, 14, 2016	AM	GW	N	✓									9	
2		Sinns	↓	↓	↓	↓	✓									9	
3		House Well					✓									9	
4		Cottage well					✓									9	
5		Main Barn					✓									9	
6																	
7																	
8																	
9																	
10																	

14-Nov-16 12:01
Ema Gitej
B6O7052
RK6 ENV-1101

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted
Lisseth Benavente	2016/NOV/14	12:05pm	[illegible]	2016/11/14	12:01	

Laboratory Use Only

Time Sensitive	Temperature (°C) on Receipt	Custody Seal	Yes	No
	12/12/12 14/13/14	Present		✓
		Intact		

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

SAMPLES MUST BE KEPT COOL (< 10° C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

White: Maxxam Yellow: Client

Maxxam Analytics International Corporation o/a Maxxam Analytics

has ice.

Your Project #: 021-1228
Site Location: TANSLEY QUARRY
Your C.O.C. #: 586661-01-01

Attention:Sharon Wood

Golder Associates Ltd
Mississauga - Standing Offer
6925 Century Ave
Suite 100
Mississauga, ON
CANADA L5N 7K2

Report Date: 2016/11/23
Report #: R4257187
Version: 4 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

MAXXAM JOB #: B6O7052
Received: 2016/11/14, 12:01

Sample Matrix: Water
Samples Received: 1

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Alkalinity	1	N/A	2016/11/16	CAM SOP-00448	SM 22 2320 B m
Anions	1	N/A	2016/11/17	CAM SOP-00435	SM 22 4110 B m
Conductivity	1	N/A	2016/11/16	CAM SOP-00414	SM 22 2510 m
Free (WAD) Cyanide	1	N/A	2016/11/17	CAM SOP-00457	OMOE E3015 m
Fluoride	1	2016/11/16	2016/11/16	CAM SOP-00449	SM 22 4500-F C m
Hardness (calculated as CaCO3)	1	N/A	2016/11/16	CAM SOP 00102/00408/00447	SM 2340 B
Mercury in Water by CVAA	1	2016/11/16	2016/11/16	CAM SOP-00453	EPA 7470A m
Metals Analysis by ICPMS (as received) (1)	1	2016/11/15	2016/11/16	CAM SOP-00447	EPA 6020B m
Total Ammonia-N	1	N/A	2016/11/17	CAM SOP-00441	EPA GS I-2522-90 m
Nitrate (NO3) and Nitrite (NO2) in Water (2)	1	N/A	2016/11/16	CAM SOP-00440	SM 22 4500-NO3I/NO2B
pH	1	N/A	2016/11/16	CAM SOP-00413	SM 4500H+ B m
Phenols (4AAP)	1	N/A	2016/11/17	CAM SOP-00444	OMOE E3179 m
Orthophosphate	1	N/A	2016/11/16	CAM SOP-00461	EPA 365.1 m
Sulphide	1	N/A	2016/11/15	CAM SOP-00455	SM 22 4500-S G m
Total Dissolved Solids	1	2016/11/15	2016/11/15	CAM SOP-00428	SM 22 2540C m
Total Phosphorus (Colourimetric)	1	2016/11/16	2016/11/16	CAM SOP-00407	SM 22 4500 P B H m
Low Level Total Suspended Solids	1	2016/11/15	2016/11/15	CAM SOP-00428	SM 22 2540D m
Turbidity	1	N/A	2016/11/16	CAM SOP-00417	SM 22 2130 B m

Remarks:

Maxxam Analytics' laboratories are accredited to ISO/IEC 17025:2005 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Maxxam are based upon recognized Provincial, Federal or US method compendia such as CCME, MDDELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported: unless indicated otherwise, associated sample data are not blank corrected.

Maxxam Analytics' liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed

Your Project #: 021-1228
Site Location: TANSLEY QUARRY
Your C.O.C. #: 586661-01-01

Attention:Sharon Wood

Golder Associates Ltd
Mississauga - Standing Offer
6925 Century Ave
Suite 100
Mississauga, ON
CANADA L5N 7K2

Report Date: 2016/11/23
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Version: 4 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

MAXXAM JOB #: B6O7052
Received: 2016/11/14, 12:01

or implied. Maxxam has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Maxxam, unless otherwise agreed in writing.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods. Results relate to samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(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.
Ema Gitej, Senior Project Manager
Email: EGitej@maxxam.ca
Phone# (905)817-5829
==
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.

RESULTS OF ANALYSES OF WATER

Maxxam ID				DLF292	DLF292		
Sampling Date				2016/11/14	2016/11/14		
COC Number				586661-01-01	586661-01-01		
	UNITS	**MAC**	**A/O**	**SIMMS**	**SIMMS Lab-Dup**	**RDL**	**QC Batch**
Calculated Parameters							
Hardness (CaCO3)	mg/L	-	80:100	330		1.0	4746662
Inorganics							
Total Ammonia-N	mg/L	-	-	<0.050	<0.050	0.050	4750913
Conductivity	umho/cm	-	-	640		1.0	4750745
Total Dissolved Solids	mg/L	-	500	382		10	4748365
Fluoride (F-)	mg/L	**1.5**	-	0.23		0.10	4750737
Free Cyanide	mg/L	**0.2**	-	<0.0010		0.0010	4751788
Orthophosphate (P)	mg/L	-	-	<0.010		0.010	4749380
pH	pH	-	6.5:8.5	8.04			4750747
Phenols-4AAP	mg/L	-	-	<0.0010		0.0010	4752261
Total Phosphorus	mg/L	-	-	0.005	0.005	0.004	4750392
Total Suspended Solids	mg/L	-	-	<1		1	4749074
Sulphide	mg/L	-	0.05	<0.020		0.020	4749185
Turbidity	NTU	-	5	0.2		0.1	4748718
Alkalinity (Total as CaCO3)	mg/L	-	30:500	270		1.0	4750750
Nitrite (N)	mg/L	**1**	-	<0.010		0.010	4749295
Chloride (Cl)	mg/L	-	250	6.0		1.0	4749665
Nitrate (N)	mg/L	**10**	-	1.37		0.10	4749295
Nitrate + Nitrite (N)	mg/L	**10**	-	1.37		0.10	4749295
Bromide (Br-)	mg/L	-	-	<1.0		1.0	4749665
Sulphate (SO4)	mg/L	-	500	56		1.0	4749665

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

Lab-Dup = Laboratory Initiated Duplicate

MAC,A/O: Ontario Drinking Water Standards - Maximum Acceptable Concentration [MAC], Interim Maximum Acceptable Concentration [IMC] & Table 4-Chemical/Physical Objectives [A/O] - Not Health Related, respectively
(Made under the Ontario Safe Drinking Water Act, 2002)

Maxxam Job #: B6O7052
Report Date: 2016/11/23

Golder Associates Ltd
Client Project #: 021-1228
Site Location: TANSLEY QUARRY
Sampler Initials: LB

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID					DLF292		
Sampling Date					2016/11/14		
COC Number					586661-01-01		
	UNITS	**MAC**	**IMC**	**A/O**	**SIMMS**	**RDL**	**QC Batch**
Metals							
Mercury (Hg)	mg/L	**0.001**	-	-	<0.0001	0.0001	4750143
. Aluminum (Al)	ug/L	-	-	100	<5.0	5.0	4749093
. Antimony (Sb)	ug/L	-	6	-	1.1	0.50	4749093
. Arsenic (As)	ug/L	-	25	-	<1.0	1.0	4749093
. Barium (Ba)	ug/L	**1000**	-	-	46	2.0	4749093
. Beryllium (Be)	ug/L	-	-	-	<0.50	0.50	4749093
. Bismuth (Bi)	ug/L	-	-	-	<1.0	1.0	4749093
. Boron (B)	ug/L	-	5000	-	51	10	4749093
. Cadmium (Cd)	ug/L	**5**	-	-	<0.10	0.10	4749093
. Calcium (Ca)	ug/L	-	-	-	78000	200	4749093
. Chromium (Cr)	ug/L	**50**	-	-	<5.0	5.0	4749093
. Cobalt (Co)	ug/L	-	-	-	<0.50	0.50	4749093
. Copper (Cu)	ug/L	-	-	1000	13	1.0	4749093
. Iron (Fe)	ug/L	-	-	300	<100	100	4749093
. Lead (Pb)	ug/L	**10**	-	-	<0.50	0.50	4749093
. Magnesium (Mg)	ug/L	-	-	-	34000	50	4749093
. Manganese (Mn)	ug/L	-	-	50	<2.0	2.0	4749093
. Molybdenum (Mo)	ug/L	-	-	-	1.2	0.50	4749093
. Nickel (Ni)	ug/L	-	-	-	<1.0	1.0	4749093
. Phosphorus (P)	ug/L	-	-	-	<100	100	4749093
. Potassium (K)	ug/L	-	-	-	3600	200	4749093
. Selenium (Se)	ug/L	**10**	-	-	<2.0	2.0	4749093
. Silicon (Si)	ug/L	-	-	-	3800	50	4749093
. Silver (Ag)	ug/L	-	-	-	<0.10	0.10	4749093
. Sodium (Na)	ug/L	**20000**	-	200000	12000	100	4749093
. Strontium (Sr)	ug/L	-	-	-	740	1.0	4749093
. Thallium (Tl)	ug/L	-	-	-	<0.050	0.050	4749093
. Tin (Sn)	ug/L	-	-	-	<1.0	1.0	4749093
. Titanium (Ti)	ug/L	-	-	-	<5.0	5.0	4749093
. Uranium (U)	ug/L	**20**	-	-	2.5	0.10	4749093
. Vanadium (V)	ug/L	-	-	-	<0.50	0.50	4749093

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

MAC,IMC,A/O: Ontario Drinking Water Standards - Maximum Acceptable Concentration [MAC], Interim Maximum Acceptable Concentration [IMC] & Table 4-Chemical/Physical Objectives [A/O] - Not Health Related, respectively
(Made under the Ontario Safe Drinking Water Act, 2002)

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID					DLF292		
Sampling Date					2016/11/14		
COC Number					586661-01-01		
	UNITS	**MAC**	**IMC**	**A/O**	**SIMMS**	**RDL**	**QC Batch**
. Zinc (Zn)	ug/L	-	-	5000	990	5.0	4749093

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

MAC,IMC,A/O: Ontario Drinking Water Standards - Maximum Acceptable Concentration [MAC], Interim Maximum Acceptable Concentration [IMC] & Table 4-Chemical/Physical Objectives [A/O] - Not Health Related, respectively
(Made under the Ontario Safe Drinking Water Act, 2002)

TEST SUMMARY

Maxxam ID: DLF292
Sample ID: SIMMS
Matrix: Water

Collected: 2016/11/14
Shipped:
Received: 2016/11/14

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	4750750	N/A	2016/11/16	Surinder Rai
Anions	IC	4749665	N/A	2016/11/17	Fari Dehdezi
Conductivity	AT	4750745	N/A	2016/11/16	Surinder Rai
Free (WAD) Cyanide	SKAL/CN	4751788	N/A	2016/11/17	Xuanhong Qiu
Fluoride	ISE	4750737	2016/11/16	2016/11/16	Surinder Rai
Hardness (calculated as CaCO3)		4746662	N/A	2016/11/16	Automated Statchk
Mercury in Water by CVAA	CV/AA	4750143	2016/11/16	2016/11/16	Magdalena Carlos
Metals Analysis by ICPMS (as received)	ICP/MS	4749093	2016/11/15	2016/11/16	Prempal Bhatti
Total Ammonia-N	LACH/NH4	4750913	N/A	2016/11/17	Charles Opoku-Ware
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	4749295	N/A	2016/11/16	Chandra Nandlal
pH	AT	4750747	N/A	2016/11/16	Surinder Rai
Phenols (4AAP)	TECH/PHEN	4752261	N/A	2016/11/17	Bramdeo Motiram
Orthophosphate	KONE	4749380	N/A	2016/11/16	Alina Dobreanu
Sulphide	ISE/S	4749185	N/A	2016/11/15	Neil Dassanayake
Total Dissolved Solids	BAL	4748365	2016/11/15	2016/11/15	Zahid Soikot
Total Phosphorus (Colourimetric)	LACH/P	4750392	2016/11/16	2016/11/16	Sarabjit Raina
Low Level Total Suspended Solids	BAL	4749074	2016/11/15	2016/11/15	Massarat Jan
Turbidity	AT	4748718	N/A	2016/11/16	Tahir Anwar

Maxxam ID: DLF292 Dup
Sample ID: SIMMS
Matrix: Water

Collected: 2016/11/14
Shipped:
Received: 2016/11/14

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Total Ammonia-N	LACH/NH4	4750913	N/A	2016/11/17	Charles Opoku-Ware
Total Phosphorus (Colourimetric)	LACH/P	4750392	2016/11/16	2016/11/16	Sarabjit Raina

GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	12.0°C
Package 2	13.7°C

Revised report (2016/11/23): Split report as per client request.

Revised report (2016/11/22): Criteria is included in this report as requested.

Results relate only to the items tested.

Maxxam Job #: B6O7052
Report Date: 2016/11/23

QUALITY ASSURANCE REPORT

Golder Associates Ltd
Client Project #: 021-1228

Site Location: TANSLEY QUARRY
Sampler Initials: LB

			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
4748365	Total Dissolved Solids	2016/11/15					<10	mg/L	1.7	25	96	90 - 110
4748718	Turbidity	2016/11/16			100	85 - 115	<0.1	NTU	NC	20		
4749074	Total Suspended Solids	2016/11/15					<1	mg/L	NC	25	98	85 - 115
4749093	. Aluminum (Al)	2016/11/16	94	80 - 120	102	80 - 120	<5.0	ug/L	2.4	20		
4749093	. Antimony (Sb)	2016/11/16	98	80 - 120	102	80 - 120	<0.50	ug/L	NC	20		
4749093	. Arsenic (As)	2016/11/16	97	80 - 120	98	80 - 120	<1.0	ug/L	NC	20		
4749093	. Barium (Ba)	2016/11/16	96	80 - 120	98	80 - 120	<2.0	ug/L	2.2	20		
4749093	. Beryllium (Be)	2016/11/16	97	80 - 120	100	80 - 120	<0.50	ug/L	NC	20		
4749093	. Bismuth (Bi)	2016/11/16	91	80 - 120	94	80 - 120	<1.0	ug/L	NC	20		
4749093	. Boron (B)	2016/11/16	95	80 - 120	96	80 - 120	<10	ug/L	NC	20		
4749093	. Cadmium (Cd)	2016/11/16	97	80 - 120	99	80 - 120	<0.10	ug/L	NC	20		
4749093	. Calcium (Ca)	2016/11/16	NC	80 - 120	101	80 - 120	<200	ug/L	3.0	20		
4749093	. Chromium (Cr)	2016/11/16	99	80 - 120	102	80 - 120	<5.0	ug/L	NC	20		
4749093	. Cobalt (Co)	2016/11/16	98	80 - 120	101	80 - 120	<0.50	ug/L	NC	20		
4749093	. Copper (Cu)	2016/11/16	94	80 - 120	98	80 - 120	<1.0	ug/L	2.3	20		
4749093	. Iron (Fe)	2016/11/16	101	80 - 120	104	80 - 120	<100	ug/L	NC	20		
4749093	. Lead (Pb)	2016/11/16	93	80 - 120	95	80 - 120	<0.50	ug/L	NC	20		
4749093	. Magnesium (Mg)	2016/11/16	100	80 - 120	105	80 - 120	<50	ug/L	2.0	20		
4749093	. Manganese (Mn)	2016/11/16	100	80 - 120	103	80 - 120	<2.0	ug/L	NC	20		
4749093	. Molybdenum (Mo)	2016/11/16	98	80 - 120	101	80 - 120	<0.50	ug/L	NC	20		
4749093	. Nickel (Ni)	2016/11/16	96	80 - 120	99	80 - 120	<1.0	ug/L	NC	20		
4749093	. Phosphorus (P)	2016/11/16	98	80 - 120	106	80 - 120	<100	ug/L	NC	20		
4749093	. Potassium (K)	2016/11/16	99	80 - 120	103	80 - 120	<200	ug/L	2.8	20		
4749093	. Selenium (Se)	2016/11/16	96	80 - 120	99	80 - 120	<2.0	ug/L	NC	20		
4749093	. Silicon (Si)	2016/11/16	96	80 - 120	102	80 - 120	<50	ug/L	1.2	20		
4749093	. Silver (Ag)	2016/11/16	95	80 - 120	98	80 - 120	<0.10	ug/L	NC	20		
4749093	. Sodium (Na)	2016/11/16	NC	80 - 120	102	80 - 120	<100	ug/L	2.6	20		
4749093	. Strontium (Sr)	2016/11/16	93	80 - 120	98	80 - 120	<1.0	ug/L	1.0	20		
4749093	. Thallium (Tl)	2016/11/16	94	80 - 120	94	80 - 120	<0.050	ug/L	NC	20		
4749093	. Tin (Sn)	2016/11/16	97	80 - 120	101	80 - 120	<1.0	ug/L	NC	20		
4749093	. Titanium (Ti)	2016/11/16	100	80 - 120	103	80 - 120	<5.0	ug/L	NC	20		

QUALITY ASSURANCE REPORT(CONT'D)

			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**
4749093	. Uranium (U)	2016/11/16	90	80 - 120	91	80 - 120	<0.10	ug/L	NC	20		
4749093	. Vanadium (V)	2016/11/16	98	80 - 120	101	80 - 120	<0.50	ug/L	NC	20		
4749093	. Zinc (Zn)	2016/11/16	96	80 - 120	100	80 - 120	<5.0	ug/L	NC	20		
4749185	Sulphide	2016/11/15	90	80 - 120	99	80 - 120	<0.020	mg/L	NC	20		
4749295	Nitrate (N)	2016/11/16	102	80 - 120	101	80 - 120	<0.10	mg/L	NC	20		
4749295	Nitrite (N)	2016/11/16	104	80 - 120	96	80 - 120	<0.010	mg/L	NC	20		
4749380	Orthophosphate (P)	2016/11/16	120	75 - 125	99	80 - 120	<0.010	mg/L	NC	25		
4749665	Bromide (Br-)	2016/11/16	104	80 - 120	106	80 - 120	<1.0	mg/L	NC	20		
4749665	Chloride (Cl)	2016/11/16	NC	80 - 120	99	70 - 130	<1.0	mg/L	0.64	20		
4749665	Sulphate (SO4)	2016/11/16	NC	80 - 120	100	80 - 120	<1.0	mg/L	2.6	20		
4750143	Mercury (Hg)	2016/11/16	105	75 - 125	105	80 - 120	<0.0001	mg/L	NC	20		
4750392	Total Phosphorus	2016/11/16	99	80 - 120	100	80 - 120	<0.004	mg/L	NC	20	97	80 - 120
4750737	Fluoride (F-)	2016/11/16	102	80 - 120	106	80 - 120	<0.10	mg/L	NC	20		
4750745	Conductivity	2016/11/16			101	85 - 115	<1.0	umho/cm	0.078	25		
4750747	pH	2016/11/16			102	98 - 103			0.51	N/A		
4750750	Alkalinity (Total as CaCO3)	2016/11/16			95	85 - 115	<1.0	mg/L	0.19	20		
4750913	Total Ammonia-N	2016/11/17	99	80 - 120	100	85 - 115	<0.050	mg/L	NC	20		
4751788	Free Cyanide	2016/11/17	107	80 - 120	101	80 - 120	<0.0010	mg/L	NC	20		
4752261	Phenols-4AAP	2016/11/17	NC	80 - 120	100	85 - 115	<0.0010	mg/L	NC	20		

N/A = Not Applicable

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 too small to permit a reliable recovery calculation (matrix spike concentration was less than 2x that of the native sample concentration).

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (one or both samples < 5x RDL).

Maxxam Job #: B6O7052
Report Date: 2016/11/23

Golder Associates Ltd
Client Project #: 021-1228
Site Location: TANSLEY QUARRY
Sampler Initials: LB

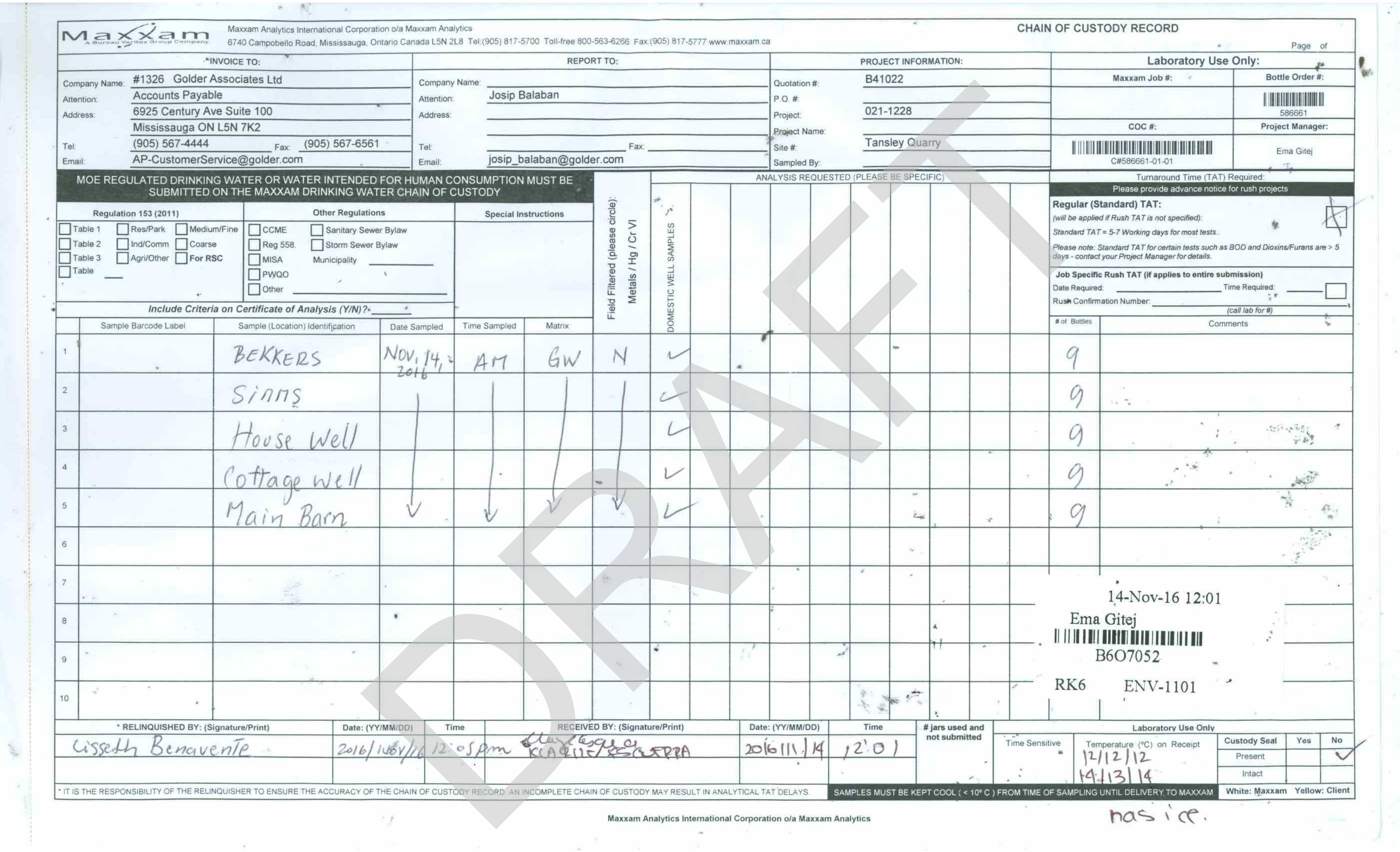
VALIDATION SIGNATURE PAGE

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

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.



Maxxam Analytics International Corporation o/a Maxxam Analytics
6740 Campobello Road, Mississauga, Ontario Canada L5N 2L8 Tel:(905) 817-5700 Toll-free:800-563-6266 Fax:(905) 817-5777 www.maxxam.ca

CHAIN OF CUSTODY RECORD

Page of

***INVOICE TO:**

Company Name: #1326 Golder Associates Ltd
Attention: Accounts Payable
Address: 6925 Century Ave Suite 100
Mississauga ON L5N 7K2
Tel: (905) 567-4444 Fax: (905) 567-6561
Email: AP-CustomerService@golder.com

REPORT TO:

Company Name:
Attention: Josip Balaban
Address:
Tel: Fax:
Email: josip_balaban@golder.com

PROJECT INFORMATION:

Quotation #: B41022
P.O. #:
Project: 021-1228
Project Name:
Site #: Tansley Quarry
Sampled By:

Laboratory Use Only:

Maxxam Job #:
Bottle Order #: 586661
COC #: C#586661-01-01
Project Manager: Ema Gitej

MOE REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE MAXXAM DRINKING WATER CHAIN OF CUSTODY

Regulation 153 (2011)

☐ Table 1 ☐ Res/Park ☐ Medium/Fine
☐ Table 2 ☐ Ind/Comm ☐ Coarse
☐ Table 3 ☐ Agri/Other ☐ **For RSC**
☐ Table ___

Other Regulations

☐ CCME ☐ Sanitary Sewer Bylaw
☐ Reg 558. ☐ Storm Sewer Bylaw
☐ MISA Municipality ________
☐ PWQO
☐ Other ________

Special Instructions

Include Criteria on Certificate of Analysis (Y/N)? ______

ANALYSIS REQUESTED (PLEASE BE SPECIFIC)

Turnaround Time (TAT) Required:
Please provide advance notice for rush projects

Regular (Standard) TAT: ☒
(will be applied if Rush TAT is not specified):
Standard TAT = 5-7 Working days for most tests.
Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

Job Specific Rush TAT (if applies to entire submission)
Date Required: ________ Time Required: ________ ☐
Rush Confirmation Number: ________ *(call lab for #)*

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Field Filtered (please circle): Metals / Hg / Cr VI	DOMESTIC WELL SAMPLES									# of Bottles	Comments
1		BEKKERS	NOV, 14, 2016	AM	GW	N	✓									9	
2		Sinns	↓	↓	↓	↓	✓									9	
3		House Well	↓	↓	↓	↓	✓									9	
4		Cottage well	↓	↓	↓	↓	✓									9	
5		Main Barn	↓	↓	↓	↓	✓									9	
6																	
7																	
8																	
9																	
10																	

14-Nov-16 12:01
Ema Gitej
B6O7052
RK6 ENV-1101

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted
Lisseth Benavente	2016/NOV/14	12:05pm	KLARISSE ESGUERRA	2016/11/14	12:01	

Laboratory Use Only

Time Sensitive	Temperature (°C) on Receipt	Custody Seal	Yes	No
	12/12/12 14/13/14	Present		✓
		Intact		

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

SAMPLES MUST BE KEPT COOL (< 10° C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

White: Maxxam Yellow: Client

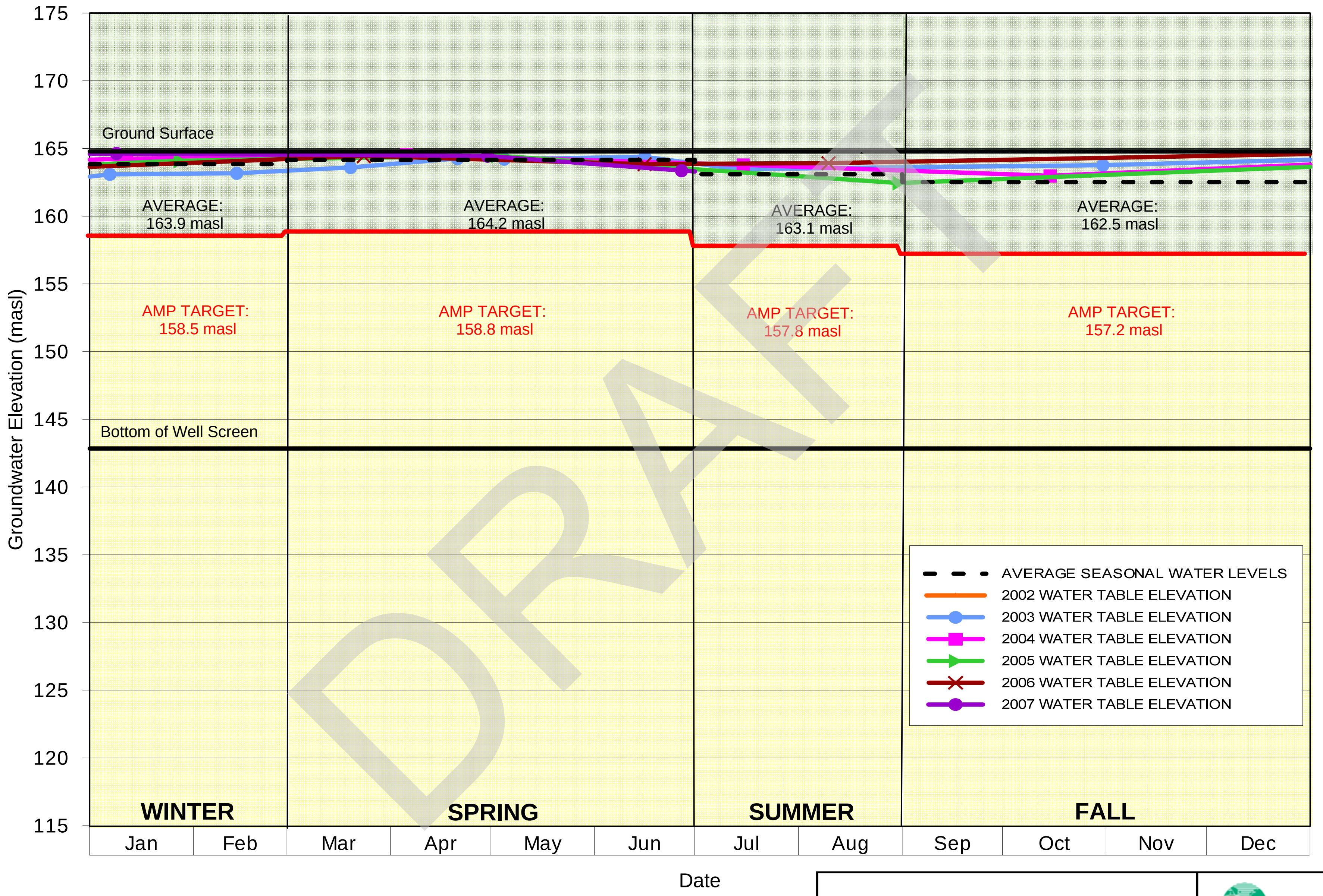
has ice.

Maxxam Analytics International Corporation o/a Maxxam Analytics

APPENDIX F

Target Water Level Graphs

Target Water Level Calculation for MW-01I

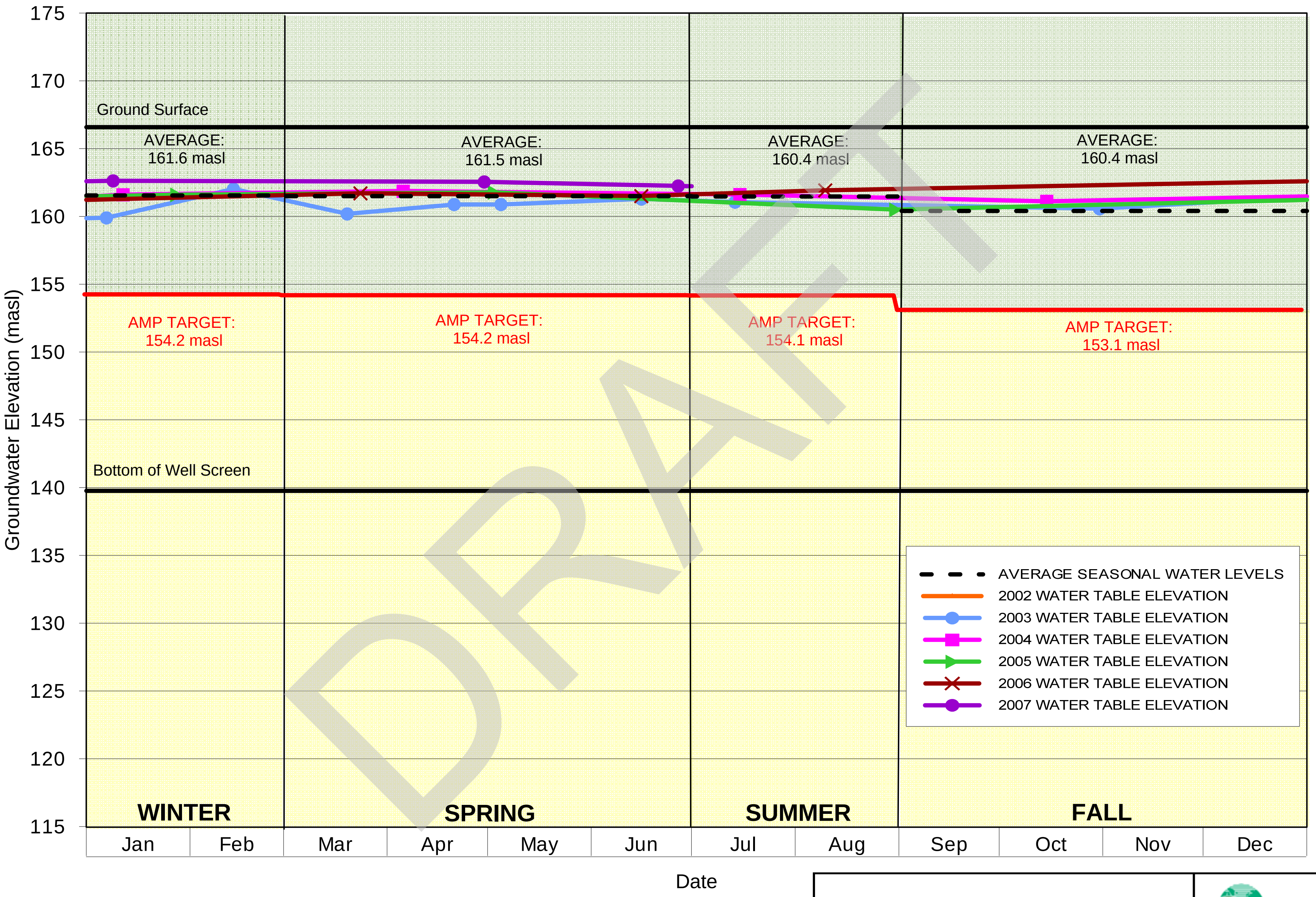


Tansley Quarry

Golder Associates

DRAWN: LB	APPROVED: SW	DATE: June 2015
PROJECT: 021-1228		FIGURE: F.1

Target Water Level Calculation for MW-02I



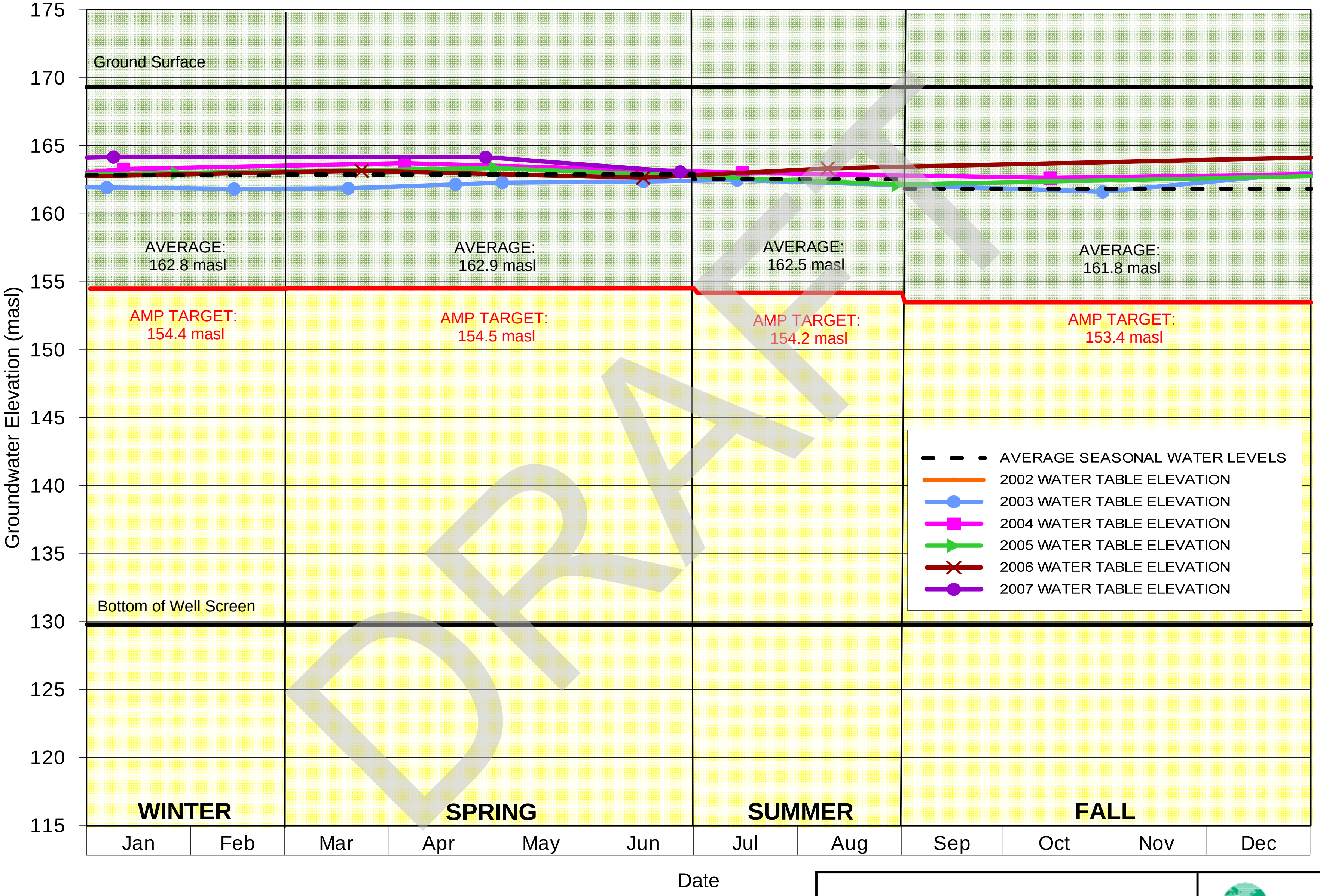
Tansley Quarry

Golder Associates

DRAWN: LB | APPROVED: SW | DATE: June 2015

PROJECT: 021-1228 | FIGURE: F.2

Target Water Level Calculation for MW-03I



Tansley Quarry

Golder Associates

DRAWN: LB | APPROVED: SW | DATE: June 2015

PROJECT: 021-1228 | FIGURE: F.3

As a global, employee-owned organisation with over 50 years of experience, Golder Associates is driven by our purpose to engineer earth's development while preserving earth's integrity. We deliver solutions that help our clients achieve their sustainable development goals by providing a wide range of independent consulting, design and construction services in our specialist areas of earth, environment and energy.

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